Design Development and Study of Static Sunshade for Comfort Conditioning of Buildings in Composite Climate

THESIS
Submitted in partial fulfilment
of the requirements for the degree of
DOCTOR OF PHILOSOPHY

By

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BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE
PILANI (RAJASTHAN)
2004

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CERTIFICATE

This is to certify that the thesis entitled **"Design Development and Study of Static Sunshade for Comfort Conditioning of Buildings in Composite Climate"** and submitted by **Rahul Vasant Ralegaonkar** ID. No. **2000PHXF801** for award of Ph.D. Degree of the Institute, embodies the original work done by him under my supervision.

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ACKNOWLEDGEMENTS

I wish to express deep sense of gratitude and sincere thanks to my thesis supervisor Prof. (Dr.) Rajiv Gupta - Dean of EHD for his valuable guidance, encouragement, suggestions, and moral support throughout the period of this research work. It has been a privilege for me to work under his valuable guidance.

Gratitude is also accorded to BITS, Pilani for providing all the necessary facilities to complete the research work. My sincere thanks to Prof. S. Venkateswaran, the Vice-Chancellor of the Institute for allowing me to pursue my research work successfully. My special thanks to Prof. L. K. Maheshwari – Director (Pilani), Prof. M. Ramachandran – Director (Dubai), Prof. K. E. Raman – Deputy Director (Administration), Prof. V. S. Rao – Deputy Director (Off-Campus Programmes), Prof. H. S. Moondra – Unit Chief (Maintenance Unit), for providing the necessary infrastructure and other facilities. Much appreciation is expressed to Dr. B. Bandopadhyay – Director, MNES for extending Non-Renewable Energy Fellowship during research work.

I also express my gratitude for the kind and affectionate enquiries about the work and the encouragement given by Prof. Ravi Prakash - Dean (Research and Consultancy Division) and Dr. S. D. Pohekar of the same Division.

Much appreciation is expressed to Dr. K. S. Raju, Dr. M. K. Deshmukh and Dr. Manoj Kumar who were the members of Doctoral Advisory Committee (DAC) for their kind suggestions, moral support, and assistance.

I thank Dr. Pinto Modak – Director (Physical Education), Mr. Devender Singh (Assistant Chief, Maintenance Unit) and other members of Maintenance Unit for the successful development of experimental models. Sincere thanks to Dr. Anshuman for providing timely computing facilities.

Special thanks and appreciation is extended to Prof. A. K. Sarkar, Dr. P. K. Gupta, Dr. A. P. Singh, Mr. A. Vasan, Mr. Manish Kewalramani and other members of Civil Engineering Group for their valuable moral support throughout the study. I am thankful to Dr. S. D. Manjare, Mr. Sandip Dekhmukh and other nucleus member of Center for Renewable Energy and Environment Development (CREED) for their cooperation and encouragement in completing my research work. I also thank Mr. V. K. Deshpande, Mr. Rajesh Purohit for providing kind guidance during research work.

Sincere thanks to Prof. J. P. Misra – Unit chief (Information Processing Centre) for providing internet facilities for literature survey and Dr. M. Ishwara Bhat, Librarian, BITS as well as to Mr. Debal C. Kar, Fellow and Area Convener, Library and Information Center, Tata Energy Research Institute, New Delhi for providing literature useful for the present study. Special thank to my friends Mr. Ravindra Marathe - Research scholar (National University of Singapore) and Amit Gaikwad - Research scholar (IIT, Delhi) for providing various research literature throughout the study. I thank my co-researchers Mr. Rajendra Khapre, Mr. Shrikant Charde, Mr. Praveen Talan, Mr. Abhijit Asati and the other researcher scholars for their constant cooperation and encouragement in completing my research work.

I sincerely thank Prof. Meera Banerjee for peered review of the thesis. I also thank anonymous reviewers of International Journal of 'Renewable Energy' and 'Journal of Institution of Engineers', India, 'Journal of Indian Buildings Congress' and 'Journal of Energy and Fuel Users Association of India' for critical review and acceptance of research papers for publication in their journals based on the present study. Special thanks are also extended to Prof. A. A. M. Sayigh - Editor in Chief (Renewable Energy) and Prof. Sharon Holmes, Faculty of Engineering, Science and Built Environment (London South Bank University) for their valuable suggestions while the reviewing the research papers based on the present work.

I express my thanks to non-teaching staff of Civil Engineering Group for their cooperation and help during the preparation of this thesis. I would like to thank one and all who have helped me in myriad ways throughout the course of this work.

Last but not the least, this work would not have been completed without the moral support and encouragement I got from my parents and family members. I would like to express gratitude to my close friends Mr. Anup Deshpande, Dr. A. S. Chaurasia, Mr. Samir Kale and all other friends who supported and encouraged all the way for the research work.

Rahul V. Ralegaonkar

ABSTRACT

As a consequence of the growing concern about the future of the world's energy resources, building designers are constantly being urged to re-appraise their attitudes to the consumption of energy in buildings and to consider the "energy-economics" of their designs. Passive solar design is a broad term used to encompass a wide range of strategies and options resulting in energy-efficient building design and increased occupant's comfort. Thermal designing of solar buildings includes thermal comfort inside the building depending upon atmospheric conditions, physical properties of different structural materials utilized and exposed building components.

Of the various exposed building components, windows, which play a vital role for direct solar entry inside the buildings, should make use of proper sunshades. The effectiveness of a sunshade is decided as per the regulation of sunlit area inside the buildings. The external static sunshades, which intercept the sun before it enters the building, are the effective mean for solar control inside the buildings. Although various static sunshades have been developed depending upon solar geometry, the efficiency with respect to control over solar entry inside the building is a major concern for the considered seasonal classification at a particular geographic location.

A large part of India that lies in the tropical zone is broadly classified into six climatic zones due to diversified conditions of climate. Depending on the seasonal requirements, the new geometry of a static sunshade has been designed by calculating the sun angles for the two specific dates. From solar chart for the corresponding latitude, it has been inferred that the desired projection for a horizontal sunshade may satisfy shading needs partially. The designed static sunshade, whose geometry is computed by solar angles for the two design dates, which depend on seasonal

characteristics, has been found effective as compared to horizontal sunshade for energy-efficient window. A detailed methodology for deciding desired geometric shape and dimensions of developed static sunshade for the considered geographic location has been described. The design methodology of the static sunshade is validated using experimentation technique, which has been carried out at the Birla Institute of Technology and Science (BITS), Pilani, Rajasthan (India). The constructed small-scale models are also simulated for the optimal orientation, thermal comfort and shading characteristics with the use of particular sunshade.

In Northern hemisphere, south facade wall has an advantage of receiving maximum beam radiation. The optimal orientation of the model has been decided by developing and using software "ORAL" as per the availability of beam radiation. The model has been tested for every 5° interval from 0°-180°.

To analyze the thermal comfort inside the single-room constructed models, Linear Graph Theory (LGT) has been elaborated. LGT is a systematic methodology for modeling of systems with exact number of independent equations in terms of state variables. The developed mathematical model helps to evaluate the temperature at various salient points of building elements with respect to measured ambient temperature and specific material properties. A software "SMTP" is developed to predict the temperature. The software results have been compared with the experimental temperature records and found in good agreement. The model is useful to design the energy-efficient building.

The direct solar entry through various building components like doors, windows, etc., heats up the space inside the buildings. The amount of direct sunlight inside the buildings is measured in terms of sunlit area. The software approach AutoCAD 3D modeling, which is easy to represent and visualize has been elaborated for the accurate computation of sunlit area. The methodology is validated over a particular location (Pilani) with the help of constructed small-scale experimental models, which are varying in construction details over south facade window with horizontal sunshade and without sunshade. The results found are in accordance with the experimental sunlit area records and hence correct.

For the experimentation, eight models of the various materials have been prepared with varying aspect ratio of windows and varying static sunshades. Three experimental models are of the insulating material, polyurethane foam (PUF), with varying aspect ratio of windows and the effectiveness of horizontal sunshade have been studied over the aspect ratio of windows for the duration from July 2002-November 2002. Later, the models have been modified with window dimensions. The developed sunshade has been constructed over the model, which has no sunshade. Sunlit area and temperature have been recorded over a period of December 2002-August 2003.

Another five models have been prepared of the brick masonry (BM), with varying aspect ratio of windows and type of sunshades. The desired geometry of developed sunshade has been constructed using Ferro-cement. The experimentation has been conducted during December 2002- March 2004. Depending upon solar position over the location (Pilani) different areas, i.e. sunlit area, windowsill area and shadow area over the south facade wall are measured. Also, the atmospheric temperature and temperature inside the models are recorded. Shading mask diagrams have been plotted for all the models to represent the regulation of sunlit entry inside various models. Sunlit area inside the models is made the criterion for deciding the effectiveness of the sunshade. With respect to sunlit area control and in turn temperature over the considered geographic location, the developed static sunshade has been found most effective as compared to all other sunshades.

Keywords: Passive solar design; Energy-efficient building; Linear Graph Theory; Optimal orientation; Sunlit area; AutoCAD 3D modeling; External static sunshades; Tropical zones; Geometric shape; Aspect ratio of windows; Horizontal static sunshade; Developed static sunshade; Shading mask diagram.

LIST OF SYMBOLS/ABBREVIATIONS

A	Area of the surface
B	Total number of branches
C	Specific heat
C_r	Thermal capacitance of room
C_w	Thermal capacitance of wall
D_n	Door on North wall
E_t	Equation of time
E_s	Energy gain
FW	Window width
F_c	Sub matrix corresponding to chords
F_t	Sub matrix corresponding to tree branch
f	Coefficient of convective heat transfer
g	Acceleration due to gravity
G_r	Grashof number
H	Monthly mean daily global radiation
H_0	Monthly mean extraterrestrial radiation
H_0	Surface heat transfer coefficient for radiation and convection
HA	Sill height
I	Angle of incidence
I	Global solar radiation on surface
I_{bh}	Horizontal beam radiation
I_c	Total radiation
I_{dh}	Diffuse radiation
I_h	Total horizontal radiation
I_{pl}	Internal plaster thickness
I_{sc}	Solar constant
K	Thermal conductivity of a material

L	Length of surface
LCT	Local civil time
LST	Local solar time
L_{st}	Standard meridian for local time zone
N	Number of day in the year
N_u	Nusselt number
n_t	Total number of nodes
PUF	Polyurethane Foam
P_r	Prandtl number
Q	Heat flux
Q_{cd}	Quantity of heat flow due to conduction
Q_{cv}	Quantity of heat flow due to convection
Q_r	Quantity of heat radiated by a surface
R_{cd}	Thermal conductive resistance
R_{cv}	Thermal convective resistance
R_{cva}	Convective resistance due to air
R_{cvr}	Convective resistance due to room
R_{cvw}	Convective resistance due to window surface
S	Monthly average daily sunshine duration
s	Specific heat of a material
S_0	Maximum possible monthly average daily sunshine duration
S_A	Sunlit area
S_H	Shadow area curve
S_I	Sill area curve
S_L	Sunlit area curve
ST	Standard time
T_a	Atmospheric temperature
T_c	Temperature of cold surface
T_d	Temperature difference
T_f	Average film temperature
T_h	Temperature of hot surface
T_{os}	Sol-air temperature
T_r	Room temperature

T_{re}	Room temperature (Experimental)
T_{rs}	Room temperature (Simulation)
T_w	Wall temperature
t_{BR}	Brick thickness
t_{IP}	Internal plaster thickness
t_{EP}	External plaster thickness
V	Volume of a component
V_h	Specific height
$V.S.A$	Vertical shadow angle
$W.S.A.$	Wall solar azimuth angle
W_e	Window on East wall
W_s	Window on South wall
ΔT	Temperature difference between two nodes
α	Altitude angle
β	Surface tilt angle
β_{cv}	Volume coefficient of expansion
ν	Kinematic viscosity
δ	Earth's declination angle
ϕ	Latitude of a place
θ	Longitude of the location
θ_Z	Zenith angle
ω	Hour angle
ω_s	Sunset hour angle
a_ω	Wall solar azimuth angle
ρ	Density of material
ρ_r	Ground reflectance factor
σ	Stefan-Boltzman's radiation constant
ς	Absorptivity for solar radiation
χ	Thermal diffusivity
γ	Specific volume
γ_s	Solar azimuth angle
Δq_{ir}	Correction to radiation transfer between surface and environment

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CHAPTER 1

INTRODUCTION

The prospect of an unlimited energy resource has intrigued man's ingenuity for many years. When fossil fuels began to be used the reserves seemed limitless and hence no attempts were made to manage them for the most intelligent long-term benefits. Conventionally, energy can be obtained from fossil fuels (coal, natural gas and oil), nuclear fuels (atomic power) and water (hydropower). Fossil fuels store energy in the form of chemical energy. Nuclear energy is contained as bonding within the part of nucleus of an atom. This atomic energy can be obtained by fusion or fission of radioactive elements. Oil and natural gas contribute towards the petroleum products along with heat liberation when burnt. The heat energy obtained can be transformed further into mechanical and electrical energy. Due to urbanization there is a growth in the consumption of conventional energy resources. The exact amount of reserve of these fuel resources is not known. Extracting energy from these fuels has led to environmental hazards such as air and water pollution, global warming, depletion of ozone layer, etc. In the present scenario of energy crisis, researchers have rightly drawn the attention to the limitations of the available energy resources and this has raised the need of alternative energy resources for the consumption.

To obtain the energy, alternative resources are conceivable and they are all ultimately derived from four natural sources of power: the energy of the tides, the heat inside the earth, the energy stored in the atomic nucleus and the radiation of the sun (Olgyay and Olgyay, 1963). The tidal energy is a renewable resource, supplied by the gravitational force of the moon. The tidal energy is much more concentrated nearby costal areas only. Wind power is a great source of energy, but due to large variation in the wind intensity it has never been used on a large scale. The points of availability of geothermal energy are not precisely known. Also the rate of heat convection to the surface of the earth from geothermal sources is not well known. The atomic energy undergoes depletion, as fission fuels are getting scarce. The energy radiated by the sun is immense and is constantly being replenished. Hence, solar radiation is the greatest resource of energy (Winter and Cox, 1978).

1.1 PASSIVE SOLAR SYSTEM

For the heating and cooling purposes, solar systems can primarily be categorized as active and passive. Active systems need separate solar collectors, storage devices and distribution system. It may need a back-up system in case of bad weather conditions. Keeping in view the large installation cost for the equipment and the concern over maintenance problems, large numbers of residential buildings are being constructed using passive solar techniques (Cowan, 1980). The concept emphasizes architectural design approaches that minimize building energy consumption by integrating conventional energy-efficient devices with passive design elements such as an efficient envelope, appropriate amounts of fenestration, increased day lighting design and thermal mass. Passive solar design balances all aspects of the energy use in a building, i.e. lighting, cooling, heating and ventilation.

The basic idea of passive solar design is to allow daylight, heat and airflow into a building when beneficial. The objectives are to control the entrance of sunlight and airflow into the building at appropriate times and to store and distribute the heat and cool air so that it is available whenever needed. Many passive solar design options can be achieved at little or no additional cost. The various building elements themselves act as a collector system. If the building is designed properly, it will function as a solar collector, collecting heat when the sun is shining and storing it for later use (Garg 1991). The building can function as a solar storage house. It can store heat for cool times, as well as can increase thermal comfort during warm and hot periods. The buildings constructed with heavy materials such as stone or concrete do this most effectively. The well-designed buildings can even function as a good heat trap. It can make efficient use of heat or cool and let it escape at slower rate. This can be achieved primarily by reducing the heat loss of the building through the use of insulation, reduction of infiltration and storm windows. The selection of building construction materials, or prediction of the environment inside the building can suitably be done using appropriate mathematical techniques.

Walls and roofs of the building must be oriented in such a way so as to receive optimum solar radiation heat in the winter and shade it in the summer. A building is benefited from its orientation; for the similar reasons, it is also benefited from different ratios of its length to its width to its height. The optimum shape loses the minimum amount of outward moving heat and gains maximum amount of solar heat in the winter and retains the minimum amount of solar heat in the summer (IS: 7662 (Part-I) -1974). Apart from these factors for solar heat gain, one of the significant components is the window. Windows play a vital role for the direct gain of sun inside the buildings and hence their size and position on a particular wall is of utmost importance. In Northern Hemisphere, windows on south facade wall should be designed with great care as these windows govern complete aspect of direct solar entry inside the buildings during most of the period throughout the day. Besides reducing lighting load, it allows sunlight to heat up the space inside the buildings. The way heating is required in winter, it is important to have proper shading over these energy-efficient windows in summer to avoid overheating problem.

1.2 SUNSHADES

The sunshades for various facades of the building can be classified as interior and exterior. Sunshades are not only responsible for reducing the room temperature during hot season but are equally responsible to heat up the space inside the building during cold season. The sunshades can be classified as represented in Figure 1.1

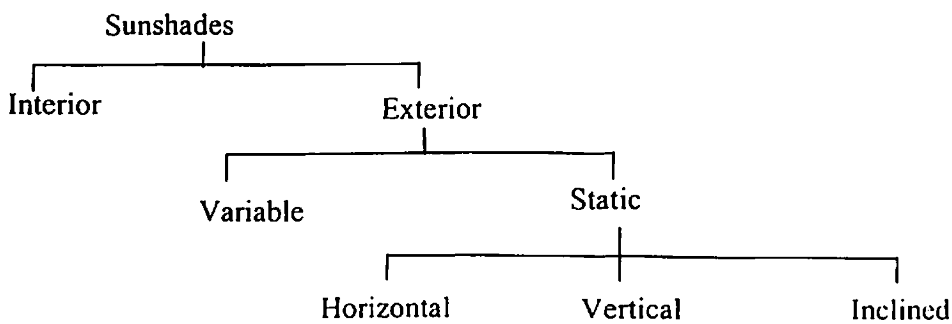


Figure 1.1 Classification of sunshades

The efficiency of a sunshade can be defined as the fraction of total incident radiation transmitted through the openings. The time dependent efficiency value is a geometric variable which depends on the sunshades opening system, geometry, sun position, wall orientation, etc. Both interior and exterior sunshades control heat gain. There are several ways to block the sun's heat from inside the building. Some of the interior sunshades are (Olgyay and Olgyay, 1963):

1. Draperies and curtains: They are made of tightly woven, light-colored, opaque fabrics and reflect more of the sunrays than they let through. The tighter the curtain is against the wall around the window, the better it will prevent heat gain. Two layers of draperies improve the effectiveness of the draperies insulation when it is either hot or cold outside.
2. Blinds: Although not as effective as drapes, they can be adjusted to let in some light and air while reflecting the sun's heat. Some newer blinds are coated with reflective finishes. To be effective, the reflective surfaces must face the outdoors.
3. Cellular or honeycomb: These shades are similar to window shades, but are constructed from two layers of material with an air-gap between. This allows them to be raised and lowered easily and also increases the thermal resistance of the overall window slightly. Some interior cellular shades also come with reflective coatings. When down, these shades block natural light and restrict airflow.
4. Opaque roller shades: They are in the form of a thin sheet of material that unrolls down behind the window to reduce direct sun penetration. They are reasonably effective when fully drawn but also block light and restrict airflow.

1.2.1 EXTERIOR SUNSHADES

Exterior sunshades are more effective than interior sunshades because they block sunlight before it enters the window. When deciding which sunshade to be used and where to use them, the designer must consider a number of issues such as:

- Whether they will be opened and closed daily as needed,
- Whether they will adversely affect natural lighting level or even produce more glare, and
- Whether they will affect any natural ventilation strategy.

Exterior sunshades include awnings, louvers, shutters, rolling shutters and shades, and solar screens. The exterior sunshades can further be classified as:

1. Variable sunshades: awnings, shutters, etc., and
2. Static sunshades: roof overhangs, etc.

Some of the external variable sunshades are (Dubois, 2000):

1. Awnings: They are very effective because they completely block direct sunlight. They are usually made of fabric or metal. It may be desirable to remove awnings for winter storage, or to install retractable ones to maximize winter heat gains. The amount of drop depends on the orientation of the window.
2. Louvers: They are attractive because their adjustable slats control the level of sunlight entering the building and, depending on the design, can be manually adjusted from inside or outside. The slats can be vertical or horizontal. Louvers remain fixed and are attached to the exteriors of window frames. Careful attention to the louver angle can allow winter sun penetration excluding sun in summer.
3. Shutters: They are movable wooden or metal coverings that, when closed, keep sunlight out. Shutters are either solid or slatted with fixed or adjustable slats. Besides reducing heat gain, they can provide privacy and security. Some shutters help insulate windows when it is cold outside. Roller shutters have a series of horizontal slats that run down along a track. Rolling shades, on the other hand, use a fabric. These are the most expensive shading options, but they work well and provide excellent security. Many exterior rolling shutters or shades can be conveniently controlled from the inside. One disadvantage is that when fully extended, they block all light. The automated window shutters are more effective than manually operable shutters.
4. Solar screens: They resemble standard window shades except that they keep direct sunlight from entering the window, cut glare, and block light without blocking the view or eliminating air flow. They also provide privacy by restricting the view of the interior from outside the building.

1.2.2 EXTERIOR STATIC SUNSHADES

Variable sunshades are more complex and expensive as compared to static sunshades. Also they are subjected to wear and tear. Operable sunshades are difficult to maintain and are subjected to deterioration, e.g. venetian blinds are expensive and difficult to maintain. Interior sunshades e.g. roller shades; draperies obstruct the natural view outside the building. The best option for the sunshades is to go for static shading. In many instances, the structure and form of the building can be such that it protects windows that may normally be exposed to direct summer sun. Balcony overhangs and inset windows are perfect examples of static shading. Basically static shading is done in two ways:

(i) Horizontal shading which obstructs the light from the top, and

(ii) Vertical shading which obstructs the light from sides.

Although horizontal and vertical sunshades are being used in practice either individually or in combination, effective design of the external sunshades is a technical problem, which should take into account the diurnal and annual variations of solar positions and the orientation of the building elements to be shaded. Large areas of India (Central and Northern) and the world have composite climate, which includes hot-dry, hot-humid and cold climatic conditions. The extreme variation in temperature is observed in composite climate.

1.3 OBJECTIVES

The most efficient way of maximizing management of the influx of solar heat gain through the building envelope is to protect against solar radiation heat gain in summer and admit solar radiation in winter. This can be achieved with great efficacy using proper sunshade. External sunshades, which intersect the entry of sunlight inside the buildings before it actually falls over wall surface is the most efficient. Keeping in view the climatic changes for any composite region, sunshade should be designed for efficient use of solar energy inside the buildings. Researchers have rightly pointed out the need over improvement of shading characteristics of an efficient sunshade over energy-efficient window (El-Refaie, 1987). Thus, to improve the effectiveness of the sunshades, the research work aimed on the following objectives:

- Comparison of the existing sunshades with respect to their effectiveness in terms of reduction in thermal (cooling and heating) load,
- Orientation decision for the experimentation with respect to available beam radiation,
- Simulation approach for temperature prediction at various salient points of the experimental models as per selected material and dimensions,
- Design development of a new static sunshade,
- Determination of sunlit area on various wall faces inside the models,
- Experimental verification of the effectiveness of new static sunshade over horizontal sunshade in terms of variation in the temperature due to solar intrusion.
- Practical design steps and guidelines for its effective use in composite climate.

1.4 STRUCTURE OF THESIS

The thesis is organized as follows:

Chapter-2 gives a brief overview of literature survey with key issues such as orientation, simulation software development for temperature prediction, sunlit area determination, contributions for the sunshades, small-scale modeling, limitations of earlier models, and objectives of the present study.

Chapter-3 deals with solar geometry and computation of sun angles. Complete method for constructing the solar chart for the particular latitude has been discussed in brief.

Chapter-4 deals with the estimation of optimum orientation of the building at a particular geographic location with respect to beam radiation. Depending upon the seasonal requirement the orientation can be decided.

Chapter-5 focuses on the software development of mathematical model constructed using Linear Graph Theory for the temperature prediction. The thermal response of various building elements like wall, window opening, etc., has been computed using heat transfer mechanism.

Chapter-6 describes the detailed methodology for sunlit area determination using AutoCAD 3D Modeling. The methodology is validated over a particular location with the actual experimental recorded data.

Chapter-7 deals with actual design development of the static sunshade. The effectiveness of the developed sunshade has been compared with the horizontal sunshade. As per the solar position, actual sunlit area, windowsill area and shadow area have been measured for the constructed models and compared with measured temperature record.

Chapter-8 gives the summary of the thesis along with important conclusions and design guidelines for the efficient static sunshade. The possible extension of the present work has also been elaborated.

Appendix-A represents several existing static sunshades along with respective shading mask diagram, which gives overall shading performance.

Appendix-B provides location details from various climatic zones of India. To compute beam radiation for optimal orientation decision of the buildings, details of the software, ORAL (O-Orientation, R-Radiation, A-Aspect Ratio, L-Location), developed in 'C' language is also described. With respect to different orientations the obtained radiation values have been made available in graphical format.

Appendix-C gives details of the software, SMTP (SM-Simulation, TP-Temperature), developed in MATLAB for temperature prediction at salient points of a single-room model.

Appendix-D gives details of constructed models and the experimental data.

CHAPTER 2

LITERATURE REVIEW

The primary function of a building is to provide a comfortable indoor environment. Due to increase in energy demand and limited available non-renewable energy resources, conservation of energy has become very important. Passive solar architecture uses specific building design principles, which reduces the artificial energy requirements for achieving indoor thermal comfort. Passive solar system is a better alternative approach for thermal comfort conditioning inside the buildings. Garg (1991) determined the thermal environment in a traditional building envelope and applied the passive solar techniques to examine how far the discomfort can be controlled. It was concluded that two-third of the discomfort could be eliminated by the judicious use of simple passive options based on thermophysical properties and configuration of building envelops. Kumar et al. (1999) introduced some of the passive cooling techniques like application of insulating material (coir fiber) and proper surface treatments. Raman et al. (2001) developed passive solar system to provide comfort throughout the year in composite climate. Although passive solar chimney was constructed for heating, cooling and ventilation, the initial cost of the constructed room was 20% more than the conventional room.

Thus, for a climate responsive architecture, building design criteria should be emphasized on several parameters like geographic location and climatic conditions, building shape, orientation, selection of construction materials, etc., (Randell, 1978). Various building openings viz., windows play significant role for the direct interaction of sun between surrounding atmosphere and building interior. The direct solar gain inside the buildings, which helps to heat up the interior space, must be controlled with the proper selection of sunshade. Although several researchers have carried out successful inventions in view of energy-efficient building design, it's important to stress on technological studies. In view of this, the present chapter deals with the work carried out, their limitations and need for advanced study. The study has been carried out on following factors that affect thermal performance of a passive building.

1. Effect of beam radiation reception for building orientations and different wall areas (shape of the building),
2. Simulation techniques for thermal performance evaluation,
3. Determination of sunlit area with the aid of specific tools and
4. Efficient sun shading to regulate sunlit entry.

2.1 BEAM RADIATION AND BUILDING DESIGN CRITERIA

Clearly the success of utilizing the solar radiation depends on the size and orientation of the windows and also the materials used for the construction and finishes in the room. The intensity of solar radiation varies not only throughout the year and with changing weather conditions, but peak levels also occur at different times of the year according to the aspect at a particular geographic location. Although several models are available for the estimation of solar radiation (Nayak, 1992), choosing a proper model for the particular purpose is of great importance. Some of the important contributory work done in the field of radiation estimation is represented in Table 2.1.

Table 2.1 Radiation estimation contributions

Researcher(s)	**Contribution**
Reddy (1971)	Proposed an empirical method for computing daily total solar radiation depending upon climatic data.
Mani and Chacko (1973)	Values of direct solar radiation were estimated from continues record of the global and sky radiation for different places of India.
Modi and Sukhatme (1979)	Insolation and weather data for Indian cities were analyzed and correlated. Well-established Liu-Jordan Model was tested.
Gopinathan (1988)	Developed the equations to express regression coefficients in terms of latitude, elevation and percentage possible sunshine, which can be made useful while calculating global solar radiation over horizontal surface.

Aguiar and Pereira (1992)	Developed a model to generate synthetic daily sequences of hourly radiation values on horizontal plane for a particular location with clearness index as input.
Chandel et al. (2002)	Presented a new correlation model for estimating monthly average values of global solar radiation from ambient temperature data.

Heat gain is also a function of the surface area of building envelope exposed to sunlight and in turn this area depends on aspect ratio of the building. Although the guidelines have been specified for the optimal orientation of energy-efficient buildings as mentioned in IS: 7662 (Part-I) – (1974), which suggest a method to calculate heat gain, and "Manual on Solar Passive Solar Architecture (1999)", which suggests orientation direction and aspect ratio values on maximum-minimum scale, there is a necessity to know the duration of sunshine and hourly solar intensity value incident on the surface for practical evaluation.

2.2 SIMULATION AND INDOOR TEMPERATURE

The amount of heat transmitted into or lost from a building varies with the change from day to night time temperatures and changes due to fluctuating weather i.e. heating by sunshine and cooling by wind or rain. The indoor temperature changes depending on the amount of heat broadly follows the pattern of outside temperature, although some variation in time may occur between internal and external peak temperatures according to the thermal response of the building. The simulation technique could be a useful tool for the designers to achieve an optimum thermal performance of the localized buildings under given thermal climate (Duffie and Beckman, 1991). Micro-site analyses in relation to thermal impacts on the building performance can easily be achieved by using physical modeling techniques (Lee and Oberdick 1981). In order to investigate the thermal simulation of a full-sized passive solar building using scale models, researchers have constructed simplified single test-room using several test units of half and quarter-scale. Using thermal scaling technique, all the analyses of the test results suggested that it's quite feasible to simulate the thermal performance of full-scale passive buildings. Thus, one of the simple ways to simulate the thermal performance of the building is to consider single-room passive solar house design. Hay and Yellott (1970) considered small passive-solar test box for building design. The steady-state thermal conductance of walls, etc., had been used to calculate the thermal load for a given temperature difference between building interior and ambient temperature. Physical thermal (mathematical) modeling of passive-solar building design was done by Grimmer et al. (1979). The small-scale models were constructed and thermal performances of the models were computer simulated using weather and solar radiation data. Simulation and experimental values were found to be differing significantly. Athienitis and Ramadan (2000) developed an explicit finite difference simulation model to study the thermal behavior of a room under different control strategies for the sunshade over transparently insulated south facade wall. The simulation approach helps to decide the overheating period and suitable option to use particular movable sunshade. All of the above mathematical approaches involve tedious calculations, which in turn increase computation time. The physical model can be simulated with the help of computers, as they can save the designer effort and time and they can offer the opportunity to work with more complete information about the effects of design decisions.

A computer simulation analysis had been employed by Balcom (1977) to aid in the selection of components whose results indicated that a performance comparable to that of a conventional active solar heating system should be achievable in an optimized designed passive solar heating system. Andre et al. (1994) developed an evaluation methodology and monitoring plan for passive solar commercial buildings. Together with the experimental investigation intensive computer simulation work had defined an optimized design of the building. Bansal et al. (1996) extended the concept of solar gain factor and the overall heat loss coefficient to size the building elements for different climatic conditions. The developed SUNCODE software helps to determine only the room temperature for a specific wall. Schultz and Svendsen (1998) developed a two-node model of a room and implemented in the computer program, WinSim, for the evaluation of thermal performance of windows in new buildings and in case of retrofitting. The computed values were compared with an advanced building simulation program. The compared results were found slightly deviating. Fang and Li (2000) developed a three-dimensional transient heat transfer model of the lattice passive solar heating wall using Finite Difference Method and the simulation software was generated in FORTRAN. Nayak and Francis (2002) developed integrated software, TADSIM for automatic linkage between design and simulation of thermal performance of buildings. The interface enables the user to carry out building simulation using two commercially available software, namely TRANSYS (version 14.2) and DOE-2 (version 2.1 E). As per the need, researchers contributed application softwares that can be used for solving specific energy engineering problem and development in the field of automation is still continuing due to technological advancement.

2.3 ENERGY MANAGEMENT AND SUNLIT AREA

Energy conservation has been defined by Winter and Cox (1978) as the strategy of adjusting and optimizing energy using systems and procedures to reduce energy requirement per unit of output without affecting socio-economic development or causing disruption in life styles. It has been reported by Qian (1995) in the forth International Architect Conference, held at Sweden, that the residential buildings should have at least two hours sunshine during the day in winter. Since then, many countries have set up their own regulations for sunshine hours of residential buildings, which shows that the problem of residence sunshine has become important. There can be a significant impact on energy conservation by controlling and managing the energy systems in the buildings. Energy management can be done by determining optimum energy settings and policies for the control of the energy systems. The goal of energy management is to provide a comfortable environment in the most economical way. Passive solar architecture aims at maximum living quality with minimum environmental impact, which in turn satisfies the goal of energy management inside the buildings. Direct gain system like unconditioned sunspaces providing extra surface for absorption of solar radiation and extra mass for its storage, are the most effective as far as heating and day lighting inside the passive solar building is concern (Garg and Prakash, 1997). The principle involved for comfort conditioning of buildings is to regulate sunlit penetration through windows or building openings depending upon the seasonal requirements. The entry of sun directly into the room constitutes major amount of the total heat inflow. Thus, although heat penetrates the interiors by convection (moving air), conduction (through walls) and radiation (by penetration of sunlight), radiation control is of great concern for comfort conditioning of buildings throughout the year (Sayigh, 1979). Solar radiation is an important term in the energy balance of a building and one must account for it in the calculation of loads. Sunlit area is a measure to determine the radiation interception, which regulates temperature inside the buildings.

Hiller et al. (2000) pointed out that for analyzing the systems with solar gains, design tools should have a reliable and accurate means of predicting the solar radiation surfaces, which helps to calculate internal solar distribution for the building simulation. Researchers introduced a simulation program called TRANSHD for external and internal insolation calculations of buildings. The discussion presented for the frequency at which beam radiation is performed yields the conclusion that the calculation on an average day of each month is sufficient. However, generalization of the results is difficult due to parametric constraints like geographic location and weather data. Kreith and Kreider (1978) presented a method for calculating the shaded portion through the opening depending upon the location. But the methodology for the calculation of shadow angle protractor is not only tedious and time consuming, but also it gives some approximation in the calculation. For the cases such as an overhang above a window, mathematical formulae were presented (Kreider and Rabl, 1994). The basic assumption made over here is that the sunshades are long enough and hence end effects can be neglected. However, it is not the practical case where sunshade have finite dimension in all respects. Niewienda and Heidt (1996) described a method for calculation of sunlit area both for direct and diffuse cases using set theory and implemented in the program SOMBRERO. The mathematical formulae presented in several approaches to determine sunlit area inside the buildings faced the problem of numerical approximation. Marion et al. (1999) developed a computer program for shading and insolation calculations of the buildings. The program determines the sunlit area within the building. The program can handle a large variety of surface shapes as well as beam and diffuse radiation.

2.4 SUNSHADES

Energy-efficient building design includes proper shading over exposed building surfaces, like windows, to reduce the heating and cooling loads inside the buildings. The sunshades for various facades of the building are classified as interior and exterior sunshades. Kischkoweit-Lopin (2002) studied various passive solar system components like shading systems affecting daylighting inside the buildings. An overview of various existing sunshades has been presented with illustrative sketches and the detailed descriptions to choose the right system for a given condition. Littlefair (2001) discussed the ways to ensure solar access in obstructed situations, both within new developments and in existing buildings nearby. He gave the design guidelines for the both existing and new buildings for the United Kingdom. Because of reduction in free space in adjacent buildings, free air circulation reduces, and hence, increases the heating and cooling loads. To protect full glass window wall, which offers very little (around 12%) protection from radiation Christoffers (1996) designed prismatic panes, which are shading responsive to sun's position for different seasons throughout the year. The panes are suitable for windows or facade elements, preferably in applications, which do not need a clear view. Kassem et al. (1999) developed the computational procedure for evaluating the solar heat gain to a space having a vertical cylindrical glass envelope, which can be made useful for proper selection of sunshade. For the region over Middle East, with large areas of glazing in commercial buildings, Zalewskia et al. (2002) proposed triple-glazed window, which helps to reduce air conditioning demand. But the specific glass type may face the problem of high initial and installation cost.

To protect the window, man-made shades like fully opaque curtains are retrofitted to the buildings. For the cooling of buildings, Sodha and Bansal (1984) considered roofs and windows as the important components. Researchers considered windows with movable screens for cooling effect. Givoni (1991) studied the application of various passive solar heating systems with main design factors affecting their performance. For solar control, the researcher considered mechanically operable internal sunshades for windows. Zaheeruddin (1987) gave the design for automated window shutters. The researcher considered room temperature and solar flux as design parameters for the control of shutter closer or exposure. They were more effective than manually operable shutters. But the operational and maintenance cost vary significantly and also they are not often recognized as architectural elements.

The best method for radiation control is to apply proper external static sunshade. It intersecpts the sun before it falls over the window on a particular wall facade and thus the method is sound and most suitable. External static sunshades proved to have performed in the most efficient manner as their geomerty can be designed as per changing seasonal sun-path to achieve summer shading and winter heat gain. Location, latitude and orientation all contribute to the formulation of an effective sunshade. The efficiency can easily be measured graphically by generating shading characteristics for a particular sunshade i.e., by plotting shading mask diagram (SP: 41 - 1987). The shading masks were plotted for several external sunshades (Olgyay and Olgyay, 1963). The design procedure has been mentioned by Cowan (1980) along with several case studies of external static sunshdes of the buildings in Australia.

El-Refaie (1987) studied the performance of the basic vertical and horizontal types of external sunshades. The different performance modes were presented in the form of shading masks featured by cutoff angles. He derived few mathematical formulae to express the cutoff angles in terms of various geometrical parameters.

A practical tool was designed by Jorge et al. (1993) for sizing optimal sunshades. Researchers presented a nomogram for the use in regions with a Mediterranean climate to optimize the design of sunshades. The nomogram allows the performance of external static sunshade to be evaluated. But the graphical approach leads to an error of about 10%, which is quite significant.

Chandra (1996) gave the design of external louvers in relation to different building facades taking diurnal and seasonal variations of sun positions. The study was limited to basic types of external sunshades like horizontal, vertical, inclined and eggcrate.

Parishwad et al. (1997) discussed the various thermal considerations in the design of building components for the tropical regions in India. The entire region has been classified into six climatic zones. Various techniques of passive cooling using insulating and reflecting materials in walls and roofs and developments in energy-efficient windows were discussed in detail. They considered only horizontal external shading on the south walls to protect sun entry from top.

Beam radiation, which penetrates inside the buildings through various openings, can be controlled using sunshades for the temperature regulation. Yener (1999) presented a mathematical model for the design of fixed sunshade from two aspects i.e. climatic and visual. The study was restricted to horizontal and vertical sunshades only.

Using Computer Aided Design Tools, Kabre (1999) had generated new possibilities in the passive solar design of buildings. WINSHADE is an integrated computer tool for the design of passive solar control through building fenestrations. It is based on the generation and the optimization paradigms of Computer Aided Design. Given the required inputs, it automatically generates prescriptive quantitative information to design optimum external sunshades and to select appropriate type of sunshade class. The models presented were tested with basic types of sunshades like horizontal and vertical ones. Provision of suitable glass may obstruct low sun in peak winter period.

Dubois (2000) presented a simple chart useful to design sunshades. The chart, which is complementary to existing solar path diagrams, provides additional information about the window's solar angle dependent properties and its geometrical relationship to the sunbeam. This information allows making meaningful hypotheses about the optimum geometry of the sunshade.

2.5 CONSIDERATIONS FOR SUNSHADE DESIGN

From the literature review as discussed above, it can be inferred that

1. For passive solar architecture, the most significant design parameters which alter the solar contribution to the total cooling and heating load inside the building are aspect ratio of walls, orientation of the building, window details (size and location) and proper sunshade to control the amount of admission of incident solar radiation.
2. To meet the heating and cooling requirements, the selection of proper building orientation for a particular aspect ratio should be done with the computation of beam radiation falling over exposed wall surface.
3. Small-scale modeling technique is one of the easy and effective methods of experimentation to analyze a particular system. For fast and accurate

computation simulation software is the best suitable option to predict the indoor environment.

4. Sunlit area is a measure to determine the radiation interception, which regulates temperature inside the buildings. Graphical determination of sunlit area is helpful for easy visualization and accurate measurement.
5. Windows, which play a vital role for solar incursion inside the buildings, should be shaded properly to regulate the sun entry as per seasonal requirements in composite climates. External static sunshades are more efficient than other types of sunshades as they restrict the sun before it interacts with building components (wall, window).
6. The existing external static sunshades (horizontal, vertical and eggcrate) satisfy shading needs partially. To check the effectiveness of a particular sunshade shading mask should be plotted.
7. There is a scope to design more efficient static sunshade, which will follow sun path at a particular geographic location whose shading characteristics can be controlled as per seasonal requirements.

2.6 OBJECTIVES

With the above-mentioned considerations from the vast literature survey the following objectives have been set:

- Estimation of beam radiation on the exposed wall surface for a specific aspect ratio of walls to choose optimum building orientation,
- Prediction of temperature inside the building depending upon the thermophysical properties of the construction material used,
- Depending upon particular geographic location and particular time, graphical determination of sunlit area inside the building,
- Design development of static sunshade following sun path diagram at a particular location to satisfy shading characteristics with respect to seasonal requirements,
- Analysis of the existing sunshades with respect to their effectiveness in terms of reduction in thermal (cooling and heating) load,

- Experimentation for the design of a new static sunshade to measure variation in temperature due to solar intrusion, and
- Practical design steps for the design development of new static sunshade.

CHAPTER 3

SUN ANGLES AND SHADOW ANGLES

Passive solar architecture is the system, which works on the principle to provide heating in the winter and cooling in the summer to minimize the external energy to cause the system to operate. Among different categories of passive systems, the most efficient type is direct gain system. The single important design consideration for passive solar direct gain systems is the planning of taking the best advantage of the location of sun in the sky at different times of the day throughout the year. The further sections highlight the sun's apparent movement throughout the year and basic solar angles whose knowledge is important for the design of any solar appliance.

3.1 THE SUN'S APPARENT MOTIONS

For any solar application design process, the knowledge of sun's path in the sky on various days in a year at a particular place is the fundamental pre-requisite. Also, if the sky is conceived as being some hemispherical shell completely covering the plane on which we stand, then the sun, during the course of the day, will appear to move along the arc of a circle which is symmetrical about the vertical plane running through north and south as shown in Figure 3.1. At the solar noon, the sun lies in this vertical plane and at this time it occupies its highest angular position above the horizon for the day. This motion of the sun is made apparent because of the earth-rotating daily on its axis of rotation.

Besides its daily movement, the sun also undergoes a second apparent motion, which an observer can only notice as the day follows day and the sun is seen to travel along slightly different but parallel paths each day. This second motion is due to the annual movement of the earth about the sun, which, in effect, causes a relative shift of the sun to the north and to the south of the equator as in its orbital movement the earth keeps its axis always oriented in the same direction. The angular distance of the sun's rays from the equator at any time is termed as sun's declination, which changes continuously between –23.5° to +23.5° at the time of summer solstice (June 22) and winter solstice (December 22) respectively. Thus, to an observer, during the course of a year, the sun will appear to trace out patterns of daily paths, with shortest and lowest corresponding to the day of winter solstice, and the longest and the highest corresponding to the day of summer solstice (Figure 3.1).

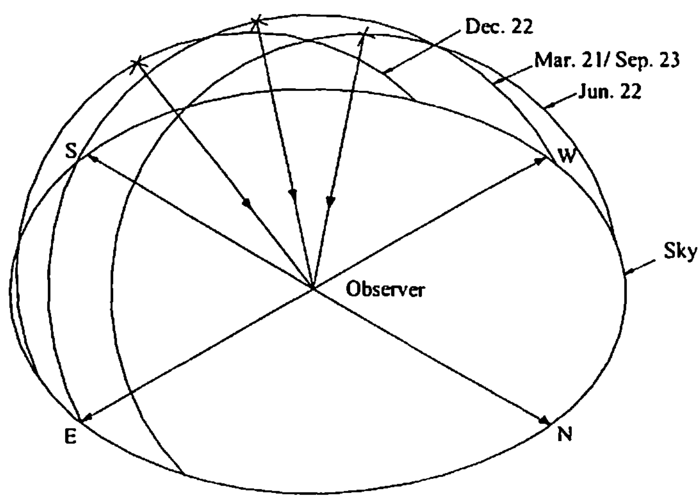


Figure 3.1 Schematic illustration of daily and yearly movement of the sun

Each pathway lying between these extremes will be followed by the sun of the two days in the year when the sun's declination happens to be the same. One of the days will occur before a solstice and the second will occur on equal number of days after the solstice. On the two days in the year when the sun's declination is zero, i.e., on March 21st and September 23rd, the sun remains directly above the equator, and day and night of practically equal duration are experienced all over the world with the sun rising due east and setting due west. Because of the shape of the earth, complete pattern of parallel sun paths will be same for all the places having same latitude, but will differ from those having other latitudes. This difference depends upon the difference in latitudes.

3.2 SOLAR TIME

Time as measured by the apparent diurnal motion of the sun is called Solar Time. Due to the elliptical shape of the earth's orbit and to its increase in velocity at the perihelicon, the length of the apparent solar day, i.e., the interval between two successive passages of the sun through the meridian, is not constant. Local civil time may deviate from true solar time by as much as 4.5° because even if the length of any apparent solar day and its corresponding mean solar day differs a little, the effect is cumulative (Rai, 1989). The difference between local solar time (*LST*) and local civil time (*LCT*) is called the equation of time (E_t). The time kept in each zone is the local civil time of a selected meridian near center of the zone. Such time is called standard time. Local civil time is derived from the standard time with the help of the equations (Eqn. 3.1 - Eqn. 3.3).

$$E_t = LST - LCT \qquad ...3.1$$

$$LCT = ST \pm (L_{st} - \theta) \times 4 \qquad ...3.2$$

and local solar time,

$$LST = ST + E_t \pm (L_{st} - \theta) \times 4 \qquad ...3.3$$

(+ sign for west and –ve for east)

where, E_t = equation of time in minutes and is determined from Figure 3.2.

ST = standard time.

L_{st} = standard meridian for the local time zone and

θ= longitude of the location (in degrees west or east).

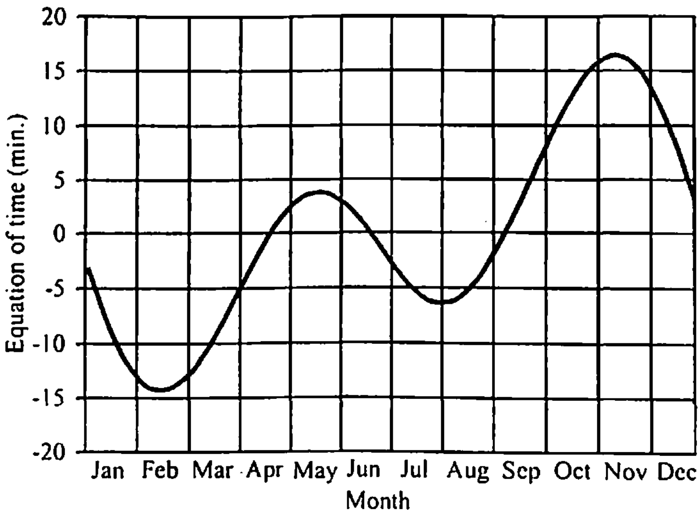


Figure 3.2 Equation of time correction

Hence, it is concluded that the time specified in all the sun angle relationship is solar time, which does not coincide with local clock time. It is necessary to convert standard time to solar time by applying two corrections. First, there is a constant correction for any difference in longitude between the location and the meridian on which the local standard time is based. The second correction is from the equation of time for the specific meridian, which takes into account the various perturbations in the earth's orbit, and the rate of rotation that affects the time.

3.3 DERIVED SUN ANGLES

The solar position is determined for each hour of a day of each month. The position of the sun in the sky is specified by two solar angles, the solar zenith angle and the solar azimuth angle (Duffie and Beckman, 1991). The zenith angle (θ_Z) is the vertical angle between the sun's rays and a line perpendicular to the horizontal plane through the point. As shown in Figure 3.3, altitude angle (α) is a vertical angle between the projection of the sun's rays on the horizontal plane and the direction of sun's rays, i.e., complement of zenith angle. The solar azimuth angle (γ_s) is the angle between local meridian and the projection of line of sight of the sun onto the horizontal plane. The necessary equations (Eqs. 3.4 and 3.5) are as follows.

$$\theta_Z = \frac{\Pi}{2} - \alpha \qquad ...3.4$$

$$\cos\theta_Z = \sin\alpha = (\sin\delta \times \sin\phi) + (\cos\delta \times \cos\phi \times \cos\omega) \qquad ...3.5$$

where ϕ = latitude of a place; δ = earth's declination angle of the day; and ω = hour angle of the time of the day.

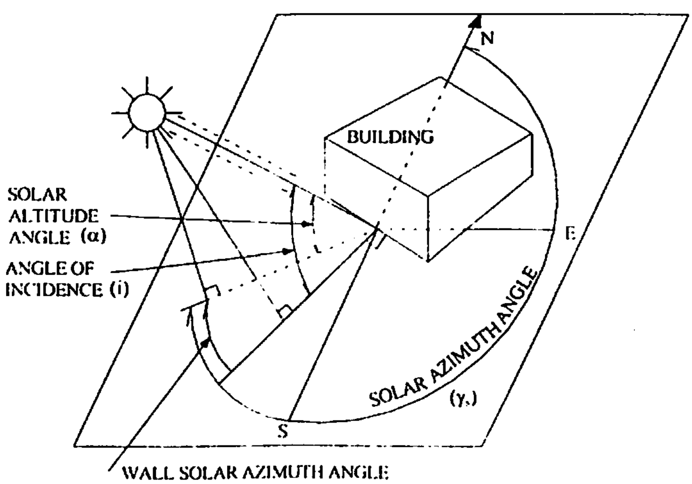


Figure 3.3 Sun angles

The hour angle (ω) is the angle through with the earth must turn to bring the meridian of the point directly in line with the sun's rays. Thus, at solar noon the hour angle is zero and accounts 15° for each hour from solar noon with negative sign for forenoon, and positive sign for afternoon. Earth's declination is calculated as follows (Eqn. 3.6).

$$\delta = 23.45 \sin\left[\frac{360 \times (284 + n)}{365}\right] \qquad \ldots 3.6$$

Where, n is the number of the day in the year and can conveniently be obtained as represented in Table 3.1.

Table 3.1 Recommended average days

Month	n for i^{th} day of month	Date	n, day of year	δ, Declination
January	i	17	17	-20.9
February	31+ i	16	47	-13.0
March	59+ i	16	75	-2.4
April	90+ i	15	105	9.4
May	120+ i	15	135	18.8
June	151+ i	11	162	23.1
July	181+ i	17	198	21.2
August	212+ i	16	228	13.5
September	243+ i	15	258	2.2
October	273+ i	15	288	-9.6
November	304+ i	14	318	-18.9
December	334+ i	10	344	-23.0

Solar azimuth angle (γ_s) is the solar angle in degrees along the horizon east or west of north or it is a horizontal angle measured from north to the horizontal projection of the sun's rays. It is represented as follows (Eqn. 3.7).

$$\sin \gamma_s = \sec \alpha \cos \delta \sin \omega \qquad \ldots 3.7$$

3.3.1 SUN-PATH DIAGRAM

The relative position of the sun at different times of the day and year is represented graphically by constructing circular sun-path diagrams (Krieth and Kredider, 1978). The projection of sun's path on the horizontal plane is called sun-path diagram. Such diagrams are very useful in determining shading phenomena associated with solar collector, windows and sunshades. As represented in Eqs. 3.5 and 3.7, it is concluded that solar angles, i.e. solar azimuth and altitude angles depend upon the hour angle, declination and latitude. Since only two of these variables are plotted on a two-dimensional graph, the usual method is to prepare a different sun-path diagram for each latitude with variations of hour angle and declination shown for full year. General steps for the construction of sun-path diagram are as follows:

1. Concentric circle projecting from center towards outer side are used to represent altitude angle.
2. Radial lines are used to represent azimuth angle.
3. For a particular location, sunrise and sunset positions are well known. For example, in northern hemisphere, at equinoxes (21st March and 23rd September, δ = 0°) sunrise is due east and sunset is due west.
4. With specific latitude, for equinoxes the highest altitude position is determined using the following equation (Eqn. 3.8).

   $$\alpha_{noon} = 90° - \phi + \delta \qquad \text{...3.8}$$

   Thus, arc is generated using start point (sunrise), end point (sunset) and highest altitude point (solar noon).
5. Similarly, arcs are generated for summer solstice (21st June, δ = +23°27') and winter solstice (23rd December, δ = -23°27'). Sunrise and sunset points are obtained by determining azimuths of sunrise and sunset as given in Eqn. 3.9.

   $$\gamma_{\alpha=0} = \cos^{-1}\left(\frac{-\sin\delta}{\cos\phi}\right) \qquad \text{...3.9}$$

   The obtained angular value is plotted with respect to south direction.
6. Likewise with desired declination values, several arcs are plotted.
7. Solar time lines, i.e. hour lines always cross the sun-paths at 90°. At equinoxes for sunrise and sunset, the hour lines pass through the horizon line

due east and due west respectively. The intermediate hour lines may be positioned on the basis of spacing them equally between the noon and sunrise-sunset lines.

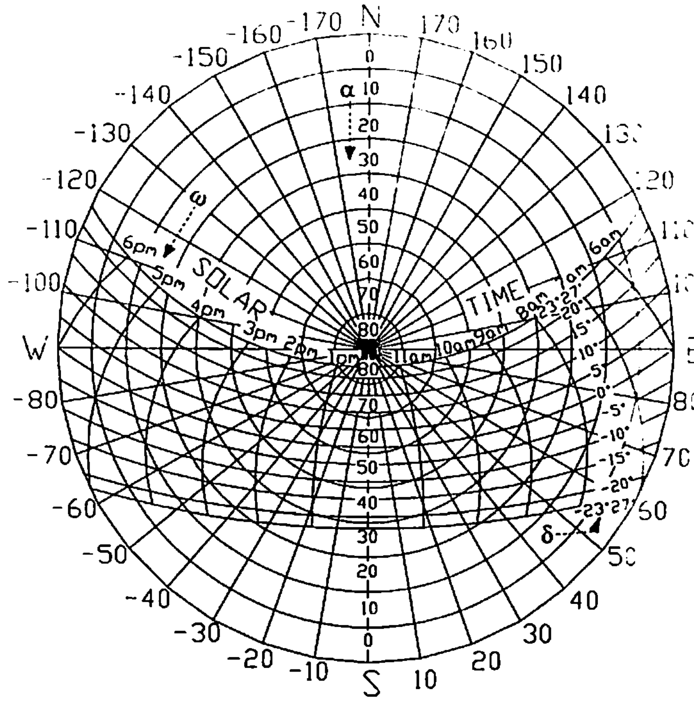


Figure 3.4 Sun-path diagram for 30° N latitude showing altitude and azimuth angles

Complete constructed sun-path diagram is represented in Figure 3.4. Sun-path diagrams for given latitude are used by entering appropriate values of declination (δ) and hour angle (ω). The point at the intersection of corresponding δ and ω lines represents instantaneous location of the sun. The solar altitude angle (α) is then read from the concentric circles in the diagram and the azimuth, from the scale around the circumference of the diagram.

3.3.2 SHADOW ANGLE PROTRACTOR

The shadow angle protractor used in shading calculations is a plot of solar-altitude angles, projected onto a given plane, versus solar-azimuth angle. The projected altitude angle is usually called the profile angle. It is defined as the angle between the normal to a surface and the projection of the sun's rays on a plane normal to the same surface.

Figure 3.5 shows a solar ray 'p1 - s' striking a facade, position 1 in plan and section. The shadow of point p1 lies on s. 'q - p1' in section (s - p1 in plan) is the required projection of a horizontal overhang to cast a shadow of a 'throw' of depth 'q - s'. The orientation of the facade in 'position 1' was chosen to coincide with the azimuth of the sun. The Wall Solar Azimuth (W.S.A.) is in this case equal to zero degrees. The wall solar azimuth angle is also known as the 'horizontal shadow angle'.

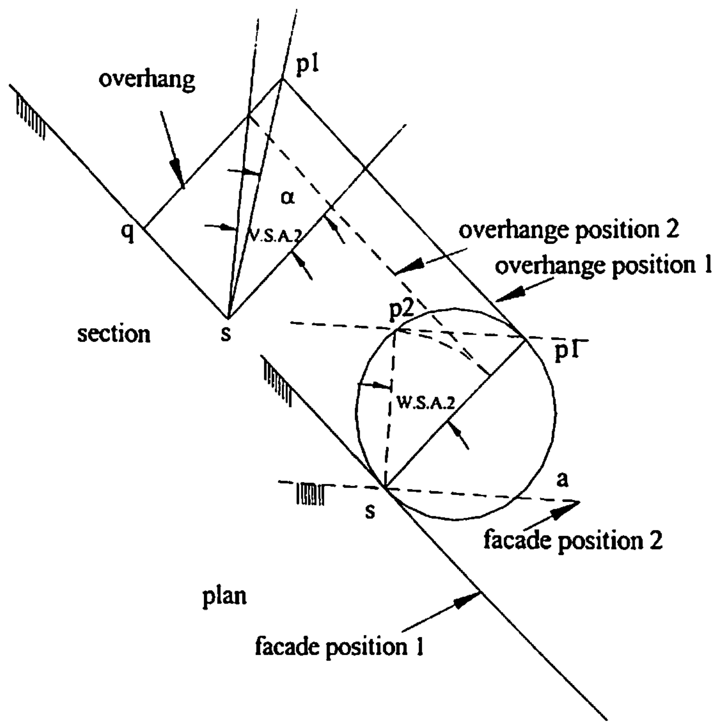


Figure 3.5 Geometry of vertical and horizontal shadow angles

The Vertical Shadow Angle (V.S.A.) is found mathematically as given in Eqn. 3.10.

$$V.S.A. = \arctan\left(\frac{\tan\alpha}{\cos(W.S.A.)}\right) \quad ...3.10$$

The shadow angle protractor (Figure 3.6) should be constructed of the same scale as that of sun-path diagram. It is used by plotting the limiting values of profile angle and azimuth angle that will start to cause shading of a particular point. The shadow-angle protractor is usually traced onto a transparent sheet so that the shadow map constructed on it can be placed over the pertinent sun-path diagram to indicate the times of day and months of the year during which shading will take place. Thus, shading mask diagram is plotted on a shadow-angle protractor for a particular type of sunshade over a window. For several existing sunshades, shading mask diagrams are presented in the Section A-1 (Appendix-A).

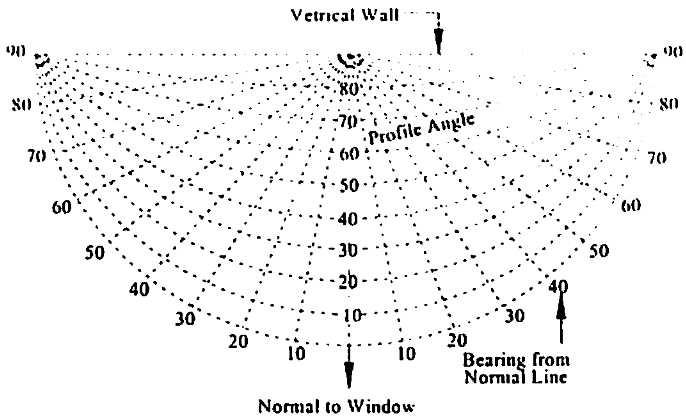


Figure 3.6 Shadow angle protractor

Thus, sun-path diagram is helpful for solar angles determination and is useful for the design of any solar device. By superimposing shadow angle protractor, shading mask diagram is plotted to study overall shading characteristics of the solar device, eg., a design of any particular sunshade. The vertical and horizontal shadow angles play a vital role to study shading characteristics of any particular sunshade.

CHAPTER 4

ESTIMATION OF BEAM RADIATION FOR OPTIMAL ORIENTATION AND SHAPE DECISION OF BUILDINGS

4.1 INTRODUCTION

Orientation is an important parameter of the building design and refers to the location with respect to the cardinal directions, i.e., North-South and East-West. Although several climatological factors influence the optimum orientation decision of buildings, thermal comfort inside the buildings is achieved with significant control over the solar radiation incident on exposed wall surfaces. As the distribution of the diffuse radiation is almost identical in all the directions for a particular location, the most important factor to be considered for the calculation is total incident beam radiation. The optimum orientation from a solar-load point of view requires that the building as a whole should receive maximum radiation in winter and the minimum in summer. For the practical evaluation, it is necessary to know the duration of sunshine and the hourly solar intensity value of the seasons at a particular location on different facades of the building. The total heat intake should be calculated for all possible building orientations to arrive at the optimum orientation.

The total beam radiation quantity directly depends on exposed area of the building facades. Thus, choosing proper building dimensions (length, width and height) is also important factor when the evaluation of beam radiation has to be incorporated for the design purpose. A software, ORAL, is developed using 'C' language for the computation of beam radiation. To decide optimal orientation and shape of buildings based on incident beam radiation the analysis is carried out for representative cities from different climatic zones of India. The presented analysis helps to decide width to length ratio, as well discusses the effect of radiation received on horizontal surface for several building heights.

4.2 CLIMATIC ZONES OF INDIA

The radiation incident on a surface varies from different times of the year depending on altitude, latitude, season, time of days and atmospheric conditions. For the purpose of thermal designing of buildings knowledge of diversified climatic conditions over a particular country like India is of great interest. A large part of India lies in the tropical belt and relative small area lies in the temperate zone. Tropical climates are characterized by significant hourly and large diurnal-variations in temperatures and sunshine. They also vary considerably over the year.

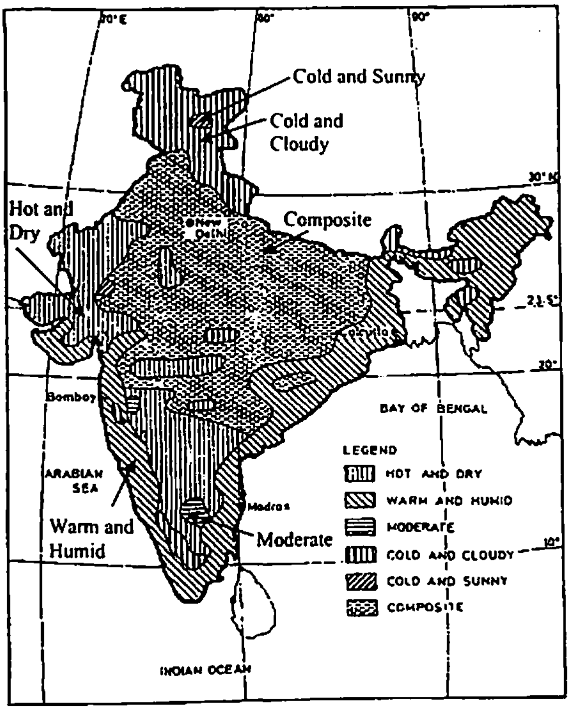


Figure 4.1 Climatic zones of India

Based on climatic factors, India is divided into six climatic zones, namely, hot and dry, warm and humid, moderate, cold and cloudy, cold and sunny and composite as represented in Figure 4.1. Several places from all over India, which lie in different zones, are mentioned in the Section B-1 (Appendix-B). To decide optimum orientation over a location, its climatological and topographical factors are studied in detail. Climatological factors especially radiation and the zones where wind blows at a higher speed should be incorporated for deciding the optimum orientation of the buildings. Prediction of prevailing wind direction is difficult. Desired air movement, which helps to increase comfort conditioning inside the buildings in most of the cases may have to be obtained artificially. Thus, the most significant climatic factor, which has been taken into consideration for the optimal orientation is the estimation of radiation falling over external surfaces of the building over a particular location.

4.3 RADIATION ESTIMATION

The primary consideration for energy-efficient building design includes its orientation and the radiation falling on various exposed surfaces of the building. Solar radiation data are used in two ways for design purposes of the buildings. One way is to use past hourly data for the locality or similar to the locality under consideration, and the future performance evaluation of the buildings should be estimated by mathematical simulation. The second way is to use data that have been derived on specific days, either completely "clear", "average", or statistically analyzed data for a particular solar appliance, to calculate the performance of the building and for its components for those types of days. Though the first technique has the advantage of easily accounting for the detailed transient nature of the interaction between the solar radiation and the building, and its heating and cooling system, it is at disadvantage due to the cost and the lack of good hourly data, particularly for the solar radiation itself. Thus, solar radiation is an important term in the energy balance of a building and is accounted for the calculation of heating and cooling loads of the buildings. For peak loads, one needs the characteristics of solar radiation on a short time scale, hourly to daily. For the analysis, the average day of a particular month is considered. For each hour the average solar position is used. The restriction to one day a month is a common approach used for the simulation calculations of building and is a reasonable compromise between accuracy and computing effort.

Development of a solar energy research must always start with the study of sun angles and solar radiation data at a site or region of interest. With the prior knowledge of computation for several sun angles as mentioned in Chapter 3, a number of correlations to compute solar radiation, which include various parameters, were developed. Energy gain (E_s, Wh) by the surfaces of the envelope exposed to the sun is calculated as follows (Eqs. 4.1- 4.12, Krishan et. al, 2001).

$$E_s = A \times \int_{t_1}^{t_2} I_c dt \qquad ...4.1$$

where, A = area of the surface (m^2)

I_c = total radiation (W/m^2)

t = time (h)

and $I_c = I_{bh} \times R_b + I_{dh} \times R_d + (I_{bh} + I_{dh}) \times \rho_r \times R_r \qquad ...4.2$

where, I_{bh} = horizontal beam radiation (W/m^2)

$= 0.834\ H$

I_{dh} = diffuse radiation (W/m^2)

$= 0.166\ H$

H = monthly mean daily global radiation (W/m^2)

ρ_r = ground reflectance factor

$$R_b = \left(\frac{\cos i}{\cos \theta_Z}\right) \qquad ...4.3$$

$$R_d = \left(\frac{1 + \cos \beta}{2}\right) \qquad ...4.4$$

$$R_r = \left(\frac{1 + \cos \beta}{2}\right) \qquad ...4.5$$

where; i = angle of incidence (°) and is obtained as:

$$\begin{aligned}\cos i &= \sin \delta \times (\sin \phi \cos \beta - \cos \phi \sin \beta \cos a_\omega) + \\ &\cos \delta \cos \omega \times (\cos \phi \cos \beta + \sin \phi \sin \beta \cos a_\omega) + \cos \delta \sin \beta \sin a_\omega \sin \omega\end{aligned} \qquad ...4.6$$

where; a_ω = wall solar azimuth angle (°)

θ_Z = zenith angle (°) and is obtained from Eqs. 3.5, Chapter 3

β = surface tilt angle (°)

In general I_c is obtained from the following expressions,

$$I_c = 0.834 H \times \left(\frac{\cos i}{\cos \theta_z}\right) + 0.166 H \times \left(\frac{1 + \cos \beta}{2}\right) + H \times \rho_r \times \left(\frac{1 - \cos \beta}{2}\right) \qquad ...4.7$$

Monthly mean daily global radiation H on a horizontal surface is calculated as

$$H = H_0 \left(a + b \times \frac{S}{S_0}\right) \qquad ...4.8$$

developed. Energy gain (E_s, Wh) by the surfaces of the envelope exposed to the sun is calculated as follows (Eqs. 4.1- 4.12, Krishan et. al, 2001).

$$E_s = A \times \int_{t_1}^{t_2} I_c dt \qquad \ldots 4.1$$

where, A = area of the surface (m^2)

I_c = total radiation (W/m^2)

t = time (h)

and $I_c = I_{bh} \times R_b + I_{dh} \times R_d + (I_{bh} + I_{dh}) \times \rho_r \times R_r \qquad \ldots 4.2$

where, I_{bh} = horizontal beam radiation (W/m^2)

= $0.834\, H$

I_{dh} = diffuse radiation (W/m^2)

= $0.166\, H$

H = monthly mean daily global radiation (W/m^2)

ρ_r = ground reflectance factor

$$R_b = \left(\frac{\cos i}{\cos \theta_Z}\right) \qquad \ldots 4.3$$

$$R_d = \left(\frac{1 + \cos \beta}{2}\right) \qquad \ldots 4.4$$

$$R_r = \left(\frac{1 + \cos \beta}{2}\right) \qquad \ldots 4.5$$

where; i = angle of incidence (°) and is obtained as:

$$\cos i = \sin \delta \times (\sin \phi \cos \beta - \cos \phi \sin \beta \cos a_\omega) + \\ \cos \delta \cos \omega \times (\cos \phi \cos \beta + \sin \phi \sin \beta \cos a_\omega) + \cos \delta \sin \beta \sin a_\omega \sin \omega \qquad \ldots 4.6$$

where; a_ω = wall solar azimuth angle (°)

θ_Z = zenith angle (°) and is obtained from Eqs. 3.5, Chapter 3

β = surface tilt angle (°)

In general I_c is obtained from the following expressions,

$$I_c = 0.834 H \times \left(\frac{\cos i}{\cos \theta_z}\right) + 0.166 H \times \left(\frac{1 + \cos \beta}{2}\right) + H \times \rho_r \times \left(\frac{1 - \cos \beta}{2}\right) \qquad \ldots 4.7$$

Monthly mean daily global radiation H on a horizontal surface is calculated as

$$H = H_0 \left(a + b \times \frac{S}{S_0}\right) \qquad \ldots 4.8$$

where; S = monthly average daily sunshine duration

S_0 = maximum possible monthly average daily sunshine duration

'a' and 'b' are the constants, which are obtained using the correlation based on elevation ($Elev$, Km), sunshine duration (S/S_0) and latitude (ϕ) (Gopinathan, 1988)

$$a = -0.309 + 0.539\cos\phi - 0.0693Elev + 0.290\left(\frac{s}{s_0}\right) \qquad \ldots 4.9$$

$$b = 1.527 - 1.027\cos\phi + 0.0926Elev - 0.359\left(\frac{s}{s_0}\right) \qquad \ldots 4.10$$

H_0 = monthly mean extraterrestrial radiation on a horizontal surface (W/m^2)

$$H_0 = \frac{24}{\Pi} I_{sc}\left[\left\{1 + 0.033\cos\left(\frac{360n}{365}\right)\right\}\left(\cos\phi\cos\delta\sin\omega_s + \frac{2\Pi\omega_s}{360}\sin\phi\sin\delta\right)\right] \qquad \ldots 4.11$$

where; I_{sc} = solar constant = 1367 W/m^2,

n = day of the year and

ω_s = sunset hour angle (°), which is determined as

$$\omega_s = \cos^{-1}(-\tan\phi\tan\delta) \qquad \ldots 4.12$$

It is also of interest to calculate the extraterrestrial radiation on a horizontal surface for an hour period. In the above-mentioned Eqn. 4.6, ω is replaced with ω_1 and ω_2, (where ω_2 is larger). Morning hour angles are represented with a negative sign. For the optimum orientation decision, keeping the surrounding conditions constant on all the facades of a particular building the diffuse and reflected component of total radiation is neglected.

4.4 METHODOLOGY

For the design of passive solar buildings, the computer generated integrated tools are effective, which can produce alternative design solutions based on a predetermined set of performance criteria. The feasible solutions are generated based on the prime performance criterion to reduce the receiving surface area in the period of excess heat stress as well increase the same in the colder period. The performance is evaluated in terms of the solar radiation intercepted by each of the exposed building surface during under-heated and over-heated period.

Depending upon the calculation of beam radiation IS: 7662 (Part-I) – 1974 suggests the guidelines for optimal orientation of non-industrial buildings. For a particular aspect ratio the present study compares total beam radiation received from different exposed wall surfaces (South, East, North, West) on two specific dates (22nd June and 22nd December). The rotation has been considered of 45° for all the facades and the analysis is extended further. But while deciding the optimal orientation based on total incident beam radiation, it is essential to have a detailed analysis for the complete year with all possible orientations. Also possible combinations of different building dimensions should be studied. The Manual on Solar Passive Architecture (1999) suggested guidelines for the orientation direction and surface area to volume ratio on maximum-minimum scale for the particular zones of India. But there is a necessity to know the duration of sunshine and hourly solar intensity value incident on the surface for the practical evaluation.

The existing guidelines for optimal orientation do not specify the exact angle of orientation for an aspect ratio of the building due to lack of a comprehensive analysis of beam radiation. In order to achieve desirable thermal conditions in the buildings from different climatic zones, the acceptable values of building orientation due to solar radiations received on exposed surface of different walls have been worked out using developed software, ORAL (Section B-2/B-3, Appendix B), for the different width to length ratios as well as surface area to volume ratios. The total heat intake is calculated for all possible building orientations (rotation from 0°-180° at every 5° interval) on the specific date of a month throughout the year to decide optimum orientation and shape of the buildings at a particular location. The obtained values for the representative cities of various climatic zones are specified as a resultant optimum orientation and shape of the buildings for specific building dimensions.

The estimated radiation values with respect to specific orientation for the particular room dimensions and the location are represented graphically in further sections. Different indices are used to represent the graphical plots. Figure 4.2 represents the obtained monthly mean daily global radiation, (represented by H), values on specific analyzed days throughout the year for the representative cities from different climatic zones of India. The different places considered for the analysis from different zones with the used indices for their representation are mentioned in Table 4.1.

Table 4.1 Climatic zones of India and indices			
Zone Number	Zone	Place	Index
I	Hot and Dry	Jaisalmer	JSM
II	Warm and humid	Guwahati	GWH
III	Moderate	Banglore	BAN
IV	Composite	New Delhi	NDL
V	Cold and Cloudy	Shimla	SIL
VI	Cold and Sunny	Leh	LEH

Figure 4.3.1-Figure 4.3.12 indicate radiation received at different orientations (0°-180° at 5° interval) for different width to length ratios (42, 55, 65, 75, 85 and 93) of the specific model dimension. To decide the optimum orientation over each location from different zones (Table 4.1), analysis is carried out on representative day of peak summer (22^{nd} June, represented by J) and peak winter (22^{nd} December, represented by D) month.

To decide the best width to length ratio, Figure 4.4.1 and Figure 4.4.2 have been plotted for the optimum orientations obtained over all the locations from different zones (represented from I-VI), during peak summer (represented by J) and peak winter (represented by D).

Figure 4.5.1-Figure 4.5.6 are plotted to study the effect of multistoried buildings i.e., height on radiation reception over a location (Table 4.1) for two width to length ratios i.e. 42% and 65%, during peak summer (represented by J) and peak winter (represented by D).

4.5 RESULTS AND DISCUSSION

Keeping in view the diversified climatic conditions over India, representative cities from different zones (Table 4.1 and Section B-1, Appendix-B) are analyzed to suggest guidelines for optimal orientation and shape of the buildings. The dates considered for the analysis from different months are chosen, which have similar declination deviating from equinoxes as, represented in Table 4.2. The analysis has been made with the assumption of a clear sky condition with maximum beam radiation over considered location on specific dates of a month.

Table 4.2 Different dates of a month and declination angles							
Date	Dec. 22nd	Jan. 21st, Nov. 22nd	Feb. 23rd, Oct. 20th	Mar.21st, Sep. 23rd	Apr. 16th, Aug. 28th	May 20th, July 24th	June 22nd
δ	-23°27'	-20°	-10°	0°	+10°	+20°	+23°27'

The developed software, ORAL, with detailed flow chart is presented in Section B-2 (Appendix-B). A generalized case has been considered with a flat horizontal roof, and four vertical exposed surfaces. To determine unit radiation values on each surface all the area values are taken equal to unit area. While performing analysis for different width to length ratio, scaling factors considered are mentioned in Table 4.3. As the horizontal surface receives same radiation in all the orientations, it has not been considered for the analysis.

Table 4.3 Scaling factor values for various small wall to longer wall ratio		
Ratio (Approximate) (%)	Scaling factor	
	Long wall (Length)	Small wall (Width)
42	2	0.84
55	1.75	0.96
65	1.6	1.05
75	1.5	1.12
85	1.4	1.2
93	1.344	1.25

In case of multistoried buildings, height factor is significant as far as surface area of exposed wall surfaces receive beam radiation. The effect of roof has been incorporated in such cases. For such types of analysis at a particular width to length ratio the effective height of building is varied from 3 m. to 21 m. at an interval of 3m. to analyze the overall radiation received by the building. The overall radiation received over vertical surfaces is compared with the inclusion of radiation received over the roof (horizontal surface) in it. For the analysis considered wall length and width are in multiple of 10 with the above-mentioned scaling factors (Table 4.3) for a particular width to length ratios.

The software, ORAL, computes radiation received over individual surfaces on hourly basis on a particular day of the month with specific orientation of building facades. For the considered locations total beam radiation received throughout the year on horizontal surface is obtained as shown in Figure 4.2. From the derived horizontal surface radiation and angle of incidence for a particular vertical facade the radiation per unit area are calculated on all vertical facades. All the unit radiation computed values on vertical facades are represented in the Section B-4 (Appendix-B) for one of the representative city (Jaisalmer, hot and dry zone). The orientation corresponds to 0° indicates building have facades in South-East-North-West directions. Later rotation is considered anticlockwise from South.

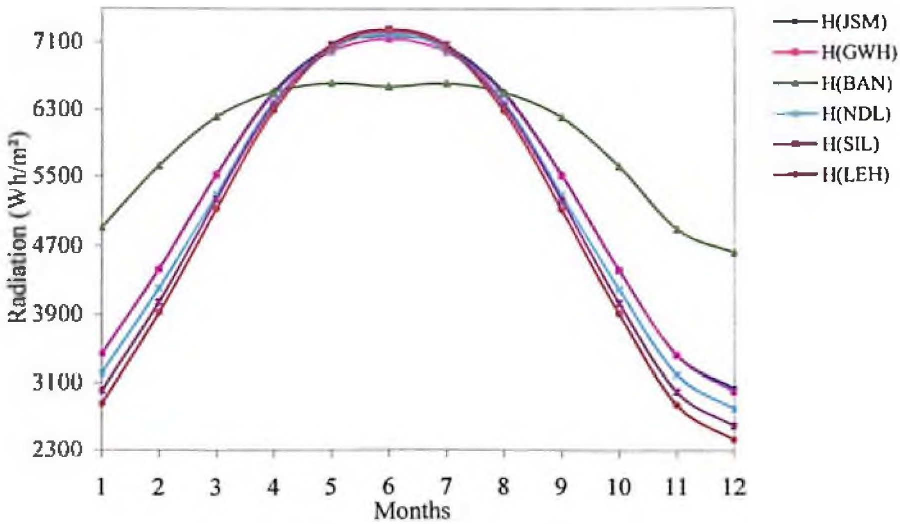


Figure 4.2 Radiation received on horizontal surface at different locations

Thus, the computation of incident radiation on any facade of the building is estimated over a location. The obtained values of radiation on unit area is integrated with scaling factors as mentioned in Table 4.3 for the decision of optimum orientation at a particular width to length ratio. It is very much clear from the Sections B-4 and B-5 (Appendix-B), which indicates total unit radiation value that the maximum cooling load from summer month has to be considered for the month of June whereas maximum heating is needed in the month of December. In general, to determine the optimum orientation for a particular width to length ratio the criteria have been made to choose least radiation value from peak summer month (June) and corresponding orientation will indicate least cooling requirement for comfort conditioning inside the building. Likewise, maximum radiation has to be chosen from peak winter month (December) and corresponding orientation will suggest least heating requirement during winter. The obtained orientation is reported as optimum orientation for a particular width to length ratio. The detailed analysis for all the locations from different zones is presented further as shown in Figure 4.3.1- Figure 4.3.12.

Location: Jaisalmer (Zone I: Hot and dry)

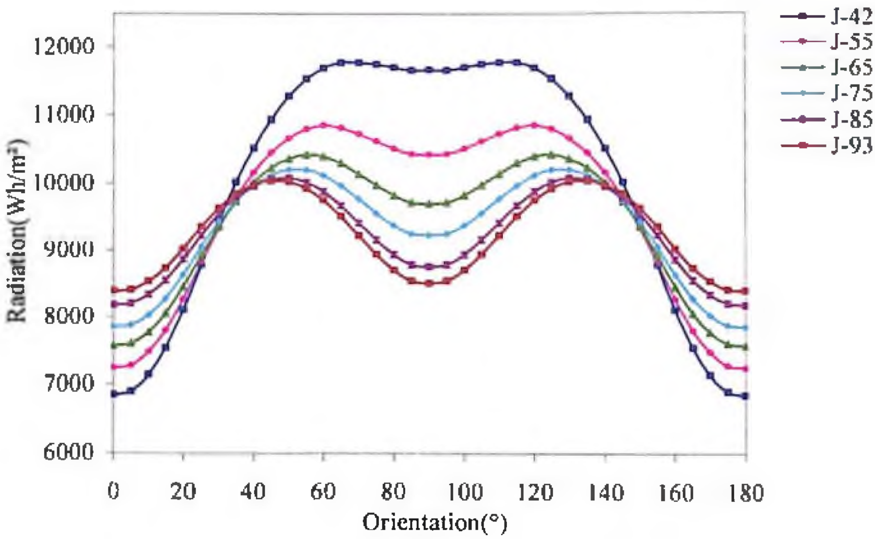


Figure 4.3.1 Radiation received at different orientations for different width to length ratios during peak summer

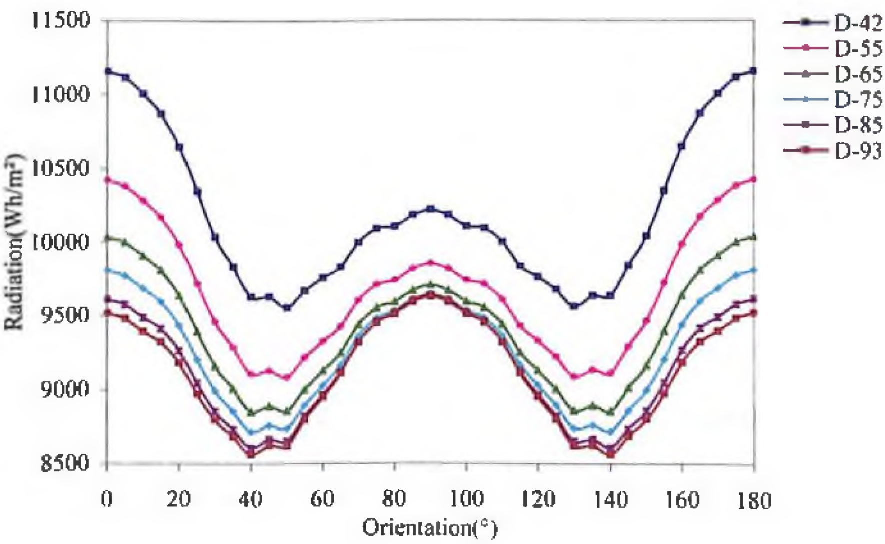


Figure 4.3.2 Radiation received at different orientations for different width to length ratios during peak winter

Location: Guwahati (Zone II: Warm and humid)

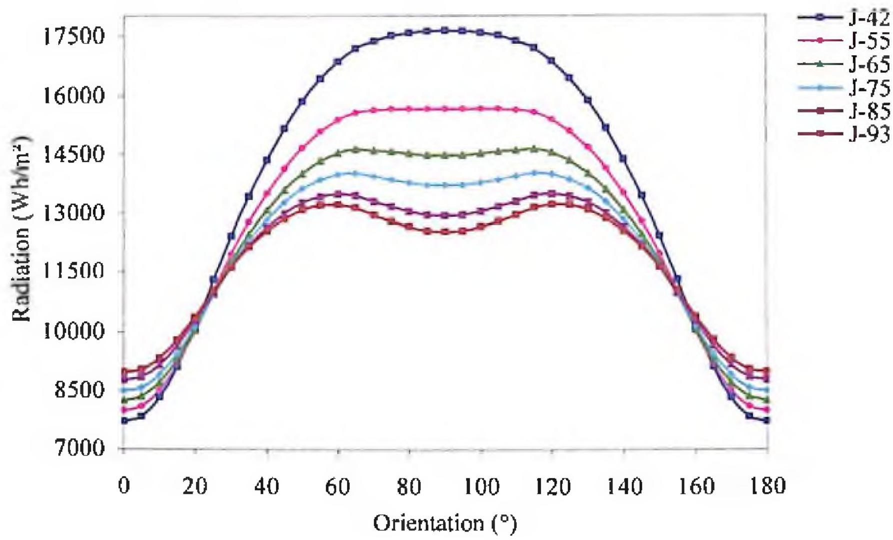


Figure 4.3.3 Radiation received at different orientations for different width to length ratios during peak summer

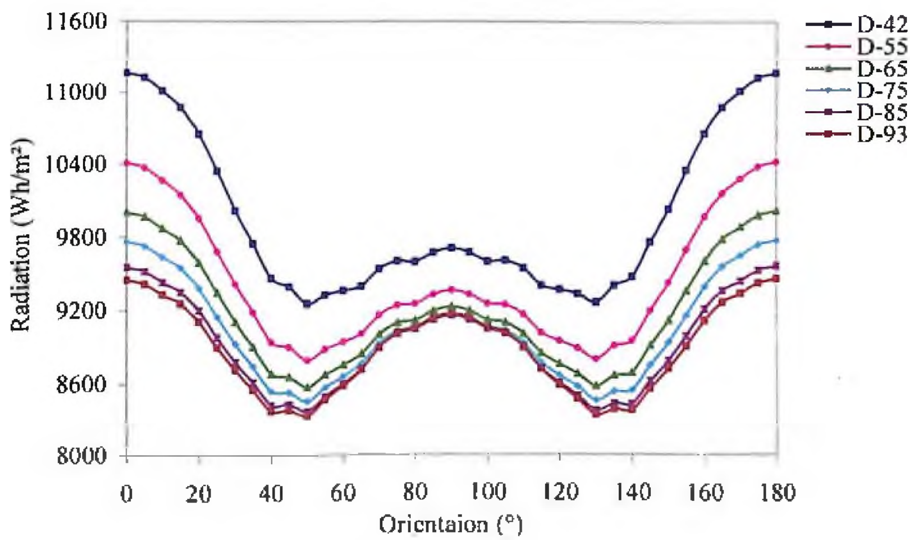


Figure 4.3.4 Radiation received at different orientations for different width to length ratios during peak winter

Location: Banglore (Zone III: Moderate)

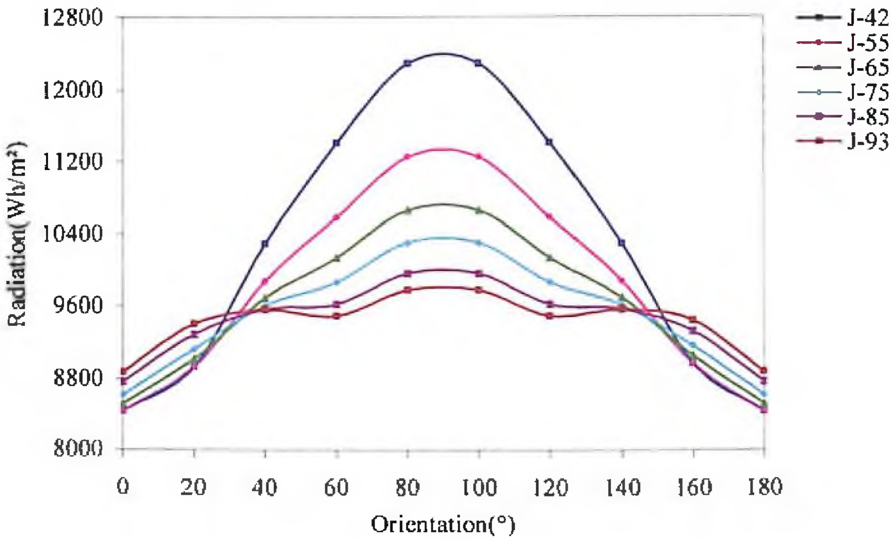


Figure 4.3.5 Radiation received at different orientations for different width to length ratios during peak summer

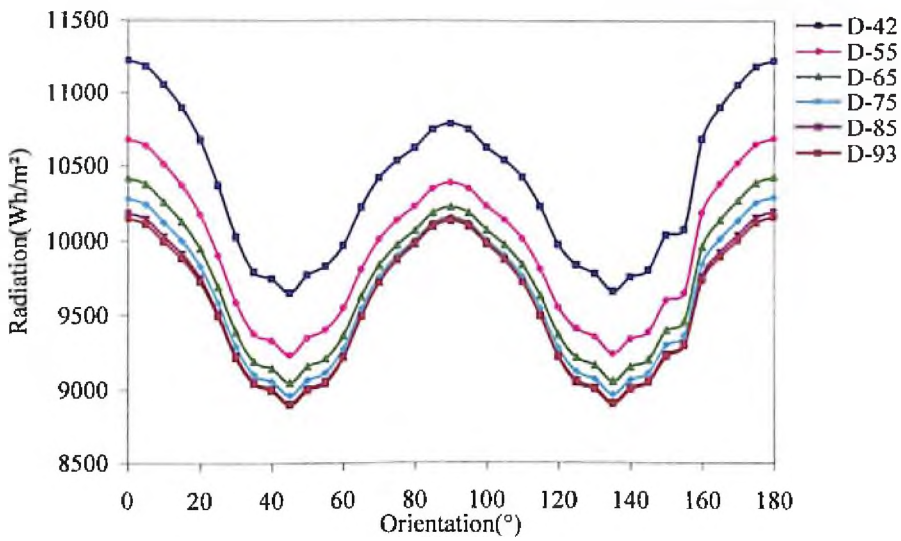


Figure 4.3.6 Radiation received at different orientations for different width to length ratios during peak winter

Location: New Delhi (Zone IV: Composite)

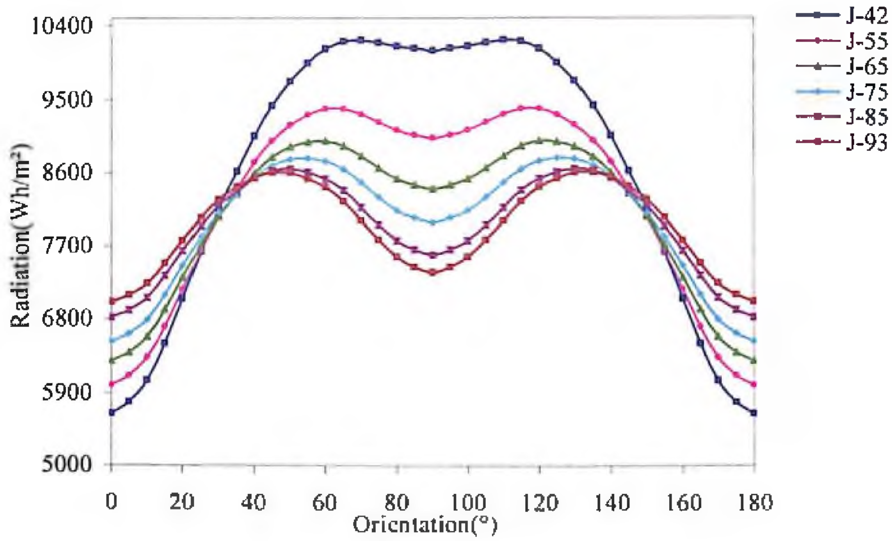


Figure 4.3.7 Radiation received at different orientations for different width to length ratios during peak summer

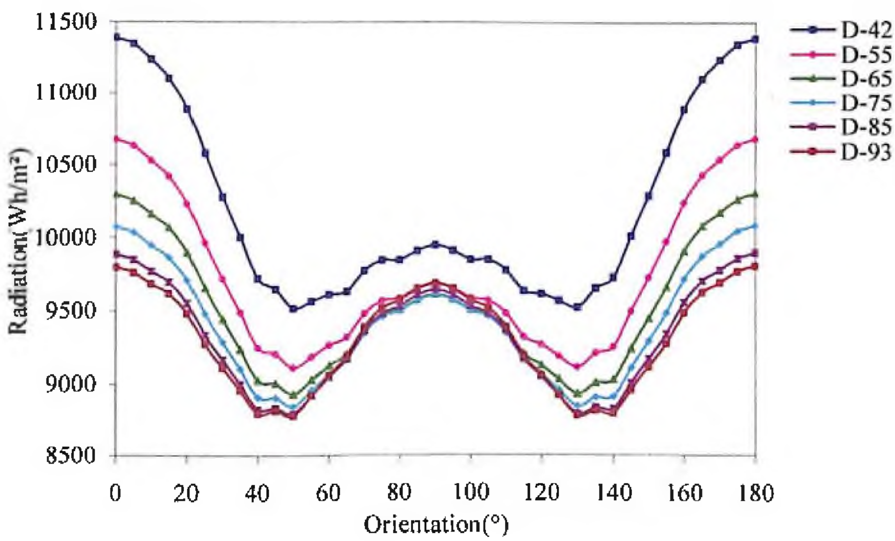


Figure 4.3.8 Radiation received at different orientations for different width to length ratios during peak winter

Location: Shimla (Zone V: Cold and cloudy)

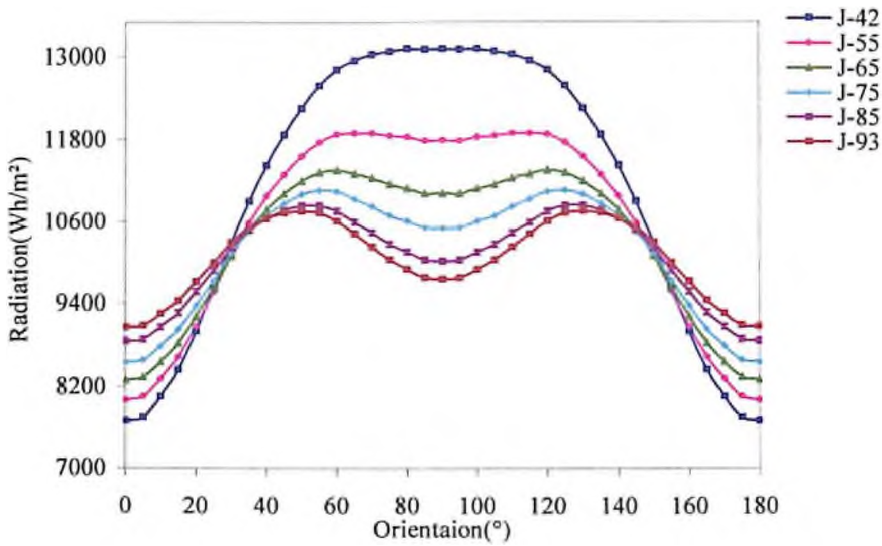


Figure 4.3.9 Radiation received at different orientations for different width to length ratios during peak summer

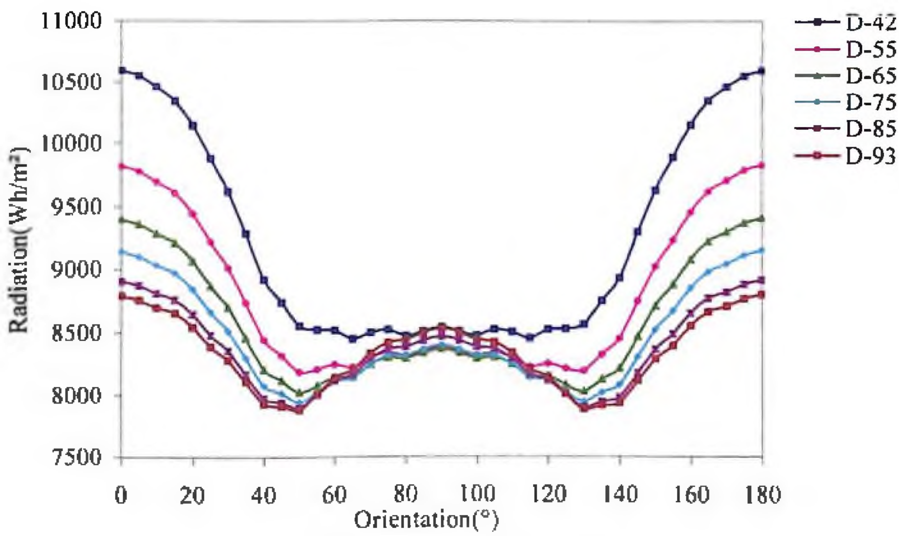


Figure 4.3.10 Radiation received at different orientations for different width to length ratios during peak winter

Location: Leh (Zone VI: Cold and sunny)

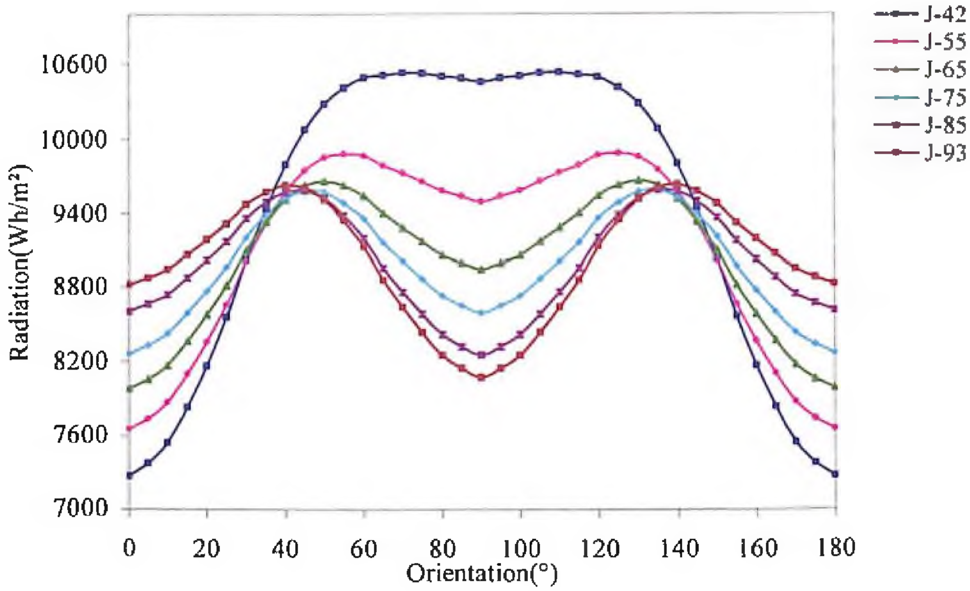


Figure 4.3.11 Radiation received at different orientations for different width to length ratios during peak summer

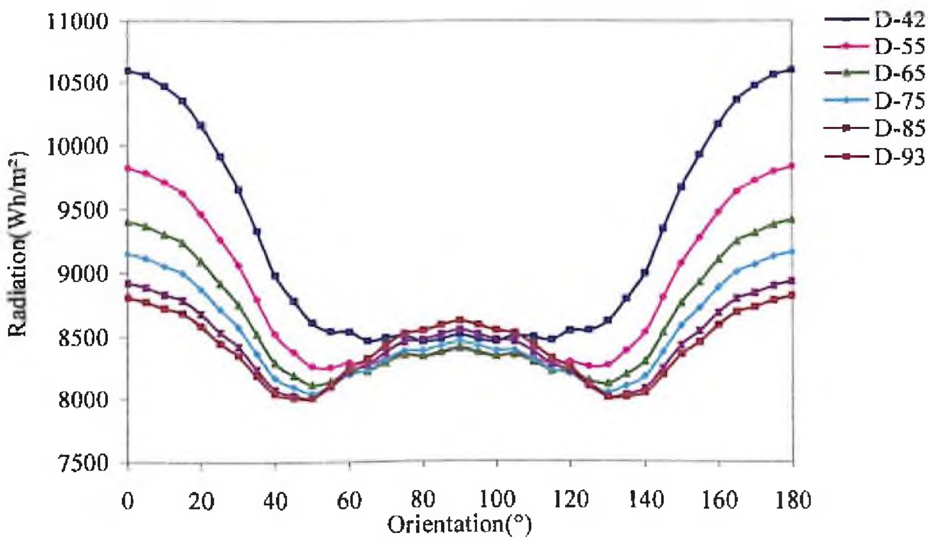


Figure 4.3.12 Radiation received at different orientations for different width to length ratios during peak winter

To reduce the cooling and heating loads during summer and winter respectively, the optimum orientation of the buildings has to be chosen. Keeping in view the criteria mentioned, from Figure 4.3.1-Figure 4.3.12 following optimum orientations are inferred for various width to length ratios.

Table 4.4 Optimum orientation decision

Places and Zones	(Width/Length) %									
	42%		55%		65%		75%		85%		93%	
	S	W	S	W	S	W	S	W	S	W	S	W
	R_{MIN}	R_{MAX}	R_{MIN}	R_{MAX}	R_{MIN}	R_{MAX}	R_{MIN}	R_{MAX}	R_{MIN}	R_{MAX}	R_{MIN}	R_{MAX}
Jaisalmer I	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°
Guwahati II	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°
Banglore III	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°
New Delhi IV	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°
Shi,mla V	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°
Leh VI	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	0°, 180°	90°	0°, 180°	90°	0°, 180°

S-Summer, W-Winter, R-Radiation, Max-Maximum, Min-Minimum

With the obtained optimal orientations for various locations all over the country (Table 4.4), it is generalized that for the Zone I (Hot and dry), Zone II (Warm and Humid), Zone III (Moderate), Zone IV (Composite) and Zone V (Cold and Cloudy) the optimum orientation found to be with the walls oriented South-East-North-West (Longer wall facing North-South). Similar condition has been observed for Zone VI (Cold and Sunny) except for higher width to length ratio. The optimum orientation value has been found much differing for 85% and 93%. In general, by observing other trends for lower width to length ratio, as well the considered location lies under cold and sunny zone where heating in winter is much more important, and hence optimum orientation is reported as with the walls orientated South-East-North-West (Longer wall facing North-South).

Thus, for the obtained optimum orientation, observing the trend for the radiation (Figure 4.4), it is inferred that it is much better to have less width to length ratio. It is observed that maximum radiation is achieved in winter as well minimum in summer with less value for width to length ratio. For the considered the case best suitable ratio is found to be 42%.

Using regression analysis, the nature of curves representing total radiation for a particular width to length ratio (Figure 4.4) is converted into suitable mathematical equations and is used to predict radiation over a location or in the other way, for some known amount of radiation the building dimensions can suitably be chosen for optimal orientation over a location. The concept is elaborated with the following example.

For the optimum orientation over Jaisalmer (Hot and dry zone), designer wants to limit minimum radiation in summer as 7700 Wh/m^2 and maximum radiation reception for winter to be 9900 Wh/m^2. To compute suitable width to length ratio of a specific scaling factor (Table 4.3), by performing regression analysis for the suitable curves from Figure 4.4, will result following two equations.

For summer,

$$Y = -0.0166 X^2 + 32.997 X + 5480.3 \qquad ...4.13$$

For winter,

$$Y = 0.5563 X^2 - 106.56 X + 14633 \qquad ...4.14$$

The quadratic Eqs. 4.13 and 4.14 are solved to obtain desired results, which yields the width to length ratio to be approximately 70%.

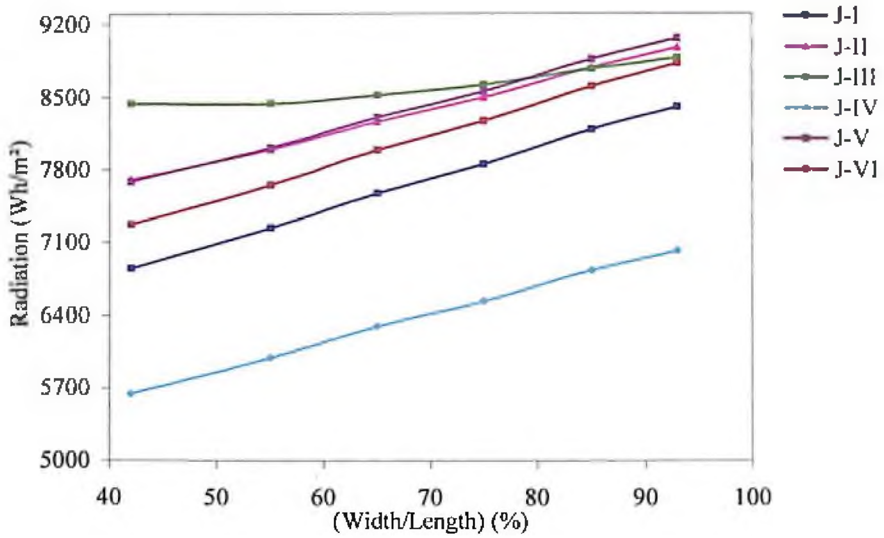


Figure 4.4.1 Variation of minimum radiation received during peak summer (June) for different zones over India

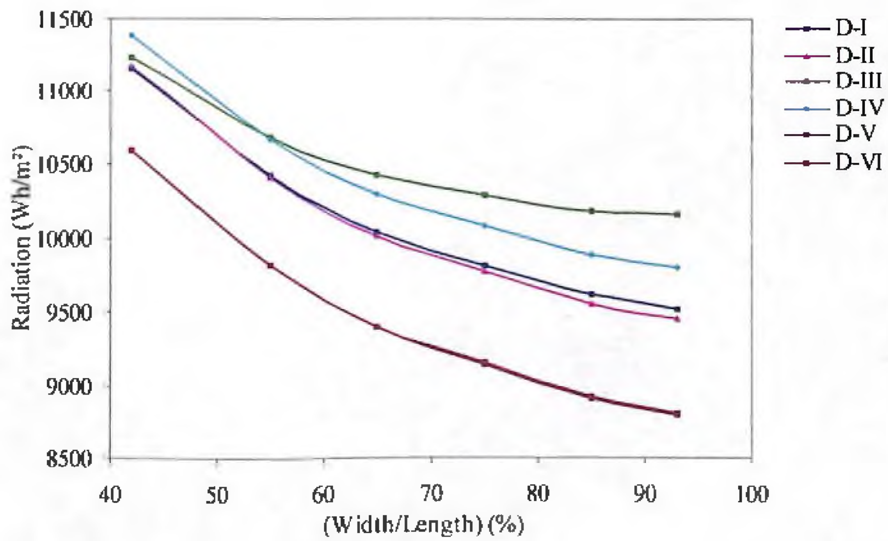


Figure 4.4.2 Variation of maximum radiation received during peak winter (December) for different zones over India

By performing multi-regression analysis similar correlations can also be established for all the possible orientations during peak summer and winter months with the different building dimensions to determine overall radiation received on exposed building surfaces. Table 4.5 represents correlation between the radiations received for a specific building orientation, with particular width to length ratio over the analyzed places from different zones.

Table 4.5: Trend-line equations for peak summer and peak winter radiation over different locations over India

Location and Zone	Summer	Winter
Jaisalmer (I)	$Y = 5712.9 + 215.89 X_1 - 1.196 X_1^2 + 0.01225 X_1^2 X_2 - 2.212 X_1 X_2 + 0.375 X_2^2$	$Y = 13002.4 - 78.47 X_2 + 0.432 X_2^2 + 0.000277 X_1^3 - 8.057 X_1$
Guwahati (II)	$Y = 6902.3 + 374.43 X_1 - 36.93 X_2 - 2.073 X_1^2 + 0.01686 X_1^2 X_2 - 3.050 X_1 X_2 + 0.657 X_2^2$	$Y = 14446.8 - 97.14 X_2 - 64.83 X_1 + 0.444 X_2^2 + 0.360 X_1^2 - 0.00315 X_1^2 X_2 + 0.567 X_1 X_2$
Banglore (III)	$Y = 8186.5 - 27.46 X_2 + 155.15 X_1 + 0.421 X_2^2 - 0.854 X_1^2 + 0.00881 X_1^2 X_2 - 1.599 X_1 X_2$	$Y = 12864.7 - 69.71 X_2 + 0.405 X_2^2 + 0.000256 X_1^3 - 7.594 X_1$
New Delhi (IV)	$Y = 4800.2 + 190.80 X_1 - 1.058 X_1^2 + 0.01055 X_1^2 X_2 - 1.903 X_1 X_2 + 0.317 X_2^2$	$Y = 14520.7 - 92.83 X_2 - 67.02 X_1 + 0.425 X_2^2 + 0.372 X_1^2 - 0.00353 X_1^2 X_2 + 0.635 X_1 X_2$
Shimla (V)	$Y = 6367.5 + 231.10 X_1 - 1.278 X_1^2 + 0.01257 X_1^2 X_2 - 2.276 X_1 X_2 + 0.362 X_2^2$	$Y = 14207.5 - 97.44 X_2 - 91.83 X_1 + 0.401 X_2^2 + 0.509 X_1^2 - 0.00493 X_1^2 X_2 + 0.890 X_1 X_2$
Leh (VI)	$Y = 6485.7 + 155.39 X_1 + 0.01011 X_1^2 X_2 - 1.821 X_1 X_2 - 0.863 X_1^2 + 0.342 X_2^2$	$Y = 14208.0 - 96.70 X_2 - 94.09 X_1 + 0.394 X_2^2 + 0.521 X_1^2 - 0.00521 X_1^2 X_2 + 0.941 X_1 X_2$

Y = Radiation, X_1 = Orientation, X_2 = (Width/Length)

The concept of multi-regression analysis is explained with the example. Over the location Jaisalmer, designer wants to make a decision with two choices for choosing building orientation and proportions of wall dimensions.

No.	Orientation (South facade wall)	(Width/Length) ratio (%)
1	65	55
2	25	65

With the help of Eqs. 4.15 and 4.16 corresponding to Jaisalmer (Table 4.5) radiations for the mentioned cases for peak summer and winter months are calculated.

For peak summer,

$$Y = 5712.9 + 215.89\,X_1 - 1.196\,X_1^2 + 0.01225\,X_1^2\,X_2 - 2.212\,X_1\,X_2 + 0.375\,X_2^2 \qquad ...4.15$$

For peak winter,

$$Y = 13002.4 - 78.47\,X_2 + 0.432\,X_2^2 + 0.000277\,X_1^3 - 8.057\,X_1 \qquad ...4.16$$

No.	Orientation	(Width/Length) (%)	Radiation (Wh/m²)	
			Summer	Winter
1	65	55	10764.7	9547.0
2.	25	65	8850.5	9531.7

Thus, although computed radiation during peak winter is nearly similar, the estimated radiation during peak summer month is significantly reduced in case 2, and hence should be preferred among the available options.

It has been observed that the radiation received by a horizontal roof is constant in any orientation over a location. But in case of multistoried buildings height play an important part as far as radiation over exposed wall surfaces is concerned. In such cases effective height for a particular wall surface should be taken into account along with wall length (or width) to determine radiation over a surface. Dimensions of long (South/North) walls have been taken as 16 × Ht. (m.) and short (East/West) walls as 10.5 × Ht (m.). Height (Ht.) is varied from 3m. to 21m. at an interval of 3m. to analyze the effect of total radiation over wall surfaces along with roof surface. By applying the methodology to determine optimum orientation for a particular location with specific exposed surface dimensions, radiation values during peak summer (June) and winter (December) are estimated for the varying building heights. The total radiation values over all the vertical surfaces are correlated with the inclusion of radiation received over roof (horizontal) surface to determine effective building height for a specific width to length ratio over which inclusion of roof radiation becomes compatible with all vertical building surfaces.

Location: Jaisalmer (Zone I: Hot and dry)

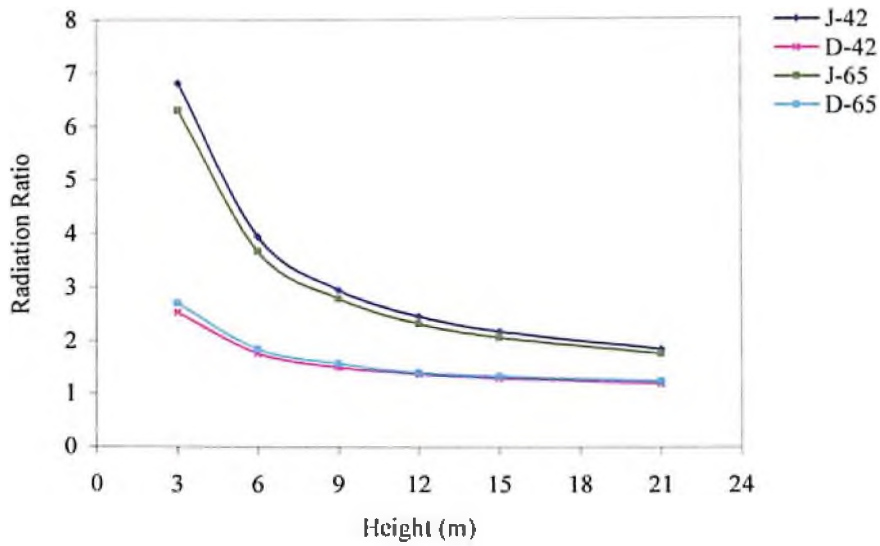


Figure 4.5.1 Radiation ratio vs height for different width to length ratio

Location: Guwahati (Zone II: Warm and humid)

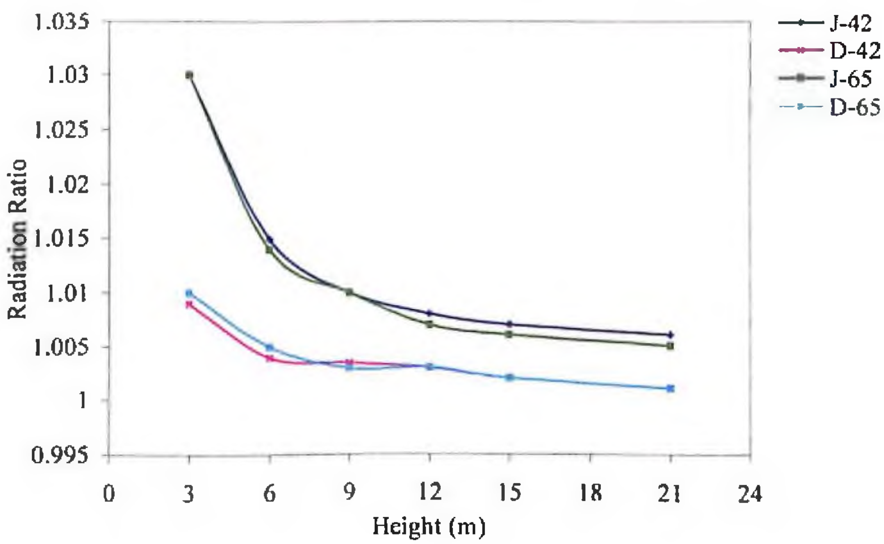


Figure 4.5.2 Radiation ratio vs height for different width to length ratio

Location: Banglore (Zone III: Moderate)

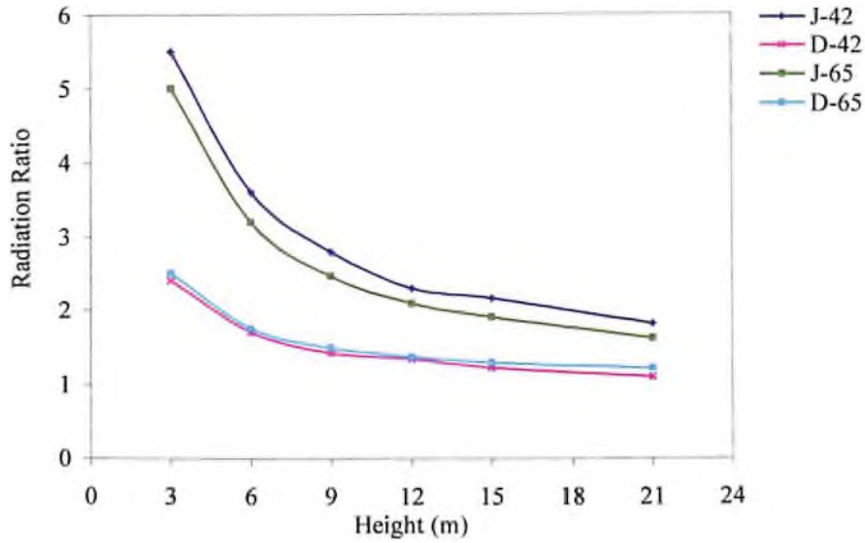


Figure 4.5.3 Radiation ratio vs height for different width to length ratio

Location: New Delhi (Zone IV: Composite)

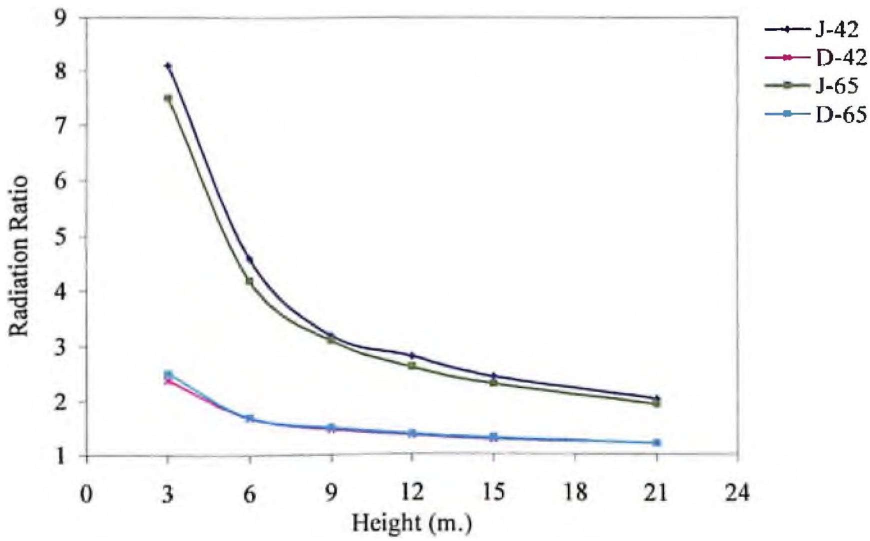


Figure 4.5.4 Radiation ratio vs height for different width to length ratio

Location: Shimla (Zone V: Cold and cloudy)

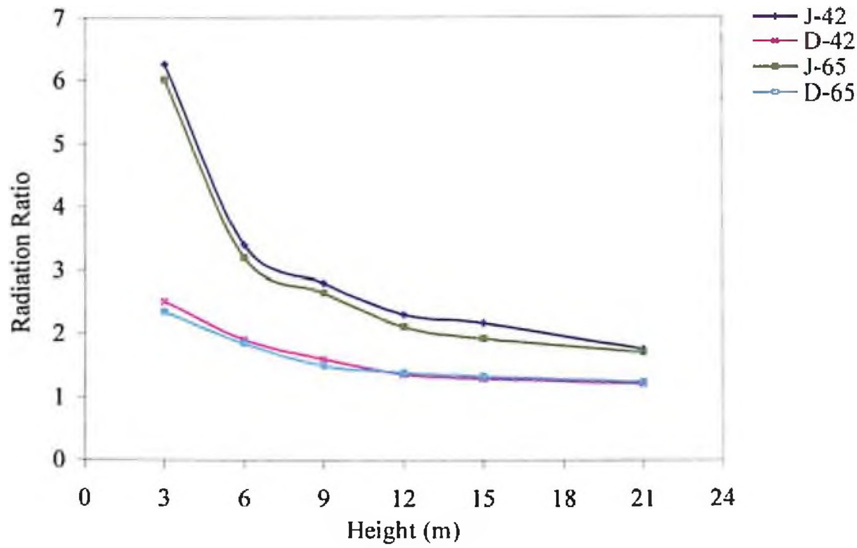


Figure 4.5.5 Radiation ratio vs height for different width to length ratio

Location: Leh (Zone VI: Cold and sunny)

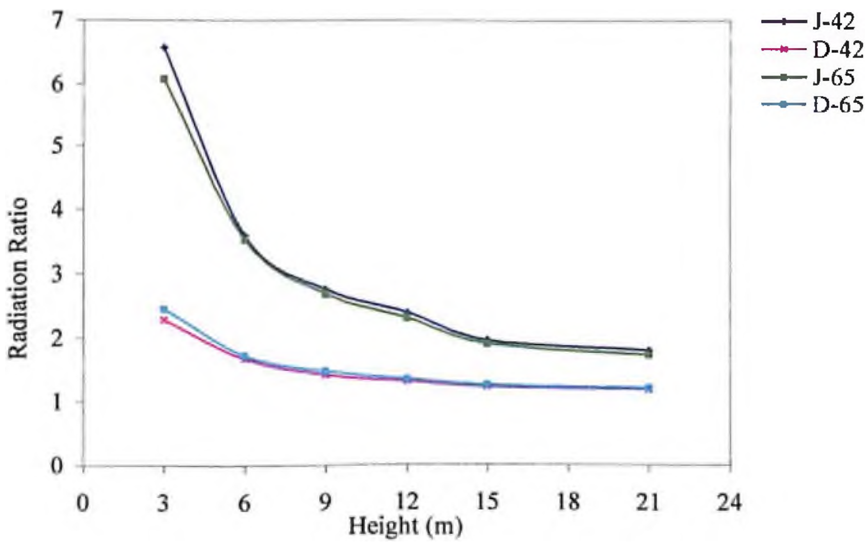


Figure 4.5.6 Radiation ratio vs height for different width to length ratio

To check the compatibility of horizontal surface effect along with total vertical surfaces with respect to radiation, the analysis has been carried out for two specific wall ratios as mentioned in Figure 4.5.1-Figure 4.5.6. It is inferred that for Guwahati, the total effective radiation received along with roof surface is nearly same as for the radiation received over only vertical wall surfaces. For the rest of the places major variation is from 3m. to 9m., after which radiation ratio (radiation received over horizontal and total vertical surfaces to radiation received over vertical surfaces) decreases slowly with increase in height of the building. Even though wall ratio differs, the radiation ratio value is found to be nearly the same.

Thus, due to the radiation computation capability over the location with the specific orientation of building facades from 0°-180°, the presented methodology is practically applicable to any building shape. The work is also useful for radiation computation over any particular surface. For more practical situations the concept of shadowing over surfaces can be integrated with the mentioned methodology for radiation computation.

CHAPTER 5

MODELING AND ANALYSIS OF BUILDING SYSTEM USING SYSTEM APPROACH

5.1 INTRODUCTION

As a consequence of the growing concern about the future of the world's energy resources, building designers are constantly being urged to re-appraise their attitudes to the consumption of energy in buildings and to consider the "energy-economics" of their designs. Developing suitable computational tools capable of being applied to all stages of a design process to help designers to generate alternative proposals and then to choose between them are important tasks. Due to numerical approximation and high computation time, manual methods are inefficient for practical purposes. Even though several computer programs are available, it's too cumbersome to use at all stages of a design. The fundamental requirement is a greater understanding on the part of designers of the total nature of the physical environment in buildings, how it is created and in particular, what role is played by the building enclosure (i.e., the system of walls, roofs, floors and windows) in creating this environment. For the energy-efficient buildings, among several governing environmental factors, atmospheric temperature is considered to be the fundamental determinant of heat load inside the buildings. The simulation technique could be a useful tool for the designers to achieve an optimum thermal performance of the localized buildings under given thermal climate. One of the simple ways to simulate the thermal performance of the building is to consider scaled one-room passive solar house design (Grimmer et al., 1979). The physical model can be simulated with the help of computers.

The Chapter elaborates Linear Graph Theory (LGT), which is a systematic methodology for modeling of systems with exact number of independent equations in terms of state variables. An analogy between building elements and electrical elements has been developed whose values are computed using heat transfer mechanism. A mathematical model is formulated using Linear Graph Theory and state variable model is developed in discrete-time form. The solution procedure avoids the error accumulation problems. The presented case study using small-scale room model has been evaluated by the developed software, SMTP, in MATLAB (Hanselman and Littlefield, 1996), to predict temperature values on inner side of wall as well at the room center. The evaluated values are verified with the experimental values on a specific date of the month.

5.2 HEAT TRANSFER MECHANISM

The calculation of temperature and heat flow through the walls, windows and roof of a building is the first step in preventing problems arising from thermal stresses. Heat energy always tends to migrate in the direction of decreasing temperature. Heat transfer can occur by three basic mechanisms, namely, conduction (through walls), convection (moving air) and radiation (by penetration of sunlight). When a temperature gradient exists in a body (medium of specific characteristics), there is an energy transfer from the high-temperature region to the low-temperature region. This process of heat transfer is known as conduction. The basic equation for steady state one-dimensional heat conduction is represented in Eqn. 5.1

$$Q_{cd} = KA\left(\frac{T_h - T_c}{t}\right) \qquad \ldots 5.1$$

where, $\frac{t}{K} = R_{cd}$ ...5.2

Q_{cd} = quantity of heat flow due to conduction (W)

A = area of surface (m^2)

T_h , T_c = temperature of hot surface and cold surface (K)

R_{cd} = thermal conductive resistance (m^2.K/W)

t = thickness (m)

K = thermal conductivity of material (W/m.K)

In case of building components, conduction takes place through a wall, roof or floor. These components vary significantly in material properties. All materials are assigned a resistance (R) value, which takes into account the thickness of the material and the ease with which heat passes through it. Conductive heat loss is inversely related to R. Surface area and temperature gradients are also key aspects of this mode of heat loss. For conduction, interior and exterior temperatures produce the necessary temperature gradient.

Thermal energy can be transported through a fluid by conduction and also by the movement of the fluid from one region to another. This process of heat transfer associated with fluid movement is called convection. The rate of heat transfer by convection is expressed by the Eqn. 5.3.

$$Q_{cv} = \frac{A(T_h - T_c)}{R_{cv}} \qquad \text{...5.3}$$

where, $R_{cv} = \frac{1}{f}$ ...5.4

Q_{cv} = quantity of heat flow due to convection (W)

A = area of surface (m²)

T_h, T_c = temperature of hot surface and cold surface (K)

R_{cv} = thermal convective resistance (m².K/W)

f = coefficient of heat transfer (W/m².K)

To compute f, standard correlations have to be used, which depends on following parameters.

I. Prandtl Number (P_r): It is the parameter, which relates the relative thickness of the hydrodynamic and thermal boundary layers and mathematically it is expressed as represented in Eqn. 5.5

$$P_r = \frac{\nu}{\chi} \qquad \text{...5.5}$$

where, ν = kinematic viscosity

χ = thermal diffusivity

The ratio of $\frac{\nu}{\chi}$ expresses the relative magnitudes of diffusion of momentum and heat in the fluid. But these diffusion rates are precisely the quantities that determine how thick the boundary layers will be for a given external flow field; large diffusivity means that the viscous or temperature influence is felt farther out in the flow field. Thus, Prandtl number connects link between the velocity head and temperature field. For a particular temperature the value can be read from standard table (Holman, 2002).

II. Grashof Number (G_r): The Grashof number is interpreted physically as a dimensionless group representing the ratio of the buoyancy forces to the viscous forces in the free-convection flow system and is determined mathematically as represented in Eq. 5.6.

$$G_r = \frac{g\beta_{cv}|T_w - T_a|L^3}{\gamma^2} \quad \text{...5.6}$$

where, g = acceleration due to gravity

β_{cv} = volume coefficient of expansion $= \frac{1}{T_f}$

T_w = wall temperature

T_a = atmospheric temperature

L = length of surface

γ = specific volume

T_f = average film temperature

III. Nusselt Number (N_u): It is a dimensionless number and depends on geometry of the problem and the incident surface. For example, if a surface is vertical with specific height (V_h), Nusselt number is determined as given by Eqn. 5.7.

$$N_u = 0{,}13(G_r P_r)^{1/3} \qquad \text{for } 10^8 < G_r P_r < 10^{12} \quad \text{...5.7}$$

The convective heat transfer coefficient is determined as mentioned in Eqn. 5.8.

$$f = \frac{N_u K}{V_h} \quad \text{...5.8}$$

All objects continuously lose energy by the emission of electromagnetic radiation and gain energy by absorbing some of the radiation from other objects that is incident on them. This process of heat transfer by radiation takes place in the space between the radiating objects. The equation of radiation (Eqn. 5.9) follows Stefan-Boltzman's law.

$$Q_r = \sigma A(T_h^4 - T_c^4) \qquad \ldots 5.9$$

where, Q_r = quantity of heat radiated from surface area A (W)

σ = Stefan-Boltzman radiation constant = 5.669×10^{-8} ($W/m^2.K^4$)

A = area of the emitting body (m^2)

5.2.1 HEAT TRANSFER AT AN EXTERIOR SURFACE

The outside surface of a wall or window receives a great deal of energy from the sun, and this is quite independent of the temperature difference between the surface and the air. The effects of convection and radiation are combined in this case by the use of a fictitious temperature called the sol-air temperature. The sol-air temperature (T_{os}) deals with the extreme temperatures at the outer surfaces of buildings. The temperature distribution through a wall or window is calculated using sol-air temperature as mentioned in the Eqn. 5.10.

$$T_{os} = T_a + \frac{\varsigma I_c}{h_0} - \frac{\Delta q_{ir}}{h_0} \qquad \ldots 5.10$$

where, T_a = Atmospheric Temperature (K)

ς=Absorptivity for solar radiation

h_0 = surface heat transfer coefficient for radiation and convection ($W/m^2.K$)

I_c = global solar radiation on surface (W/m^2)

Δq_{ir} = correction to radiation heat transfer (W/m^2)

In practice, $\frac{\Delta q_{ir}}{h_0}$ varies from zero to 3.9 K for vertical surfaces.

5.2.2 HEAT TRANSFER AT AN INTERIOR SURFACE

The inside surface of a wall or a window exchanges heat by convection with the air in the room and by radiation with all the other surfaces that together enclose the room. It is often convenient to allow for the two independent heat transfer processes by using an inside surface conductance that is the sum of convection and radiation just as it is done for an air space. This is quite all right so long as the surfaces that are seen from the wall or window are close to the same temperature as the air in the room. This is usually the case for floors, ceilings and partitions that separate rooms at about the same temperature. It is not true, however, for a corner room, which has two outside walls; nor is it true for a room with a radiant heating system or a high level of artificial lighting. In these cases the radiation and convection are combined by the use of a fictitious air temperature similar to the sol-air temperature for the outside surface.

Thus, heat transfer is the tendency of a constituent to travel from a region of higher temperature to one of low temperature, is analogous to the flow of current from a high potential to a low potential. The heat flow rate and temperature are the through-variable and across-variable for heat-transfer system. In a multi-face test-box system, a room model is analogous to an electrical circuit. The sun acts as the source of heat supply. Various faces are equivalent to thermal capacitances with respective analogous resistance in each face. Different nodes in the system indicate specific temperature record of various salient points of the model. An analogous electrical circuit drawn for a heat transfer system should be represented by a corresponding Linear Graph (Nagrath and Gopal, 1982) for the necessary purpose of solving the problem.

5.3 SYSTEM MODELING USING LINEAR GRAPH THEORY

The word "system" is used in almost all sciences and is defined as a collection of components wherein individual components are constrained by connecting interrelationships such that the system as a whole fulfils some specific functions in response to varying demands. The methodology of describing systems and their behavior is known as systems approach. In a sense, the systems approach is no different from the scientific approach and helps to solve a particular problem under consideration.

In order to describe large scale, complex, interactive systems, the systems approach makes use of models. Modeling is the determination of those quantities and features, which describe the operation of a system. To simplify the complexity of the actual problem, certain idealizing assumptions are made. Due to the precise nature of mathematical theories, suitable mathematical methods should be incorporated while modeling the system. For certain phenomena, a completely valid theory should be solved mathematically with the present mathematical techniques. The fundamental concepts are interpreted in the form of equations and are solved. This set of equations gives a mathematical model. An idealized version of a physical problem system, which is solved mathematically, is referred to as a physical model. The physical model describes the behavior of the system with the same variables as used in the real system.

Physical models and analog models are both representations of physical systems. An analogy is the existence of consistent mutual similarity between the equations and structures of two systems and an identification and association of the quantities and structural element that play mutually similar roles in these equations or structures. Analogies are useful when it is desired to compare an unfamiliar system with one that is better known because in familiar systems, relation and actions are more easily visualized and analytical solutions are obtained more easily.

The objective of an engineering analysis of a physical system is prediction of its behavior, often when the system is being designed. The mathematical models of systems are specified in terms of a set of component relationships (constitutive relations) together with a set of constraint relationships (compatibility and/or continuity equations) which define the way the components are assembled to form systems. To take utmost advantage of these similarities and to form a basis for dealing with diverse systems in a coherent manner, a generalized approach to modeling is desirable. One of the precise approaches is the formulation of a set of equations using Linear Graph Theory. The word linear in Linear Graph connotes line in the geometrical science and the theory is applicable to both linear and nonlinear systems. Since all types of physical systems are viewed as a collection of components united at a finite number of interfaces the Linear Graph is extendable to any system. Linear-graph models are constructed using a uniform notation for various types of systems. Standard techniques are then used to translate the linear-graph model into convenient mathematical models. For a system component, which is represented by line segment, in general, will possess across-variables with different terminal values and through-variables with same terminal values. These are referred to as component variables. When the terminals of two or more terminal graphs are interconnected in a one-to-one correspondence with the actual interconnection of the components in a system, the system graph is obtained. The independent constraint equations (compatibility and continuity equations) written for the system graph are considered to be a generalization of Kirchoff's voltage and current laws. Thus, for any given system graph, the algebraic sum of the across-variables around a closed loop and the through-variables at a node are zero. The resulting equations in the across-variables and through-variables are called circuit and cut-set equations respectively. The constraint relations written from the system graph are independent of component equations and thus are always linear regardless of the characteristics of the components. The mathematical model is obtained by combining the constraint equations with the set of component equations.

A single-room model (Figure 5.1) of specific dimensions (Table 5.1), the south faced wall is represented by electrical analog model (Figure 5.2), and a representative Linear Graph is shown (Figure 5.3).

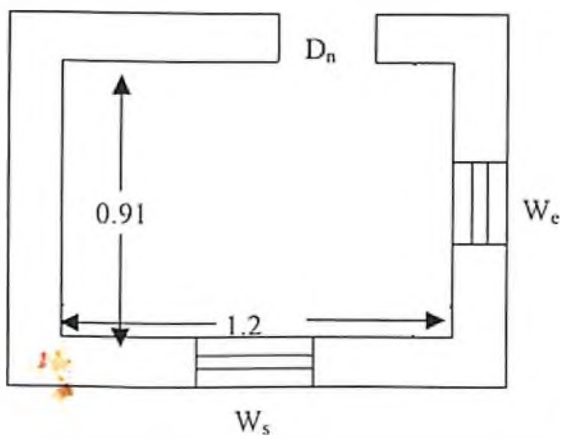


Figure 5.1 Plan of model

Table 5.1 Model room details

Room Dimension (m^3)	1.2×0.91×0.91
Wall thickness (m)	$0.0254t_{IP}+0.0889t_{BR}+0.0254t_{EP}$
W_s (m^2)	0.2743×0.3658
W_e (m^2)	0.2743×0.2743
D_n (m^2)	0.3048×0.6096

where, W_e, W_s = Window on East and South sides respectively,

D_n= Door on North side,

t_{IP}, t_{EP} = Internal and External Plaster thickness respectively,

t_{BR} = Bricks thickness

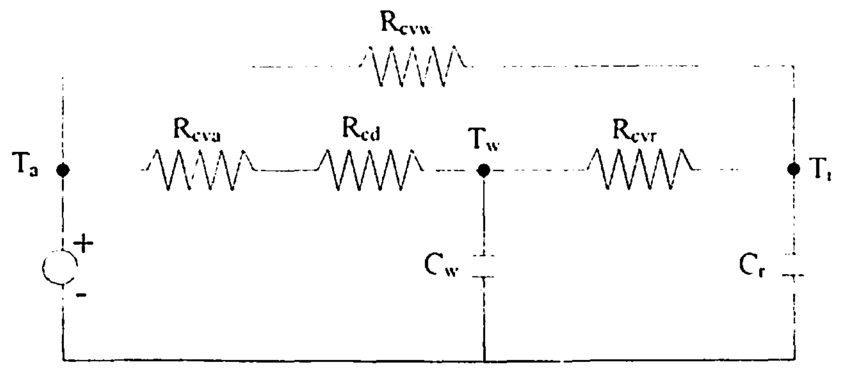


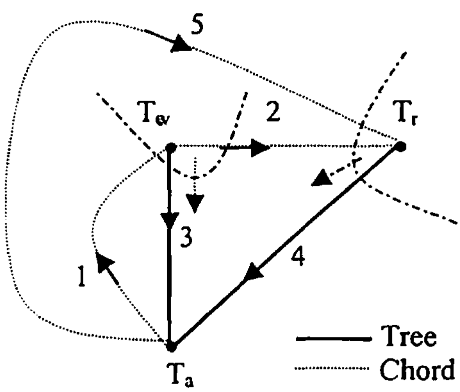
Figure 5.2 Electrical analog model

where, T_a, T_w. T_r = atmospheric temperature, wall (interior) temperature and room temperature respectively

R_{cva}, R_{cvw}. R_{cvr} = convective resistance due to air, window surface and room respectively

R_{cd} = resistance due to conduction (wall)

C_w. C_r = thermal capacitance of wall and room respectively



Sign conventions for cutset equations: Towards node: –ve, Away from node: +ve

Figure 5.3 Linear Graph

The complete heat transfer mechanism in single-room model (Figure 5.1) is represented by analogous electrical circuit (Figure 5.2). The sun acts as the source of heat supply. Internal south facade wall surface and room center are represented by equivalent thermal capacitances, (C_w and C_r in Figure 5.2). Different nodes in the system indicate specific temperature of the model i.e., atmospheric temperature (T_a)

at external wall surface, temperature at internal south facade wall surface (T_w) and at room center (T_r). The through-variables and across-variables are connected with appropriate resistance offered by the specific medium. External surrounding and internal south facade wall surface are connected with two resistances in a series i.e., convective resistance due to air (R_{cva}) and conductive resistance due to wall surface. Internal wall surface and room center are connected with a resistance offered due to convection inside the room (R_{cvr}). Due to window opening on south facade wall, external surface and room center are directly connected with equivalent convective resistance (R_{cvw}).

For the necessary purpose of solution of the problem, electrical circuit is represented by a corresponding Linear Graph. The Linear Graph is drawn by taking a reference node, which is at atmospheric temperature and is connected to all the nodes of the system. A node represents temperature at a salient point either on the wall or inside the room. These nodes are connected by the line-segments that represent the heat flow rate between two nodes. The fundamentals of Linear Graph Theory are explained further.

Linear Graph: A Linear Graph is defined as an interconnected set of line segments (1-5 in Figure 5.3).

Oriented Linear Graph: A Linear Graph in which every line is oriented is called an oriented Linear Graph (Figure 5.3, an arrow is used to indicate orientation).

Branch: A branch is an oriented line segment in a Linear Graph (Line Segments 1-5, Figure 5.3).

Node: A node (vertex) is the end point of branch (#T_a, #T_w, #T_r in Figure 5.3).

Path: A route traced through a Linear Graph, which goes through a node not more than once, is called a path.

Sub Graph: Any constituent part of a Linear Graph is called its sub graph.

Connected Graph: If for a given graph there exists a path between every pair of nodes, then the graph is connected.

Circuit: A circuit is a sub graph of a given connected graph which

i) is connected and

ii) has precisely two branches of the sub graph incident to each node of the sub graph.

In Figure 5.3, subgraphs 1-2-5 and 2-3-4 are the examples of circuit.

Cut-set: A set of branches of a connected graph is called a cut-set if the following properties hold

i) If all the branches of the cut-set are removed, the graph is split into two parts (considering an isolated node as apart), which are not connected.

ii) No subset of the above set has this property.

In Figure 5.3, subgraphs 1-2-3 and 2-4-5 are the examples of cut-set.

Tree: A tree is a sub graph of a given connected graph which

i) is connected,

ii) contains all the nodes of the given graph and

iii) contains no circuit.

A tree with n_t nodes contains (n_t-1) branches. A subgraph with branches 3 and 4 represents a tree in Figure 5.3.

Chords: Those branches of a connected graph, which are not included in a selected tree, are called chords of that tree. Branches 1, 2, and 5 are chords (for the tree of 3-4) of the Linear Graph shown in Figure 5.3.

Co-tree: The complete set of chords for a given tree is called the co-tree of that tree.

Fundamental Circuit: Once a tree has been selected for a connected graph, a special class of circuits, called the fundamental circuits, is defined. A tree does not contain any circuit. When one chord is added to a tree, exactly one circuit, called the fundamental circuit is formed. A graph with n_t nodes and b branches contains $(b$-

n_t+1) chords. So there will be ($b-n_t+1$) fundamental circuits in a graph for any choice of a tree. Branches 2 (chord), 3 and 4 form a fundamental circuit in Figure 5.3.

An arrow whose direction is the same as that of the chord defining the circuit specifies the orientation of a fundamental circuit. It may be noted that the fundamental circuit has only one chord, others being tree branches.

Fundamental Cut-set: Once a tree has been selected for a connected graph, a special class of cut-sets, called the fundamental cut-set is defined. In Figure 5.3, branches 2, 4 and 5 form a fundamental cutset.

A cut-set containing only one tree branch (other branches in the cut-set being chord) is called a fundamental cut-set. Since there are (n_t-1) branches in a tree, we will obtain exactly (n_t-1) fundamental cut-sets.

5.4 MODELING METHODOLOGY

For the considered location Pilani, India (Latitude: 28.25°N, Longitude: 75.65°E) with respect to sun movement, south facade wall is of great concern for the heat gain inside the buildings by direct Sun. The single-room model (Figure 5.1) consists of various salient points i.e. external surface, internal wall surface and room center for temperature recordings, each represented by a separate node in Linear Graph. For modeling the physical systems using Linear Graph Theory, a pair of variables is attributed to each branch of the Linear Graph, which corresponds to the system being analyzed. They are called the through-variable and the across-variable. For a thermal system, the through-variable (q) represents the heat flux through a branch, and the across-variable (T) represents the temperature difference between the two nodes connected to that branch. For the temperature prediction at various salient points of the shown single-room model (Figure 5.1), the temperature values have been recorded experimentally. The mass of the solar building that is directly exposed to the solar radiation is considered to absorb and store the incoming solar energy.

5.5 FORMULATION OF MODEL

Mathematical model has been formulated for the example (Figure 5.1) and its corresponding Linear Graph (Figure 5.3). Keeping in view the atmospheric temperature (T_a), model is idealized taking into consideration the effect of south faced wall. The formulation of the model is explained further.

The thermal network of the system is represented using following governing equations (Eqs. 5.11 and 5.12).

$$q = C\frac{dT}{dt} \quad ...5.11$$

$$\Delta T = R.q \quad ...5.12$$

where,

ΔT = Temperature difference between two connected nodes

R = Resistance offered for heat flow through the system

q = Heat flow rate

C = Heat capacity of the system

$\frac{dT}{dt}$ = Rate of change of temperature with respect to time

After classifying the branches into trees and cords, the primary (across-variables of trees and through-variables of cords) and secondary variables (across-variables of chords and through-variables of trees) are classified. The governing equations are arranged in proper matrix form. Eqn. 5.11, with time derivative terms, included in the tree graph, are rearranged in the matrix form as mentioned in Eqn. 5.13.

$$\frac{d}{dt}[T_t] = [c]'[q_t] \quad ...5.13$$

Similarly, Eqn. 5.12 is represented in the matrix form as given by Eqn. 5.14.

$$[q_c] = [R]'[\Delta T] \quad ...5.14$$

Further, secondary variables are eliminated. To eliminate across-variables of cords, the fundamental circuit equations are arranged in the following format (Eqn. 5.15).

$$[F_t : I]\begin{bmatrix} T_t \\ --- \\ T_c \end{bmatrix} = 0 \quad ...5.15$$

where, F_t = Sub matrix corresponding to tree branches

I = unit matrix

T_t, T_c = Temperature (across-variables) in tree and chord branch respectively

After expanding Eqn. 5.15, the across-variables for the chords are related to across-variables for the tree branches as follows (Eqn. 5.16).

$$T_c = -F_t T_t \qquad \text{...5.16}$$

The desired matrix $[F_t]$ is generated with columns as tree branches in ascending order and the rows as the chords in ascending order. Entries in a row corresponding to a particular chord are made as follows:

i) +1's are entered corresponding to the tree branches in the circuit oriented in the same direction as the chord.

ii) -1's are entered corresponding to the tree branches in the circuit oriented in the opposite direction as the chord.

iii) 0's are entered corresponding to the tree branches not included in the circuit oriented of the chord.

Similarly to eliminate through-variables, the cut-set equations are arranged in the following format (Eqs. 5.17 and 5.18).

$$[I : F_c]\begin{bmatrix} q_t \\ --- \\ q_c \end{bmatrix} = 0 \qquad \text{...5.17}$$

$$q_t = -F_c q_c \qquad \text{...5.18}$$

where, F_c = Sub matrix corresponding to chords

q_t, q_c = Heat flow (through-variables) of tree and chord branches respectively

Like matrix $[F_t]$, each row of matrix $[F_c]$ is generated with columns as chords in ascending order and the rows as the tree branches in ascending order. Entries in a row corresponding to a particular tree branch are made as follows:

iv) +1's are entered corresponding to the chords in the cut-set oriented in the same direction as the tree branch.

v) -1's are entered corresponding to the chords in the cut-set oriented in the opposite direction as the tree branch.

vi) 0's are entered corresponding to the chords not included in the cut-set of the tree branch.

For the system under consideration (Figure 5.3) using fundamental cut-set theory, the relationship between the through-variables associated with the tree branches, and the chord is used (Eqn. 5.18). Using Eqs. 5.13, 5.14 and 5.18 final form of the model is expressed as following expression (Eqn. 5.19).

$$\frac{d}{dt}[T_t]=[c]'\{-[F_c]\}[R]'[\Delta T] \qquad \text{...5.19}$$

For the system under consideration:

$$[T_t]=\begin{bmatrix} T_w \\ T_r \end{bmatrix} \qquad [c]'=\begin{bmatrix} \frac{1}{C_w} & 0 \\ 0 & \frac{1}{C_r} \end{bmatrix}$$

$$[F_c]=\begin{bmatrix} -1 & 1 & 0 \\ 0 & -1 & -1 \end{bmatrix} \qquad [R]'=\begin{bmatrix} R_{e1} & 0 & 0 \\ R_{e1} & R_{cvr} & 0 \\ 0 & 0 & R_{cvw} \end{bmatrix}^{-1}$$

$$[\Delta T]=\begin{bmatrix} T_a - T_w \\ T_w - T_r \\ T_a - T_r \end{bmatrix}$$

Thus, Eqn. 5.19 is further simplified as expressed in Eqn. 5.20.

$$\frac{d}{dt}\begin{bmatrix} T_w \\ T_r \end{bmatrix}=[A]\begin{bmatrix} T_w \\ T_r \end{bmatrix}+[B][T_a] \qquad \text{...5.20}$$

where,

$$[A]=\begin{bmatrix} \frac{-1}{C_w}\left(\frac{1}{R_{e1}}+\frac{1}{R_{cvr}}\right) & \frac{1}{C_w R_{cvr}} \\ \frac{1}{C_r R_{cvr}} & \frac{-1}{C_r}\left(\frac{1}{R_{cvr}}+\frac{1}{R_{cvw}}\right) \end{bmatrix}$$

$$[B]=\begin{bmatrix} \frac{1}{C_w}\left(\frac{1}{R_{e1}}+\frac{1}{R_{cvr}}\right) \\ \frac{1}{C_r}\left(\frac{1}{R_{cvr}}+\frac{1}{R_{cvw}}\right) \end{bmatrix}$$

$$R_{e1} = R_{cva} + R_{cd}$$

Each resistance in this model is a combination of the conduction and convection resistances. The resistance due to conduction and convection is computed using Eqs. 5.2 and 5.4 respectively.

The capacitance of a specific component is given as following Eqn. 5.21.

$$C = (\rho s V) \qquad ...5.21$$

where, ρ = density of the material

s = specific heat of the material

V = volume of component

The various materials used for the model have the following values for different properties (Rohsenow and Harnett, 1973) as specified in Table 5.2.

Table 5.2 Model material properties

Sr. No.	Material name	Density (kg/m^3)	Thermal conductivity (W/m.K)	Specific heat capacity (kJ/kg K)
1	Brick	1820	0.811	0.88
2	Plaster	1762	0.721	0.84

The solution procedure expresses the state-equations in a discrete-time form, whose solution is exact. The only source of error in the procedure exists in the evaluation of the matrices defining the discrete time equations. Since this evaluation is made by means of a power series, which has to be computed only once, the error is bounded up to the desired limit. Thus, the procedure avoids the accumulation of problems relating to error inherent in the step-by-step integration methods. The detailed solution procedure is mentioned by Rodellar and Barbet (1985). The Eqn. 5.20 is written in the form:

$$T(k\Delta t + \Delta t) = T \times (k\Delta t) + P_1 B(k\Delta t + \Delta t) + P_2 [B(k\Delta t + \Delta t) - B(k\Delta t)] \qquad ...5.22$$

where;

$$T = e^{A\Delta t} = I + A\Delta t + A^2 \frac{\Delta t^2}{2!} + A^3 \frac{\Delta t^3}{3!} + ...$$

$$P_1 = \int_0^{\Delta t} e^{A\mu} d\mu = A^{-1}[e^{A\Delta t} - 1] = I\Delta t + A\frac{\Delta t^2}{2!} + A^2 \frac{\Delta t^3}{3!} + ...$$

$$P_2 = A^{-1}[\frac{1}{\Delta t} P_1 - T]$$

With the above-mentioned methodology for the model generation and solution procedure, software, SMTP, has been developed in MATLAB. Detailed flow chart along with source code for the considered passive building model is presented in

Sections C-1 and C-2 (Appendix-C). For the software, SMTP, material properties, model dimensions and initial values of atmospheric temperature (T_a), wall temperature (T_w) and room temperature (T_r) are considered as input. Temperature values have been measured actually during experimentation. The analysis is carried out for 22nd January 2003, 15th March 2003 and 15th May 2003 at Pilani.

Following stepwise algorithm have been followed for SMTP in MALTAB:

i) Thermal resistances for the considered dimension and material of the model (Eqs. 5.2, 5.4) are computed.

ii) Thermal capacitances of the wall and model room (Eqn. 5.21) are estimated.

iii) The coefficients of matrix $[A]$ are evaluated.

iv) Eqs. 5.20 and 5.22 are formulated with all the variables for the prediction of temperature on inner wall surface and room center.

5.6 RESULTS AND DISCUSSION

Three representative dates of different months (22nd January 2003, 15th March 2003 and 14th May 2003) of varying seasons have been analyzed. The temperature values obtained for the wall surface and room center are represented in Table 5.3. The values show similar behavior as that of atmospheric changes.

Table 5.3 Obtained temperature (K+273)

	22-January, 2003				15-March, 2003				14-May, 2003			
Time	T_a	T_w	T_{rs}	T_{rm}	T_a	T_w	T_{rs}	T_{rm}	T_a	T_w	T_{rs}	T_{rm}
8:00	17.5	15.08	14.43	14.0	26.3	25.33	21.70	21.8	39.7	32.87	31.05	31.5
9:00	19.0	16.85	15.79	15.9	28.5	25.75	23.10	23.5	41.1	33.62	32.70	33.3
10:00	21.2	17.96	17.17	17.6	30.6	26.11	24.50	25.1	42.2	35.23	34.45	35.0
11:00	22.8	18.83	18.21	18.8	32.0	27.00	26.00	26.7	43.3	36.10	35.30	36.0
12:00	25.0	20.50	20.20	20.4	34.5	28.70	26.90	27.5	44.7	37.74	36.80	37.6
13:00	25.4	22.26	21.44	22.1	35.0	29.80	28.15	28.5	47.0	39.53	38.70	39.2
14:00	26.0	23.54	22.75	23.3	35.3	30.90	29.35	30.0	48.5	41.44	39.40	40.5
15:00	26.4	24.76	24.00	24.7	34.0	29.50	28.85	29.7	47.9	42.20	39.30	41.2

T_a = Atmospheric temperature, T_w = Wall temperature,

T_{rs} = Room temperature (simulation), T_{rm} = Room temperature (measured)

The obtained room temperature values are plotted and compared with the experimental values. The indices used for the representation includes room temperature obtained by simulation (represented as T_{rs}) and by experimentation (represented as T_{rm}) followed by month and specific date number (22nd January 2003 represented as (J_1-22), 15th March 2003 represented as (M_3-15) and 14th May 2003 represented as (M_5-14)).

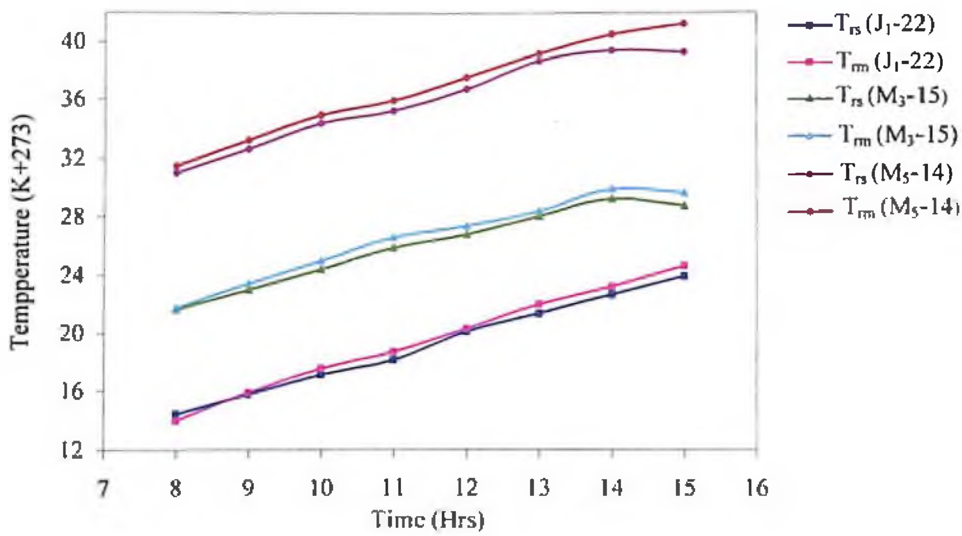


Figure 5.4 Room temperature comparison by simulation and experimentation on 22nd January 2003, 15th March 2003 and 14th May 2003

Computed and measured temperature records inside the room on analyzed dates (Figure 5.4) found in good agreement of results. Average deviation from the measured room temperature values is 2.1%, 2% and 3.16% on 22nd January 2003, 15th March 2003 and 14th May 2003 respectively. The deviation may be due to idealization of the model and neglecting the wind.

Thus, for a representative date from the different months of varying seasons, the temperature values have been verified. This verification supports the conclusion that good agreement of the results is obtained between experimental and the simulation approach. Linear Graph Theory (LGT) is found to be relatively quick, inexpensive and sound methodology. LGT approach can be implemented very easily for the actual energy-efficient buildings for temperature forecast at various salient points.

CHAPTER 6

DETERMINATION OF SUNLIT AREA USING AUTOCAD 3D MODELING

6.1 INTRODUCTION

There can be a significant impact on energy conservation by controlling and managing the energy systems in the buildings. For the control of energy systems, energy management should be done to provide a comfortable environment in the most economical way possible. In case of passive solar architecture, direct gain systems like unconditioned sunspaces, which provides extra surface for absorption of solar radiation and extra mass for its storage, is the most effective as far as heating and day lighting inside the passive solar building is concerned. The principle involved for comfort conditioning of buildings is to regulate sunlit penetration through windows or building openings depending upon the seasonal requirements. Beam radiation, which penetrates inside the buildings through various openings, should be controlled using sunshades for the temperature regulation.

Thus, sunlit area is a measure to determine the radiation interception, which regulates temperature inside the buildings. The Chapter elaborates a methodology for graphical determination of sunlit area inside the buildings, with the aid of software tool: AutoCAD 3D modeling. The analysis has been carried out on specific dates at a particular location. The methodology is validated with the actual measured sunlit area values.

6.2 METHODOLOGY

The available mathematical models need numerical approximation and are often time consuming (Section 2.3, Chapter 2). To overcome the problems, a graphical solution of sunlit area determination has been discussed further. The solution has been obtained using software tool-AutoCAD 3D modeling. The 3D model gives better picture for visualization as well as prediction. The developed method is easy to apply and to predict the sunlit area for any geographic location, at a particular instant of time, throughout the year. A step-wise methodology has been explained further for the development and sunlit area calculation of the 3D model.

6.2.1 MODELING OF VARIOUS WALL FACES

To prepare the model rectangles on various wall faces are drawn. It is better and easier to change the user coordinate system for the ease of work in different desired directions. It is necessary to draw a region to convert a two-dimensional (2D) model into a three-dimension (3D). Thickness is given by extruding the region in a particular direction. 3D intersection option is used to place the window on a particular wall at a particular face as shown in Figure 6.1.

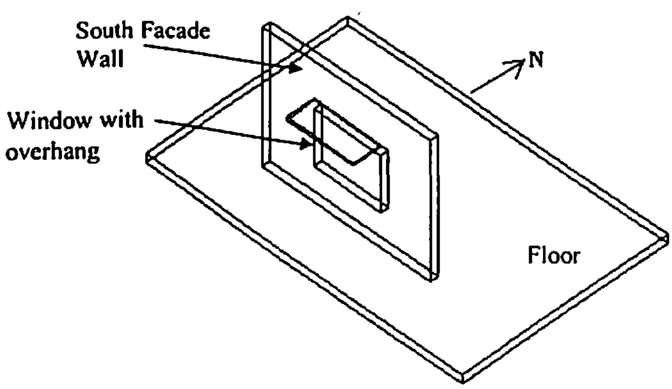


Figure 6.1 3D model of different components of a room

6.2.2 RENDERING FOR SUNLIT AREA DETERMINATION

To get the required sunlit area inside the model a proper rendering is done. Distant light is used to represent the sun position for the simulation purpose (Head, 1995). The sun should be positioned properly by choosing appropriate geographic location or by entering azimuth and altitude angle properly. Daylight saving option should be enabled. Thus, a distant light is used to simulate the position of the sun in relation to the model. A distant light emits uniform parallel light rays in one direction only. Light rays extend infinitely on either side of the point specified as the light source. The intensity of distant light does not diminish over distance; it is as bright at each face it strikes as it is at the source. The direction of a distant light in a drawing is more critical than its location. Although the sun radiates in all directions, because of its size and distance, by the time its rays reach the earth they are effectively parallel. Because a distant light is so frequently used to simulate the sun in this way, especially in architectural renderings, the photo realistic renderers provide a special sun angle calculator that calculates the sun's position based on both the hour of the day and geographic location.

AutoCAD facilitates positioning of the sun graphically as a distant light over specific location. To position a distant light, the azimuth and altitude controls in the new distant light should be used and modify distant light dialog-boxes. To position a distant light for simulating sunlight:

- The model should be aligned in relation to the points of the compass: North, South, East, and West. By default, the y-axis points north.
- A new distant light should be added.
- The light intensity, color should be set properly.
- Shadow option should be turned on.
- To simulate the sun's position sun angle calculator should be used, which helps to decide particular geographic location and sets appropriate azimuth and altitude angle for a particular instance of time.

6.3 ANALYSIS

The graphical approach for the determination of sunlit area is used and evaluated by analyzing two models. Figure 6.2 represents details of the south facade wall of the models (M-7 and M-8, Appendix-D). South facade wall of the model M-7 and M-8 have a window without horizontal sunshade (Figure 6.2.1) and with horizontal sunshade (M-8) respectively. The analysis has been done on two specific dates, 17th January and 10th March at every one-hour interval from 8:30 to 15: 30 hr. solar time to study the variation of computed sunlit area values for various months of different seasons. The obtained sunlit area values by graphical approach have been verified with the experimental hourly-recorded values for the actual constructed models (M-7 and M-8, section D-1, Appendix-D) located at the Birla Institute of Technology and Science, Pilani, India (Latitude: 28.25° N, Longitude: 75.65° E).

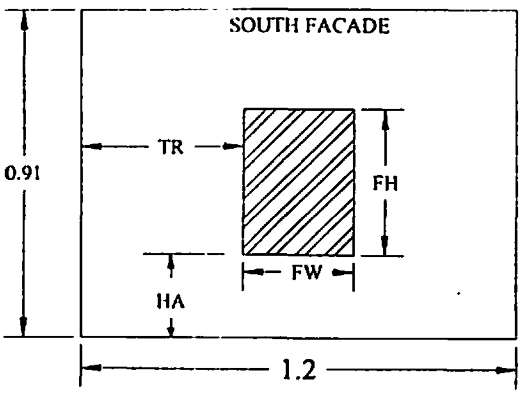


Figure 6.2.1 Model without sunshade (M-7)

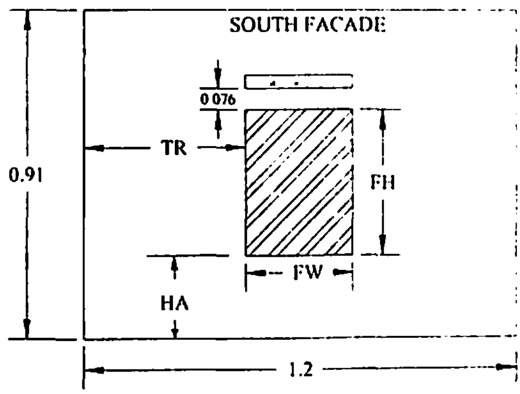


Figure 6.2.2 Model with horizontal sunshade (M-8)

where, Window Width, (FW) = 0.27 m., Window Height, (FH) = 0.37 m.,
Sill Height, (HA) = 0.23 m., Sunshade Projection for (M-8) = 0.15 m.,
Distance between Sidewall and Window Jamb, (TR) = 0.47 m.

Figure 6.2 Details of south facade wall for considered models

6.4 RESULTS AND DISCUSSION

The results of sunlit area determination through the window over south facade wall are shown in Table 6.1 and 6.2. Various sunlit areas have been calculated by the discussed (AutoCAD 3D modeling) graphical approach. On 17th January 2003 as the sunlit area determined on north facing wall is zero, only other internal surfaces of the floor, west wall and east wall are mentioned in the Table 6.1.1 and 6.1.2. As no other opening is available on any other facades there is no intersection of direct sunlight on internal south facade wall.

Table 6.1.1 Total sunlit area computed by AutoCAD 3D modeling on 17th January 2003

Solar Time (Hrs.)	M-7 (Without sunshade): Sunlit area ($m^2 \times 10^{-2}$) on				M-8 (With horizontal sunshade) Sunlit area ($m^2 \times 10^{-2}$) on			
	Floor	West Wall	East Wall	Total	Floor	West Wall	East Wall	Total
08:30	0.783	2.100	-	2.883	0.783	1.78	-	2.563
09:30	16.360	1.795	-	18.155	16.36	0.54	-	16.90
10:30	21.196	-	-	21.196	16.798	-	-	16.798
11:30	22.586	-	-	22.586	16.505	-	-	16.505
12:30	22.586	-	-	22.586	16.505	-	-	16.505
13:30	21.196	-	-	21.196	16.798	-	-	16.798
14:30	16.360	-	1.795	18.155	16.36	-	0.54	16.90
15:30	0.783	-	2.100	2.883	0.783	-	1.783	2.566

Table 6.1.2 Total sunlit area measured experimentally on 17th January 2003

Solar Time (Hrs.)	M-7 (Without sunshade): Sunlit area ($m^2 \times 10^{-2}$) on				M-8 (With horizontal sunshade) Sunlit area ($m^2 \times 10^{-2}$) on			
	Floor	West Wall	East Wall	Total	Floor	West Wall	East Wall	Total
08:30	0.783	2.100	-	2.883	0.783	2.100	-	2.883
09:30	14.860	0.488	-	15.348	14.860	0.488	-	15.348
10:30	19.346	-	-	19.346	16.297	-	-	16.297
11:30	20.150	-	-	20.150	16.020	-	-	16.020
12:30	19.630	-	-	19.630	15.960	-	-	15.960
13:30	19.930	-	-	19.930	15.960	-	-	15.960
14:30	16.360	-	1.795	18.155	14.580	-	0.579	15.159
15:30	0.783	-	1.783	2.566	0.783	-	1.783	2.566

A similar analysis has been done on 10th March. As the sunlit area is available on floor area, only that face has been mentioned in Table 6.2.

Table 6.2 Total sunlit area on 10th March 2003				
Time (Hrs.)	AutoCAD 3D modeling		Experimental	
	M-7 (Without Sunshade): Sunlit area ($m^2 \times 10^{-2}$) on	M-8 (With horizontal Sunshade) Sunlit area ($m^2 \times 10^{-2}$) on	M-7 (Without Sunshade): Sunlit area ($m^2 \times 10^{-2}$) on	M-8 (With horizontal Sunshade) Sunlit area ($m^2 \times 10^{-2}$) on
	Floor	Floor	Floor	Floor
8:30	-	-	-	-
9:30	2.929	2.838	2.963	2.963
10:30	5.358	2.615	5.520	3.070
11:30	7.620	0.902	6.773	0.808
12:30	7.620	0.902	6.706	0.762
13:30	5.360	2.615	5.883	3.200
14:30	2.929	2.838	3.810	3.810
15:30	-	-	-	-

From the Tables 6.1 and 6.2 it is concluded that deviation in the software modeling and experimental values is less for higher values of the sunlit area. For lesser sunlit areas, measurements should be taken with great care and high precision. The main source of error rises from the fact that the boundaries of the sunlit areas are hard to determine due to lack of sharpness of the line between shadow and light. Also, the measurements of the entire sunlit configuration could not be achieved, especially when it falls over more than one surface at a time. A relative error between the experimental measurements and AutoCAD 3D modeling with respect to total sunlit area of all internal surfaces is calculated for each specified hour. On 17th January 2003 for case M-7, the average encountered hourly error amounts to 1%; for case M-8, the average error turned out to be 2%. Similarly on 10th March 2003, for case M-7 average error is reported as 0.6% and for case M-8 average deviation accounted as 0.5%.

Temperature records on the design dates at various day hours are presented graphically (Figure 6.3). Atmospheric temperature (represented as T_A) and temperature inside the models M-7 (represented as T(M-7)) and M-8 (represented as T(M-8)) are recorded.

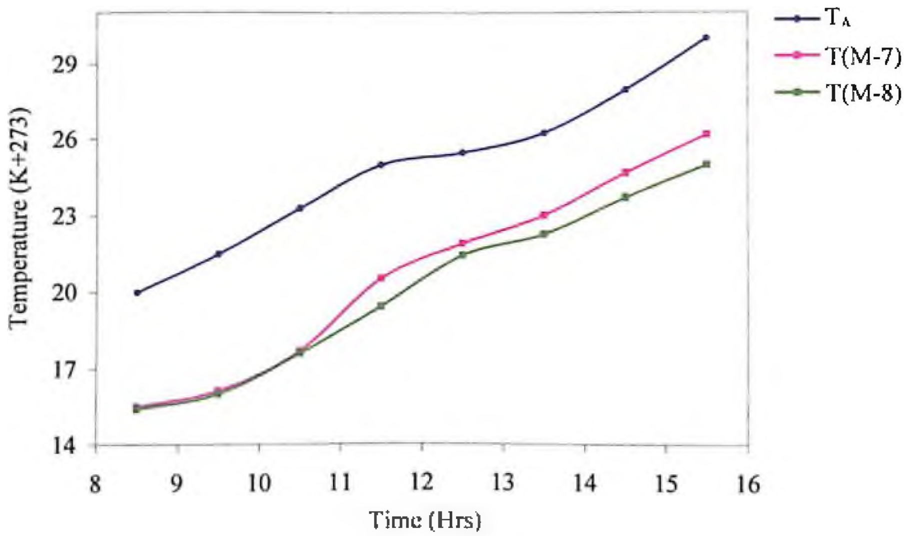


Figure 6.3.1 Temperature records on 18th January 2003

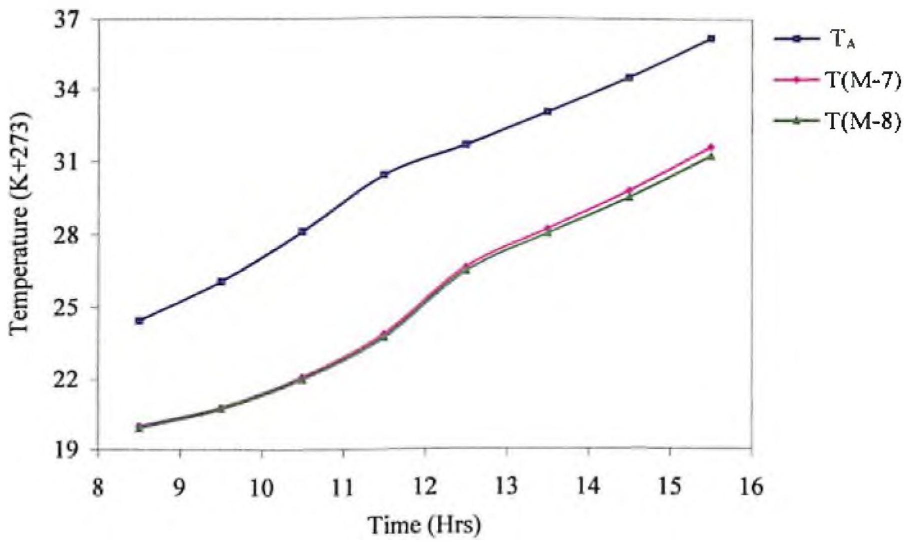


Figure 6.3.2 Temperature records on 10th March 2003

It helps to correlate computed sunlit area values with hourly measured temperature values. Assuming the temperature range for comfort zone lies from (18+273) K to (28+273) K, it is very much clear from Table 6.3 that the horizontal sunshade used for the analysis doesn't affect much in the required heating period on 17th January. Whereas on 10th March, a considerable amount of direct sunlit entry has been blocked by the chosen sunshade in overheated period, which helps to maintain a low temperature inside the model M-8.

Table 6.3 Variation in sunlit area due to use of sunshade			
Date	(%) Blocking of sunlit area by M-8 with respect to M-7		
	Average Blocking	Blocking at Peak Heating Required Hours	Blocking at Peak Cooling Required Hours
17th January	11	9	-
10th March	33	-	44

Thus, for the two specific dates of different months, sunlit area has been calculated for the location Pilani, India and is correlated with hourly temperature records, which helps to analyze the effectiveness of sunshade. Good agreement of the results is obtained between the experimental and developed software approach. Thus, sunlit area inside the model at the desired location has been calculated using the suggested AutoCAD 3D modeling graphical approach, which is helpful for energy management inside the buildings. The complete methodology is easy to represent. Using proper sunshade, sunlit area inside the building can be regulated. The suggested methodology is also helpful for computing the comparative study of various types of sunshades.

CHAPTER 7

DESIGN DEVELOPMENT OF STATIC SUNSHADES

7.1 INTRODUCTION

To reduce the heating and cooling loads of the buildings, energy can be conserved by natural means of solar entry regulation as per the seasonal requirements. The use of the passive cooling and heating technique can significantly contribute in reducing the total energy consumption of the buildings that helps to improve indoor comfort. The main design parameters, which significantly alter the solar contribution to the total cooling and heating load inside the building, are wall area facing the sun, ratio of window to wall area and the provision for proper sunshades. Beam radiation, which penetrates inside the buildings through various openings, can be controlled using sunshades for the temperature regulation. An ideal sunshade is expected to exclude solar radiation during over-heated periods and admit it during under-heated periods. This can be directly achieved through the use of movable, or adjustable sunshades. However, these require special maintenance. Moreover, they are usually not considered as architectural elements, but they may be retrofitted to any building. On the other hand, the required selectivity may also be realized, to a certain extent, through the incorporation of fixed sunshades. The external static sunshades intercept the solar radiation before it enters the building, and hence are most effective in solar control, must be properly designed taking into account the variations of solar positions throughout the year.

Effective design of the external sunshades is a technical problem, which should take into account the diurnal and the annual variations of solar positions and the orientation of the building elements to be shaded depending upon seasonal requirements. In further sections, depending on solar angles, design development of static sunshade is discussed. The design methodology is implemented practically using small-scale modeling technique. Its efficiency is experimentally verified by a comparative study with horizontal sunshades.

7.2 METHODOLOGY

The design methodology for the static sunshade is validated using the experimentation technique, which has been carried out at the Birla Institute of Technology and Science (BITS), Pilani (Latitude: 28.25°N, Longitude: 75.65°E), Rajasthan (India). The considered location for the experimentation falls in hot and dry zone. Several experimental models have been constructed with the insulating material, polyurethane foam (PUF) and the construction material, brick masonry (BM), comprising properties as shown in Table 7.1 (Perry and Chilton 1973, Rohsenow and Harnett, 1973).

Table 7.1 Construction material properties

Sr. No.	Property / Material	Density (kg/m^3)	Thermal Conductivity (W/m. K)	Specific Heat (kJ/kg. K)
1	Brick	1820	0.811	0.88
2	Cement	1762	0.721	0.84
3	Polyurethane Foam	132.12	0.033	1.26

The insulating material used for different building facades leads to nullify the heat transfer effect through them. Thus, it helps to study overall temperature effect inside the model due to sunlit entry through wall openings on particular wall facade. Models constructed with BM construction material facilitate a comparative study of construction materials. The study suggests guidelines for the actual construction of newly designed sunshade. The total amount of sunlit entry is measured in terms of sunlit area inside the model.

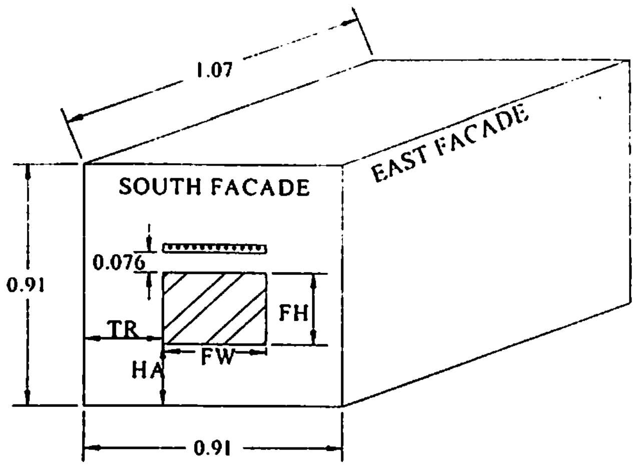
For PUF models and BM models, experimentation was conducted from July 2002-August 2003 and December 2002-March 2004 respectively. The comparative experimental study from July 2002-November 2002, for the different aspect ratio of windows with horizontal static sunshade of PUF models helped to annotate the need for more efficient static sunshade, as well appropriate window dimension for the considered location. Later, the PUF models were modified with new smaller dimensions of south facade window (as per SP: 41, 1987) and various static sunshades including the developed static sunshade. One of the models was retained with horizontal sunshade having greater window height for the comparative study. The sunlit area and temperature has been recorded during December 2002-August 2003 facilitating the inference of the effectiveness of the developed sunshade as compared to the horizontal static sunshade for the considered design dates.

Five BM models are constructed with the dimensions as per actual room size (SP: 41, 1987). The window dimensions of BM models vary in terms of aspect ratio. Various static sunshades are designed and constructed over the windows, from which comparative study of the constructed models is carried out. PUF and BM models are also compared to prove the effectiveness of the developed sunshade.

A detailed methodology for deciding desired geometric shape and dimensions of developed sunshade for the considered geographic location is described. Depending upon the solar position, instantaneous measurements of the sunlit area on the internal wall surfaces and windowsill, shadow areas over south facade wall and temperature records of the room have been measured every hour in solar time. From the solar chart of the corresponding latitude, shading mask diagrams are plotted.

7.3 MODEL DESCRIPTION

In all, six models of PUF are analyzed. Three models (M-1, M-2 and M-3) are constructed and placed on the roof terrace of the Institute (BITS) building to make the models shadow free from adjacent buildings. The model room has rectangular parallelipipedic enclosure with a south oriented single window (Figure 7.1). Model dimensions have been chosen as per Messadi (1990) and the experimentation has been carried out for the duration July 2002-November 2002. Later, the window dimensions of previously constructed models have been modified as per SP: 41 (1987) and the experimentation has been continued for the modified models (M-4, M-5 and M-6) over the duration December 2002-August 2003. Figure 7.1 and Table 7.2 indicate the detailing of model dimensions. The wall thickness of the models has been maintained between 0.0254 m. -0.0381 m. for the complete solar intersection on internal wall surfaces.



Note: All dimensions are in meters

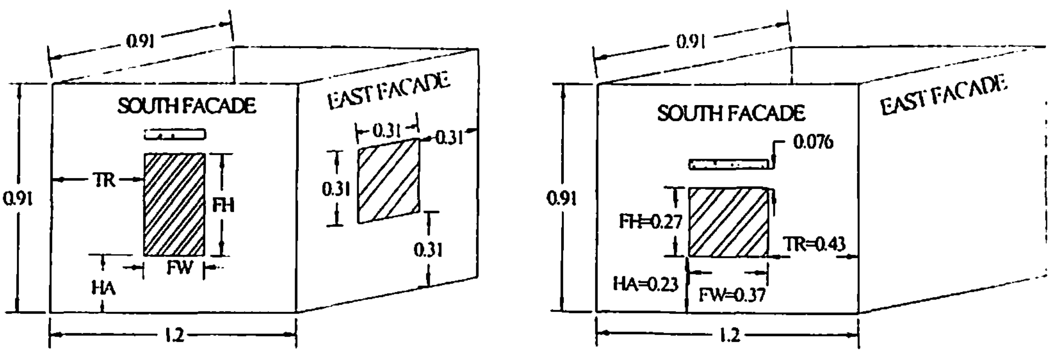
Figure 7.1 Polyurethane foam model

Table 7.2 Dimensions of PUF model room

Duration	July 2002-November 2002			December 2002- August 2003		
Parameter	Model 1 (M-1)	Model 2 (M-2)	Model 3 (M-3)	Model 4 (M-4)	Model 5 (M-5)	Model 6 (M-6)
Window Width FW (m.)	0.61	0.41	0.61	0.37	0.37	0.304
Window Height FH (m.)	0.41	0.61	0.41	0.27	0.27	0.38
Sill Height HA (m.)	0.25	0.15	0.25	0.23	0.23	0.23
Dist. (Sidewall-Window Jamb) TR (m.)	0.15	0.25	0.15	0.27	0.27	0.303
Sunshade Type*	H	H	N	H	D	H
Sunshade Projection (m.)	0.15	0.15	-	0.15	0.15	0.15

* H- Horizontal sunshade, N-No sunshade, D-Developed sunshade

The performance of the models M-4 and M-6 with horizontal static sunshades is analyzed with the model M-5, which is built with the developed sunshade. The sunlit area on internal surfaces and temperature records of the room are measured hourly in solar time. Similarly, five BM models (M-7 to M-11) have been constructed on a plot at BITS, Pilani away from buildings to avoid shadowing problems. All the models are of the same dimensions with different aspect ratio of windows and type of sunshades (Figure 7.2 and Table 7.3). The models are of half brick wall thickness (0.0762m.) with minimum plaster thickness (0.0254m.) on both internal and external surfaces.



7.2-a (M-8) **7.2-b (M-9)**

Note: All dimensions are in meters

Figure 7.2 Brick masonry models

Table 7.3 Dimensions of BM models (December 2002-March 2004)

Parameter	Model 7 (M-7)	Model 8 (M-8)	Model 9 (M-9)	Model 10 (M-10)	Model 11 (M-11)
Window Width FW (m.)	0.27	0.27	0.37	0.37	0.27
Window Height FH (m.)	0.37	0.37	0.27	0.27	0.37
Sill Height HA (m.)	0.23	0.23	0.23	0.23	0.23
Dist. (Sidewall-Window Jamb) TR (m.)	0.47	0.47	0.43	0.43	0.47
Sunshade Type*	N	H	H	D	D
Sunshade Projection (m.)	-	0.15	0.15	0.15	0.15

* H- Horizontal sunshade, N-No sunshade, D-Developed sunshade

Although the models M-7, M-8 and M-11 have the same aspect ratio for the south facade window, M-7 is without sunshade and M-8 and M-11 are with horizontal and developed sunshade respectively. The models M-9 and M-10 have reverse aspect ratio as that of M-7, M-8 and M-11. Over the window of models M-9 and M-10, horizontal and developed sunshades are constructed respectively. The models M-7 to M-11 are for the data obtained over the duration December 2002-March 2004.

7.4 DESIGN DEVELOPMENT OF STATIC SUNSHADE

The sun's position in the sky changes from day to day and hour to hour. It is common knowledge that the sun is higher in the sky in summer than in winter. In Northern hemisphere, the sun rises south of east in winter and north of east in summer. Knowing the latitude, declination and hour angle, the solar altitude and azimuth angles are computed. For the shading calculations the profile angle is computed.

A design procedure enables a free form line, in plan, to be projected into a position in three-dimensional space such that line represents the outer extremity of the sunshade and will shade the window for the specified period. Alternatively, a particular geometric form may be superimposed over the window and the feasibility will be checked. The appropriateness of the geometry selected as a basis for the design will be a function of facade orientation.

Stepwise methodology for the static sunshade development is as follows.

- With the given orientation of the facade for which a static sunshade is to be designed, a decision as to the design day and the period of time on that design day during which the window is to be shaded is made. For example, keeping in view the climatic conditions over the considered location (Pilani), 22nd December is chosen as first design day, for which total exposure of the window on south facade wall is desired and 23rd March is chosen as the second design day, for which complete shading is desired throughout the day.
- The corresponding vertical and horizontal shadow angles at a close interval of time for accurate geometry of desired static sunshade, which defines the movement of sun relative to a normal projection from the face of the façade is computed.

- A decision about the maximum projections of the static sunshade from the face of the building and also on its extension beyond each side and above the window is made.
- Then the sun's movement relative to building facade and window position to obtain the desired geometry of static sunshade is plotted.

Thus, using horizontal shadow angles, the sun's position relative to normal to the wall is plotted in the plan. The sun's morning and afternoon movement is plotted from the western-most lower edge and eastern-most lower edge of the window. The obtained intersection points in plan are projected in side-view with the vertical shadow angles from lower edge of the window. These points are then projected onto the elevation. The most important part is the practical design of the obtained geometry of sunshade.

For the considered place (Pilani, Rajasthan, India), geographic location details are as- Latitude: 28.25°N, Longitude: 75.65°E. Studying the atmospheric data from previous years it is inferred that the climatic condition over the region is extreme. With reference to solar chart and comfort temperature zone (18-27°C) the design dates have been chosen for the design development of static sunshade. 22nd December, the date when the sun is at the lowest position in the sky, is chosen as the first cut off date. From the climatic point of view, it lies in extreme winter, and hence, should allow full entry of sun through the window. Similarly 23rd March (equinox), where the sun is appreciably at higher heights in the sky, is chosen as the second cut off date. From the climatic point of view, the second cut off date lies, where the season changes from comfort to summer after which there should be no direct entry of sun inside the model. Assumption made for the design development of static sunshade is that the sun entry is between 8 a.m. to 4 p.m. solar time from south facade window inside the model. Using the described methodology the developed geometry of the static sunshade for the considered dates is obtained as shown in Figure 7.3.

Considering the problem of accumulation of rainwater at the interface between sunshade and wall surface, minimum amount of drop-down is made at the end of the sunshade. Ferro-cement (Reinhold, 1974) is used to obtain complex shape for the actual construction. The desired geometry is achieved by pre-cast technique with the developed wooden formwork. The constructed models are shown in Section D-1 (Appendix-D).

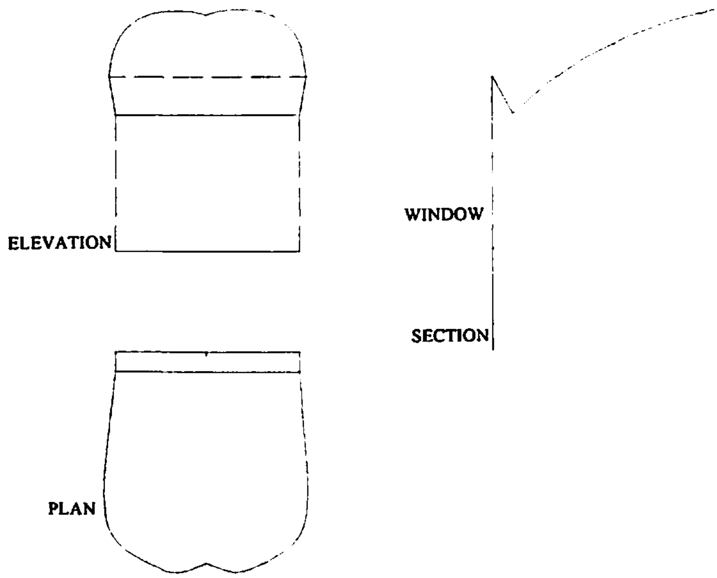


Figure 7.3.1 Plan, section and elevation of developed static sunshade

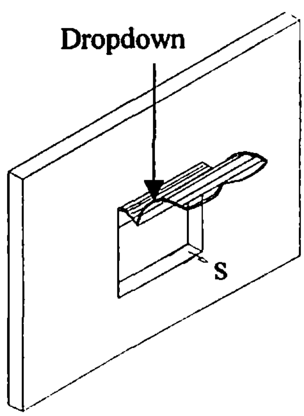


Figure 7.3.2 Isometric view of developed static sunshade

Figure 7.3 Developed static sunshade

7.5 ANALYSIS

For the constructed models, analysis is carried out from the various recorded modes of solar intersection i.e., either sunlit area through the window or sunlight on windowsill area, that have been measured depending upon the solar position and temperature inside the models (Section D-2, Appendix-D). For the models of greater thickness (BM models), during peak summer, the shadow over the south facade wall have been measured and correlated with the temperature records inside the models. The various values have been recorded throughout the year during sunlight hours through various days. The graphs presented in the section represent timely variation developed wooden formwork. The constructed models are shown in Section D-1 (Appendix-D).

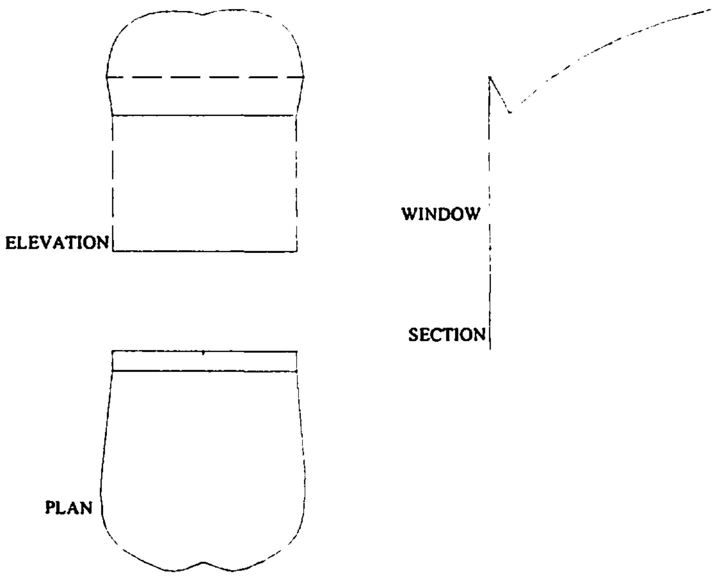


Figure 7.3.1 Plan, section and elevation of developed static sunshade

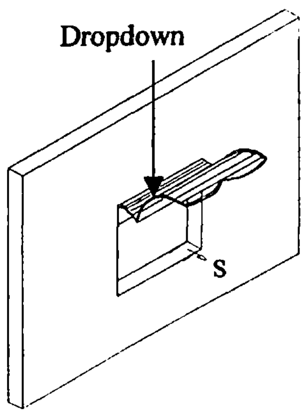


Figure 7.3.2 Isometric view of developed static sunshade

Figure 7.3 Developed static sunshade

7.5 ANALYSIS

For the constructed models, analysis is carried out from the various recorded modes of solar intersection i.e., either sunlit area through the window or sunlight on windowsill area, that have been measured depending upon the solar position and temperature inside the models (Section D-2, Appendix-D). For the models of greater thickness (BM models), during peak summer, the shadow over the south facade wall have been measured and correlated with the temperature records inside the models. The various values have been recorded throughout the year during sunlight hours through various days. The graphs presented in the section represent timely variation of the measured sunlit area or shadow area and temperature inside the models. With the help of sunlit area determination by 3D modeling, it has been generalized that the intersection of sunlight from south facade wall is over the duration from 8 am. to 4 pm. throughout a day. Every model has three temperature records, one at center of the model and other two at location 0.3048 m. apart from the center. The average value is considered for the analysis. The digital thermometer sensor has been maintained at around 0.3048 m. above ground. Sunlit area has been measured on different inner wall surfaces and floor of the models. The intersection of sunlight through south facade wall has been observed mainly on three internal surfaces i.e. west wall, floor and north wall.

During the analysis for the complete duration (July 2002-August 2003), sunlit area has been measured inside PUF models (M-1 to M-6). Similarly, for BM models (M-7 to M-11) depending upon solar positions, various area values have been measured throughout the year. Sunlit areas have been recorded inside all the five models (M-7 to M-11) over a period from December 2002-March 2003 and September 2003-December 2003. Sunlight on windowsill area has been recorded in all the five models over a period from April 2003-May 2003 and August 2003-September 2003. During May 2003-July 2003, although sunlight on windowsill area recording has been continued in the model M-7, for all other models (M-8 to M-11) shadow area over south facade wall has been recorded.

The detailed analysis has been represented with possible closest date to average day of a month to represent the behavior of recorded data for the models. Different indices are used to represent the entities. Overall temperature variation from 23rd July 2002- 3rd March 2004 is represented with a suitable plot between temperature vs dates. The trend for maximum temperature (represented as T(Maximum)) and minimum temperature (represented as T(Minimum)) are shown and discussed in detail for seasonal classification.

A representative date from each month is represented graphically for the study. A plot between temperature vs time represents the measured hourly temperature values on the specific date. The recorded temperature values are atmospheric temperature (represented as T_A) and the average temperature values measured inside the models M-1 to M-11 (represented as T(M-1) to T(M-11)).

Variation of measured sunlit area over the time is represented in different plots. The hourly sunlit area measured values inside the models M-1 to M-6 are represented as S_A(M-1) to S_A(M-6). The area under sunlit area curve is plotted for the study of overall behavior of the models M-1 to M-6 (represented as S_L(M-1) to S_L(M-6)) and compared with the plots of average temperature observed inside the models M-1 to M-6 (represented as T_{avg}(M-1) to T_{avg}(M-6)) over the total duration of analysis (Section D-2, Appendix-D).

The study is extended further for the BM models. Different area values measured during the experimentation for the models M-7 to M-11 over specific duration are represented as the area under sunlit area curve (represented as S_L(M-7) to S_L(M-7)) and the area under windowsill area curve (S_l(M-7) to S_l(M-7)). Measurement of shaded area on south facade wall is done for the models M-8 to M-11 and the area under shadow area curve (represented as S_H(M-7) to S_H(M-7)) are plotted.

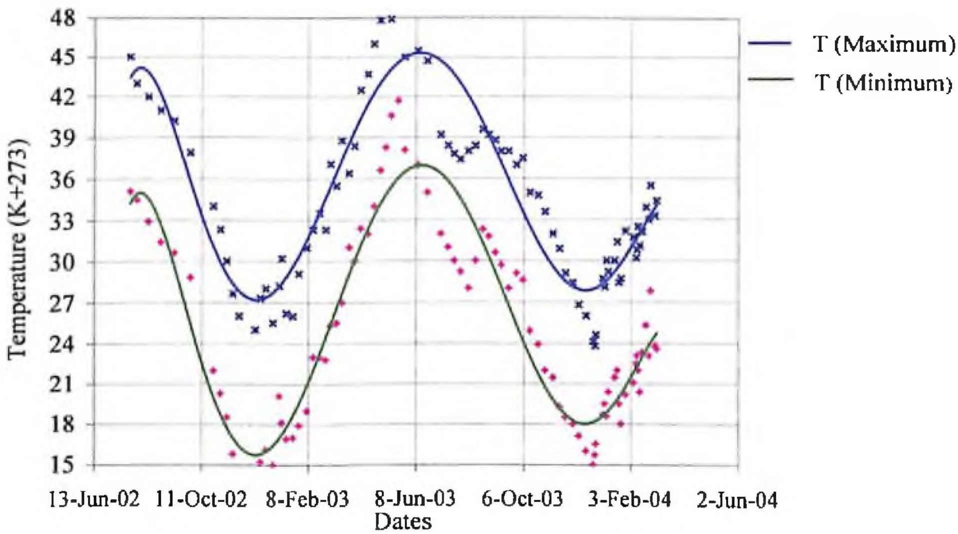


Figure 7.4 Overall temperature variation from 23rd July 2002- 3rd March 2004

Figure 7.4 represents maximum and minimum temperature over considered complete experimentation duration (July 2002- March 2004) that helps to classify the months into various seasons as mentioned in Table 7.4.

Table 7.4 Seasonal classification	
Month	**Seasonal classification**
November, December, January	Winter
October, February	Comfort
September, March	Moderate (Maximum: Discomfort)
April, May, June, July, August	Summer

With respect to considered location and climatic classification, the solar position observed during the summer months is high and hence sunlit area recorded during these months is negligible. For the models M-1, M-2 and M-3, Figure 7.5 indicates the temperature variation on 23rd July 2002. The total sunlit area recorded is almost negligible and hence the temperature variation is also small in all the models.

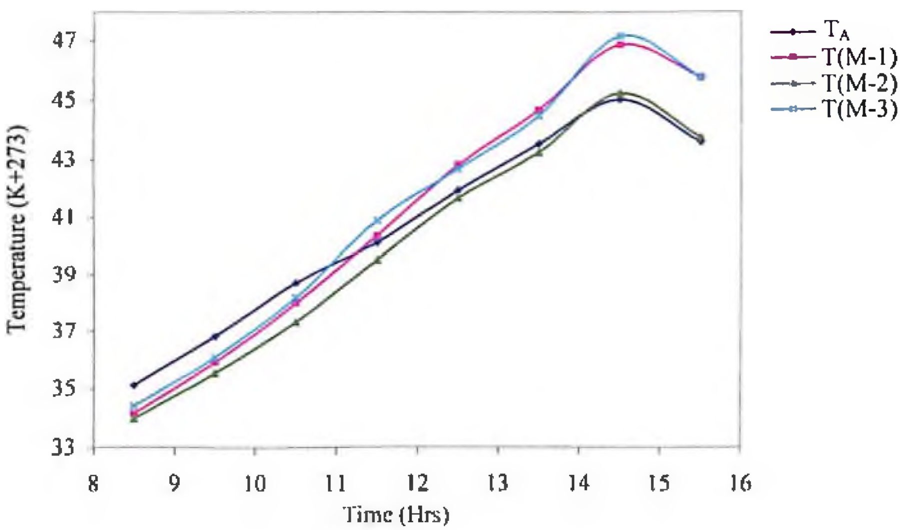


Figure 7.5 Temperature records on 23rd July 2002

From Section D-2 (Appendix-D) it is observed that similar trend continues further for the previously considered models over the month of August 2002 also, with negligible sunlit area inside the models and small temperature variation.

Keeping in view the average day (16th) of August, the temperature variation observed on the closest possible day is represented in Figure 7.6 and is not varying appreciably inside the models M-1, M-2 and M-3.

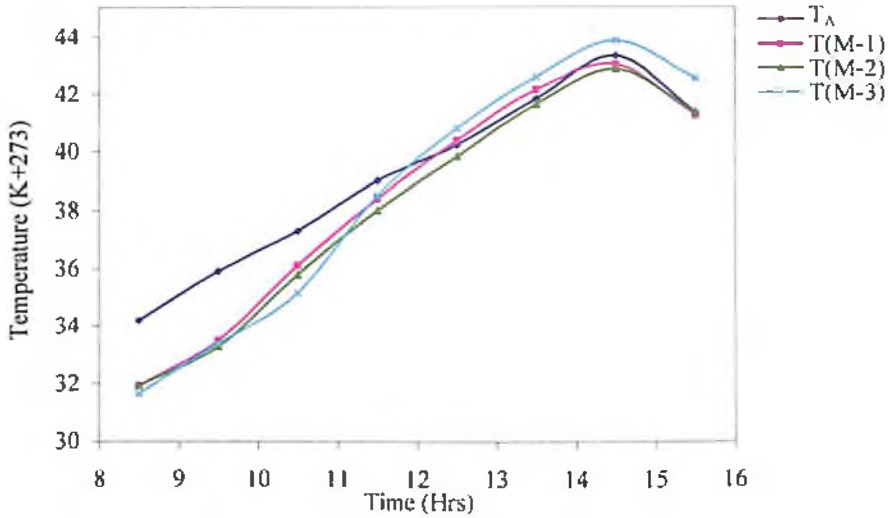


Figure 7.6 Temperature records on 17th August 2002

With the obtained sunlit area inside the models (Figure 7.7.1) on 17th of September 2002 and corresponding temperature variation (Figure 7.7.2) the methodology correlating sunlit area and temperature inside the model is explained.

The area under sunlit area curve is the decision criteria to decide the effectiveness of static sunshades. To obtain the area, regression analysis is carried out. The second order equation is found suitable with the trend obtained for the curves as shown in Figure 7.7.1. For example, considering the nature of curve obtained for the model M-I as shown in Figure 7.7.1, whose equation after regression analysis is obtained as

$$Y = 0.4741X^2 - 4.1468X + 16.822 \qquad \ldots 7.1$$

Using Simpson's rule for integration (Allison, 1999) areas under the sunlit area curves is calculated. For the above-mentioned Eqs. (7.1), after integration within the time limits (8 a.m. to 4 p.m., i.e. 8 Hrs.) the sunlit area value is 67.75×10^{-4} m^2. Likewise, computation of the area under sunlit area curves is obtained for all the other models.

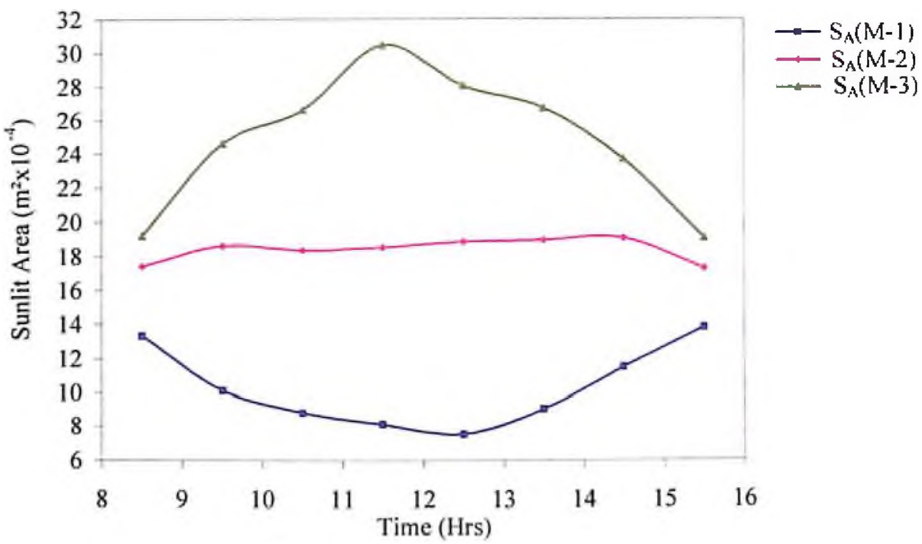


Figure 7.7.1 Sunlit Area records on 17th September 2002

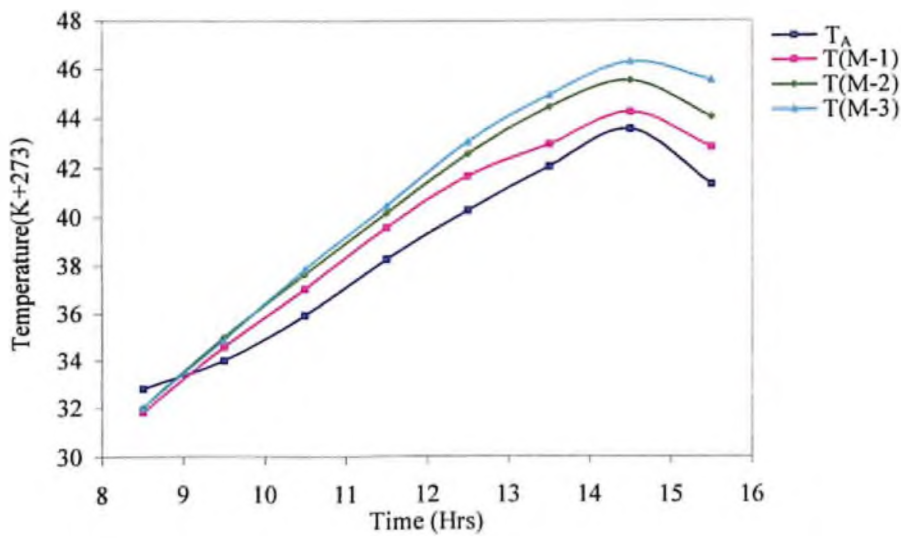


Figure 7.7.2 Temperature records on 17th September 2002

With reference to Figure 7.7.1, areas obtained under models M-2 and M-3 are 129.32 $\times$ 10^{-4} m^2 and 180.23 $\times$ 10^{-4} m^2 respectively. From the computed areas for various models it is inferred that the model M-1 (horizontal window with horizontal sunshade) is having least sunlit area under the curve. From the temperature curve (Figure 7.7.2), it is observed that the ambient temperature for the considered month (September) is above comfort zone (18-27°C) and hence there should be maximum shading against direct entry of sun inside the models. The average temperature gain inside the models (Figure 7.7.2) is proportional to effective sunlit area inside the models (Figure 7.7.1) and hence performance-wise one can rate the model M-1 the best for the present consideration, model M-2 (vertical window with horizontal sunshade) as a moderate option whereas model M-3 (horizontal window without sunshade) is found unsuitable.

To study the overall effectiveness over the window dimensions and sunshade type, further analysis is carried out. The variation of sunlit area and temperature on 17th of October 2002 (Figure 7.8.1, Figure 7.8.2) and 16th November 2002 (Figure 7.9.1, Figure 7.9.2) have been represented graphically, from which it is interpreted that temperature increases with increase in sunlit area.

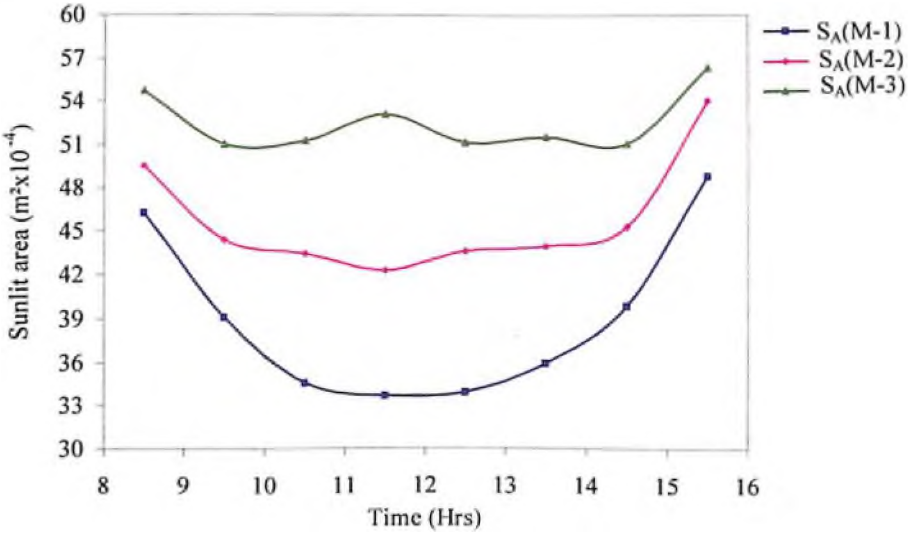


Figure 7.8.1 Sunlit area curve on 17th October 2002

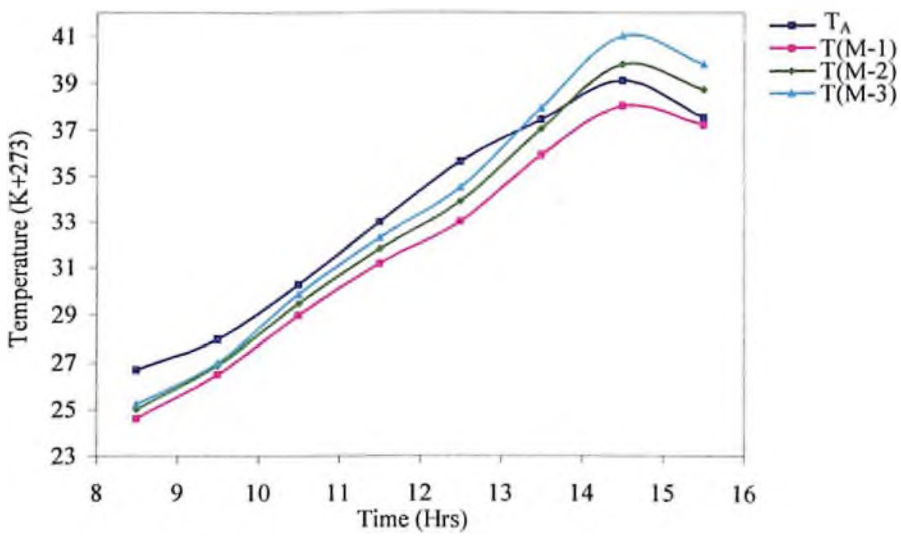


Figure 7.8.2 Temperature records on 17th October 2002

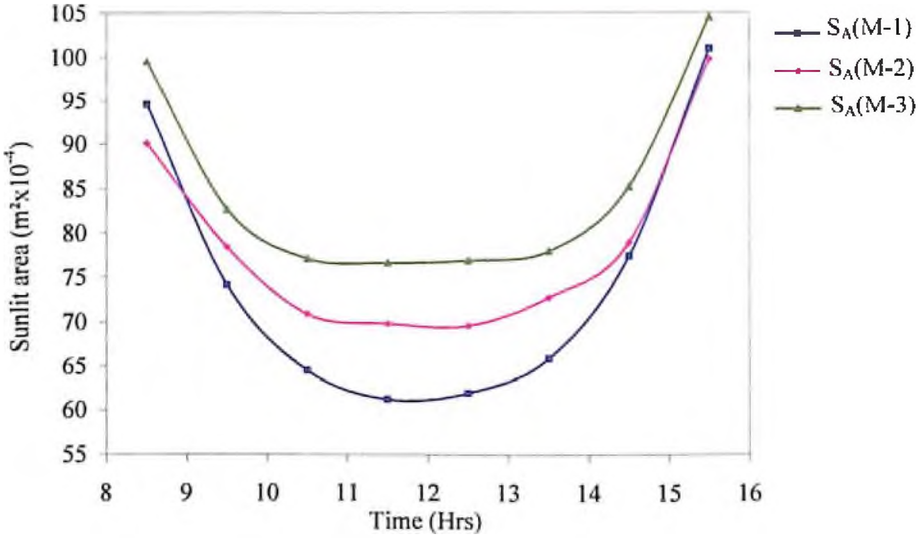


Figure 7.9.1 Sunlit area curve on 16th November 2002

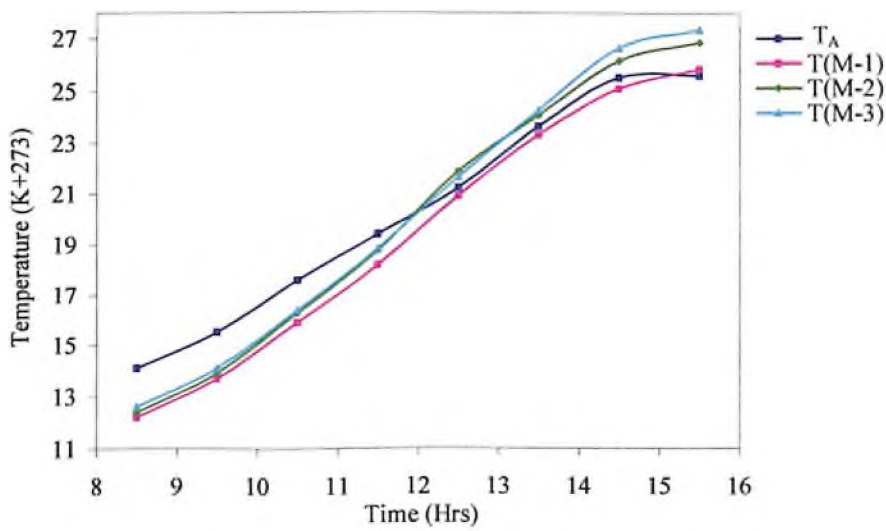


Figure 7.9.2 Temperature records on 16th November 2002

The overall effect on sunlit area (Figure 7.10.1) and temperature (Figure 7.10.2) inside the models M-1, M-2 and M-3 is studied. Throughout the experimentation duration, it is observed that the model M-3, (model having window with lesser height as compared to width and without sunshade, Table 7.2) have maximum sunlit area intersection (Figure 7.10.1). Secondly model M-2, (model with more window height as compared to width and with horizontal sunshade, Table 7.2) possess intermediate characteristics of a sunlit area intersection (Figure 7.10.1).

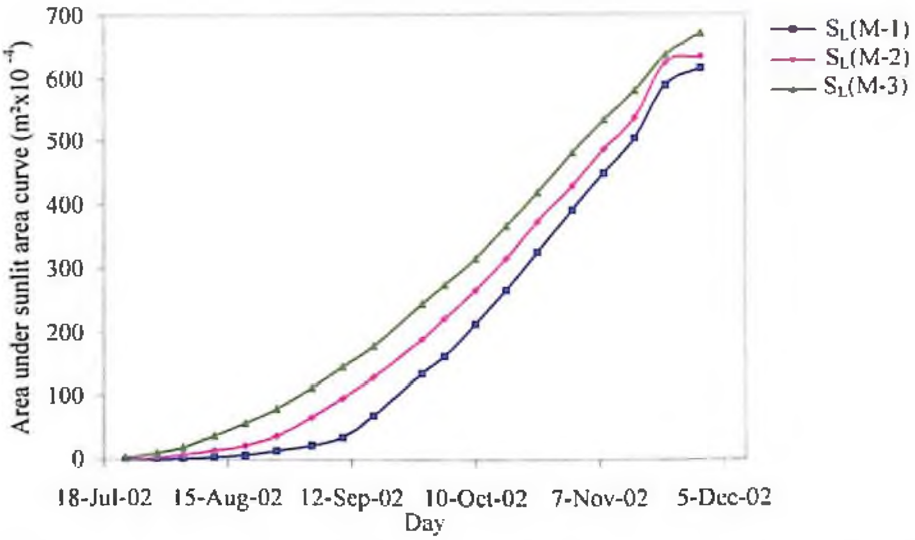


Figure 7.10.1 Area under sunlit area curve from 23rd July 2002-30th November 2002

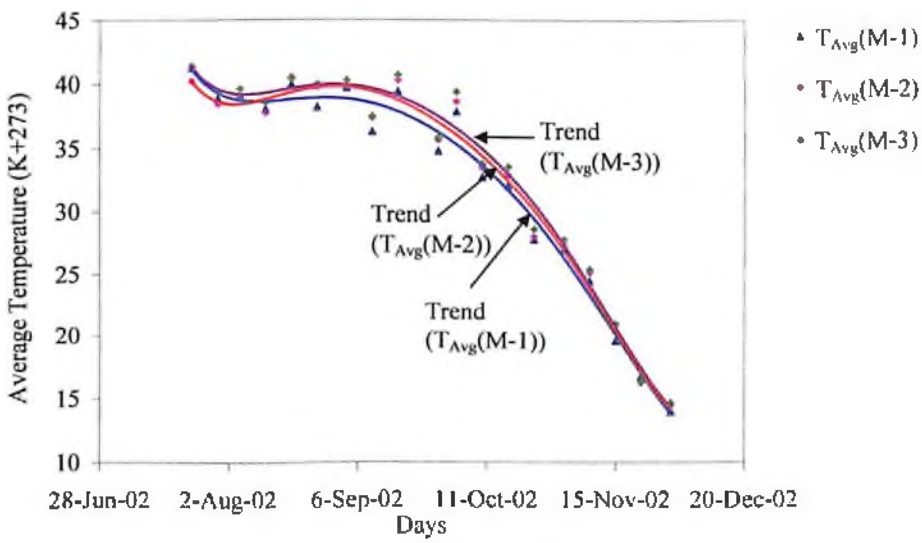


Figure 7.10.2 Average temperature records from 23rd July 2002- 30th November 2002

Lastly, in model M-1, (model with lesser window height as compared to width and with horizontal sunshade, Table 7.2) has the least sunlit area intersection (Figure 7.10.1). The shading characteristics should vary as per seasonal requirements. Over the considered location (Pilani), it is clear that over the duration July - October cooling requirement is more and during the month of November heating is needed (Figure 7.4). Hence the model M-1 is more effective as compared to the models M-2 and M-3. Overall average percentage saving of sunlit area during overheated period (23rd July 2002- 17th October 2002) inside the model M-1 over model M-3 is 43.5%, whereas as compared to model M-2 it is 23%. Further during winter (November 2002) the similar trend has continued. Due to low position of the sun in the sky, sunlit area inside the models M-1 and M-2 is not varying appreciably. As the model M-3 is without sunshade, it has shown maximum sunlit area, which is undesirable for summer season. Thus, it is inferred that horizontal sunshades satisfies shading characteristics partially. Figure 7.10.2 indicates average temperature variation over complete duration. Although sunlit area is fairly varying, the effect of temperature variation is small. The reason for the variation may be due to less solar intensity in the winter season as well as large exposure, i.e. window area is much higher in proportion over south facade wall. Thus, the need for more accurate window dimensions over a particular wall is rightly pointed out. For the further study, with modified window area as per SP: 41 (1987), the models M-4, M-5, M-6 (Table 7.2) have been analyzed with sunlit area and temperature characteristics over the duration December 2002-July2003, to determine the effectiveness of developed sunshade depending on the seasonal requirement.

The total variation of the sunlit area (Figure 7.11.1) and temperature (Figure 7.11.2) findings inside the modified models M-4, M-5 and M-6 (Table 7.2) during average day (10^{th}) of December 2002 is analyzed. It is inferred that the model M-5 with developed static sunshade has higher sunlit area throughout the average day, 10-December, 2002 (Figure 7.11.1) as compared to the model M-4, with horizontal static sunshade, which in turn gains higher temperature (Figure 7.11.2). With the considered climatic classification (Table 7.4), it is observed that December lies in winter season where the heating is required most and hence the developed static sunshade performs well in winter season. Model M-6 is having larger window dimensions and hence the sunlit area and temperature are more in comparison with model M-4 and M-5. Further analysis is continued for the months of varying season (Table 7.4) from winter (January) to comfort zone (February).

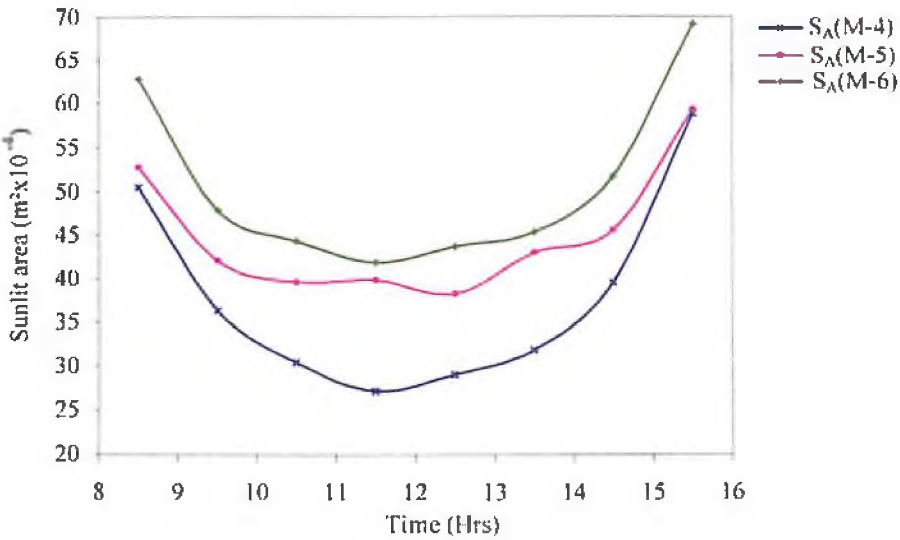


Figure 7.11.1 Sunlit area curve on 10th December 2002

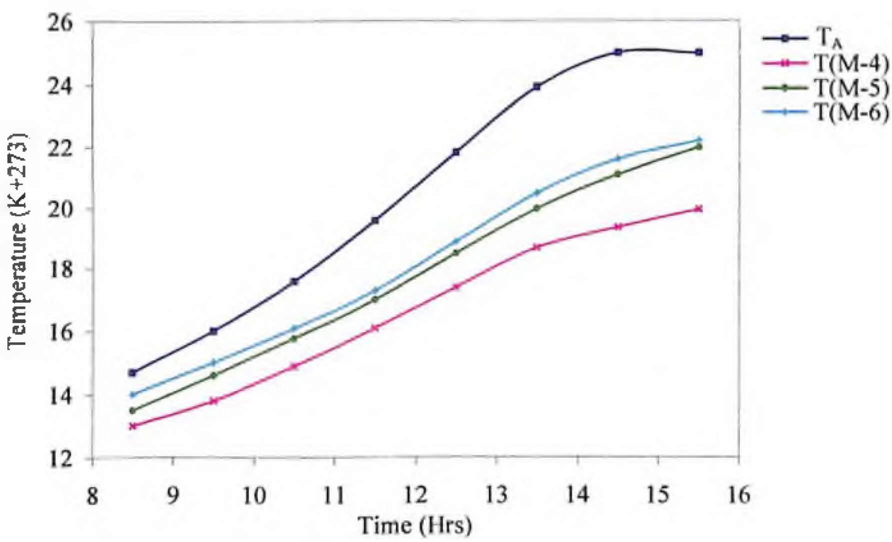


Figure 7.11.2 Temperature records on 10th December 2002

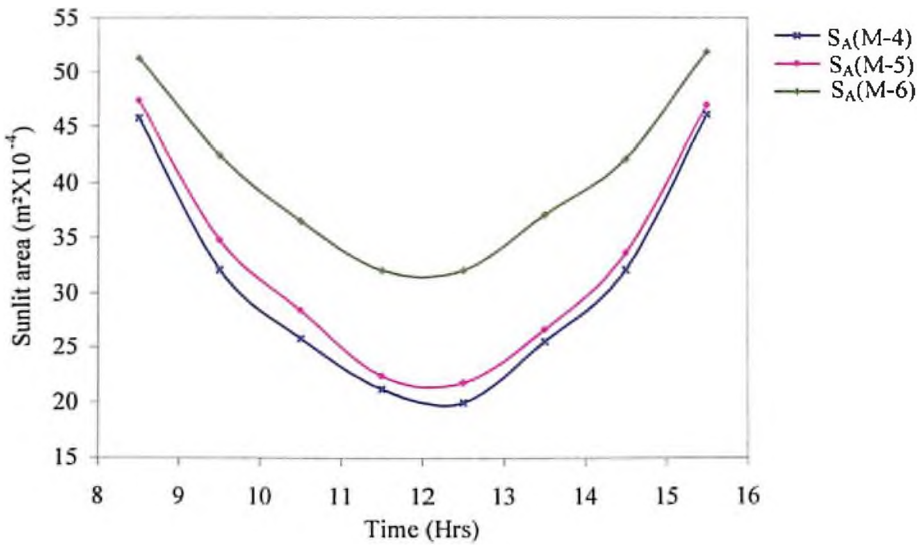


Figure 7.12.1 Sunlit area curve on 11th January 2003

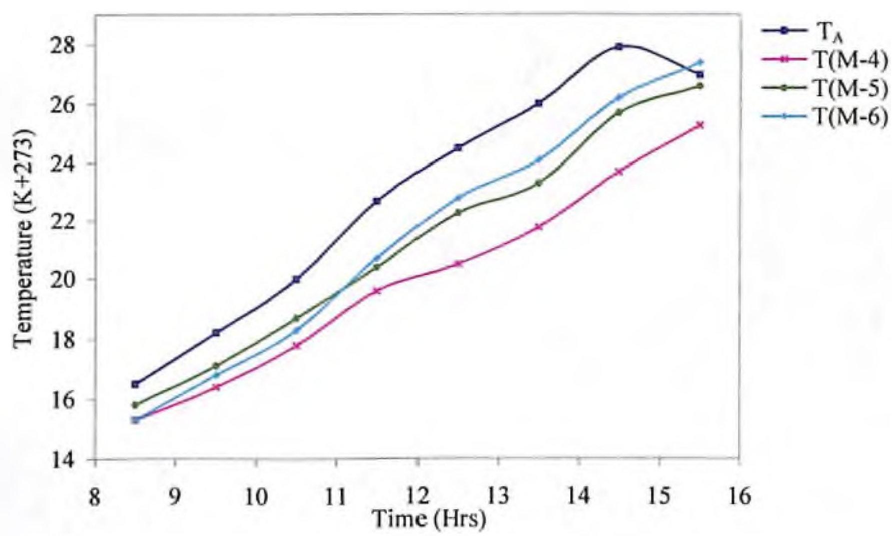


Figure 7.12.2 Temperature records on 11th January 2003

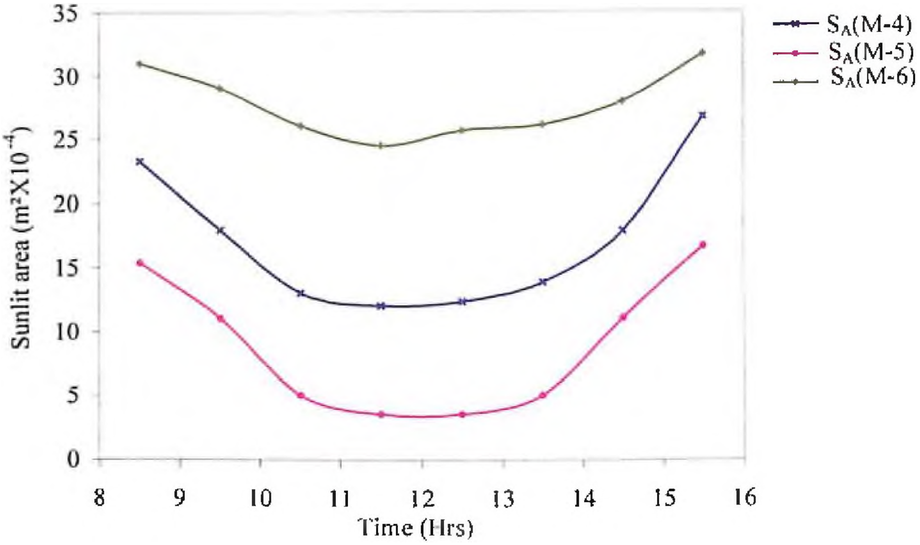


Figure 7.13.1 Sunlit area curve on 18th February 2003

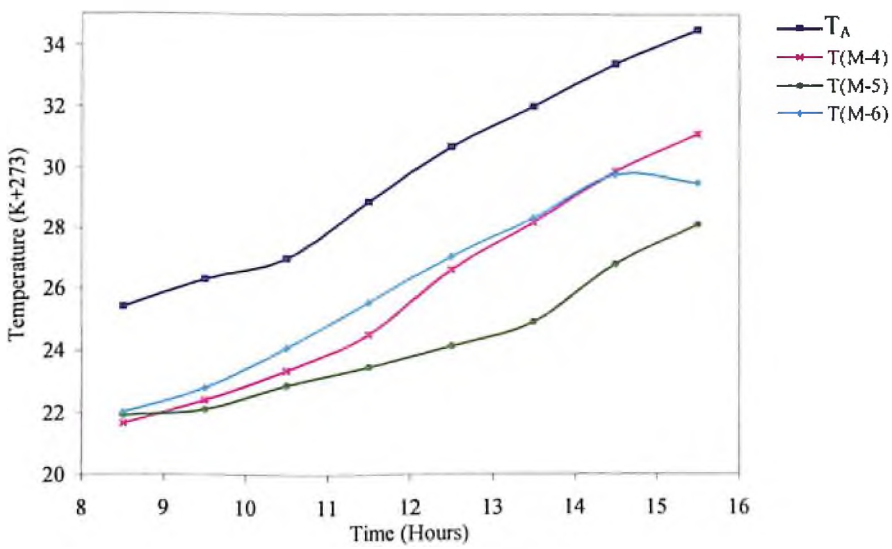


Figure 7.13.2 Temperature records on 18th February 2003

Model M-5, (developed static sunshade) shows change in nature i.e. sunlit area (Figure 7.12.1, Figure 7.13.1) and temperature (Figure 7.12.2, Figure 7.13.2) decreases with respect to model M-4 (horizontal sunshade). Model M-6 represents maximum sunlit area and temperature. By further proceeding over next month (March), where maximum temperature is higher than comfort range of temperature, maximum sunlit entry inside the model should be restricted.

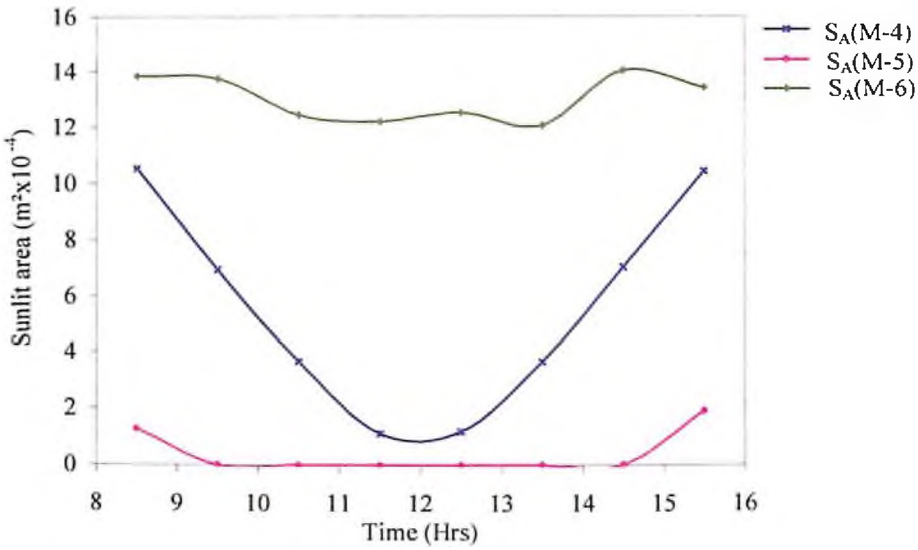


Figure 7.14.1 Sunlit area curve on 17th March 2003

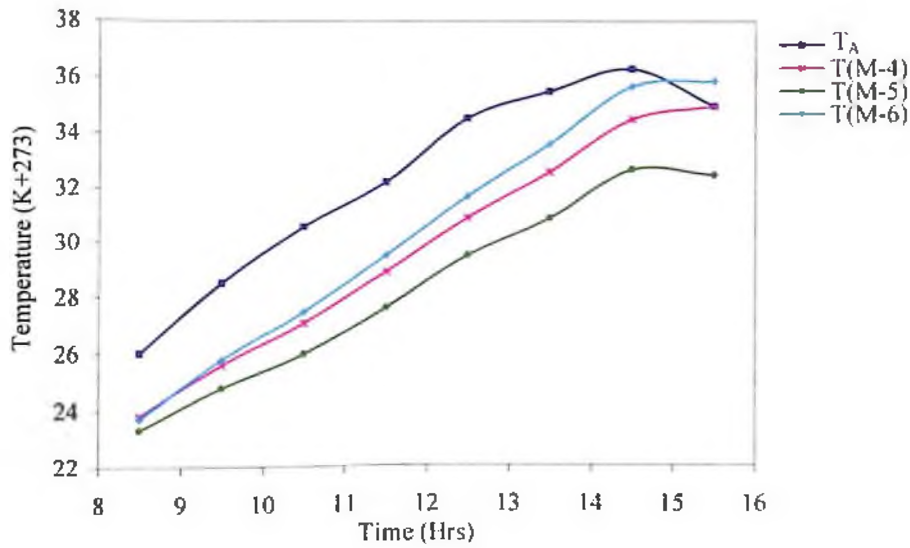


Figure 7.14.2 Temperature records on 17th March 2003

From Figure 7.14.1 it is observed that during the analyzed date, 17-March 2003 sunlit area is minimum for the model M-5 with developed sunshade, which in turn represents minimum temperature (Figure 7.14.2) as compared to model M-4. Model M-6 represents maximum sunlit area and temperature, which is undesirable due to higher heat gain and thus increases cooling load.

The analysis is continued further over summer season (April 2003-July 2003), with the varying trends of sunlit area and temperature findings inside the models on representative dates of a particular month.

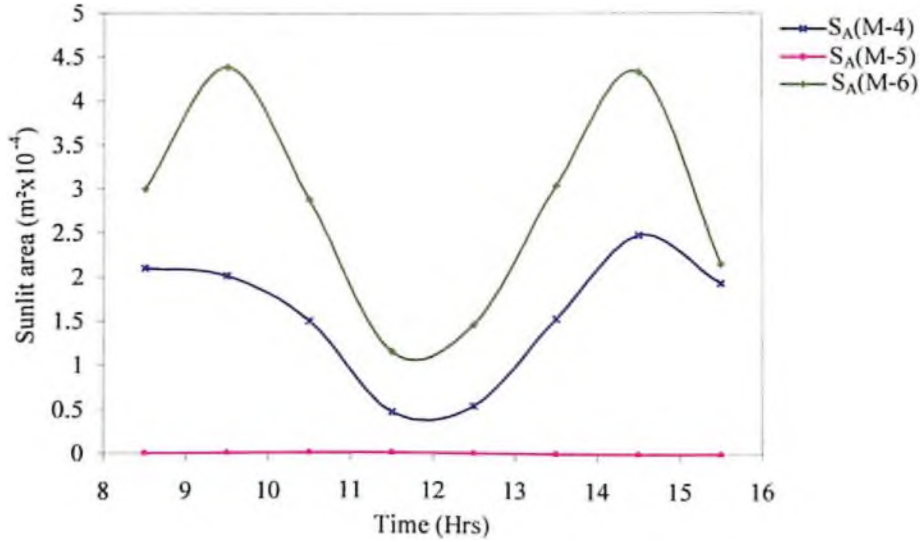


Figure 7.15.1 Sunlit area curve on 15th April 2003

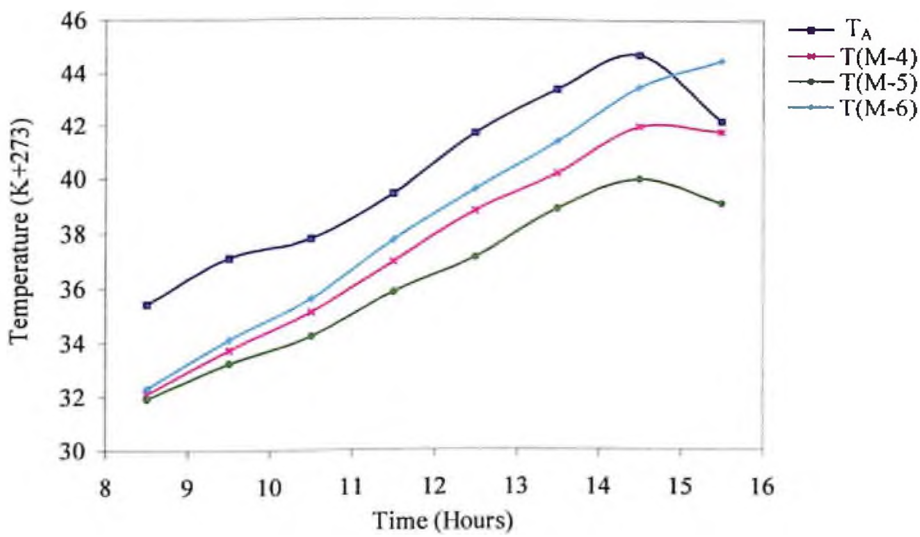


Figure 7.15.2 Temperature records on 15th April 2003

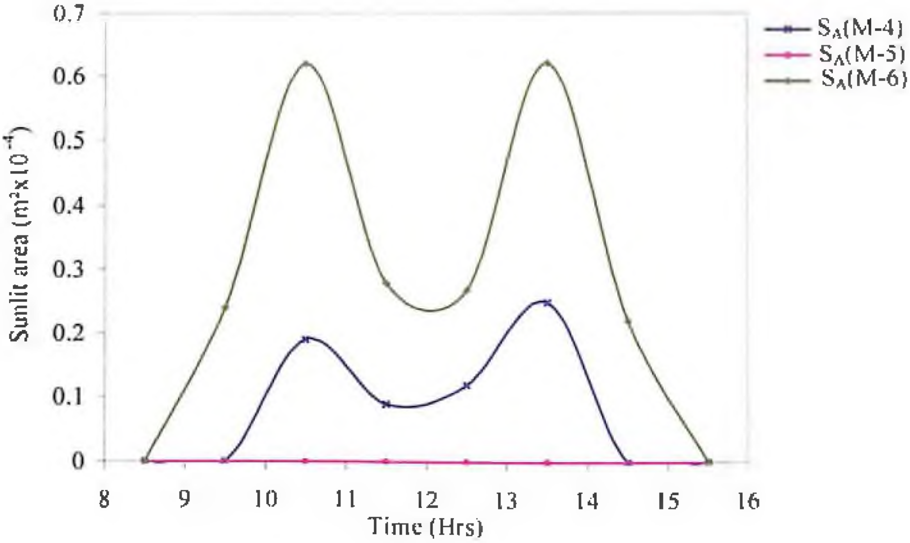


Figure 7.16.1 Sunlit area curve on 10th May 2003

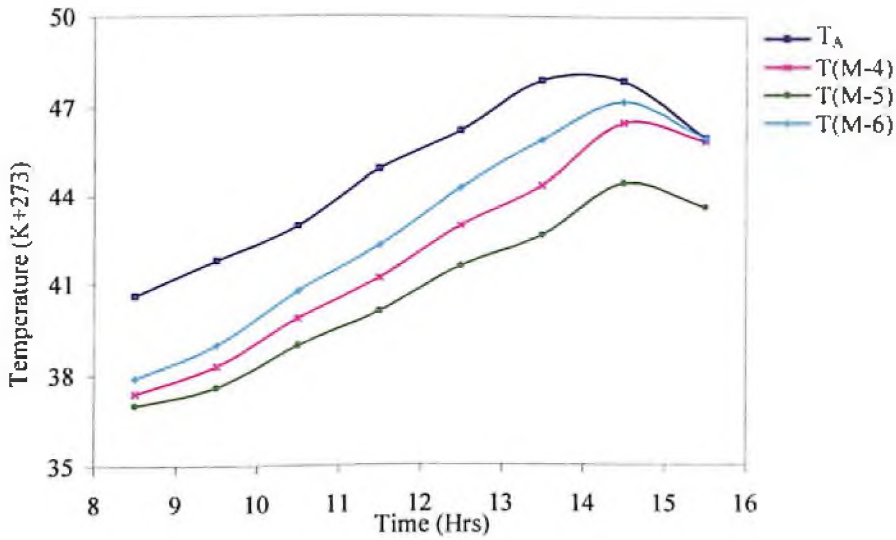


Figure 7.16.2 Temperature records on 10th May 2003

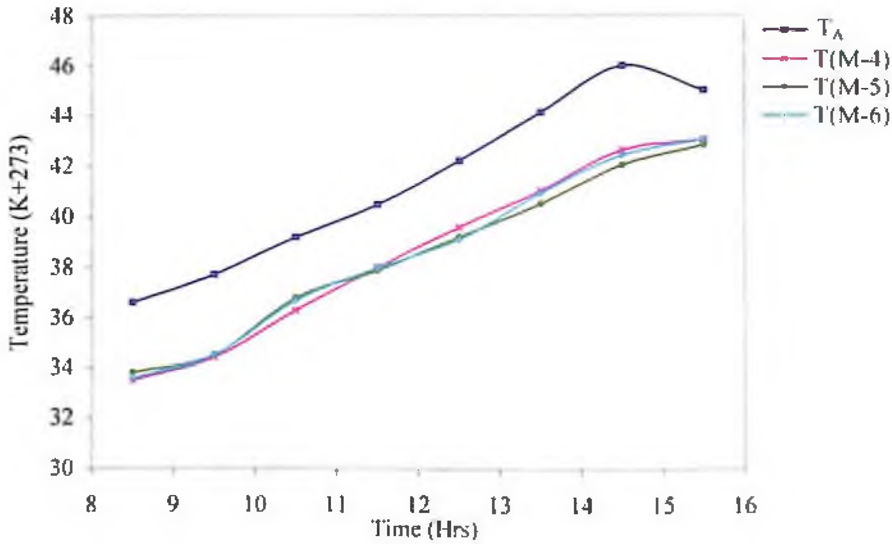


Figure 7.17 Temperature records on 9th June 2003

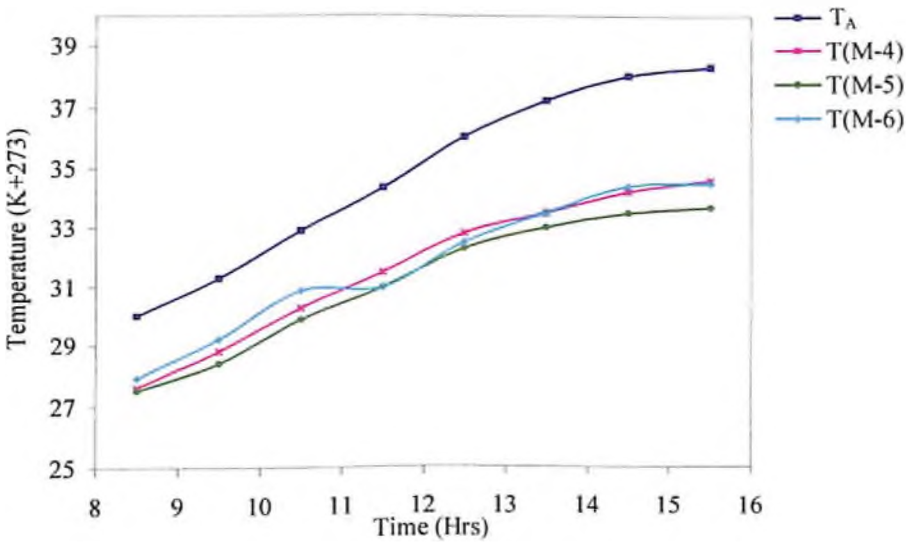


Figure 7.18 Temperature records on 15th July 2003

During the summer months, April and May, the total sunlit entry is restricted in the model M-5 with developed sunshade (Figure 7.15.1 and Figure 7.16.1) and thus, the temperature inside the model (Figure 7.15.2 and Figure 7.16.2) is observed less as compared to model M-4. Model M-6, having maximum sunlit area and temperature is not suitable for the summer months. Due to high position of sun in the sky during peak summer (June and July) the total sunlit area is restricted in all the models M-4, M-5, M-6 and hence the difference observed in the temperature inside the models is not varying significantly (Figure 7.17, Figure 7.18). Thus, the complete analysis is summarized further as represented in Figure 7.19.1 and Figure 7.19.2.

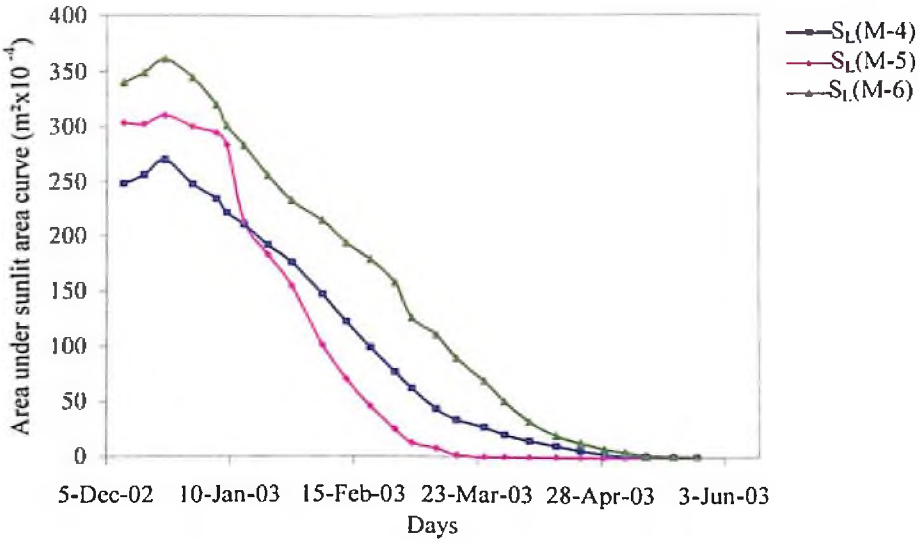


Figure 7.19.1 Area under sunlit area curve from 12th December 2002-8th August 2003

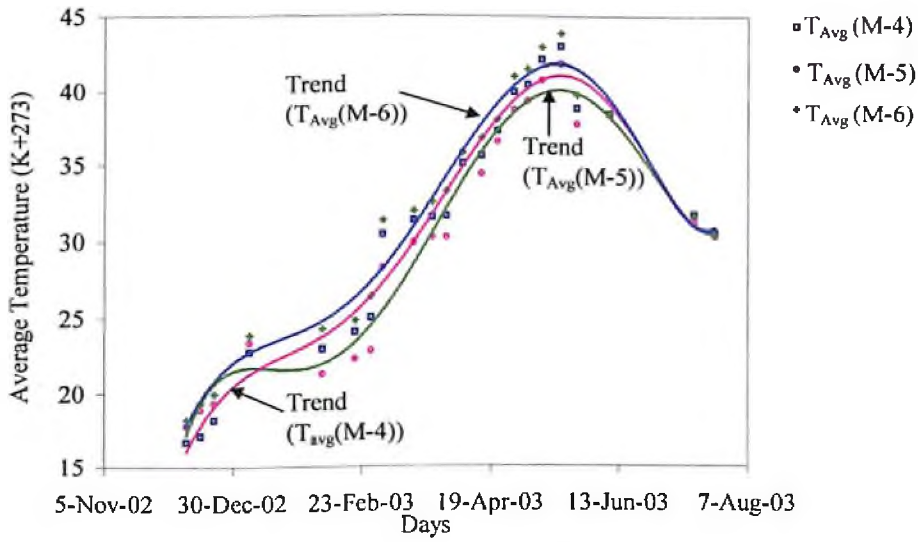


Figure 7.19.2 Average temperature records from 12th December 2002-8th August 2003

With the modified window dimensions and sunshades (models M-4, M-5, M-6), overall characteristics of sunlit area (Figure 7.19.1) and average temperature (Figure 7.19.2) are represented. As per the seasonal requirements, the model M-5 with developed static sunshade indicates changes in the nature of area under sunlit area curve as well average temperature from higher value in winter to lower value in summer as compared to model M-4 with horizontal sunshade, and hence is more efficient. From Section D-2 (Appendix-D), it is inferred that during winter months (10^{th} December 2002-18^{th} January 2003) the sunlit area inside the model M-5 is observed more with respect to model M-4. Overall a 12.66% increment in sunlit area is observed under the model M-5 as compared to model M-4, resulting in more temperature and reduction in heating load requirement. Further, with the increment over time duration, the sunlit area started reducing in model M-5 over the model M-4. Reduction in total sunlit area under model M-5 as compared to model M-4 is 38.85% over the specific duration of time (21^{st} January 2003-17^{th} March 2003), resulting in lesser temperature record inside the model. Further, no sunlit area is observed under the model M-5 from 20^{th} March 2003 to 11^{th} August 2003. Whereas, the intersection of sunlight has continued in model M-4 over longer duration from 20^{th} March 2003 to 9^{th} June 2003 and further reduced to no sunlight entry from 11^{th} June 2003 to 24^{th} July 2003). Model M-6 represents overall highest value of the area under sunlit area curve (10.66%, 62% more than model M-5, from 10^{th} December 2002-18^{th} January 2003 and 21^{st} January 2003-17^{th} March 2003 respectively). The recorded temperature in the model M-6 is the maximum amongst all three models (Figure 7.19.2), which is undesirable during summer months and hence not suitable. Thus, model M-5 with the developed static sunshade is more efficient with respect to models M-4 and M-6.

With the actual construction material, another five BM models (M-7 to M-11, Table 7.3) have been constructed (December 2002- February 2004, Section D-2, Appendix-D) to study the overall effectiveness over the window dimensions and sunshade types. Using the Simpson's integration approach to determine the area under either sunlit area or windowsill area or shadow area curves, overall effect has been analyzed (Figure 7.20.1- Figure 7.20.6).

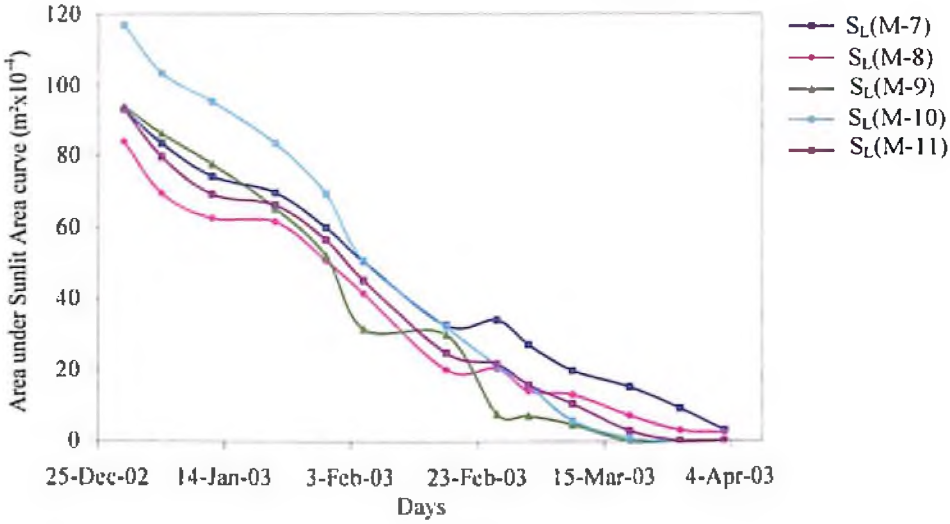


Figure 7.20.1 Overall sunlit area during 29th December 2002-3rd April 2003

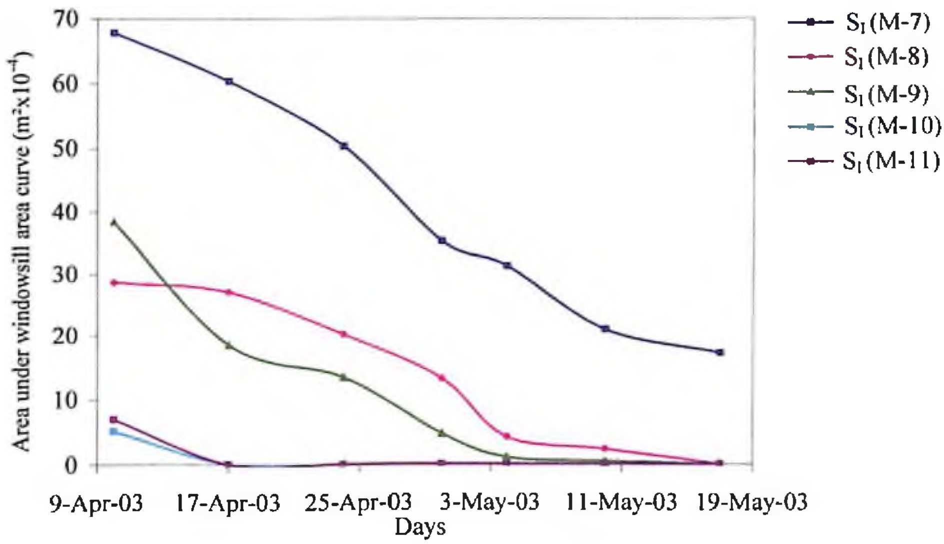


Figure 7.20.2 Overall windowsill area from 10th April 2003-17th May 2003

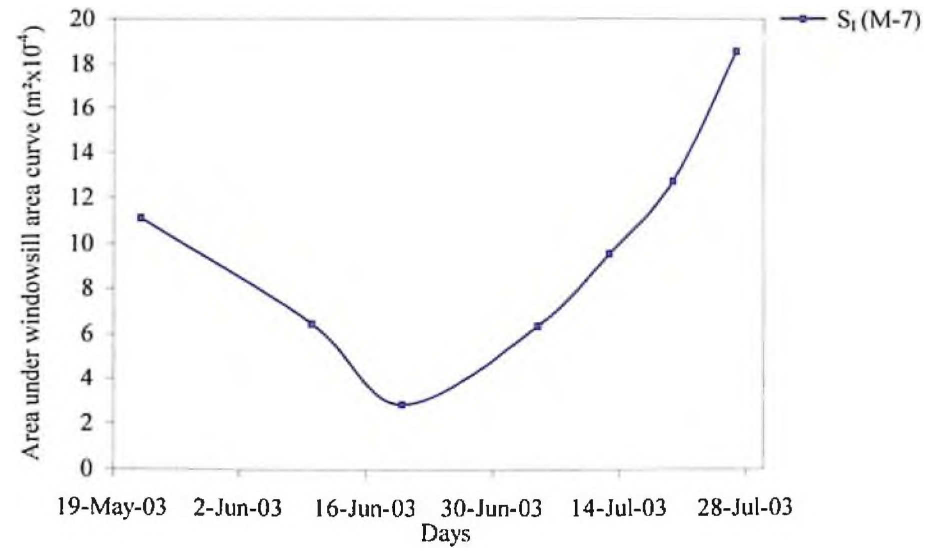


Figure 7.20.3 Overall windowsill areas from 29th May 2003-3rd July 2003

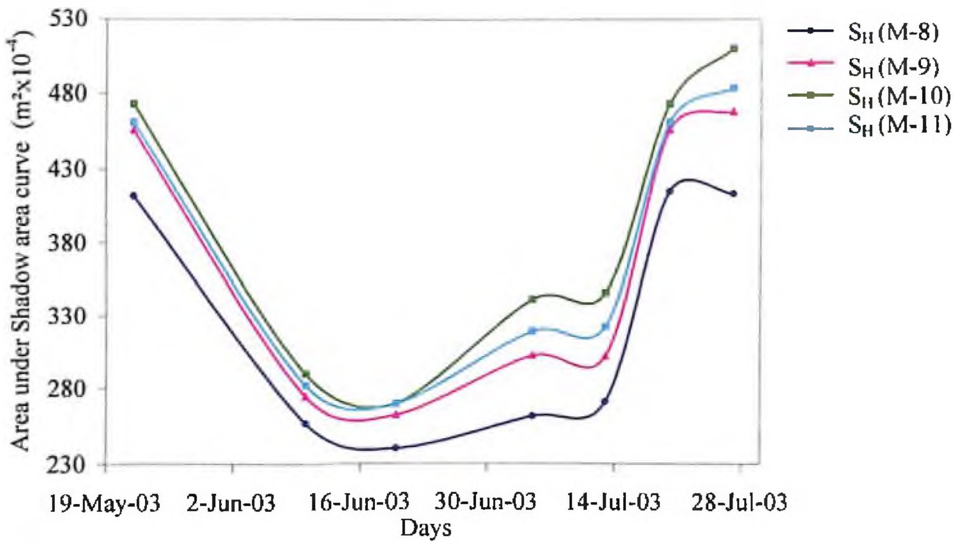


Figure 7.20.4 Overall shadow area from 29th May 2003-3rd July2003

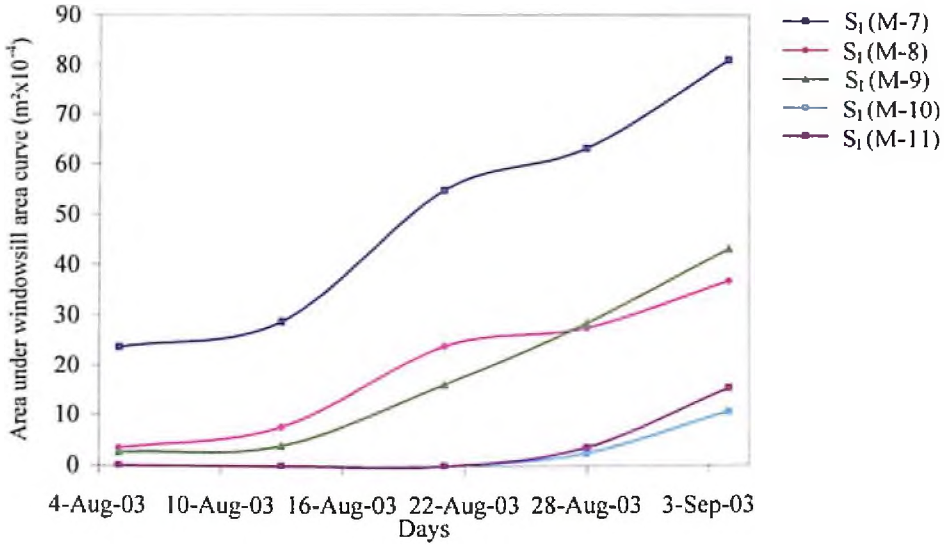


Figure 7.20.5 Overall windowsill area from 5th August 2003-4th September 2003

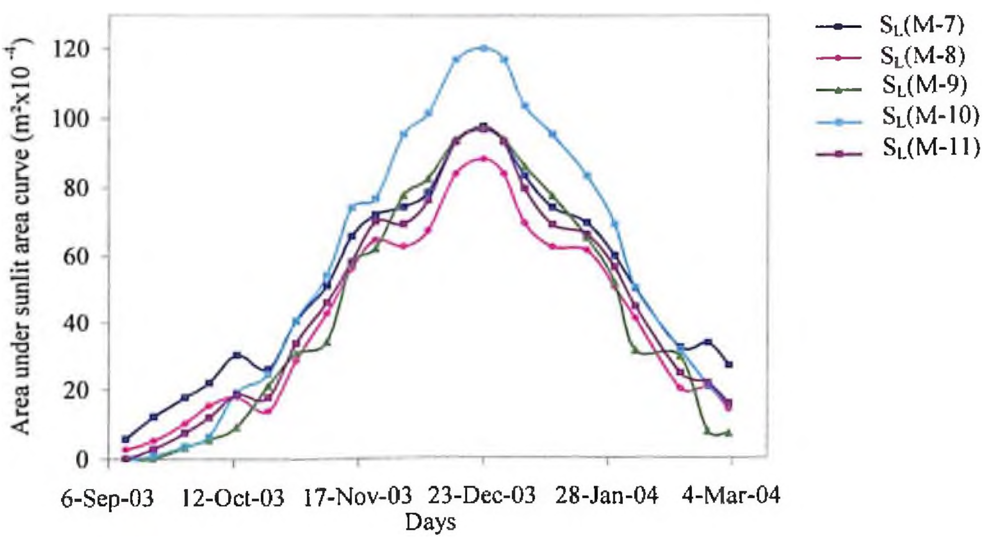


Figure 7.20.6 Overall sunlit area from 11th September 2003-3rd March 2004

With respect to sunlit entry inside the model (Figure 7.20.1 to Figure 7.20.6), all the five models are arranged in ascending order and are summarized in Table 7.5, which gives a clear picture of solar entry inside the models. Keeping in view the control of solar entry inside the models and seasonal classification the best suitable model has been categorized individually.

Table 7.5 Model performance as per overall measured areas		
Months	Model order as per sunlit entry inside the model	Best Suited model as per seasonal classification
December (Last week) – January (Mid week)	***M-10***, M-9, M-7=***M-11***, M-8	M-10
January (Third week, Last week)	***M-10***, M-7, ***M-11***, M-9, M-8	M-10
February (First week)	M-7=***M-10***, ***M-11***, M-8, M-9	M-7, M-10
February (Third week)	M-7=***M-10***, M-9, ***M-11***, M-8	M-11
March (First week)	M-7, ***M-10***=***M-11***, M-8, M-9	M-10, M-11
March (Second week, Third week)	M-7, M-8, ***M-11***=***M-10***, M-9	M-10, M-11
March (Last week) - April (First week)	M-7, M-8, M-9=***M-10***=***M-11***	M-9, M-10, M-11
April (Second week)	M-7, M-9, M-8, ***M-10***=***M-11***	M-10, M-11
April (Third week) - May (Third week)	M-7, M-8, M-9, ***M-10***=***M-11***	M-10, M-11
May (Last week) – July (Last week)	M-7, M-8, M-9, ***M-11***, ***M-10***	M-10
August (First week) – September (Second week)	M-7, M-8, M-9, ***M-10***=***M-11***	M-10, M-11
September (Third week) – October (First week)	M-7, M-8, ***M-11***, ***M-10***, M-9	M-9
October (Second week)	M-7, ***M-10***, ***M-11***, M-8, M-9	M-11
October (Third week)	M-7, ***M-10***, M-9, ***M-11***, M-8	M-11
October (Last week)	***M-10***, M-7, ***M-11***, M-9, M-8	M-11
November (First week)	***M-10***, M-7, ***M-11***, M-8, M-9	M-10
November (Second week)	***M-10***, M-7, ***M-11***, M-9, M-8	M-10
November (Third week)	***M-10***, M-7, ***M-11***, M-8, M-9	M-10
November (Last week) – December (Third week)	***M-10***, M-9, M-7, ***M-11***, M-8	M-10
*Note: ***Bold*** letters indicates ordering of the models with developed sunshade		

As represented in Table 7.5, the model which is placed at position one implies maximum sunlit area, whereas the model which is at fifth position implies maximum restriction for sunlit area. All the other intermediate performance models are placed sequentially in between. The relations shown with equal sign imply that the overall area measured is same for those particular models. As per the sequence shown in Table 7.5 it is observed that the design criterion considered for the developed static sunshade model is satisfied experimentally. The models M-10 and M-11 have better exposure in peak winter, later reducing during overheated period. As shown in Table 7.5, with respect to sunlit area regulation inside the models, model M-10 is found suitable over most of the considered dates of various months throughout the day. As per the considered seasonal classification, model M-10 represents best performance over the solar entry regulation followed by model M-11 (Section D-2, Appendix-D). Model M-9 followed by M-8 are rated as an intermediate option for selection of sunshade, whereas model M-7 not being protected with any type of sunshade is not recommended. From the recorded temperature inside the models on a particular day of a month, overall temperature performance throughout the year is studied further (Figure 7.21.1 to Figure 7.21.14).

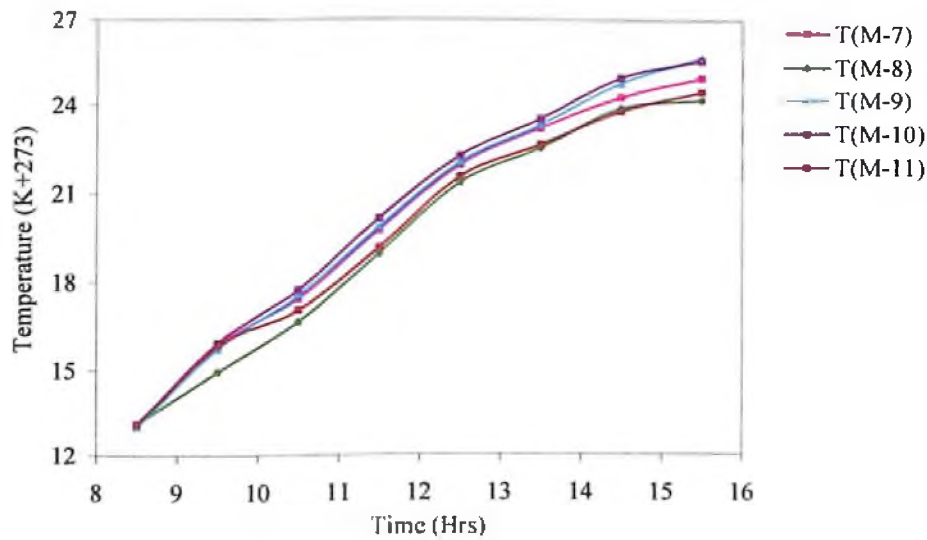


Figure 7.21.1 Temperature records on 12th January 2003

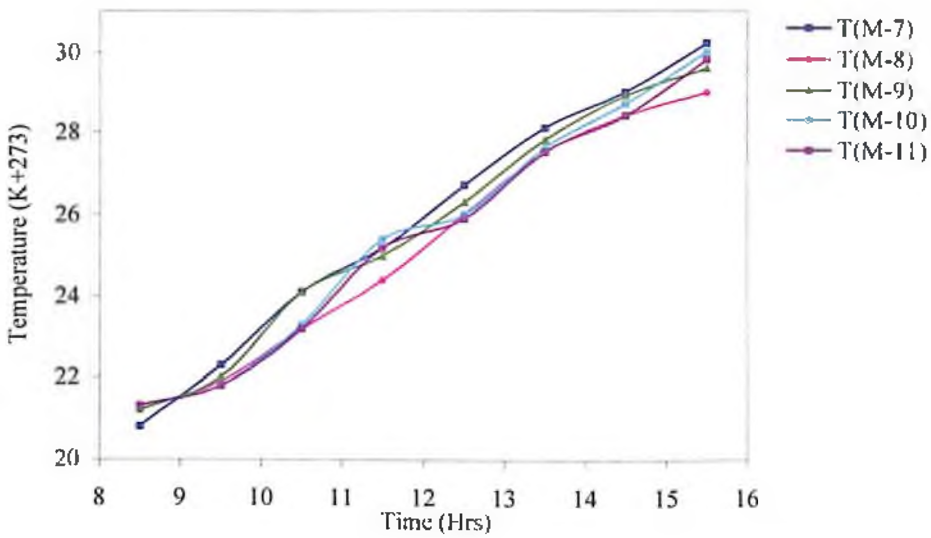


Figure 7.21.2 Temperature records on 18-February 2003

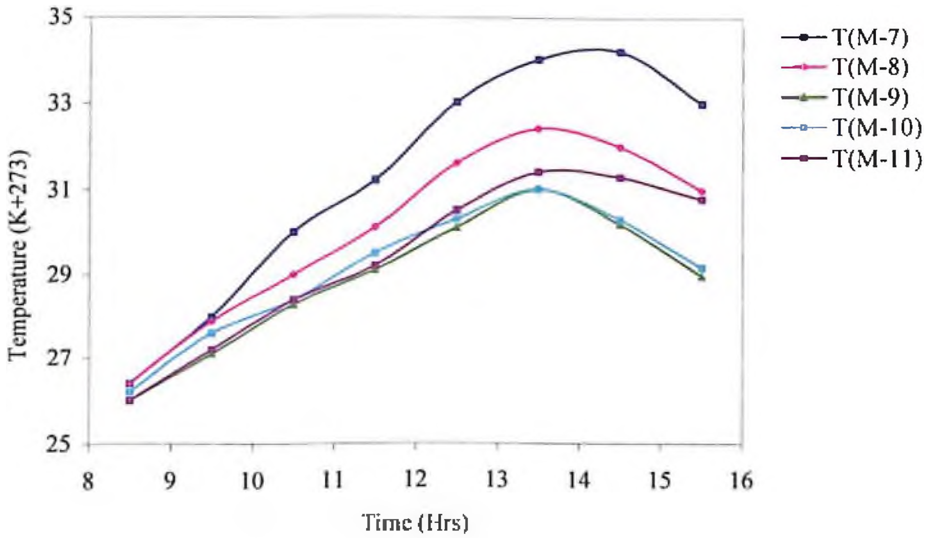


Figure 7.21.3 Temperature records on 20th March 2003

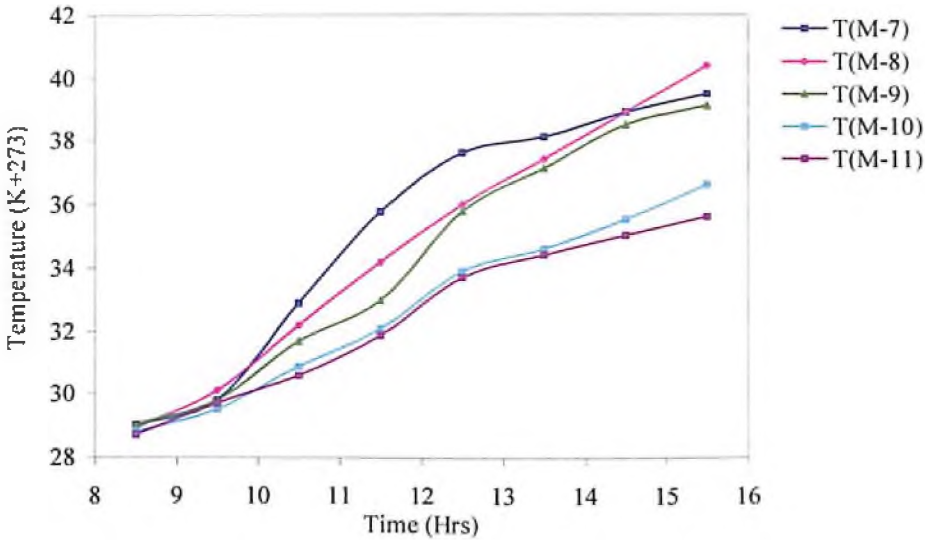


Figure 7.21.4 Temperature records on 17th April 2003

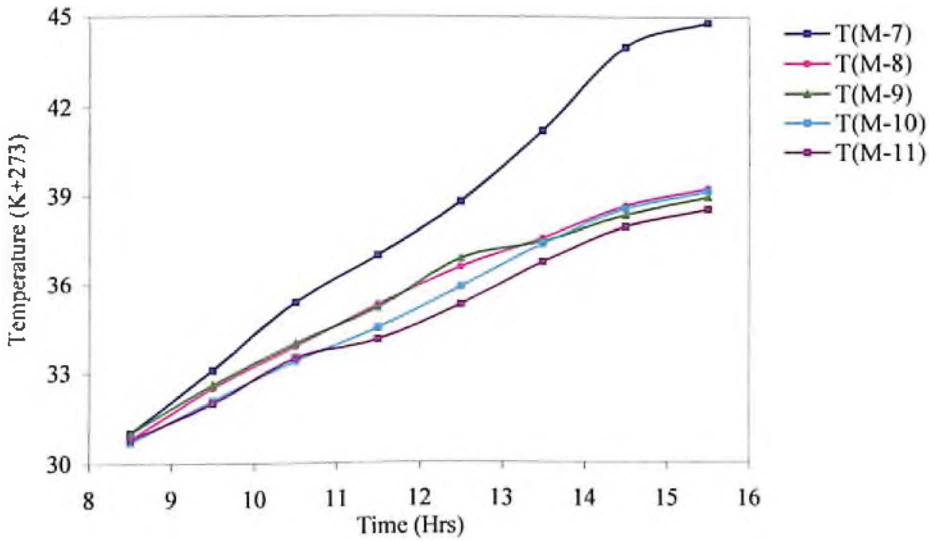


Figure 7.21.5 Temperature records on 17th May 2003

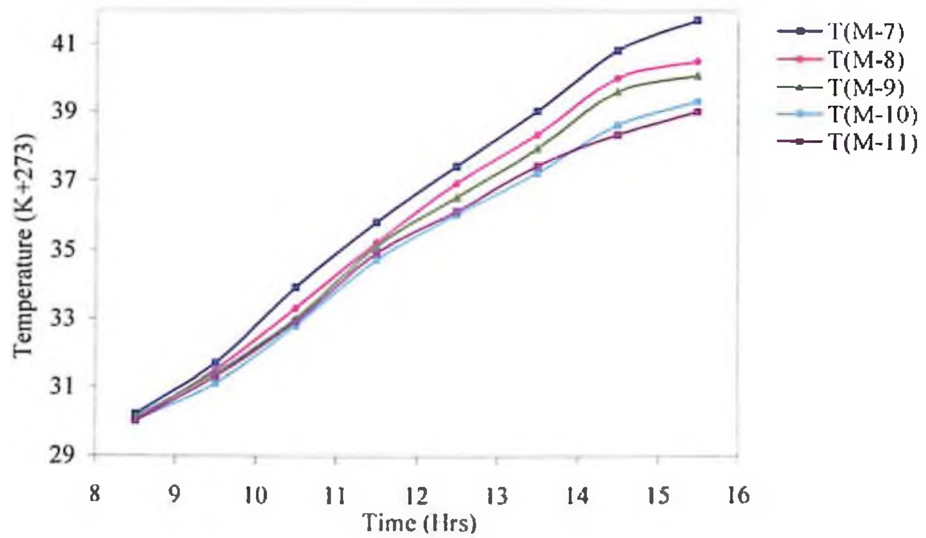


Figure 7.21.6 Temperature records on 9th June 2003

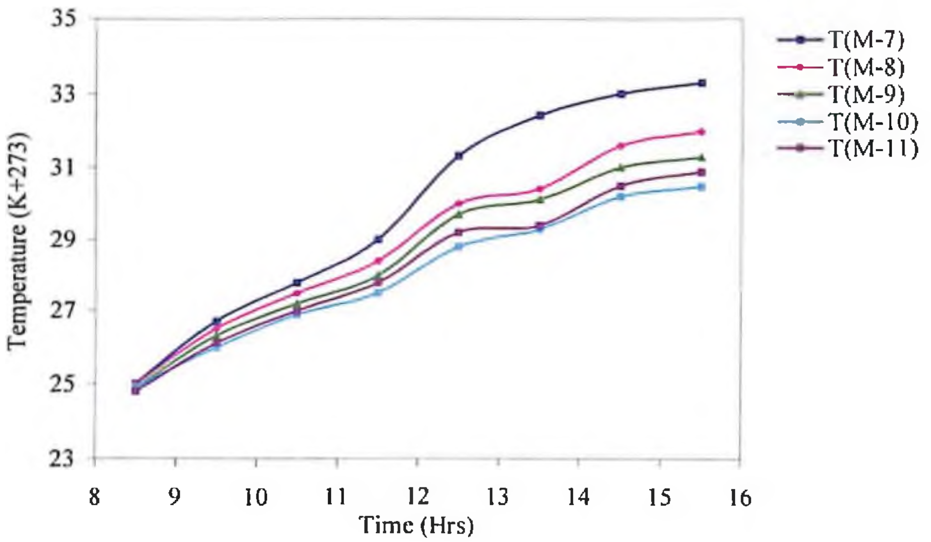


Figure 7.21.7 Temperature records on 20th July 2003

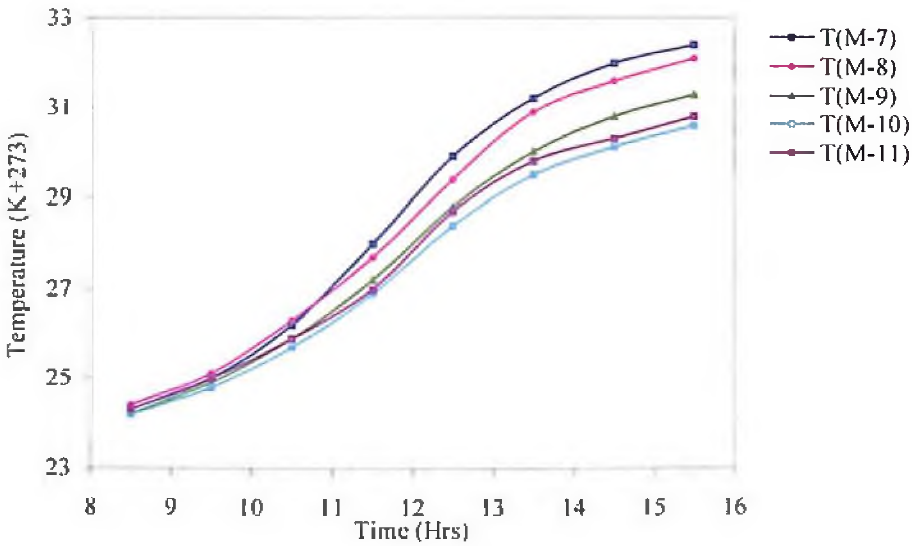


Figure 7.21.8 Temperature records on 13th August 2003

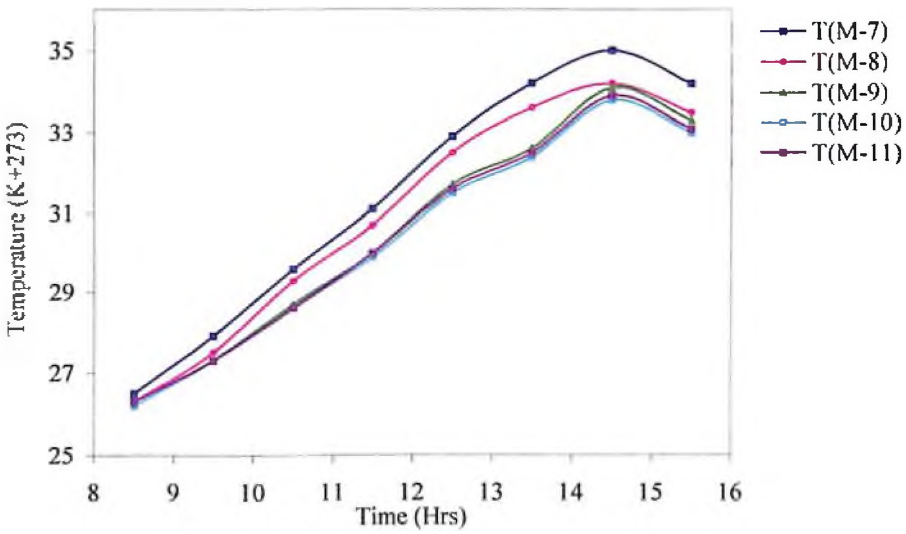


Figure 7.21.9 Temperature records on 11th September 2003

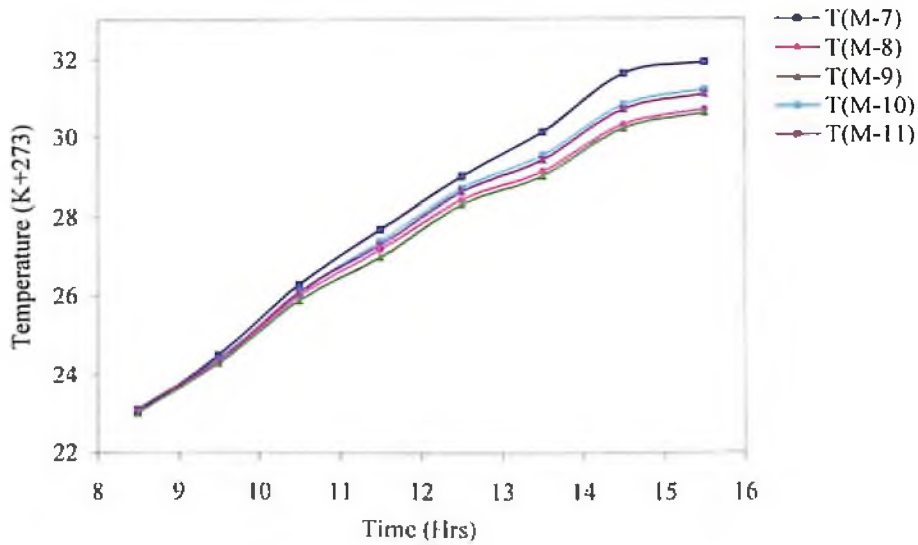


Figure 7.21.10 Temperature records on 13th October 2003

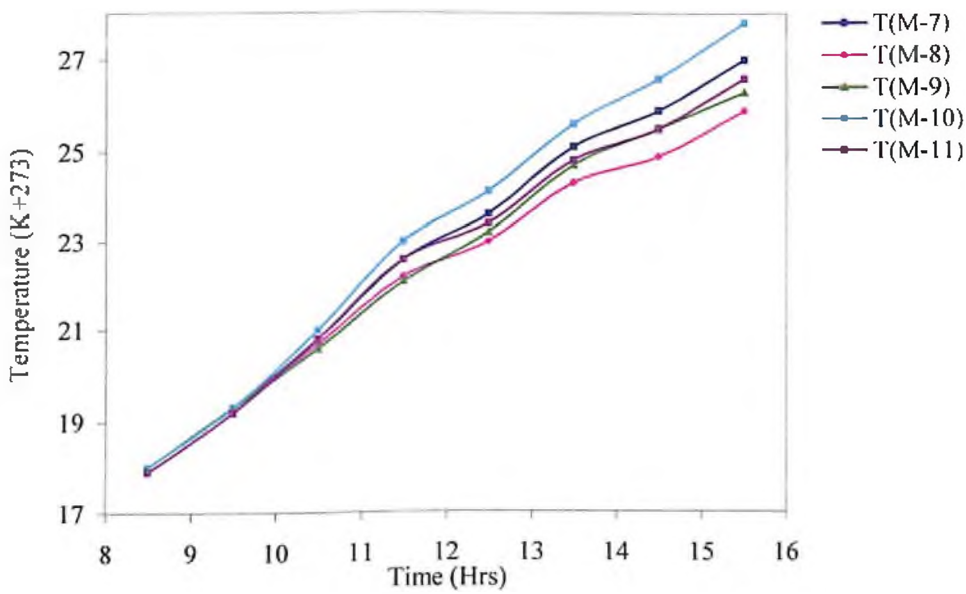


Figure 7.21.11 Temperature records on 15th November 2003

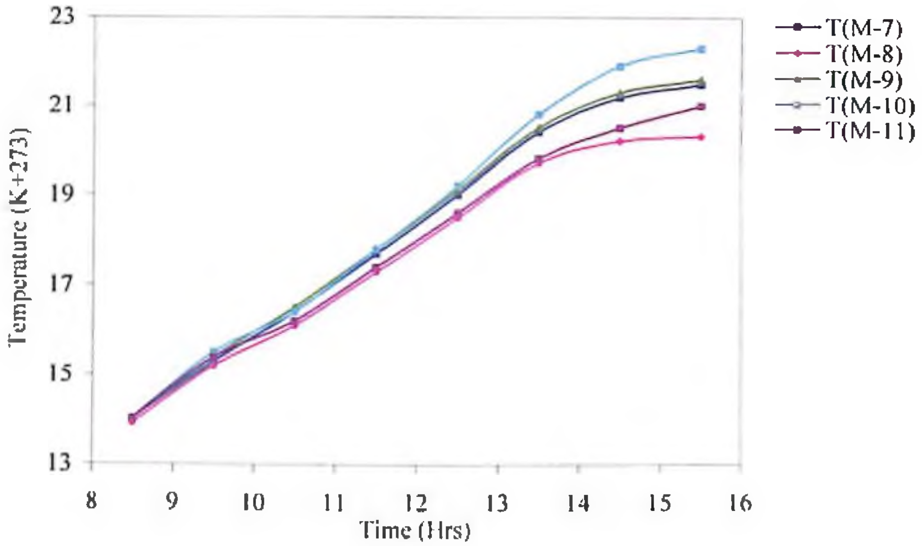


Figure 7.21.12 Temperature records on 8th December 2003

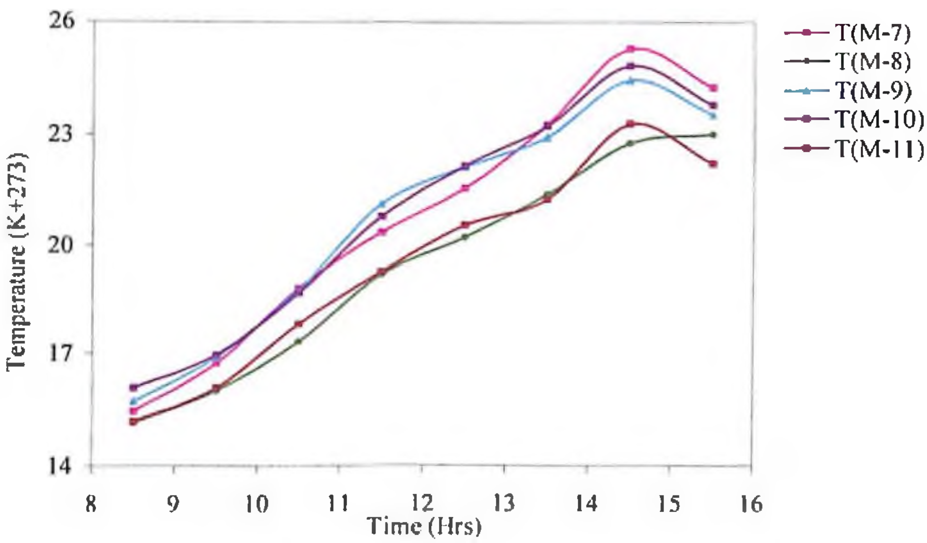


Figure 7.21.13 Temperature records on 12th January 2004

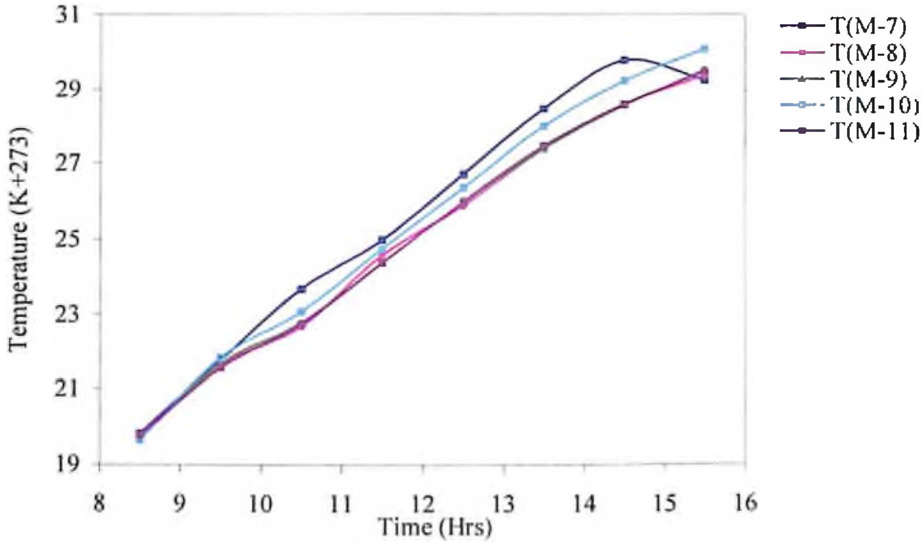


Figure 7.21.14 Temperature records on 16th February 2004

Figure 7.21.1 to Figure 7.21.14 gives clear picture of thermal characteristics inside the models. One of the possible dates closest to or on average day of the month is represented for all the months of the year. As per the seasonal classification represented in Table 7.4 and the model exposure characteristics as summarized in Table 7.5, it is observed that the temperature variation is also of similar nature inside the models. Thus, the exposure to sun and temperature variation inside the models are directly proportional. The temperature variation during peak winter is not significant in all the models due to low radiation intensity, which is seen prominently during over heated period. It is very clear from above figures (Figure 7.20.1- Figure 7.20.6 and 7.21.1- Figure 7.20.14) that the model M-10 with developed sunshade gives the best control over solar penetration and correspondingly the temperature inside the model. Performance-wise the other models are arranged in the descending order as models M-11, M-9, M-8 and M-7.

During the same period (January 2003 -July 2003) of analysis models of similar window dimensions along with same type of sunshade (M-4 =M-9, M-5 =M-10) are studied to decide the desired model with efficient sunshade. Models with developed sunshade (M-5, M-10) proved to be of more efficient for direct sunlit entry management and in turn temperature inside the models as compared to models with horizontal sunshade (M-4, M-9). The obtained sunlit entry characteristics are varying appreciably due to model thickness variations. The temperature inside the models is also varying which depends on several factors like model dimensions, wall thickness, material properties, etc. In practice, actual construction materials are used and the particular wall can be integrated with suitable insulating material to obtain desired thermal comfort inside the buildings. With respect to solar entry control inside the models and temperature characteristics obtained for the models, the model M-10 proved to be the best in performance.

To interpret the performance of various developed models graphically, shading masks are drawn (Figure 7.22). For the model with developed static sunshade, partial shading time is reduced drastically as compared to all other models.

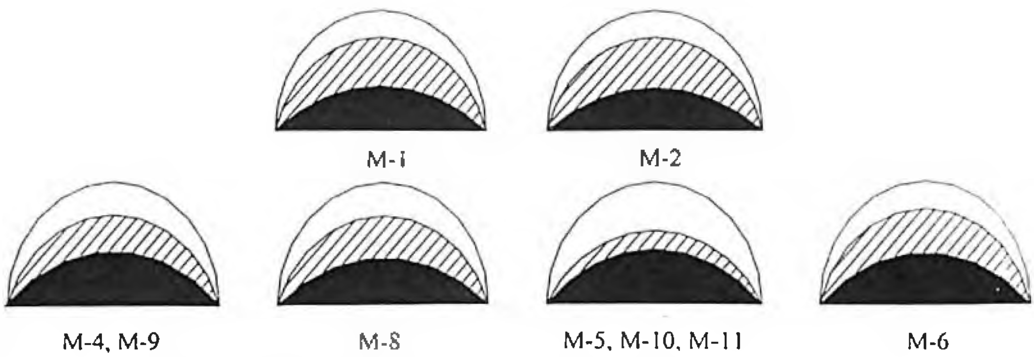


Figure 7.22 Shading mask for various developed models

Thus, the comparative experimental study presented in the Chapter rightly points out the importance of proper window dimensions and application of suitable sunshade for energy conservation inside the buildings. The methodology presented for design development of static sunshade can be implemented over any geographic location with suitable cutoff dates as per the seasonal requirements. Although the methodology is implemented for small-scale models, it can be extended further for practical purposes in large buildings.

With the help of shading mask diagram for various static sunshades (Figure 7.22, Section A-1, Appendix-A) the efficiency of developed static sunshade is discussed further. Over the considered location horizontal sunshades proved to satisfy shading needs partially. Vertical sunshades are useful when the problem of shading concerns side faces of the opening on a particular building facade and thus, during peak hours desired shading may not be obtained. Movable Fins (Figure A.2.3, Appendix-A) will cause overshadowing for the considered location and increased maintenance cost is also cause of concern. Eggcrate sunshades (Figure A.3, Appendix-A) are the combination of horizontal and vertical sunshades, which may need high initial cost for the material of construction.

Thus, in comparison with existing static sunshades (Appendix-A), developed sunshade is more efficient in both the ways i.e., performance-wise as well as being cost-effective. The additional cost incurred for the development of new static sunshade is the construction of formwork. The desired shape is developed as per the design requirements over a location and the obtained geometry. But, for actual buildings, over a particular wall facade, symmetric windows can be constructed and protected with similar sunshades. Thus, the overall requirement for the development of formwork can be optimized and hence minimizes the effect of extra cost requirement as on overall construction cost of total structure.

CHAPTER 8

CONCLUSIONS

Energy management can be effectively achieved using the principles of Passive solar architecture, which aims at maximum living quality with minimum environmental impact. To achieve the thermal comfort, some of the primary functional requirements of energy-efficient buildings are optimal building orientation, proper selection of material for the construction and control over direct solar entry inside the buildings.

Windows, which play a vital role for direct solar entry inside the buildings, should be properly shaded. Although different sunshades are commercially used, exterior sunshades are more effective than interior sunshades because they block sunlight before it enters into the building. Due to the problem of maintenance and high initial cost for variable sunshades, the best option for the sun shading is to consider the efficient static sunshades. The effective design of external sunshades should take into account the diurnal and annual variations of solar positions and the orientation of the building elements.

The following conclusions are drawn from the present study:

1. For the design of solar system, the knowledge of sun angles is important. The development of sun path diagram over a particular location is useful to determine the solar angles, i.e., altitude, azimuth, declination and hour angle for the specific day of the year and time of the day.

2. The small-scale experimentation technique is easy for the analysis purpose and is cost-effective. All the small-scale model dimensions should follow specific code requirements (SP: 41, 1987, for India).

3. The estimation of total incident beam radiation falling over exposed wall surfaces is important to decide optimal building orientation and the proportioning of buildings facades. The developed software is useful for the estimation of total beam radiation, which incorporates all the location details i.e., latitude, longitude and elevation in the mathematical correlations.

   Over the analyzed places from different climatic zones of India, the optimum orientation is 0°/180° and the ratio of short-wall (width) to long-wall (length) should be as minimum as possible, to gain minimum solar radiation in the peak summer season and maximum in the peak winter season. The developed mathematical correlations among radiation, orientation and width to length ratio are useful for determining the interdependent parameters. The radiation received over horizontal surfaces shows significant impact on energy gain for the buildings with smaller heights and the effect reduces as the building heights increase.

4. For the design of overall building system, modeling is an important tool. Linear Graph Theory is a solution technique for the systematic mathematical modeling of the building systems with exact number of independent equations. The developed software predicts the temperature at salient points of the room-model with respect to specific material properties and building-component dimensions. This is useful for the building design purpose.

5. For the energy management inside the buildings determination of sunlit area is important. The presented graphical methodology, AutoCAD 3D Modeling, to determine sunlit area inside the building is easy to represent, visualize and accurate approach. Over a particular location and time, the sunlit area and the temperature inside a room are relative; as the overall sunlit area increases the corresponding temperature gain increases. The study is useful to analyze the effectiveness of sunshades.

6. To increase the thermal comfort, the new static sunshade design methodology is implemented, which depends on sun angles and shadow angles for the specific dates over a geographic location. The methodology is generalized and by choosing the suitable cutoff dates, the new static sunshade can be designed for the any geographic location. The curved geometry of sunshades can be developed using Ferro-cement technique effectively.

   For the performance evaluation of sunshades, the shading mask diagrams should be drawn. The shading mask diagram for the developed sunshade showed overall effective control over partial shading duration as compared to horizontal static sunshade.

   To evaluate the exact performance of the sunshades over the specific time, the area under the curve (sunlit area, windowsill area, shadow area, etc.) approach is developed. The methodology is verified experimentally. With the help of observations and analysis, area under the curve approach is found suitable. The better sunlit area and temperature regulation have been observed inside the model with the developed sunshade.

All the approaches presented in the study are useful over any geographic location and are practically applicable to achieve the functional requirements of an energy-efficient (passive solar) building design. To achieve the prime functional requirements of self energy-efficient building design, the developed static sunshade is recommended as an important part for direct solar entry regulation.

CHAPTER 9

FUTURE SCOPE

The work carried out in the present study can be extended further with the following objectives:

- Using multiple regression analysis over more number of places from a particular climatic zone, the correlations can be developed between geographic location parameters, beam radiation, orientation and aspect ratio of walls.

- The presented software approach for the optimal orientation decision (ORAL) can be integrated further with multi facades of building and shadow analysis over exposed building facades.

- Temperature prediction has been presented over a day length, which can be extended further over a year with the inclusion of sinusoidal nature of time series, which indicates change in solar intensity characteristics between day and nights.

- The presented software approach for temperature predication (SMTP) can be extended further with more number of parameters like multi-rooms, multi-floor buildings, etc. and these can be analyzed.

- The design methodology for developed static sunshade can be implemented for prototype models and the effectiveness can be measured with the inclusion of more parameters like, different types of sunshade, more number of windows on particular wall facade, multi room, multi floor analysis, inclusion of other climatic factor like air circulation, humidity inside the models, etc.

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- Ralegaonkar R. V. and Gupta R. (2004). Design Development of a Static Sunshade Using Small Scale Modeling Technique. International Journal of Renewable Energy, In Press.
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- Gupta R. and Ralegaonkar R. V. (2004). Performance Analysis of Static Sunshades using Shading Mask Approach. Journal of Energy and Fuel Users Association of India, LIV (2), 39-43.
- Gupta R. and Ralegaonkar R. V. (2004). New Static Sunshade Design for Energy Efficient Buildings. Journal of Energy Engineering, under review.

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- Ralegaonkar R. V. and Gupta R. (2004). Design of an Efficient Static Sunshade Using Small Scale Modeling Technique. 3rd International Conference on Heat Powered Systems: Cooling, Heating and Power Generation Systems, Larnaca, Accepted.
- Gupta R., Ralegaonkar R. V. and Asati A. (2004). A Simulation Technique Using LGT for Temperature Prediction of Passive Solar Heated Building Model.

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- Ralegaonkar R. V. and Gupta R. (2003). 3-D Modelling: A Tool to Determine Sunlit Area for Energy Management Inside the Buildings. International Conference on Energy and Environmental Technologies for Sustainable Development, Malviya National Institute of Technology, Jaipur, 397-408.
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APPENDIX-A

A-1 EXISTING STATIC SUNSHADES AND SHADING MASK

Isometric View	Side View	Shading Mask

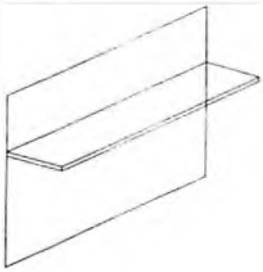
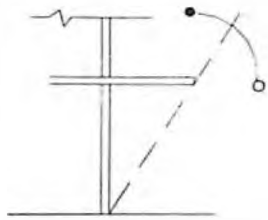

	

Figure A.1.1 Horizontal overhang		

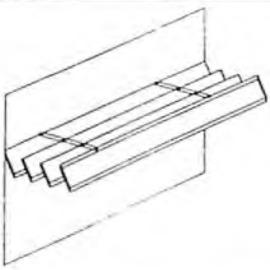
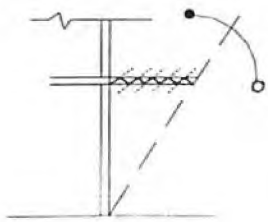

	

Figure A.1.2 Louvers parallel to wall		

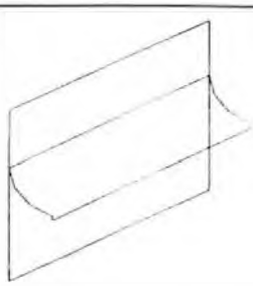
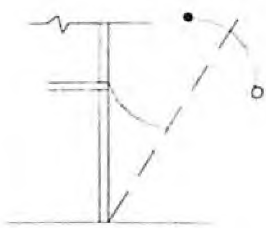

	

Figure A.1.3 Canvas canopies		

Isometric View	Side View	Shading Mask

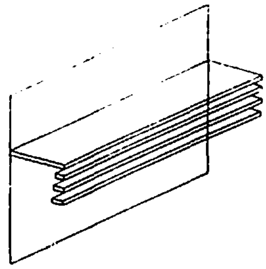
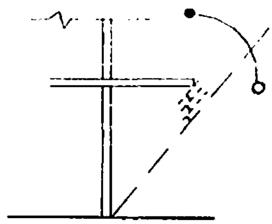

	

Figure A.1.4 Louvers hung from solid horizontal overhang		

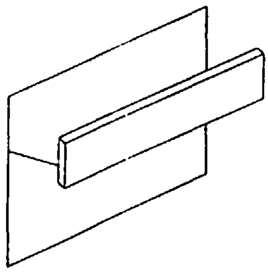
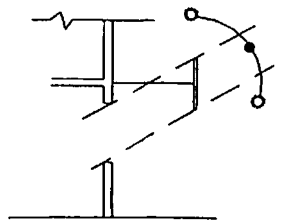
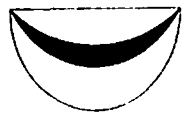

		

Figure A.1.5 Screen		

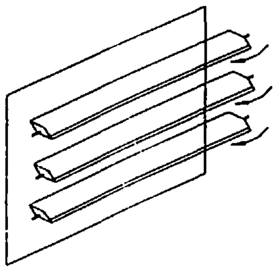
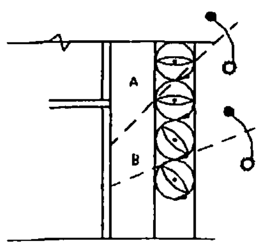
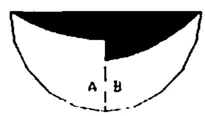

		

Figure A.1.6 Movable horizontal louvers		
Figure A.1 Horizontal sunshades		

Isometric View	Side View	Shading Mask

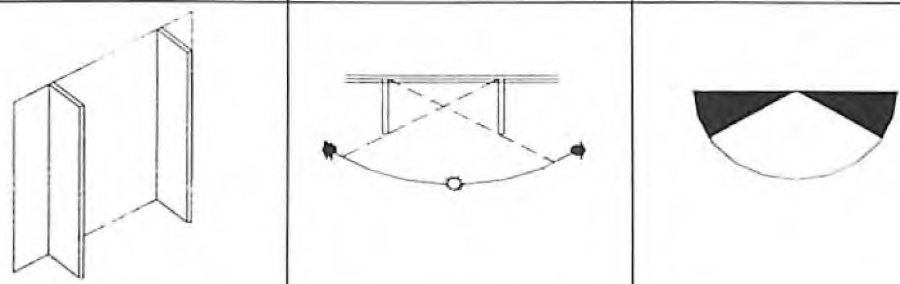


Figure A.2.1 Vertical fins

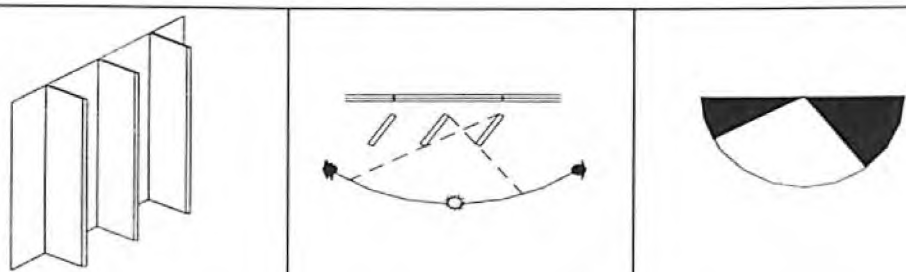


Figure A.2.2 Vertical fins oblique to wall

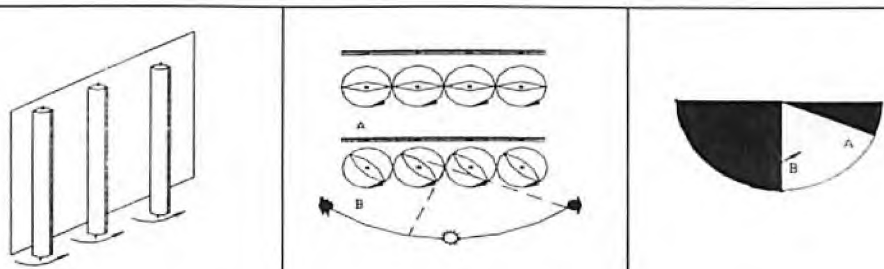


Figure A.2.3 Movable fins

Figure A.2 Vertical sunshades

Isometric View	Side View	Shading Mask

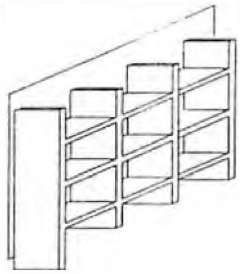
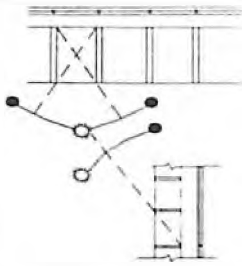

	

Figure A.3.1 Eggcrate as combination of horizontal and vertical types		

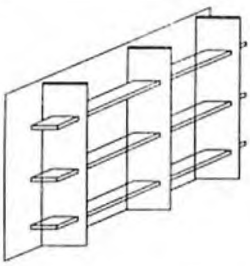
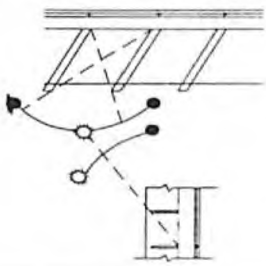

	

Figure A.3.2 Eggcrate with slanting vertical fins		

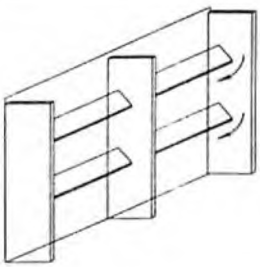
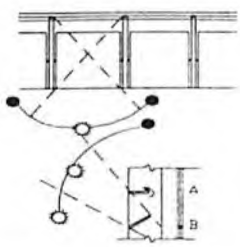

	

Figure A.3.3 Eggcrate with movable horizontal element		
Figure A.3 Eggcrate sunshades		

APPENDIX-B

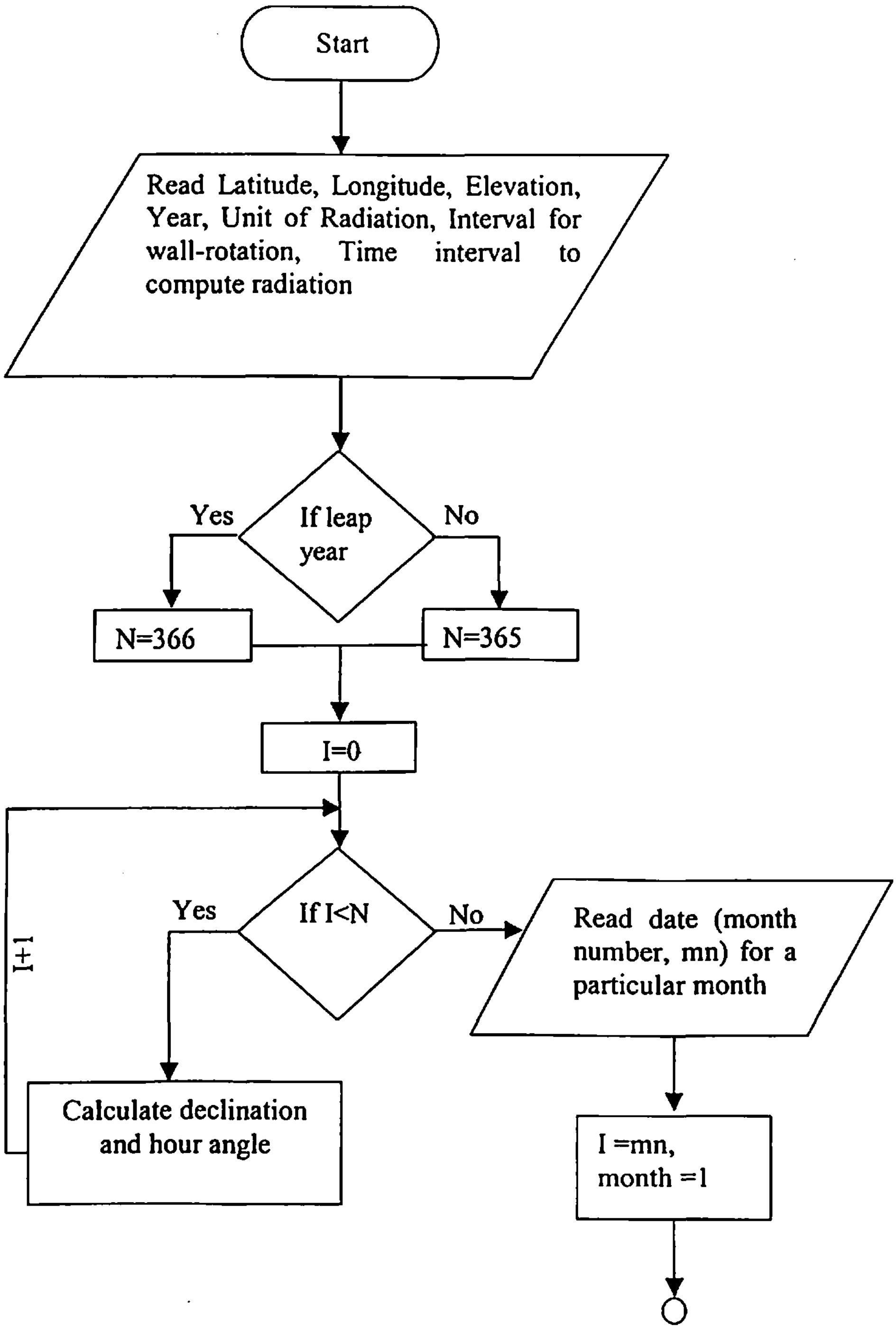
B-1 LOCATION DETAILS FOR VARIOUS PLACES IN INDIA

Zone No.	Climatic zone	Place	Latitude (°N)	Longitude (°E)	Elevation above M.S.L. (m.)
I.	Hot and dry	**Jaisalmer**	**26.90**	**70.92**	**242.00**
		Pilani	28.25	75.65	220.00
		Jodhpur	24.67	71.25	229.00
II.	Warm and humid	**Guwahati**	**26.18**	**91.47**	**55.00**
		Calcutta	22.65	88.45	6.00
III.	Moderate	**Banglore**	**12.97**	**77.58**	**921.00**
		Pune	18.53	73.85	559.00
IV.	Composite	**New Delhi**	**28.58**	**77.20**	**216.00**
		Nagpur	21.10	79.05	310.00
V.	Cold and cloudy	**Shimla**	**31.10**	**77.17**	**2202.00**
		Shillong	25.57	91.88	1526.00
VI.	Cold and sunny	**Leh**	**34.15**	**77.57**	**3154.00**
		Mount Abu	24.60	72.70	1200.00

(*NOTE: Highlighted Places are used for analysis)

Source of Data: Mani A. (1981). Handbook of Solar Radiation Data for India. Allied publishers Private Limited: New Delhi.

B-2 FLOW CHART FOR ORAL SOFTWARE



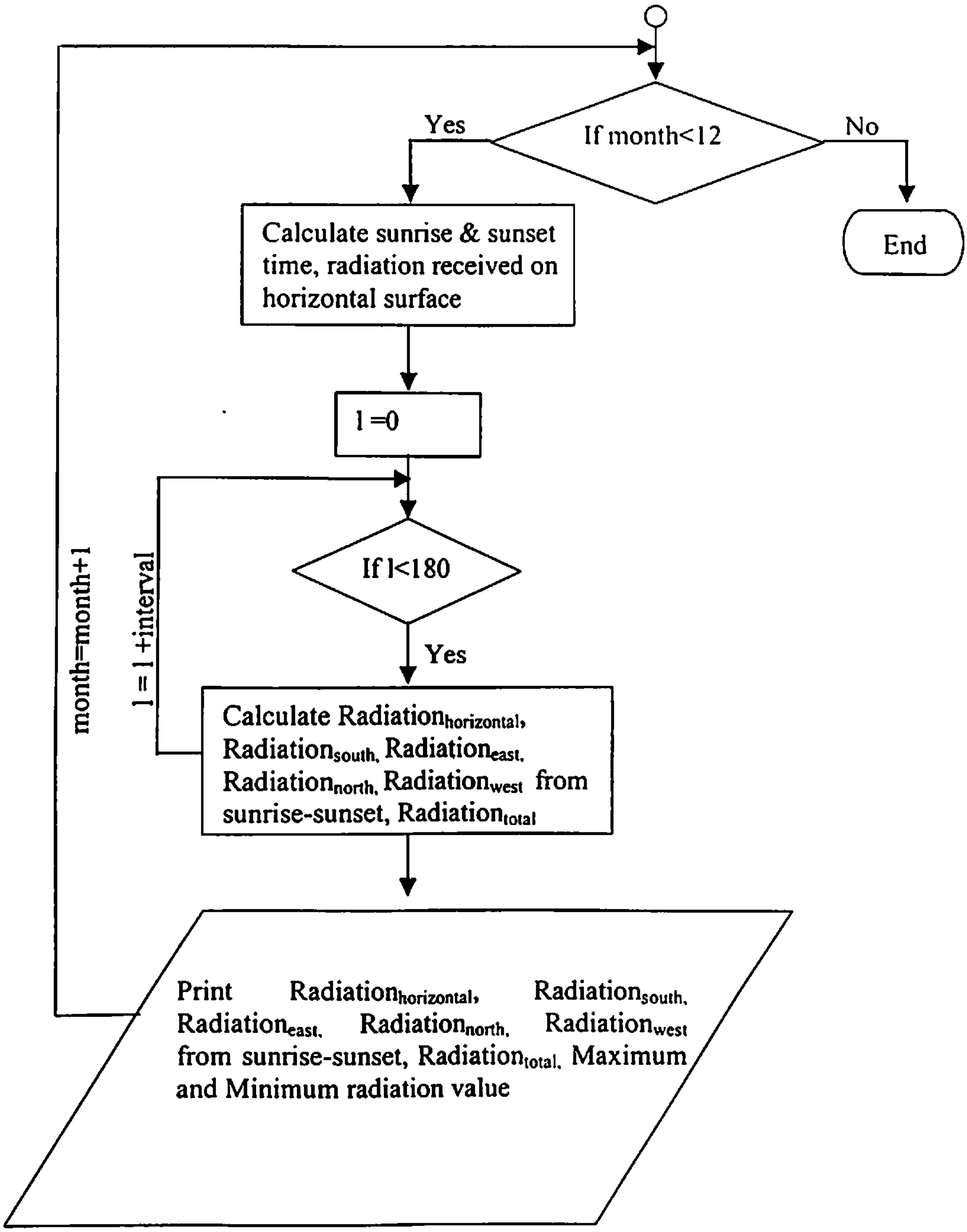


Figure B.1 Flowchart to compute beam radiation for optimal orientation decision with specific dimensions of walls

B-3 ALGORITHM FOR ORAL SOFTWARE

/*Computation of beam radiation for optimal orientation decision with specific dimensions of walls (ORAL, CHAPTER 4)*/

```
#include<stdio.h>
#include<conio.h>
#include<stdlib.h>
#include<math.h>
#include<process.h>
#define z 366
#define pif 0.017453292
#define pi 3.14159265
int di=1,dic;
void main()
{
float I_day(int type,int nd,float lat,float decl,float hrang);
float cal_Ihr(int type,int nd,float lat,float decl,float hrang0, float hrang10);
float get_date();
char s1='N',s2='E';
char month[12][10]={"January","February","March","April","May","June",
                    "July","August","September","October","November","December"};
int dlat,mlat,dlan,mlan,y,jk,jl,d1,m1,d2,m2;
int a,b,n,i,j,k,l,inc_for_ang=5,ml,nl,days=0,srhr[z],srmin[z],sshr[z],ssmin[z], units=1;
float jj,term,term0,term10,term1,term2,term3,term4,Ihr,interval=60.0,
hr,min,colsum,colsum1,colsum2,colsum3;
float dtlat,elat,rb,dtlan,dtmer,decl[z],hrang[z],slat,slong,cmin[z],time,Td;
float srtime[z],sstime[z],a_sr_hrang[z],a_ss_hrang[z],Io,Iday,z1,z2,ze,avgt;
float area[5],I[6],Isum[4],nd1,nd2,nd3,nod1,nod2,nod3,c1,c2,e,am,ps,fac;
float ma,mn,max,mini,MAX,MIN,Max[37],Min[37],MAXT,MINT,Maxt[37],Mint[37];
float Isouth[2],Ieast[2],Inorth[2],Iwest[2];
int MaxN[37],MinN[37],start,end;
FILE *fp;
fp=fopen("d:\\simcast.txt","w");
clrscr();
if(fp==NULL)
  {printf("Can't create the output file");
   getch();
   exit(0);
  }
printf("OK");
getch();
area[0]=area[2]=1.0;
area[1]=area[3]=1.0;
area[4]=1.0;
/* latitude & longitude of a place */
printf("Enter Latitude of a Place in\nDegrees : ");
scanf("%d",&dlat);
printf("Minutes : ");
scanf("%d",&mlat);
printf("Enter the direction N or S : ");
scanf("%s",&s1);
if(s1=='N'||s1=='n')
   slat=1;
else
   slat=-1;
printf("Enter Longitude of a Place in\nDegrees : ");
scanf("%d",&dlan);
printf("Minutes : ");
scanf("%d",&mlan);
printf("Enter the direction E or W : ");
```

```
scanf("%s",&s2);
if(s2=='E'||s2=='e')
slong=1;
else
   slong=-1;
dtlat=((dlat/1.0)+(mlat/60.0))*slat;
dtlan=((dlan/1.0)+(mlan/60.0))*slong;
printf("Enter Elevation of a Place in\nmeters : ");
scanf("%f",&e);
e=e/1000.0;
/* check for total No. of days */
printf("\nEnter the Year : ");
scanf("%d",&y);
if(y%4==0)
    n=366;
else
    n=365;
/* To calculate declination angle, Hr. angle */
/* To decide radiation unit*/
for(i=0;i<=n;i++)
     {
       decl[i]=23.45*sin(pif*360*(284+i)/365.0);
       hrang[i]=acos(-1.0*tan(dtlat*pif)*tan(decl[i]*pif));
     }
      do{
           printf("Enter the UNIT choice for Radiation\n1\tFor SI\n2\tFor MKS\n
      Choice : ");
      scanf("%d",&units);
      if(units==2)
      {
                units=3;
       break;
      }
           else if(units==1)
      break;
           else
      printf("ERROR : Chioce is not enetered in proper format\n");
           }while(1);
      if(units==1)
      {
              do{
                printf("Enter the UNIT choice for Radiation\n1\tFor Watt\n2\tFor Jules\nChoice : ");
      scanf("%d",&units);
      if(units==1||units==2)
          break;
      else
          printf("ERROR : Chioce is not enetered in proper format\n");
             }while(1);
           }
interval=interval/60.0;
k=0;
clrscr();
/*Computation of radiation on specific day*/
printf("Enter the Average Date for month January : ");
scanf("%d",&start);
days=start;
dic=di;
for(i=start;k<12; )
   {
   clrscr();
```

```
srtime[i]=12.0-hrang[i]/(15.0*pif);
sstime[i]=12.0+hrang[i]/(15.0*pif);
jk=srtime[i]+1;
jl=sstime[i];
Iday=I_day(units,i,dtlat*pif,decl[i]*pif,hrang[i]);
Td=2.0/15.0*(hrang[i]/pif);
printf("enter percentage possible sunsine hours=");
scanf("%f",&ps);
ps=ps/100.0;
c1=-0.309+0.539*cos(dtlat*pif)-0.0693*c+0.29*(ps);
c2=1.527-1.027*cos(dtlat*pif)+0.0926*c-0.359*(ps);
printf("\nenter the factor of beam rad=");
scanf("%f",&fac);
Iday=Iday*fac*(c1+c2*(ps));
fprintf(fp,"\nradiation received on horizontal surface::");
fprintf(fp,"%.3f",Iday);
/*Radiation estimation for total rotation w.r.t. each building facade*/
 for(l=0;l<=180;l+=inc_for_ang)
    {clrscr();
    fprintf(fp,"\nRadiation Data wrt. solar time on ");
    fprintf(fp,"%s ",month[k]);
    fprintf(fp,"%d with %dø",days,l);
    fprintf(fp,"\n\n Time\t\tIhr\t\tIs\t\t  Ie\t\t  In\t\t  Iw\t\t     It");
    term=(srtime[i]>(int)srtime[i])?((int)srtime[i]):((int)srtime[i]-1);
    term0=(12.0-srtime[i])*15.0;
    term10=(12.0-(term+1))*15.0;
    Ihr=cal_Ihr(units,i,dtlat*pif,decl[i]*pif,term0*pif,term10*pif);
    Ihr=Ihr*fac*(c1+c2*(ps));
    z1=sin(dtlat*pif)*sin(decl[i]*pif);
    z2=cos(dtlat*pif)*cos(decl[i]*pif)*cos((12.0-srtime[i])*15*pif);
    ze=(z1+z2);
    if(ze<0.001)
    {
     I[0]=0.0;
     I[1]=0.0;
     I[2]=0.0;
     I[3]=0.0;
    }
    else
    {
     term1=-1.0*sin(decl[i]*pif)*cos(dtlat*pif)*cos(l*pif);
     term2=cos(decl[i]*pif)*cos(term0*pif)*sin(dtlat*pif)* cos(l*pif);
     term3=cos(decl[i]*pif)*sin(l*pif)*sin(term0*pif);
     rb=(term1+term2+term3)/ze;
     if(rb<=0.0)
     rb=0.0;
     term4=Ihr*area[0]*rb;
     I[0]=(term4<0)?0.0:term4;
     term1=-1.0*sin(decl[i]*pif)*cos(dtlat*pif)*cos((l+90)*pif);
     term2=cos(decl[i]*pif)*cos(term0*pif)*sin(dtlat*pif)*cos((l+90)*pif);
     term3=cos(decl[i]*pif)*sin((l+90)*pif)*sin(term0*pif);
     rb= (term1+term2+term3)/ze;
     if(rb<=0.0)
     rb=0.0;
     term4=Ihr*area[1]*rb;
     I[1]=(term4<0)?0.0:term4;
     term1=-1.0*sin(decl[i]*pif)*cos(dtlat*pif)*cos((l+180)*pif);
     term2=cos(decl[i]*pif)*cos(term0*pif)*sin(dtlat*pif)*cos ((l+180)*pif);
     term3=cos(decl[i]*pif)*sin((l+180)*pif)*sin(term0*pif);
     rb= (term1+term2+term3)/ze;
```

```
if(rb<=0.0)
rb=0.0;
term4=Ihr*area[2]*rb;
I[2]=(term4<0)?0.0:term4;
term1=-1.0*sin(decl[i]*pif)*cos(dtlat*pif)*cos((l+270)*pif);
term2=cos(decl[i]*pif)*cos(term0*pif)*sin(dtlat*pif)*cos ((l+270)*pif);
term3=cos(decl[i]*pif)*sin((l+270)*pif)*sin(term0*pif);
rb= (term1+term2+term3)/ze;
if(rb<=0.0)
rb=0.0;
term4=Ihr*area[3]*rb;
I[3]=(term4<0)?0.0:term4;
}
I[5]=Ihr+I[0]+I[1]+I[2]+I[3];
Isum[0]=I[5];
Isouth[0]=I[0];
Ieast[0]=I[1];
Inorth[0]=I[2];
Iwest[0]=I[3];
MAX=I[5];
MIN=I[5];
MAXT=term;
MINT=term;
fprintf(fp,"\nSunRise-0%.0f\t%0.2e\t%0.2e\t%0.2e\t%0.2e\t%0.2e\t%0.2e\n",
      term+1,Ihr*area[4],I[0],I[1],I[2],I[3],I[5]);
Isum[1]=Ihr;
for(jj=jk;jj<jl;jj=jj+interval)
   {
   term0=(12.0-jj)*15.0;
   term10=(12.0-(jj+1))*15.0;
   avgt=(term0+term10)*0.5;
   Ihr=cal_Ihr(units,i,dtlat*pif,decl[i]*pif,term0*pif,term10*pif);
   Ihr=Ihr*fac*(c1+c2*(ps));
   Isum[1]+=Ihr;
   z1=sin(dtlat*pif)*sin(decl[i]*pif);
   z2=cos(dtlat*pif)*cos(decl[i]*pif)*cos((avgt)*pif);
   ze=(z1+z2);
   term1=-1.0*sin(decl[i]*pif)*cos(dtlat*pif)*cos(l*pif);
   term2=cos(decl[i]*pif)*cos(avgt*pif)*sin(dtlat*pif)*cos(l*pif);
   term3=cos(decl[i]*pif)*sin(l*pif)*sin(avgt*pif);
   rb=(term1+term2+term3)/ze;
   term4=Ihr*area[0]*rb;
   I[0]=(term4<0)?0.0:term4;
   Isouth[1]=Isouth[0]+I[0];
   term1=-1.0*sin(decl[i]*pif)*cos(dtlat*pif)*cos ((l+90)*pif);
  term2=cos(decl[i]*pif)*cos(avgt*pif)* sin(dtlat*pif)*cos((l+90)*pif);
  term3 =cos(decl[i]*pif)*sin((l+90)*pif)*sin(avgt*pif);
   rb=(term1+term2+term3)/ze;
   term4=Ihr*area[1]*rb;
   I[1]=(term4<0)?0.0:term4;
   Ieast[1]=Ieast[0]+I[1];
   term1=-1.0*sin(decl[i]*pif)*cos(dtlat*pif)*cos((l+180)*pif);
  term2=cos(decl[i]*pif)*cos(avgt*pif)*sin(dtlat*pif)*cos((l+180)*pif);
  term3=cos(decl[i]*pif) *sin((l+180)*pif)*sin(avgt*pif);
   rb=(term1+term2+term3)/ze;
   term4=Ihr*area[2]*rb;
   I[2]=(term4<0)?0.0:term4;
   Inorth[1]=Inorth[0]+I[2];
   term1=-1.0*sin(decl[i]*pif)*cos(dtlat*pif)*cos((l+270)*pif);
  term2=cos(decl[i]*pif)*cos(avgt*pif)*sin(dtlat*pif)*cos((l+270)*pif);
```

```
term3=cos(decl[i]*pif)*sin((l+270)*pif)*sin(avgt*pif);
rb=(term1+term2+term3)/zc;
term4=Ihr*area[3]*rb;
I[3]=(term4<0)?0.0:term4;
I[5]=Ihr*area[4]+I[0]+I[1]+I[2]+I[3];
Iwest[1]=Iwest[0]+I[3];
Isum[1]=I[5];
Isum[1]+=Ihr;
if(MAX<I[5])
   {MAX=I[5];
    MAXT=(float)jj;
   }
if(MIN>I[5])
   {MIN=I[5];
    MINT=(float)jj;
   }
if(jj==12.0)
   {fprintf(fp,"\n%.1f-%.1f\t%0.2e\t%0.2e\t%0.2e\t%0.2e\t%0.2e\t%0.2e\n"
   ,jj,jj+1,Ihr*area[4],I[0],I[1],I[2],I[3],I[5]);
   }
else
   {for(j=0;j<24;j++)
       {if(jj<j)
           {hr=j-1;
            min=(jj-j+1)*60;
            break;
           }
       }
    fprintf(fp,"\n%.0f:%.0f-%.0f:%.0f",hr,min,hr+1,min);
    if(hr<10)
       {fprintf(fp," ");
       }
    if(MAX<I[5])
       {MAX=I[5];
        MAXT=(float)jj;
       }
    if(MIN>I[5])
       {MIN=I[5];
        MINT=(float)jj;
       }
   fprintf(fp,"\t%0.2e\t%0.2e\t%0.2e\t%0.2e\t%0.2e\t%0.2e\n",
              Ihr*area[4],I[0],I[1],I[2],I[3],I[5]);
   fprintf(fp,"\n%0.3f\t%.3f\t%.3f\t%.3f",I[0],I[1],I[2],I[3]);
   }
  }
sstime[i]=12.0+hrang[i]/(15.0*pif);
term=(sstime[i]>(int)sstime[i])?((int)sstime[i]):((int)sstime[i]-1);
term0=(12.0-term)*15.0;
term10=(12.0-sstime[i])*15.0;
Ihr=cal_Ihr(units,i,dtlat*pif,decl[i]*pif,term0*pif,term10* pif);
Ihr=Ihr*fac*(c1+c2*(ps));
Isum[2]=Isum[1]+Ihr;
fprintf(fp,"\n%.3f",Isum[2]);
z1=sin(dtlat*pif)*sin(decl[i]*pif);
z2=cos(dtlat*pif)*cos(decl[i]*pif)*cos((sstime[i]-12.0)*15*pif);
zc=(z1+z2);
if(zc<0.001)
{
 I[0]=+0.0;
 I[1]=+0.0;
```

```
I[2]=+0.0;
I[3]=+0.0;
}
else
{
term1=-1.0*sin(decl[i]*pif)*cos(dtlat*pif)*cos(l*pif);
term2=cos(decl[i]*pif)*cos(term0*pif)*sin(dtlat*pif)*cos(l*pif);
term3=cos(decl[i]*pif)*sin(l*pif)*sin(term0*pif);
rb=(term1+term2+term3)/ze;
term4=rb*Ihr*area[0];
I[0]=(term4<0)?0.0:term4;
term1=-1.0*sin(decl[i]*pif)*cos(dtlat*pif)*cos((l+90)*pif);
term2=cos(decl[i]*pif)*cos(term0*pif)*sin(dtlat*pif)*cos((l+90)*pif);
term3=cos(decl[i]*pif)*sin((l+90)*pif)*sin(term0*pif);
rb=(term1+term2+term3)/ze;
term4=rb*Ihr*area[1];
I[1]=(term4<0)?0.0:term4;
term1=-1.0*sin(decl[i]*pif)*cos(dtlat*pif)*cos((l+180)*pif);
term2=cos(decl[i]*pif)*cos(term0*pif)*sin(dtlat*pif)*cos((l+180)*pif);
term3=cos(decl[i]*pif)*sin((l+180)*pif)*sin(term0*pif);
rb=(term1+term2+term3)/ze;
term4=Ihr*area[2]*rb;
I[2]=(term4<0)?0.0:term4;
term1=-1.0*sin(decl[i]*pif)*cos(dtlat*pif)*cos((l+270)*pif);
term2=cos(decl[i]*pif)*cos(term0*pif)*sin(dtlat*pif)*cos((l+270)*pif);
term3=cos(decl[i]*pif)*sin((l+270)*pif)*sin(term0*pif);
rb=(term1+term2+term3)/ze;
term4=Ihr*area[2]*rb;
I[3]=(term4<0)?0.0:term4;
}
Isouth[2]=Isouth[1]+I[0];
Ieast[2]=Ieast[1]+I[1];
Inorth[2]=Inorth[1]+I[2];
Iwest[2]=Iwest[1]+I[3];
fprintf(fp,"\nTotal Radiation on 'S','E','N' & 'W' wall=\n%.3f",Isouth[2],
Ieast[2],Inorth[2],Ieast[2]);
I[5]=Ihr*area[4]+I[0]+I[1]+I[2]+I[3];
Isum[3]=Ihr;
if(MAX<I[5])
   {MAX=I[5];
    MAXT=(float)jj;
   }
if(MIN>I[5])
   {MIN=I[5];
    MINT=(float)jj;
   }
fprintf(fp,"\n%.0f-SunSet\t%0.2e\t%0.2e\t%0.2e\t%0.2e\t%0.2e\t%0.2e\n",
                 term,Ihr*area[4],I[0],I[1],I[2],I[3],I[5]);
Isum[3]=Isum[2]+Isouth[2]+Ieast[2]+Inorth[2]+Iwest[2];
fprintf(fp,"\n\t\tIsum=%0.2e",Isum[3]);
a=l/inc_for_ang;
fprintf(fp,"\n\t\tItsum=%0.2e",Isum[3]);
fprintf(fp,"\n\t\tMax=%f @ %0.0f",MAX,MAXT);
fprintf(fp,"\n\t\tMin=%f @ %0.0f",MIN,MINT);
if(dic==di)
    {getch();
    }
if(i==start)
   {Max[l/inc_for_ang]=MAX;
    Min[l/inc_for_ang]=MIN;
```

```
            MaxN[l/inc_for_ang]=i;
            MinN[l/inc_for_ang]=i;
            }
        else
            {if(Max[l/inc_for_ang]<MAX)
                {Max[l/inc_for_ang]=MAX;
                 MaxN[l/inc_for_ang]=i;
                }
             if(Min[l/inc_for_ang]>=MIN&&MIN!=0.0)
                {Min[l/inc_for_ang]=MIN;
                 MinN[l/inc_for_ang]=i;
                }
            }
        }
      k++;
      if(k<12)
        {if(k==2)
            if(y%4==0)
                i+=29;
            else
                i+=28;
        if(k==1||k==3||k==5||k==7||k==8||k==10)
            i+=31;
        if(k==0||k==4||k==6||k==9||k==11)
            i+=30;
        clrscr();
        printf("\nEnter the Average Date for month %s : ",month[k]);
        scanf("%d",&end);
        i=i-(start-end);
        days=start-(start-end);
        start=end;
        }
    }
  clrscr();
  fprintf(fp,"The Maximum Values are as follows\n");
  for(l=0;l<=180;l+=inc_for_ang)
  fprintf(fp,"%f\t%d\n",Max[l/inc_for_ang],MaxN[l/inc_for_ang]);
  clrscr();
  fprintf(fp,"The Minmum Values are as follows\n");
  for(l=0;l<=180;l+=inc_for_ang)
  fprintf(fp,"%f\t%d\n",Min[l/inc_for_ang],MinN[l/inc_for_ang]);
  printf("Program Ends...");
  getch();
 }
/*Function to compute day number*/
float get_date(d,m,y)
{int yf,mf;
 float nd;
 if(m<2||m==2)
 {yf=y-1;
  mf=m+13;
  }
  else
  {yf=y;
   mf=m+1;
   }
   nd=1461*(float)yf/4+153*(float) mf/5+d;
   return(nd);
   }
```

```
/*Function to compute radiation per day*/
float I_day(int type,int nd,float lat,float decl,float hrang)
{float term1,term2,term3,term4,iday; int Io;
 if(type==1)
    Io=1367.0;
 else if(type==2)
    Io=4920.0;
 else
    Io=1177.0;
 term1=(24.0/pi)*Io;
 term2=1.0+0.033*cos((2.0*pi*nd)/365.0);
 term3=cos(lat)*cos(decl)*sin(hrang);
 term4=hrang*sin(lat)*sin(decl);
 iday=term1*term2*(term3+term4);
 return(iday);
}
/*Function to compute radiation per hour*/
float cal_Ihr(int type,int nd, float lat,float decl, float hrang0, float hrang10)
{float term1,term2,term3,term4,ihr;
 int Io;
 if(type==1)
    Io=1367.0;
 else if(type==2)
    Io=4920.0;
 else
    Io=1177.0;
 term1=(12.0/pi)*Io;
 term2=1.0+0.034*cos(2.0*pi*nd/365.0);
 term3=cos(lat)*cos(decl)*(sin(hrang0)-sin(hrang10));
 term4=(hrang0-hrang10)*sin(lat)*sin(decl);
 ihr=term1*term2*(term3+term4);
 if(ihr<0)
 return(0);
 else
 return(ihr);
}
```

B-4 RADIATION VALUES ON VARIOUS BUILDING FACADES

The estimated radiation values using the software, ORAL, are represented graphically in this section. The input data for several analyzed places (section B-1) from different climatic zones of India is used to estimate unit radiation over a particular wall facade i.e. South (represented by S), East (represented by E), North (represented by N) and West (represented by W). The analysis is carried out on specific dates (Table 4.2, chapter 4) from different months (represented by month number, 1-12) throughout the year. For the analyzed dates certain computed unit radiation values found symmetric and hence are represented by the same curve with (/) sign in between two months, (1/11- January/November, 2/10- February/October, 3/9- March/September, 4/8- April/August, 5/7- May/July, 6- June, 12- December). The estimated unit radiation values on different vertical surfaces and horizontal roof surface are summed up to compute total unit radiation value (represented by T). Section B-5 represents total unit radiation value over different locations (section B-1).

Location: Jaisalmer (Zone 1: Hot and dry)

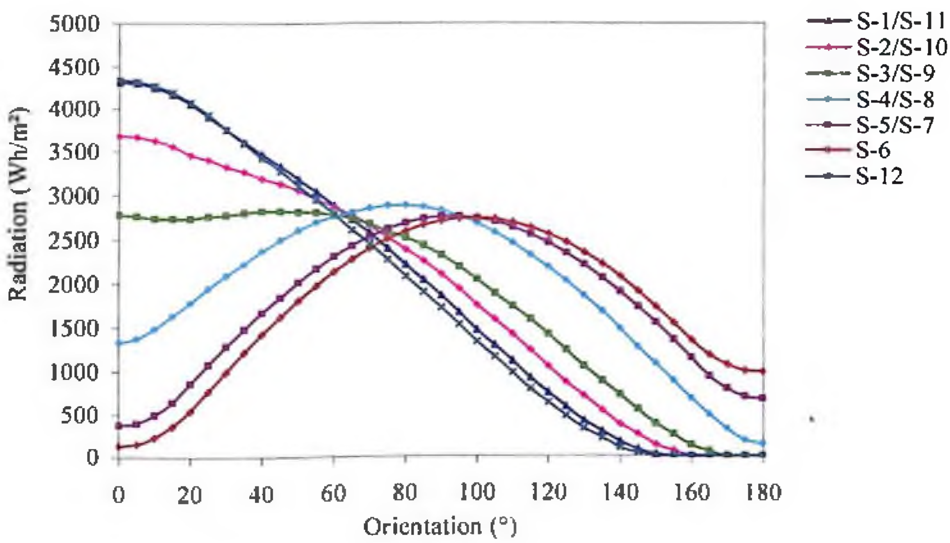


Figure B.2.1 Radiation received over South surface

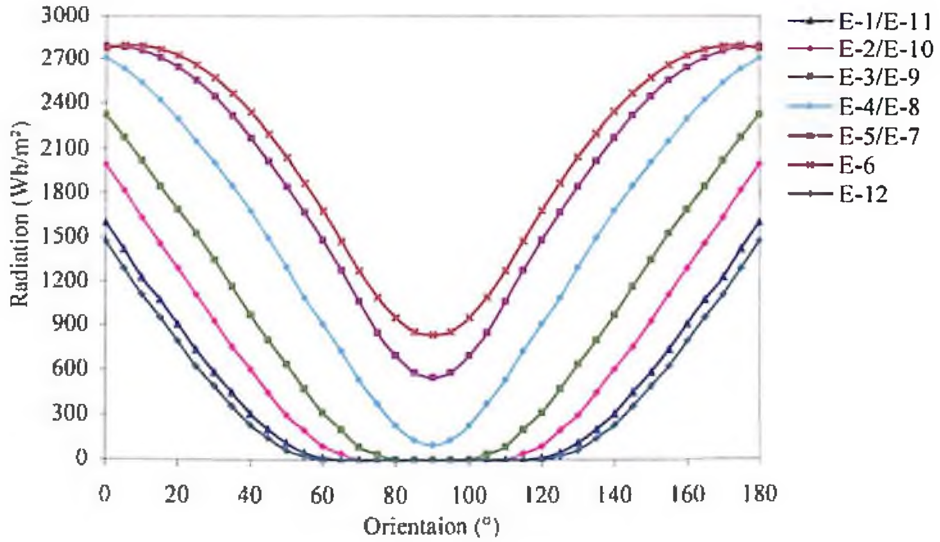


Figure B.2.2 Radiation received over East surface

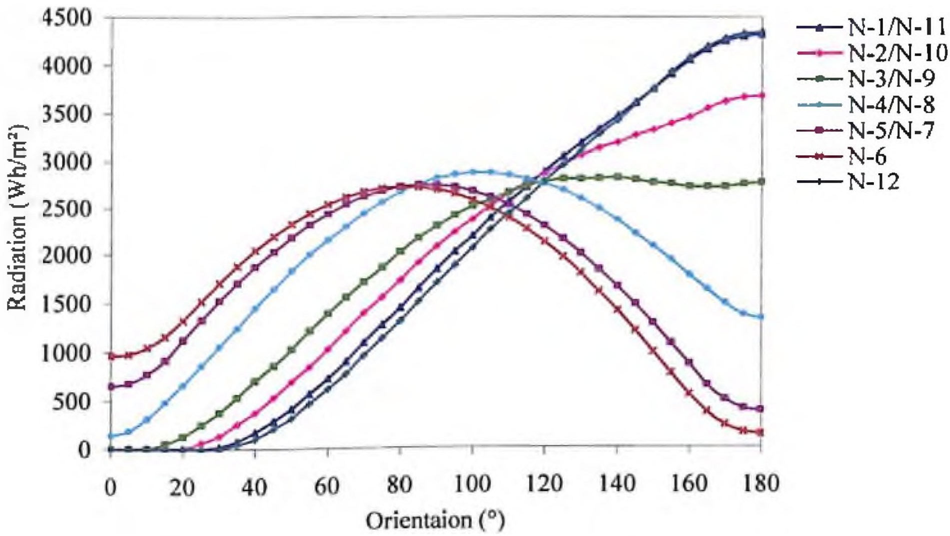


Figure B.2.3 Radiation received over North surface

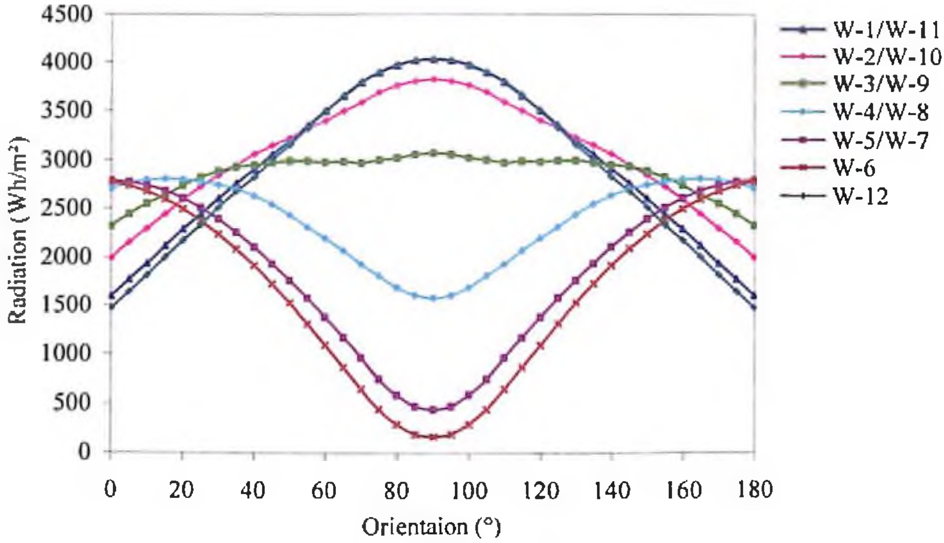


Figure B.2.4 Radiation received over West surface

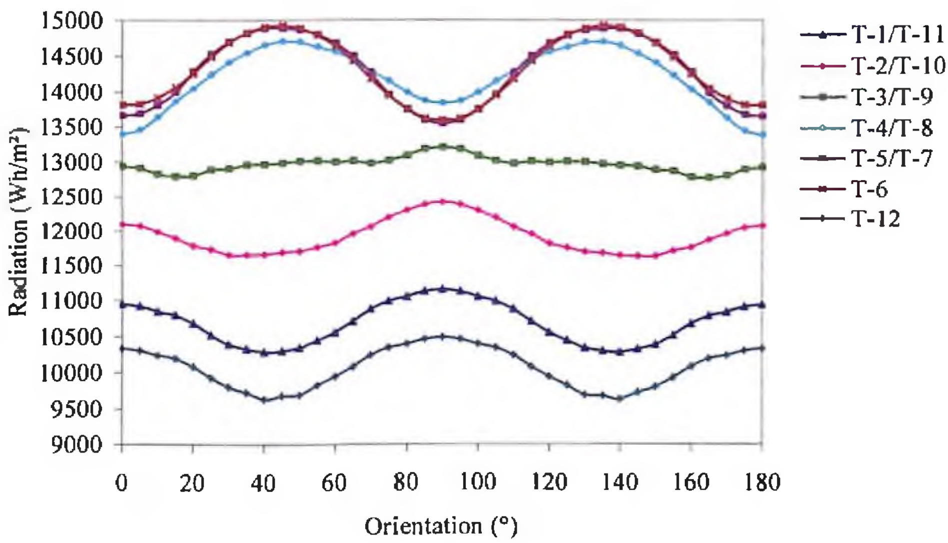


Figure B.2.5 Radiation received over total exposed surface

B-5 TOTAL UNIT RADIATION OVER DIFFERENT PLACES

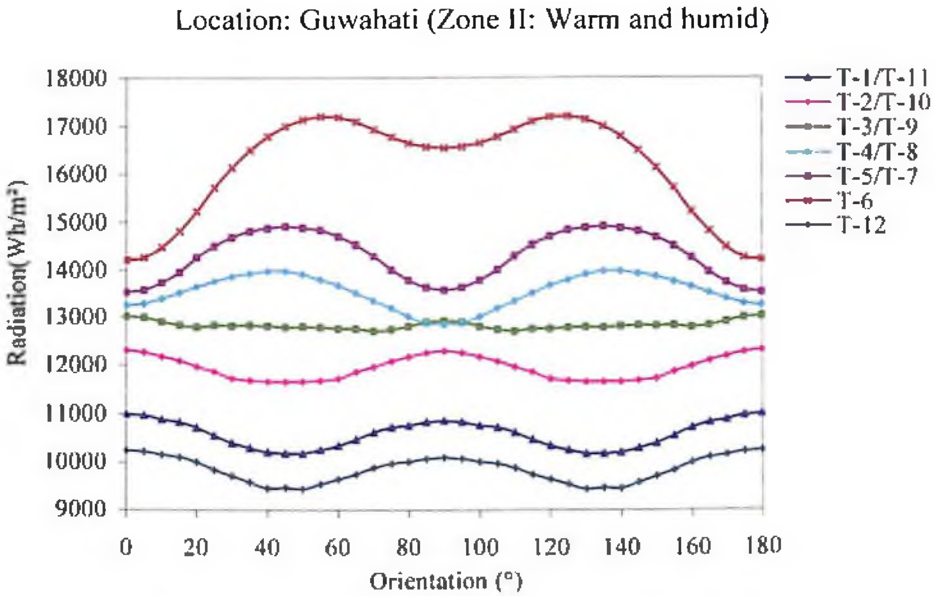


Figure B.3.1 Radiation received over total exposed surface

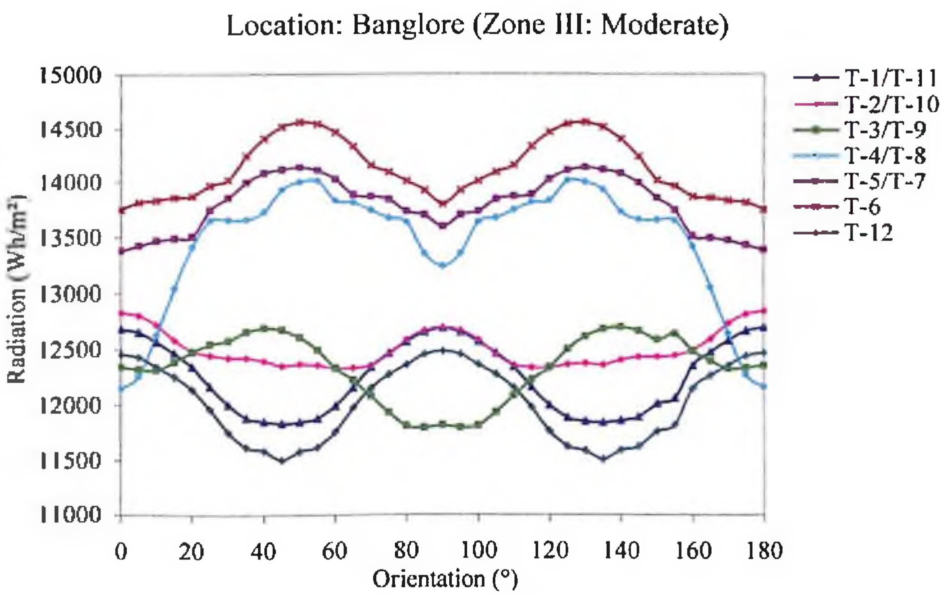


Figure B.3.2 Radiation received over total exposed surface

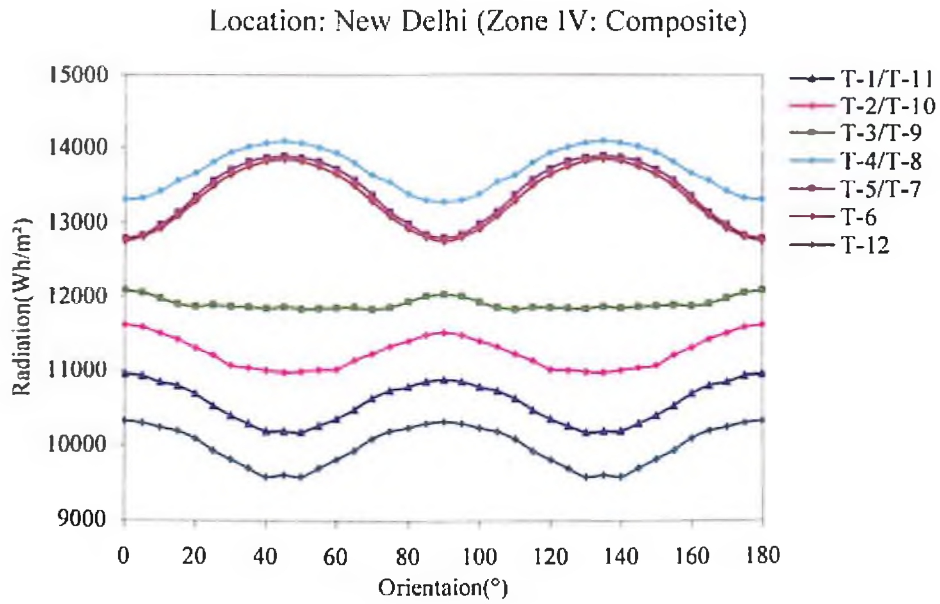


Figure B.3.3 Radiation received over total exposed surface

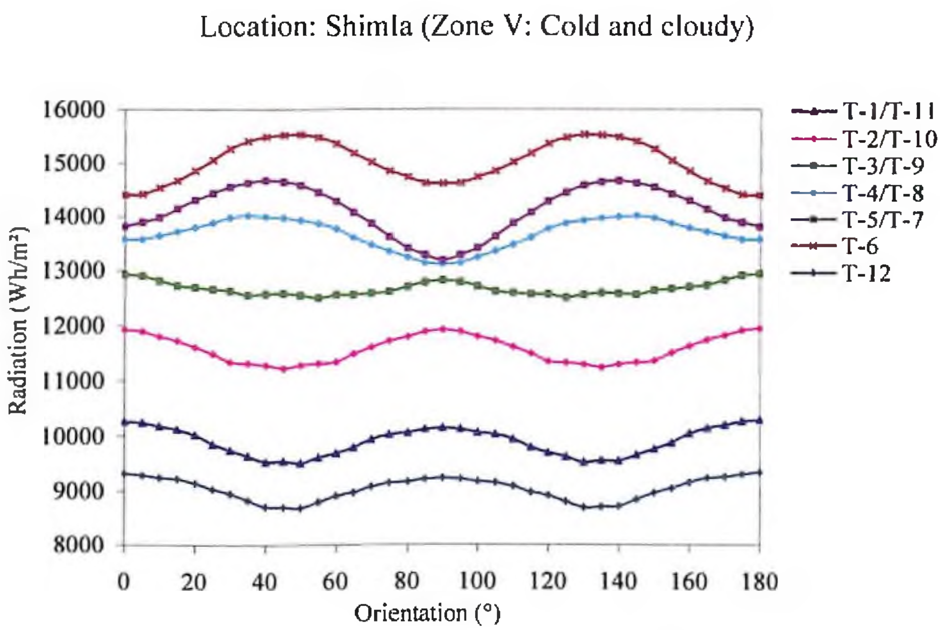


Figure B.3.4 Radiation received over total exposed surface

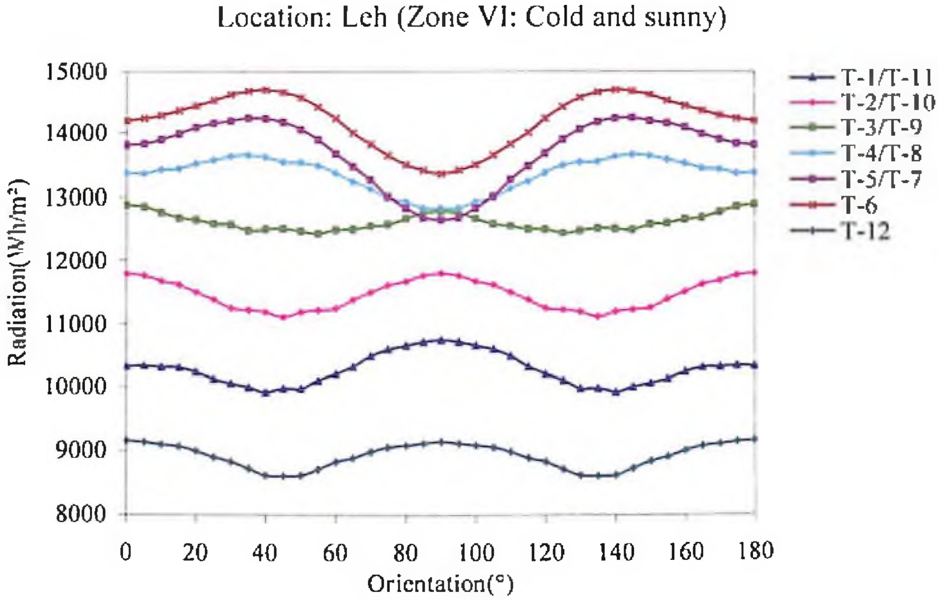


Figure B.3.5 Radiation received over total exposed surface

APPENDIX-C

C-1 FLOW CHART FOR SMTP SOFTWARE

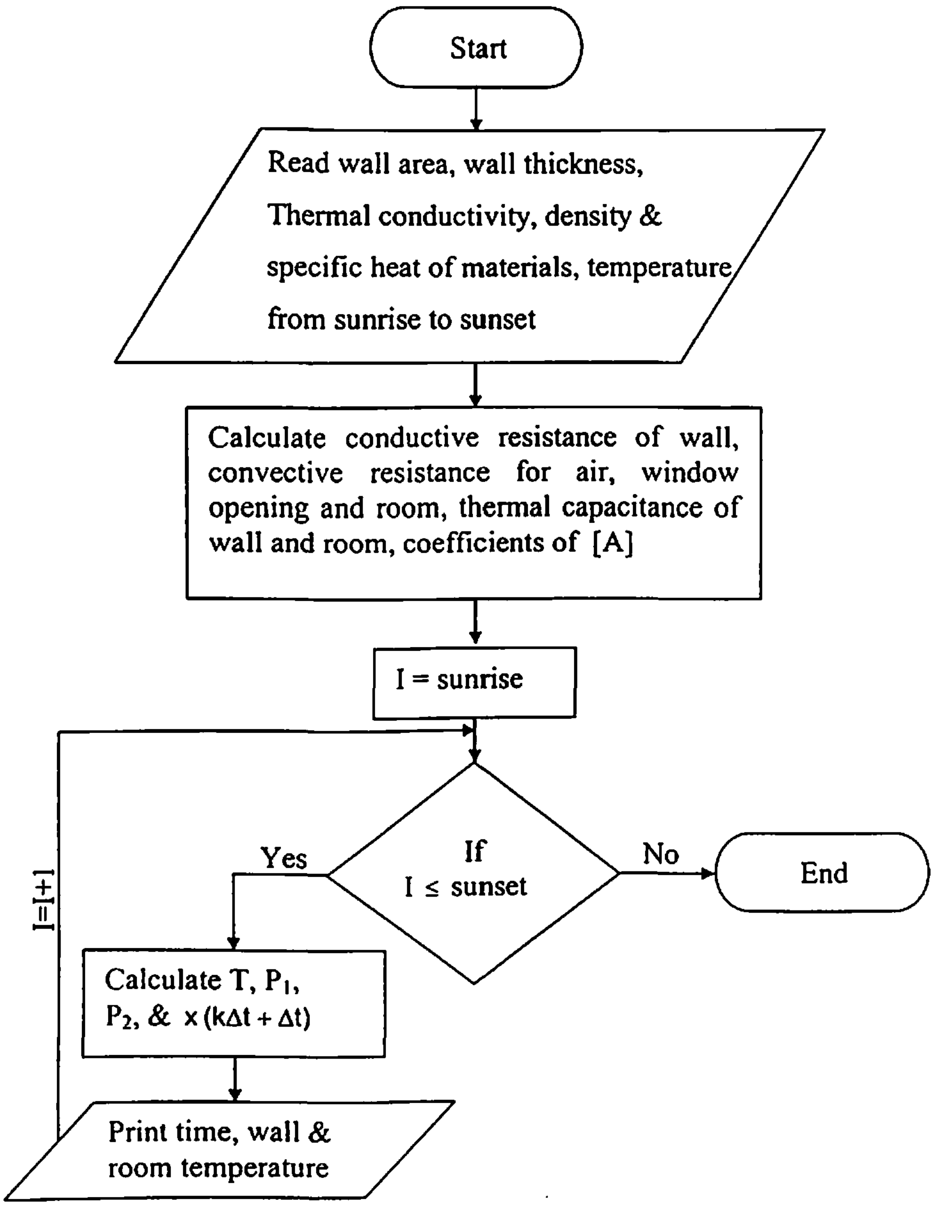


Figure C.1 Flowchart to compute temperature at wall surface and room center

C-2 ALGORITHM FOR SMTP SOFTWARE

```
% Temperature prediction for building model, (SMTP chapter 5)
clear all
clc
%Wall thickness in mts.
tp=(1/12)*0.3048;
tb=(3.5/12)*0.3048;
%Thermal conductivity
kp=0.721;
kb=0.811;
%area and resistance due to conduction
as=((4.9167*3)-1.08)*0.3048*0.3048;
asi=(12-1.08)*0.3048*0.3048;
rds=(tp/(kp*as))*2+(tb/(kb*as));
%initial temperature
tw=24.5;ta=25.1;tr=23.8;
tfo=(tw+ta)/2;
tfi=(tr+ta)/2;
tfo=tfo+273;
tfi=tfi+273;
%calculation of film coefficient
betao=1/tfo;
betai=1/tfi;
ko=0.02624;ki=0.02624;
kvo=15.69e-6;kvi=15.69e-6;
pro=0.708;pri=0.708;
rao=(9.81*betao*(ta-tw)*power((3*0.3048),3))/power(kvo,2);
rai=(9.81*betai*(ta-tr)*power((3*0.3048),3))/power(kvi,2);
prodo=rao*pro;
if (prodo<=01e+08)
  nuo=0.56*power(prodo,0.25);
else
   nuo=0.13*power(prodo,(1/3));
end
end
ho=nuo*ko/(3*0.3048);
prodi=rai*pri;
if (prodi<=01e+08)
  nui=0.56*power(prodi,0.25);
else
   nui=0.13*power(prodi,(1/3));
end
end
hi=nui*ki/(3*0.3048);
%convective resistance
rvos=1/(ho*as);
rvis=1/(hi*asi);
rw=1/(ho*1.08*0.3048*0.3048);
%thermal capacitance
rop=1762;shp=840;rob=1820;shb=880;
vsp=(12-1.08)*(1/12)*power(0.3048,3);
vsb=(12-1.08)*(3.5/12)*power(0.3048,3);
csc=(2/(rop*vsp*shp))+(1/(rob*vsb*shb));
cs=(1/csc);
cr=1.1774*(4*3*3)*power(0.3048,3)*1006;
%'b' matrix elements
rc1=(1/rds)+(1/rvos);
r11=(1/rc1)+(1/rvis);
r22=(1/rvis)+(1/rw);
```

```
ct11=3600/(cs*rvis);
ct22=3600/(cr*rw);
a11=-(3600/cs)*r11;
a12=3600/(cs*rvis);
a21=3600/(cr*rvis);
a22=-(3600/cr)*r22;
a=[a11,a12; a21,a22];
% inverse of a
v=inv(a);
T=a;
dt=1;
s=[0];
for i=2:30
  j=factorial(i);
  dt=power(dt,i);
  T=T*a;
  s=s+((T*dt)/j);
end
% sum of the series for thirty terms
id=[1,0;0,1];
s=id+a+s;
P1=v*(s-id);
P2=v*((P1/dt)-s);
tn=[tw;tr];
ta=[27,32,40,48,53,57,56,48,50,41,38,34];
%B matrix calculation
for i=7:17
        time_Twall_Troom=[i,,tw,tr]
    tt=tn;
    tn=[tn(1)-tn(2);tn(2)-tn(2)];
    term1=s*tn;
    b=[ct11;ct22]*(ta(i-5)-ta(i-6));
    b1=[ct11;ct22]*((ta(i-5)-tt(2))-(ta(i-6)-tt(2)));
    % term 2 calculation
    term2=P1*b;
    %B delta matrix calculation
    term3=P2*b1;
    % claculation of new temperature
    tn=term1+term2+term3;
         tw=tw+tn(1);
        tr=tr+tn(2);
    end
```

APPENDIX-D

D-1 SMALL SCALE EXPERIMENTAL MODELS

In the present section, photographs of the brick masonry constructed models (Section 7.3, Chapter 7) are shown. The model with no sunshade on the south (represented by S) facade wall is represented as M-7. The models with horizontal sunshade on the south facade wall with specific dimensions of window are represented as M-8 and M-9. The other two models M-10 and M-11 are constructed with the designed sunshade (Section 7.4, Chapter 7) over the windows of specific dimension. The models M-7, M-8 and M-9 are constructed with a smaller window on the east (represented by E) facade wall as compared to the south facade wall, with no sunshade. Likewise, the models M-10 and M-11 have a smaller constructed window on the west facade (represented by W) wall, with no sunshade.

Section D-2 mentions experimental data for all the constructed models. Different polyurethane foam models (M-1 to M-6) have different temperature recordings as ambient temperature (represented by T_a) and room temperatures (represented by T-I, T-II and T-III) at an instance of time. Sunlit areas are measured inside the models on various wall facades i.e. West, Floor and East, which are represented as S_{lw}, S_{lg}, S_{le} respectively. The total sunlit area is represented as S_l. Other than these records, different measurements recorded in the brick masonry models (M-7 to M-11) are sunlight over windowsill area (represented as S_i) and shadow area over the south facade wall (represented as S_h).

M-7

M-8

M-9

M-10

M-11

Figure D.1 Actual constructed brick masonry models

D-2 EXPERIMENTAL DATA

2002

7/23		M-1			M-2			M-3			M-1			M-2			M-3		
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_{lw}	S_{le}	S_k	S_{lw}	S_{le}	S_k	S_{lw}	S_{le}	S_k
8,9	35.1	34.1	34.2	34.1	34	34	33.9	34.3	34.5	34.4	0	0	0	0	0	0	0	0	0
9,10	36.8	35.8	36	35.9	35.5	35.6	35.5	36	36.2	36	0	0	0	0	0	0	0	0	0
10,11	38.7	38	38.1	37.9	37.2	37.5	37.3	38.1	38.3	38.2	0	0	0	0	0	0	0	0	0
11,12	40.1	40.2	40.5	40.3	39.4	39.7	39.4	40.8	41	40.7	0	0	0	0	0	0	0	0	0
12,13	41.9	42.6	43	42.7	41.5	41.9	41.5	42.5	42.8	42.6	0	0.03	0	0	0	0	0	1.27	0
13,14	43.5	44.5	44.8	44.6	43	43.5	43.1	44.3	44.6	44.4	0	0	0	0	0	0	0	1.27	0
14,15	45	46.8	47	46.7	45	45.5	45.1	47.1	47.3	47	0	0	0	0	0	0	0	0	0
15,16	43.6	45.6	46	45.7	43.6	44	43.6	45.7	46	45.6	0	0	0	0	0	0	0	0	0
7/24																			
8,9	34.9	33.8	34	33.9	33.8	33.9	33.7	34.1	34.3	34	0	0	0	0	0	0	0	0	0
9,10	36.6	35.5	35.8	35.7	35.3	35.5	35.3	35.8	36	35.6	0	0	0	0	0	0	0	0	0
10,11	38.5	37.7	37.9	37.7	37	37.4	37.1	37.9	38.1	37.8	0	0	0	0	0	0	0	0	0
11,12	39.9	39.9	40.3	40.1	39.2	39.6	39.2	40.6	40.8	40.3	0	0	0	0	0	0	0	0	0
12,13	41.7	42.3	42.8	42.5	41.3	41.8	41.3	42.3	42.6	42.2	0	0.03	0	0	0	0	0	1.27	0
13,14	43.3	44.2	44.6	44.4	42.8	43.4	42.9	44.1	44.4	44	0	0	0	0	0	0	0	1.27	0
14,15	44.8	46.5	46.8	46.5	44.8	45.4	44.9	46.9	47.1	46.6	0	0	0	0	0	0	0	0	0
15,16	43.4	45.3	45.8	45.5	43.4	43.9	43.4	45.5	45.8	45.2	0	0	0	0	0	0	0	0	0
7/25																			
8,9	35.4	34.4	34.5	34.3	34.3	34.4	34.2	34.6	34.8	34.7	0	0	0	0	0	0	0	0	0
9,10	37.1	36.1	36.3	36.1	35.8	36	35.8	36.3	36.5	36.3	0	0	0	0	0.1	0	0	0	0
10,11	39	38.3	38.4	38.1	37.5	37.9	37.6	38.4	38.6	38.5	0	0.1	0	0	0.6	0	0	1	0
11,12	40.4	40.5	40.8	40.5	39.7	40.1	39.7	41.1	41.3	41	0	0.03	0	0	0.2	0	0	3	0
12,13	42.2	42.9	43.3	42.9	41.8	42.3	41.8	42.8	43.1	42.9	0	0.08	0	0	0.5	0	0	3	0
13,14	43.8	44.8	45.1	44.8	43.3	43.9	43.4	44.6	44.9	44.7	0	0.09	0	0	0.82	0	0	1	0
14,15	45.3	47.1	47.3	46.9	45.3	45.9	45.4	47.4	47.6	47.3	0	0	0	0	0	0	0	0	0
15,16	43.9	45.9	46.3	45.9	43.9	44.4	43.9	46	46.3	45.9	0	0	0	0	0	0	0	0	0
7/27																			
8,9	35.8	34.7	34.9	34.8	34.7	34.8	34.6	35	35.2	35.1	0	0	0	0	0	0	0	0	0
9,10	37.5	36.4	36.7	36.6	36.2	36.4	36.2	36.7	36.9	36.7	0	0	0	0	0.15	0	0	0	0
10,11	39.4	38.6	38.8	38.6	37.9	38.3	38	38.8	39	38.9	0	0.12	0	0	1	0	0	1.5	0
11,12	40.8	40.8	41.2	41	40.1	40.5	40.1	41.5	41.7	41.4	0	0.05	0	0	0.4	0	0	3.5	0
12,13	42.6	43.2	43.7	43.4	42.2	42.7	42.2	43.2	43.5	43.3	0	0.1	0	0	0.52	0	0	3.2	0
13,14	44.2	45.1	45.5	45.3	43.7	44.3	43.8	45	45.3	45.1	0	0.11	0	0	0.85	0	0	1.2	0
14,15	45.7	47.4	47.7	47.4	45.7	46.3	45.8	47.8	48	47.7	0	0	0	0	0	0	0	0	0
15,16	44.3	46.2	46.7	46.4	44.3	44.8	44.3	46.4	46.7	46.3	0	0	0	0	0	0	0	0	0
7/28																			
8,9	34.1	33	33.2	33.1	33	33.1	32.9	33.3	33.5	33.4	0	0	0	0	0	0	0	0	0
9,10	35.8	34.7	35	34.9	34.5	34.7	34.5	35	35.2	35	0	0	0	0.15	0	0	0	0	0
10,11	37.7	36.9	37.1	36.9	36.2	36.6	36.3	37.1	37.3	37.2	0	0.12	0	0	1	0	0	1.5	0
11,12	39.1	39.1	39.5	39.3	38.4	38.8	38.4	39.8	40	39.7	0	0.05	0	0	0.4	0	0	3.5	0
12,13	40.9	41.5	42	41.7	40.5	41	40.5	41.5	41.8	41.6	0	0.1	0	0	0.52	0	0	3.2	0
13,14	42.5	43.4	43.8	43.6	42	42.6	42.1	43.3	43.6	43.4	0	0.11	0	0	0.85	0	0	1.2	0
14,15	44	45.7	46	45.7	44	44.6	44.1	46.1	46.3	46	0	0	0	0	0	0	0	0	0
15,16	42.6	44.5	45	44.7	42.6	43.1	42.6	44.7	45	44.6	0	0	0	0	0	0	0	0	0
7/30																			
8,9	34.5	31.9	32	32	32.1	32.3	32.1	32.1	32.3	32.2	0	0	0	0	0	0	0	0	0
9,10	35.6	33.8	34	33.9	33.8	34	33.9	34	34.2	34.1	0	0	0	0.16	0.03	0	0	0	0
10,11	37	36	36.2	36.1	35.7	35.9	35.6	36.3	36.5	36.3	0	0.14	0	0	1.01	0	0	1.62	0
11,12	38.8	38.3	38.5	38.3	37.7	38	37.8	38.6	39	38.7	0	0.08	0	0	0.41	0	0	3.54	0
12,13	40	40	40.3	40.1	39.5	39.7	39.6	40.8	41	40.7	0	0.14	0	0	0.55	0	0	3.28	0
13,14	41.7	41.9	42.1	41.8	41	41.2	40.9	42.7	43	42.7	0	0.11	0	0	0.87	0	0	1.24	0
14,15	43	43.7	44	43.6	42.8	43	42.7	44.7	45	44.8	0	0	0	0	0	0	0	0	0
15,16	42.2	42.8	43	42.8	42.5	42.8	42.6	43.6	43.8	43.5	0	0	0	0	0	0	0	0	0
8/1																			
8,9	34	30.9	32	31	31.1	32.2	31.1	31.1	32.3	31.2	0	0	0	0	0	0	0	0	0
9,10	35.8	32.8	33.8	32.9	32.8	33.8	32.9	33	34	33.1	0.05	0	0	0.9	0.1	0	0.05	0	0
10,11	37.5	35	35.3	35.1	34.7	34.9	34.6	35.3	35.7	35.3	0	0.4	0	0	1.5	0	0	3.3	0
11,12	39.1	37.3	37.1	37.3	36.7	36.7	36.8	37.6	37.9	37.7	0	0.15	0	0	0.6	0	0	5	0
12,13	40.6	39	38.9	39.1	38.5	38.2	38.6	39.8	39.6	39.7	0	0.2	0	0	0.8	0	0	5.5	0
13,14	41.9	40.9	40.9	40.8	40	40.4	39.9	41.7	41.5	41.7	0	0.3	0	0	1.5	0	0	3.4	0
14,15	43	42.7	42.8	42.6	41.8	42.5	41.7	43.7	44.1	43.8	0	0	0	0	0.4	0	0	0	0
15,16	42.2	41.8	44	41.8	41.5	43.8	41.6	42.6	43.2	42.5	0	0	0	0	0	0	0	0	0
8/2																			
8,9	35.2	32.6	32.7	32.7	32.8	33	32.8	32.8	33	32.9	0	0	0	0	0	0	0	0	0
9,10	36.3	34.5	34.7	34.6	34.5	34.7	34.6	34.7	34.9	34.8	0.05	0	0	0.9	0.2	0	0.05	0	0
10,11	37.7	36.7	36.9	36.8	36.4	36.6	36.3	37	37.2	37	0	0.4	0	0	1.6	0	0	3.3	0
11,12	39.5	39	39.2	39	38.4	38.7	38.5	39.3	39.7	39.4	0	0.15	0	0	0.6	0	0	5	0
12,13	40.7	40.7	41	40.8	40.2	40.4	40.3	41.5	41.7	41.4	0	0.2	0	0	0.8	0	0	5.5	0
13,14	42.4	42.6	42.8	42.5	41.7	41.9	41.6	43.4	43.7	43.4	0	0.3	0	0	1.6	0	0	3.4	0
14,15	43.7	44.4	44.7	44.3	43.5	43.7	43.4	45.4	45.7	45.5	0	0	0	0	0.4	0	0	0	0
15,16	42.9	43.5	43.7	43.5	43.2	43.5	43.3	44.3	44.5	44.2	0	0	0	0	0	0	0	0	0
8/3																			
8,9	34.1	33	33.2	33.1	33	33.1	32.9	33.3	33.5	33.4	0	0	0	0	0	0	0	0	0
9,10	35.8	34.7	35	34.9	34.5	34.7	34.5	35	35.2	35	0.06	0	0	0.91	0.2	0	0.05	0	0
10,11	37.7	36.9	37.1	36.9	36.2	36.6	36.3	37.1	37.3	37.2	0	0.41	0	0	1.68	0	0	3.49	0
11,12	39.1	39.1	39.5	39.3	38.4	38.8	38.4	39.8	40	39.7	0	0.15	0	0	0.64	0	0	5.22	0
12,13	40.9	41.5	42	41.7	40.5	41	40.5	41.5	41.8	41.6	0	0.2	0	0	0.86	0	0	5.78	0
13,14	42.5	43.4	43.8	43.6	42	42.6	42.1	43.3	43.6	43.4	0	0.37	0	0	1.8	0	0	3.58	0
14,15	44	45.7	46	45.7	44	44.6	44.1	46.1	46.3	46	0	0	0	0	0.49	0	0	0	0
15,16	42.6	44.5	45	44.7	42.6	43.1	42.6	44.7	45	44.6	0	0	0	0	0	0	0	0	0

8/5		M-1			M-2			M-3			M-1			M-2			M-3		
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_{lw}	S_{lc}	S_k	S_{lw}	S_{lc}	S_k	S_{lw}	S_{lc}	S_k
8,9	35	31.9	33	32	32.1	33.2	32.1	32.1	33.3	32.2	0	0	0	0	0	0	0	0	0
9,10	36.8	33.8	34.8	33.9	33.8	34.8	33.9	34	35	34.1	0.06	0	0	0.91	0.2	0	0.06	0	0
10,11	38.5	36	36.3	36.1	35.7	35.9	35.6	36.3	36.7	36.3	0	0.41	0	0	1.68	0	0	3.49	0
11,12	40.1	38.3	38.1	38.3	37.7	37.7	37.8	38.6	38.9	38.7	0	0.15	0	0	0.64	0	0	5.22	0
12,13	41.6	40	39.9	40.1	39.5	39.2	39.6	40.8	40.6	40.7	0	0.2	0	0	0.86	0	0	5.78	0
13,14	42.9	41.9	41.9	41.8	41	41.4	40.9	42.7	42.5	42.7	0	0.37	0	0	1.8	0	0	3.58	0
14,15	44	43.7	43.8	43.6	42.8	43.5	42.7	44.7	45.1	44.8	0	0	0	0	0.49	0	0	0	0
15,16	43.2	42.8	45	42.8	42.5	44.8	42.6	43.6	44.2	43.5	0	0	0	0	0	0	0	0	0
8/7																			
8,9	33.7	30.6	31.7	30.7	30.8	31.9	30.8	30.8	32	30.9	0	0	0	0	0	0	0	0	0
9,10	35.5	32.5	33.5	32.6	32.5	33.5	32.6	32.7	33.7	32.8	0.07	0	0	1	0.3	0	0.07	0	0
10,11	37.2	34.7	35	34.8	34.4	34.6	34.3	35	35.4	35	0	0.42	0	0	1.7	0	0	3.5	0
11,12	38.8	37	36.8	37	36.4	36.4	36.5	37.3	37.6	37.4	0	0.15	0	0	0.66	0	0	5.3	0
12,13	40.3	38.7	38.6	38.8	38.2	37.9	38.3	39.5	39.3	39.4	0	0.22	0	0	0.89	0	0	5.8	0
13,14	41.6	40.6	40.6	40.5	39.7	40.1	39.6	41.4	41.2	41.4	0	0.4	0	0	1.9	0	0	3.6	0
14,15	42.7	42.4	42.5	42.3	41.5	42.2	41.4	43.4	43.8	43.5	0	0	0	0	0.5	0	0	0	0
15,16	41.9	41.5	43.7	41.5	41.2	43.5	41.3	42.3	42.9	42.2	0	0	0	0	0	0	0	0	0
8/8																			
8,9	34.3	33.2	33.4	33.3	33.2	33.3	33.1	33.5	33.7	33.4	0	0	0	0	0	0	0	0	0
9,10	36	34.9	35.2	35.1	34.7	34.9	34.7	35.2	35.4	35	0.06	0	0	1.5	0.5	0	1.2	0.3	0
10,11	37.9	37.1	37.3	37.1	36.4	36.8	36.5	37.3	37.5	37.2	0	0.54	0	0	2.2	0	0	5	0
11,12	39.3	39.3	39.7	39.5	38.6	39	38.6	40	40.2	39.7	0	0.2	0	0	0.8	0	0	6.5	0
12,13	41.1	41.7	42.2	41.9	40.7	41.2	40.7	41.7	42	41.6	0	0.3	0	0	0.9	0	0	6.7	0
13,14	42.7	43.6	44	43.8	42.2	42.8	42.3	43.5	43.8	43.4	0	0.4	0	0	2.1	0	0	5.5	0
14,15	44.2	45.9	46.2	45.9	44.2	44.8	44.3	46.3	46.5	46	0	0.05	0	0	0.6	0	0	1	0
15,16	42.8	44.7	45.2	44.9	42.8	43.3	42.8	44.9	45.2	44.6	0	0	0	0	0	0	0	0	0
8/9																			
8,9	33.8	31.7	31.8	31.6	31.9	32	31.9	31.9	32.1	32	0	0	0	0	0	0	0	0	0
9,10	35.6	33.5	33.6	33.4	33.5	33.6	33.4	33.6	33.8	33.7	0.06	0	0	1.1	0.11	0	1	0	0
10,11	37.3	34.9	35.1	34.9	34.5	34.7	34.4	35.3	35.5	35.3	0	0.41	0	0	1.68	0	0	3.49	0
11,12	38.9	36.7	36.9	36.7	36.5	36.5	36.6	37.4	37.7	37.5	0	0.15	0	0	0.64	0	0	5.22	0
12,13	40.4	38.5	38.7	38.6	38.3	38	38.4	39.2	39.4	39.1	0	0.2	0	0	0.86	0	0	5.78	0
13,14	41.7	40.5	40.7	40.6	39.8	40.2	39.9	41	41.3	41.1	0	0.37	0	0	1.8	0	0	3.58	0
14,15	42.8	42.5	42.6	42.4	42.1	42.3	42	43.5	43.9	43.6	0	0	0	0	0.49	0	0	0	0
15,16	42	43.5	43.8	43.6	43.3	43.6	43.4	42.8	43	42.7	0	0	0	0	0	0	0	0	0
8/12																			
8,9	32.9	31.3	31.5	31.4	31.3	31.5	31.4	31	31.3	31.1	0	0	0	0	0	0	0	0	0
9,10	34.6	33	33.1	32.9	32.7	32.9	32.8	32.8	33	32.9	0.61	0	0	2	0.59	0	2.2	0.05	0
10,11	36	35.5	35.7	35.6	35.3	35.4	35.2	32.6	35.8	35.6	0	0.75	0	0	2.79	0	0	7.41	0
11,12	37.7	37.9	38	37.8	37.5	37.6	37.4	37.9	38.1	38	0	0.4	0	0	1.13	0	0	9.43	0
12,13	38.9	39.8	40	39.7	39.2	39.4	39.3	40.2	40.4	40.2	0	0.39	0	0	1.12	0	0	7.79	0
13,14	40.5	41.5	41.8	41.6	41	41.2	41.1	42	42.2	42	0	0.82	0	0	2.81	0	0	7.42	0
14,15	42	42.4	42.7	42.4	42.3	42.5	42.2	43.7	44	43.6	0	0.62	0	0	2.57	0	0	2.29	0
15,16	40	40.6	40.9	40.7	40.7	41	40.8	42.9	43.2	43	0	0	0	0	0	0	0	0	0
8/13																			
8,9	32.7	30.9	31.1	31	30.9	31.1	31	30.6	30.9	30.7	0	0	0	0	0	0	0	0	0
9,10	34.4	32.6	32.7	32.5	32.3	32.5	32.4	32.4	32.6	32.5	0.62	0	0	2	0.6	0	2.2	0.1	0
10,11	35.8	35.1	35.3	35.2	34.9	35	34.8	32.2	35.4	35.2	0	0.76	0	0	2.8	0	0	7.5	0
11,12	37.5	37.5	37.6	37.4	37.1	37.2	37	37.5	37.7	37.6	0	0.41	0	0	1.16	0	0	9.5	0
12,13	38.7	39.4	39.6	39.3	38.8	39	38.9	39.8	40	39.8	0	0.41	0	0	1.15	0	0	7.8	0
13,14	40.3	41.1	41.4	41.2	40.6	40.8	40.7	41.6	41.8	41.6	0	0.83	0	0	2.85	0	0	7.47	0
14,15	41.8	42	42.3	42	41.9	42.1	41.8	43.3	43.6	43.2	0	0.63	0	0	2.6	0	0	2.3	0
15,16	39.8	40.2	40.5	40.3	40.3	40.6	40.4	42.5	42.8	42.6	0	0	0	0	0	0	0	0	0
8/14																			
8,9	33.3	31.5	31.8	31.6	31.9	32	31.8	31.9	32.1	32	0	0	0	0	0	0	0	0	0
9,10	35	33.4	33.6	33.4	33.4	33.6	33.4	33.6	33.8	33.5	0.6	0.1	0	2	1.1	0	2	0.6	0
10,11	36.4	34.9	35.1	34.8	34.5	34.7	34.4	35.3	35.5	35.2	0	0.8	0	0	3.2	0	0	8	0
11,12	38.1	36.7	36.9	36.6	36.3	36.5	36.3	37.4	37.7	37.5	0	0.45	0	0	1.2	0	0	10.2	0
8/16																			
8,9	34	32	33.1	32.1	32.2	33.3	32.2	32.2	33.4	32.3	0	0	0	0	0	0	0	0	0
9,10	35.8	33.9	34.9	34	33.9	34.9	34	34.1	35.1	34.2	0.7	0.15	0	3	1	0	2	1.1	0
10,11	37.5	36.1	36.4	36.2	35.8	36	35.7	36.4	36.8	36.4	0	0.85	0	0	3.6	0	0	9	0
11,12	39.1	38.4	38.2	38.4	37.8	37.8	37.9	38.7	39	38.8	0	0.48	0	0	1.6	0	0	10.7	0
8/17																			
8,9	34.2	31.8	32	31.9	31.8	32	31.9	31.5	31.8	31.6	0	0	0	0	0	0	0	0	0
9,10	35.9	33.5	33.6	33.4	33.2	33.4	33.3	33.3	33.5	33.4	0.6	0.02	0	2	0.6	0	2	0.3	0
10,11	37.3	36	36.2	36.1	35.8	35.9	35.7	33.1	36.3	36.1	0	0.76	0	0	2.8	0	0	7.5	0
11,12	39	38.4	38.5	38.3	38	38.1	37.9	38.4	38.6	38.5	0	0.41	0	0	1.16	0	0	9.5	0
12,13	40.2	40.3	40.5	40.2	39.7	39.9	39.8	40.7	40.9	40.7	0	0.41	0	0	1.15	0	0	7.8	0
13,14	41.8	42	42.3	42.1	41.5	41.7	41.6	42.5	42.7	42.5	0	0.83	0	0	2.85	0	0	7.47	0
14,15	43.3	42.9	43.2	42.9	42.8	43	42.7	43.8	44	43.7	0	0.63	0	0	2.6	0	0	2.3	0
15,16	41.3	41.1	41.4	41.2	41.2	41.5	41.3	42.4	42.7	42.5	0	0	0	0	0	0	0	0	0
8/20																			
8,9	32	32.4	32.6	32.3	32.5	32.7	32.4	32.3	32.5	32.4	0	0	0	0	0	0	0	0.02	0
9,10	34.3	34.7	34	34.8	34.1	34.4	34.2	33.7	33.9	33.6	1.3	0.25	0	3	2.04	0	3	2.09	0
10,11	36.5	35.2	35.4	32.1	35.5	35.7	35.4	35	35.3	35.1	0	1.51	0	0	4.23	0	0	10.4	0
11,12	38.9	36.8	37.1	36.9	37.2	37.5	37.3	36.9	37.2	37	0	0.61	0	0	1.91	0	0	12.3	0
12,13	40.4	39.4	39.6	39.3	40.1	40.4	40.2	39.6	39.9	39.7	0	0.42	0	0	1.23	0	0	13.1	0
13,14	41.9	40.5	40.9	40.6	41.3	41.5	41.2	41.2	41.4	41.2	0	1.29	0	0	4.07	0	0	8.89	0
14,15	43	42.6	42.8	42.5	42.9	43.2	43	43.2	43.5	43.1	0	1.46	0	0	4.96	0	0	6.23	0
15,16	44	43.7	44	43.7	44.7	45	44.8	44.6	45	44.7	0	0.38	0	0	0	0	0	0.61	0
8/21																			
8,9	32.4	29.8	30.9	29.9	30	31.1	30	30	31.2	30.1	0	0	0	0	0	0	0.02	0	0
9,10	34.2	31.7	32.7	31.8	31.7	32.7	31.8	31.9	32.9	32	1.3	0.25	0	3	2.04	0	3	2.09	0
10,11	35.9	33.9	34.2	34	33.6	33.8	33.5	34.2	34.6	34.2	0	1.51	0	0	4.23	0	0	10.4	0
11,12	37.5	34.9	35.3	35.1	35.6	35.9	35.7	36.5	36.8	36.6	0	0.61	0	0	1.91	0	0	12.3	0

8/22		M-1			M-2			M-3			M-1			M-2			M-3		
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_{lw}	S_{le}	S_{lc}	S_{lw}	S_{le}	S_{lc}	S_{lw}	S_{le}	S_{lc}
8.9	31.2	31.6	31.8	31.5	31.7	31.9	31.6	31.5	31.7	31.6	0.05	0	0	0	0.35	0	0.8	0	0
9.10	33.5	33.9	33.2	34	33.3	33.6	33.4	32.9	33.1	32.8	1.4	0.25	0	3	2.5	0	3.2	2.7	0
10.11	34.2	34.4	34.3	31.3	34.7	34.9	34.6	34.2	34.5	34.3	0	1.72	0	0	4.6	0	0	11	0
11.12	35.8	36	35.7	36.1	36.4	36.7	36.5	36.1	36.4	36.2	0	0.66	0	0	2.4	0	0	13	0
12.13	38.4	38.6	38.5	38.5	39.3	39.6	39.4	38.8	39.1	38.9	0	0.5	0	0	2.2	0	0	13.1	0
13.14	39.5	39.7	39.6	39.8	40.5	40.7	40.4	40.4	40.6	40.4	0	1.4	0	0	4.4	0	0	8.89	0
14.15	41.6	41.8	41.7	41.7	42.1	42.4	42.2	42.4	42.7	42.3	0	1.6	0	0	5.3	0	0	6.5	0
15.16	40.8	40.4	40.7	40.5	40.9	41.2	41	41.8	42.1	41.9	0	0.3	0.3	0	0.4	0.2	0	0.6	0.3
8/23																			
8.9	31.8	29.5	30.6	29.6	29.7	30.8	29.7	29.7	30.9	29.8	1	0	0	1	0	0	2	0	0
9.10	33.6	31.4	32.4	31.5	31.4	32.4	31.5	31.6	32.6	31.7	1.5	0.3	0	4	2	0	5	2	0
10.11	35.3	33.6	33.9	33.7	33.3	33.5	33.2	33.9	34.3	33.9	0	1.9	0	0	5	0	0	12	0
11.12	36.9	34.9	35.2	35	35.1	35.4	35	36.2	36.5	36.3	0	0.7	0	0	3	0	0	14	0
8/26																			
8.9	30.9	28.9	30	29	29.1	30.2	29.1	29.1	30.3	29.2	1	0	0	1	0	0	2	0	0
9.10	32.7	30.8	31.8	30.9	30.8	31.8	30.9	31	32	31.1	1.5	0.3	0	4	2	0	5	2	0
10.11	34.4	33	33.3	33.1	32.7	32.9	32.6	33.3	33.7	33.3	0	1.9	0	0	5	0	0	12	0
11.12	36	34.3	34.6	34.4	34.5	34.8	34.4	35.6	35.9	35.7	0	0.7	0	0	3	0	0	14	0
8/27																			
8.9	31.4	30.8	31	30.9	31.8	32	31.9	31.6	31.8	31.7	1.87	0	0	1.47	0	0	3.44	0	0
9.10	33	32.6	32.8	32.6	34	34.1	33.9	33.8	34	33.7	2	0.91	0	5	2.43	0	6	3.26	0
10.11	35.8	35.1	35.4	35.2	36.7	36.9	36.6	36.9	37.1	36.8	0	2.08	0	0	6	0	0	13.8	0
11.12	37.5	37.8	37.9	37.7	39.3	39.5	39.2	39.6	39.8	39.5	0	0.85	0	0	3.86	0	0	15.9	0
12.13	38.5	39.8	40	39.7	41.6	41.8	41.5	41.9	42.1	41.8	0	0.64	0	0	3.53	0	0	16.1	0
13.14	39.9	41.7	42	41.8	43.7	44	43.8	44.2	44.5	44.3	0	1.94	0	0	5.96	0	0	13.5	0
14.15	41	43.2	43.5	43.2	45.5	45.7	45.4	45.8	46	45.7	0	2.89	0	0	7.48	0	0	8.17	0
15.16	38.5	41.7	42	41.8	43.1	43.4	43.2	43.7	44	43.8	0	2.26	0	0	2.15	0	0	2.57	0
8/28																			
8.9	31.8	29.8	30.9	29.9	30	31.1	30	30	31.2	30.1	1.5	0	0	1.3	0	0	3	0	0
9.10	33.6	31.7	32.7	31.8	31.7	32.7	31.8	31.9	32.9	32	1.5	0.7	0	4	2	0	6	2	0
10.11	35.3	33.9	34.2	34	33.6	33.8	33.5	34.2	34.6	34.2	0	1.9	0	0	5	0	0	14	0
11.12	36.9	35.2	35.5	35.3	35.4	35.7	35.3	36.5	36.8	36.6	0	0.7	0	0	3	0	0	14	0
8/29																			
8.9	32.5	30.5	30.7	30.6	31.5	31.7	31.6	31.3	31.5	31.4	2.3	0	0	0	1.6	0	3.5	0	0
9.10	34.1	32.3	32.5	32.3	33.7	33.8	33.6	33.5	33.7	33.4	2.2	1	0	5	2.4	0	5	4	0
10.11	36.9	34.8	35.1	34.9	36.4	36.6	36.3	36.6	36.8	36.5	0	2	0	0	6	0	0	15	0
11.12	38.6	37.5	37.6	37.4	39	39.2	38.9	39.3	39.5	39.2	0	0.85	0	0	4	0	0	15.9	0
12.13	39.6	39.5	39.7	39.4	41.3	41.5	41.2	41.6	41.8	41.5	0	0.8	0	0	3.8	0	0	16.1	0
13.14	41	41.4	41.7	41.5	43.4	43.7	43.5	43.9	44.2	44	0	1.94	0	0	6	0	0	14	0
14.15	42.1	42.9	43.2	42.9	45.2	45.4	45.1	45.5	45.7	45.4	0	3	0	0	7.3	0	0	8.5	0
15.16	39.6	41.4	41.7	41.5	42.8	43.1	42.9	43.4	43.7	43.5	0	1.5	1	0	0.6	1.2	0	1.6	1.4
8/30																			
8.9	32.9	30.9	32	31	31.1	32.2	31.1	31.1	32.3	31.2	3	0	0	4	0	0	3	0	0
9.10	34.7	32.8	33.8	32.9	32.8	33.8	32.9	33	34	33.1	3	1	0	5	2.5	0	5	3	0
10.11	36.4	35	35.3	35.1	34.7	34.9	34.6	35.3	35.7	35.3	0	2	0	0	6.5	0	0	15	0
11.12	38	36.3	36.6	36.4	36.5	36.8	36.4	37.6	37.9	37.7	0	1	0	0	4.5	0	0	16	0
9/2																			
8.9	33.1	30.9	31.1	31	31.9	32.1	32	31.7	31.9	31.8	4	0	0	4	0	0	4.9	0	0
9.10	34.7	32.7	32.9	32.7	34.1	34.2	34	33.9	34.1	33.8	2	1.8	0	4	4	0	6	6.2	0
10.11	37.5	35.2	35.5	35.3	36.8	37	36.7	37	37.2	36.9	0	2.2	0	0	8.3	0	0	15.5	0
11.12	39.2	37.9	38	37.8	39.4	39.6	39.3	39.7	39.9	39.6	0	1	0	0	7.2	0	0	18	0
9/4																			
8.9	33.9	32.1	32.3	32.2	33.1	33.3	33.2	32.9	33.1	33	5	0	0	7	0	0	5.8	0	0
9.10	35.5	33.9	34.1	33.9	35.3	35.4	35.2	35.1	35.3	35	2	2.8	0	4	5	0	6	7	0
10.11	38.3	36.4	36.7	36.5	38	38.2	37.9	38.2	38.4	38.1	0	2.7	0	0	9.2	0	0	16.5	0
11.12	40	39.1	39.2	39	40.6	40.8	40.5	40.9	41.1	40.8	0	1	0	0	8.4	0	0	20	0
9/5																			
8.9	33	31	31.2	31.1	31.2	31.4	31.3	31.8	32	31.7	5.11	0	0	7.18	0	0	6.93	0	0
9.10	35.4	34.5	34.6	34.4	34.4	34.6	34.5	34.6	34.9	34.7	2.5	2.45	0	6	4.93	0	8	6.56	0
10.11	38	36.8	37	36.9	37.4	37.5	37.3	37.7	37.9	37.6	0	2.81	0	0	9.78	0	0	17.2	0
11.12	39.6	39	39.3	39.1	39.6	39.7	39.5	39.8	40.1	39.9	0	1.01	0	0	8.59	0	0	21.1	0
12.13	41.8	41.5	41.7	41.4	41.8	42	41.9	42.4	42.6	42.3	0	0.99	0	0	8.72	0	0	20.2	0
13.14	43.2	43.2	43.5	43.3	43.5	43.6	43.4	43.8	44	43.7	0	2.87	0	0	10.2	0	0	17.7	0
14.15	44.8	45.1	45.3	45	45.5	45.7	45.4	45.8	46.1	45.9	0	4.41	0	0	10.9	0	0	14.3	0
15.16	43	43.6	43.9	43.7	43.6	43.8	43.5	43.7	44	43.7	0	3	2.6	0	4	3	0	5	3.5
9/6																			
8.9	32.3	29.8	30	29.9	30.8	31	30.9	30.6	30.8	30.7	7	0	0	9	0	0	8	0	0
9.10	33.9	31.6	31.8	31.6	33	33.1	32.9	32.8	33	32.7	2	3	0	4	8	0	6	10	0
10.11	36.7	34.1	34.4	34.2	35.7	35.9	35.6	35.9	36.1	35.8	0	3.2	0	0	11	0	0	18.8	0
11.12	38.4	36.8	36.9	36.7	38.3	38.5	38.2	38.6	38.8	38.5	0	1.5	0	0	9.8	0	0	22	0
9/7																			
8.9	31.5	28.9	29.1	29	29.1	29.3	29.2	29.7	29.9	29.6	7.5	0	0	8.8	0	0	8	0	0
9.10	33.9	32.4	32.5	32.3	32.3	32.5	32.4	32.5	32.8	32.6	4	2	0	6	7.3	0	7	8	0
10.11	36.5	34.7	34.9	34.8	35.3	35.4	35.2	35.6	35.8	35.5	0	3.6	0	0	10.2	0	0	18	0
11.12	38.1	36.9	37.2	37	37.5	37.6	37.4	37.7	38	37.8	0	2.3	0	0	9	0	0	22	0
12.13	40.3	39.4	39.6	39.3	39.7	39.9	39.8	40.3	40.5	40.2	0	2.1	0	0	9.1	0	0	21.6	0
9/9																			
8.9	32.4	29.7	29.9	29.8	29.9	30.1	30	30.5	30.7	30.4	7.5	0	0	8.8	0	0	8	0	0
9.10	34.8	33.2	33.3	33.1	33.1	33.3	33.2	33.3	33.6	33.4	2	4	0	7	6.3	0	6	9	0
10.11	37.4	35.5	35.7	35.6	36.1	36.2	36	36.4	36.6	36.3	0	3.6	0	0	10.2	0	0	18	0
11.12	39	37.7	38	37.8	38.3	38.4	38.2	38.5	38.8	38.6	0	2.3	0	0	9	0	0	22	0

9/10		M-1			M-2			M-3			M-1			M-2			M-3		
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_{tw}	S_{tr}	S_k	S_{tw}	S_{tr}	S_k	S_{tw}	S_{tr}	S_k
8,9	30.6	28.7	28.9	28.8	30.1	30.3	30.2	29.8	30	29.9	8.99	0	0	11.9	0	0	13.7	0	0
9,10	32.8	30.3	30.5	30.4	31.8	32	31.9	31.7	31.9	31.8	5	1.15	0	8	8.03	0	7	12.6	0
10,11	34.6	32.8	33	32.7	34	34.2	33.9	34.2	34.4	34.2	0	3.8	0	0	14.1	0	0	23.7	0
11,12	36	35.6	35.8	35.7	36.6	36.9	36.7	36.8	37	36.7	0	2.1	0	0	13.4	0	0	24.9	0
12,13	37.2	37.8	38	37.8	38.7	39	38.8	39	39.3	39.1	0	2.19	0	0	13	0	0	23.9	0
13,14	39	39.7	40	39.8	41.1	41.4	41.2	41.7	41.9	41.6	0	3.98	0	0	13.8	0	0	22.4	0
14,15	40.2	42.3	42.5	42.2	42.7	43	42.7	43.6	43.8	43.5	0	6.61	0	0	14.5	0	0	18.1	0
15,16	38	40.7	41	40.8	41	41.3	41.1	40.7	41	40.8	0	5	3.6	0	7	4.5	0	6	7.1
9/11																			
8,9	31.5	29.1	29.3	29.2	29.3	29.5	29.4	29.9	30.1	29.8	9.5	0	0	13.2	0	0	15	0	0
9,10	33.9	32.6	32.7	32.5	32.5	32.7	32.6	32.7	33	32.8	4	3	0	9	7.6	0	8	14	0
10,11	36.5	34.9	35.1	35	35.5	35.6	35.4	35.8	36	35.7	0	5	0	0	16	0	0	24.6	0
11,12	38.1	37.1	37.4	37.2	37.7	37.8	37.6	37.9	38.2	38	0	3.5	0	0	16.4	0	0	26	0
9/12																			
11,12	36.8	36	36.2	36.1	37	37.3	37.1	37.2	37.4	37.1	2.5	0	0	13.5	0	0	26	0	0
12,13	38	38.2	38.4	38.2	39.1	39.4	39.2	39.4	39.7	39.5	1	1.3	0	4	9.2	0	8	16	0
13,14	39.8	40.1	40.4	40.2	41.5	41.8	41.6	42.1	42.3	42	0	5	0	0	13.8	0	0	23	0
14,15	41	42.7	42.9	42.6	43.1	43.4	43.1	44	44.2	43.9	0	6.9	0	0	14.6	0	0	19	0
15,16	38.8	41.1	41.4	41.2	41.4	41.7	41.5	41.1	41.4	41.2	0	8.8	0	0	11.9	0	0	14	0
9/13																			
8,9	30.7	28.8	29	28.9	29	29.2	29.1	29.6	29.8	29.5	10.5	0	0	14	0	0	15.8	0	0
9,10	33.1	32.3	32.4	32.2	32.2	32.4	32.3	32.4	32.7	32.5	3	5	0	7	10	0	12	10.7	0
10,11	35.7	34.6	34.8	34.7	35.2	35.3	35.1	35.5	35.7	35.4	0	6	0	0	16.5	0	0	25	0
11,12	37.3	36.8	37.1	36.9	37.4	37.5	37.3	37.6	37.9	37.7	0	4	0	0	17	0	0	26.6	0
9/14																			
8,9	32	29.3	29.5	29.4	30.7	30.9	30.8	30.4	30.6	30.5	11.1	0	0	13.4	0	0	15.1	0	0
9,10	34.2	30.9	31.1	31	32.4	32.6	32.5	32.3	32.5	32.4	2	6	0	6	10.6	0	8	13.2	0
10,11	36	33.4	33.6	33.3	34.6	34.8	34.5	34.8	35	34.8	0	4.6	0	0	15	0	0	24	0
11,12	37.4	36.2	36.4	36.3	37.2	37.5	37.3	37.4	37.6	37.3	0	3.2	0	0	15	0	0	26.1	0
12,13	38.6	38.4	38.6	38.4	39.3	39.6	39.4	39.6	39.9	39.7	0	4.2	0	0	14.8	0	0	25	0
13,14	40.4	40.3	40.6	40.4	41.7	42	41.8	42.3	42.5	42.2	0	5.3	0	0	15.1	0	0	24	0
14,15	41.6	42.9	43.1	42.8	43.3	43.6	43.3	44.2	44.4	44.1	0	8	0	0	16.2	0	0	22.3	0
15,16	39.4	41.3	41.6	41.4	41.6	41.9	41.7	41.3	41.6	41.4	0	2	5	0	3	10	0	6	9
9/19																			
8,9	32.8	31.6	31.8	31.7	31.8	32	31.8	31.8	32	31.7	13.3	0	0	17.4	0	0	19.2	0	0
9,10	34	34.5	34.6	34.4	34.7	35	34.8	34.7	34.9	34.7	4	6.06	0	7	11.6	0	8	16.6	0
10,11	35.9	36.8	37	36.8	37.4	37.6	37.3	37.6	37.8	37.6	0	8.77	0	0	18.3	0	0	26.6	0
11,12	38.2	39.3	39.5	39.2	39.9	40.1	39.8	40.2	40.4	40.1	0	8.11	0	0	18.5	0	0	30.4	0
12,13	40.2	41.4	41.6	41.3	42.3	42.5	42.2	42.8	43	42.7	0	7.52	0	0	18.8	0	0	28	0
13,14	42	42.6	42.9	42.7	44.1	44.4	44.2	44.6	44.9	44.7	0	9.01	0	0	18.9	0	0	26.7	0
14,15	43.5	44	44.2	43.9	45.2	45.5	45.3	46	46.3	46.1	0	11.5	0	0	19	0	0	23.6	0
15,16	41.3	42.6	42.8	42.5	43.7	44	43.8	45.2	45.5	45.2	0	4	9.8	0	6	11	0	14	5
9/20																			
8,9	31.9	29.2	29.4	29.3	29.4	29.6	29.4	29.4	29.6	29.3	15	0	0	19	0	0	20.2	0	0
9,10	33.1	32.1	32.2	32	32.3	32.6	32.4	32.3	32.5	32.3	5	7.2	0	6	13	0	12	14	0
10,11	35	34.4	34.6	34.4	35	35.2	34.9	35.2	35.4	35.2	0	9.68	0	0	19.2	0	0	27.2	0
11,12	37.3	36.9	37.1	36.8	37.5	37.7	37.4	37.8	38	37.7	0	9	0	0	19.1	0	0	31.1	0
12,13	39.3	39	39.2	38.9	39.9	40.1	39.8	40.4	40.6	40.3	0	8.4	0	0	19	0	0	29	0
13,14	41.1	40.2	40.5	40.3	41.7	42	41.8	42.2	42.5	42.3	0	10	0	0	19.2	0	0	28.4	0
14,15	42.6	41.6	41.8	41.5	42.8	43.1	42.9	43.6	43.9	43.7	0	12.1	0	0	20	0	0	25	0
15,16	40.4	40.2	40.4	40.1	41.3	41.6	41.4	42.8	43.1	42.8	0	5	10	0	7	12	0	8	13
9/21																			
8,9	32.4	30.1	30.3	30.2	30.3	30.5	30.3	30.3	30.5	30.2	15	0	0	19	0	0	20.2	0	0
9,10	33.6	33	33.1	32.9	33.2	33.5	33.3	33.2	33.4	33.2	5	7.2	0	8	11	0	14	12	0
10,11	35.5	35.3	35.5	35.3	35.9	36.1	35.8	36.1	36.3	36.1	0	9.68	0	0	19.2	0	0	27.2	0
11,12	37.8	37.8	38	37.7	38.4	38.6	38.3	38.7	38.9	38.6	0	9	0	0	19.1	0	0	31.1	0
12,13	39.8	39.9	40.1	39.8	40.8	41	40.7	41.3	41.5	41.2	0	8.4	0	0	19	0	0	29	0
13,14	41.6	41.1	41.4	41.2	42.6	42.9	42.7	43.1	43.4	43.2	0	10	0	0	19.2	0	0	28.4	0
14,15	43.1	42.5	42.7	42.4	43.7	44	43.8	44.5	44.8	44.6	0	12.1	0	0	20	0	0	25	0
15,16	40.9	41.1	41.3	41	42.2	42.5	42.3	43.7	44	43.7	0	8	7	0	7	12	0	9	12
9/23																			
8,9	32.7	29.6	29.8	29.7	29.8	30	29.8	29.8	30	29.7	17.5	0	0	21	0	0	20.8	0	0
9,10	33.9	32.5	32.6	32.4	32.7	33	32.8	32.7	32.9	32.7	4	10	0	9	11.5	0	10	17	0
10,11	35.8	34.8	35	34.8	35.4	35.6	35.3	35.6	35.8	35.6	0	11	0	0	20.1	0	0	28.2	0
11,12	38.1	37.3	37.5	37.2	37.9	38.1	37.8	38.2	38.4	38.1	0	10.6	0	0	22	0	0	32	0
9/28																			
8,9	28.8	27.9	28	27.8	29.8	30	29.9	29.4	29.5	29.4	23.2	0	0	28.9	0	0	30.7	0	0
9,10	30.1	29.5	29.6	29.4	31	31.2	31.1	30.8	31	30.9	7	12.9	0	12	14.9	0	15	17.8	0
10,11	32	32	32.2	32.1	32.2	32.5	32.3	32.4	32.6	32.3	0	18.4	0	0	26.5	0	0	35.6	0
11,12	33.4	33.8	34	33.9	34.2	34.5	34.3	34.6	34.8	34.5	0	17.4	0	0	26.4	0	0	36.5	0
12,13	35.1	36.2	36.4	36.1	36.6	36.9	36.7	37.2	37.4	37.1	0	18	0	0	26.5	0	0	37.4	0
13,14	36.6	37.7	38	37.8	38.5	38.7	38.6	38.7	39	38.8	0	18	0	0	26.8	0	0	36.1	0
14,15	37.9	39.9	40.2	40	40.7	41	40.8	41.3	41.5	41.2	0	20.2	0	0	27.4	0	0	33.4	0
15,16	36	38.7	39	38.8	39.2	39.5	39.3	39.7	40	39.8	0	8	15	0	12	17	0	20	12
9/30																			
8,9	31	29.6	29.8	29.7	29.8	30	29.8	29.8	30	29.7	17.5	0	0	21	0	0	20.8	0	0
9,10	32.2	32.5	32.6	32.4	32.7	33	32.8	32.7	32.9	32.7	6	8	0	8	12.5	0	12	15	0
10,11	34.1	34.8	35	34.8	35.4	35.6	35.3	35.6	35.8	35.6	0	11	0	0	20.1	0	0	28.2	0
11,12	36.4	37.3	37.5	37.2	37.9	38.1	37.8	38.2	38.4	38.1	0	10.6	0	0	22	0	0	32	0
10/1																			
8,9	30.1	28.2	28.4	28.3	28.4	28.6	28.5	29	29.2	28.9	20	0	0	24	0	0	26	0	0
9,10	32.3	30.4	31.8	31.6	31.6	31.8	31.7	31.8	32.1	31.9	5	11	0	12	14	0	13	12	0
10,11	33.9	32	34.2	34.1	34.6	34.7	34.5	34.9	35.1	34.8	0	18	0	0	24	0	0	26	0
11,12	36.1	34.2	36.5	36.3	36.8	36.9	36.7	37	37.3	37.1	0	18.5	0	0	25	0	0	32	0
12,13	38.3	36.4	38.9	38.6	39	39.2	39.1	39.6	39.8	39.5	0	19	0	0	26	0	0	31	0
14,15	42.3	40.4	42.5	42.2	42.7	42.9	42.6	43	43.3	43.1	0	20.2	0	0	25.5	0	0	28.2	0
15,16	40.1	38.2	41.1	40.9	40.8	41	40.7	40.9	41.2	40.9	0	15	5	0	14	12	0	10	13

10/2		M-1			M-2			M-3			M-1			M-2			M-3		
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_{lw}	S_{le}	S_k	S_{lw}	S_{le}	S_k	S_{lw}	S_{le}	S_k
8,9	31.5	29.2	29.4	29.3	29.4	29.6	29.4	29.4	29.6	29.3	24	0	0	26	0	0	29	0	0
9,10	32.7	32.1	32.2	32	32.3	32.6	32.4	32.3	32.5	32.3	6	13	0	13	16	0	14	14.2	0
10,11	34.6	34.4	34.6	34.4	35	35.2	34.9	35.2	35.4	35.2	0	20	0	0	28	0	0	30	0
11,12	36.9	36.9	37.1	36.8	37.5	37.7	37.4	37.8	38	37.7	0	20	0	0	32	0	0	36	0
12,13	38.9	39	39.2	38.9	39.9	40.1	39.8	40.4	40.6	40.3	0	19	0	0	33	0	0	36	0
13,14	40.7	40.2	40.5	40.3	41.7	42	41.8	42.2	42.5	42.3	0	20	0	0	28	0	0	31.2	0
14,15	42.2	41.6	41.8	41.5	42.8	43.1	42.9	43.6	43.9	43.7	0	20.2	0	0	27	0	0	33	0
15,16	40	40.2	40.4	40.1	41.3	41.6	41.4	42.8	43.1	42.8	0	16	7	0	15	13	0	16	16
10/3																			
8,9	31	29.7	29.8	29.7	29.8	30	29.8	30	30.2	30.1	28.6	0	0	33.4	0	0	36.2	0	0
9,10	33.2	32.1	32.2	32	32.3	32.5	32.4	32.6	32.8	32.5	8	15.5	0	15	16.6	0	16	21	0
10,11	34.8	34.4	34.6	34.4	34.8	35	34.9	35.5	35.8	35.6	0	22	0	0	30.7	0	0	38.6	0
11,12	37	36.9	37.2	37	37.7	37.9	37.6	38.7	38.9	38.6	0	21.3	0	0	31.4	0	0	41.5	0
12,13	39.2	39.7	39.9	39.6	40.3	40.6	40.4	41.2	41.5	41.3	0	19.6	0	0	30.9	0	0	41.3	0
13,14	41.8	41.8	42.1	41.9	42.7	43	42.6	43.7	44	43.8	0	22.3	0	0	31.1	0	0	39	0
14,15	43.2	43.7	44	43.6	45	45.4	45.1	46.3	46.5	46.2	0	24.5	0	0	31.9	0	0	39.1	0
15,16	41	41.8	42.2	41.9	42.6	43	42.7	44.3	44.7	44.4	0	17	12	0	16	16	0	17	21
10/4																			
8,9	30.8	28.8	28.9	28.8	28.9	29.1	28.9	29.1	29.3	29.2	30	0	0	35	0	0	37	0	0
9,10	32.1	30.7	30.9	30.7	31.4	31.6	31.5	31.7	31.9	31.6	10	15	0	15	17	0	15	22.2	0
10,11	33.7	32.4	32.6	32.3	32.8	33	32.7	33.2	33.4	33.1	0	22	0	0	31	0	0	39.1	0
11,12	35.4	34.2	34.4	34.1	34.3	34.6	34.3	34.9	35.2	35	0	22.5	0	0	20	12	0	20	22
10/5																			
8,9	29.6	27.8	27.9	27.8	27.9	28.1	27.9	28.1	28.3	28.2	32	0	0	36	0	0	40	0	0
9,10	31.8	30.2	30.3	30.1	30.4	30.6	30.5	30.7	30.9	30.6	10	15	0	8	25	0	12	26	0
10,11	33.4	32.5	32.7	32.5	32.9	33.1	33	33.6	33.9	33.7	0	24	0	0	32.9	0	0	39	0
11,12	35.6	35	35.3	35.1	35.8	36	35.7	36.8	37	36.7	0	23	0	0	33	0	0	39	0
12,13	37.8	37.8	38	37.7	38.4	38.7	38.5	39.3	39.6	39.4	0	22	0	0	32.4	0	0	42	0
13,14	40.4	39.9	40.2	40	40.8	41.1	40.7	41.8	42.1	41.9	0	24.2	0	0	32.5	0	0	43	0
14,15	41.8	41.8	42.1	41.7	43.1	43.5	43.2	44.4	44.6	44.3	0	27	0	0	33	0	0	40	0
15,16	39.6	39.9	40.3	40	40.7	41.1	40.8	42.4	42.8	42.5	0	15	17	0	16	20	0	18	23
10/7																			
8,9	30.5	28	28.1	28	28.1	28.3	28.1	28.3	28.5	28.4	32	0	0	37	0	0	41	0	0
9,10	31.8	29.9	30.1	29.9	30.6	30.8	30.7	30.9	31.1	30.8	12	16	0	16	18	0	18	23	0
10,11	33.4	31.6	31.8	31.5	32	32.2	31.9	32.4	32.6	32.3	0	25	0	0	34	0	0	41.3	0
11,12	35.1	33.4	33.6	33.3	33.5	33.8	33.5	34.1	34.4	34.2	0	24	0	0	33	0	0	41.4	0
10/8																			
8,9	28.8	26.4	26.5	26.4	26.5	26.7	26.5	26.7	26.9	26.8	34.2	0	0	38.9	0	0	42	0	0
9,10	31	28.8	28.9	28.7	29	29.2	29.1	29.3	29.5	29.2	13	15.3	0	14	21.4	0	12	28	0
10,11	32.6	31.1	31.3	31.1	31.5	31.7	31.6	32.2	32.5	32.3	0	26	0	0	34.1	0	0	40.2	0
11,12	34.8	33.6	33.9	33.7	34.4	34.6	34.3	35.4	35.6	35.3	0	25.9	0	0	34.2	0	0	40.5	0
12,13	37	36.4	36.6	36.3	37	37.3	37.1	37.9	38.2	38	0	25	0	0	34.5	0	0	40.1	0
13,14	39.6	38.5	38.8	38.6	39.4	39.7	39.3	40.4	40.7	40.5	0	26.8	0	0	33.6	0	0	42	0
14,15	41	40.4	40.7	40.3	41.7	42.1	41.8	43	43.2	42.9	0	29	0	0	35.2	0	0	40	0
15,16	38.8	38.5	38.9	38.6	39.3	39.7	39.4	41	41.4	41.1	0	16	19	0	19	20	0	15	27
10/9																			
8,9	29.5	26.9	27	26.9	27	27.2	27	27.2	27.4	27.3	35	0	0	40	0	0	44	0	0
9,10	31.7	29.3	29.4	29.2	29.5	29.7	29.6	29.8	30	29.7	12	18	0	14	23	0	20	22	0
10,11	33.3	31.6	31.8	31.6	32	32.2	32.1	32.7	33	32.8	0	28	0	0	36	0	0	41	0
11,12	35.5	34.1	34.4	34.2	34.9	35.1	34.8	35.9	36.1	35.8	0	27	0	0	35.5	0	0	41.3	0
10/10																			
8,9	27	24.9	25	25	25.2	25.5	25.3	25.3	25.5	25.4	36.6	0	0	41.3	0	0	45.7	0	0
9,10	29.4	27	27.2	27.1	27.4	27.7	27.5	27.6	27.8	27.7	15	15.3	0	14	20.2	0	20	24.9	0
10,11	32	29.7	29.9	29.7	30.2	30.5	30.3	30.2	30.5	30.3	0	29.5	0	0	37.1	0	0	44.6	0
11,12	34.2	31.4	31.6	31.3	32.1	32.4	32.1	32.4	32.6	32.3	0	27.7	0	0	36.1	0	0	45	0
12,13	36.3	33.4	33.5	33.2	34.2	34.5	34.3	34.5	34.8	34.6	0	26.7	0	0	36.9	0	0	44.7	0
13,14	38	36.6	36.8	36.5	36.6	37	36.7	37.3	37.5	37.2	0	29.7	0	0	36.8	0	0	45.1	0
14,15	40.5	38.7	39	38.7	40.1	40.4	40.2	40.7	41	40.8	0	31.3	0	0	38.9	0	0	43.7	0
15,16	39.2	37.7	38	37.8	39	39.3	39.1	39.5	39.8	39.6	0	17	20	0	20	21	0	16	21
10/11																			
8,9	27.9	25.7	25.8	25.7	25.8	26	25.8	26	26.2	26.1	37	0	0	43	0	0	47	0	0
9,10	30.1	28.1	28.2	28	28.3	28.5	28.4	28.6	28.8	28.5	15	16	0	18	20	0	20	26	0
10,11	31.7	30.4	30.6	30.4	30.8	31	30.9	31.5	31.8	31.6	0	30	0	0	39	0	0	45.4	0
11,12	33.9	32.9	33.2	33	33.7	33.9	33.6	34.7	34.9	34.6	0	28	0	0	37	0	0	47	0
10/14																			
8,9	26.3	23.8	23.9	23.8	23.9	24.1	23.9	24.1	24.3	24.2	40	0	0	45	0	0	50	0	0
9,10	28.5	26.2	26.3	26.1	26.4	26.6	26.5	26.7	26.9	26.6	15	20	0	15	26	0	28	20	0
10,11	30.1	28.5	28.7	28.5	28.9	29.1	29	29.6	29.9	29.7	0	32	0	0	40	0	0	48	0
11,12	32.3	31	31.3	31.1	31.8	32	31.7	32.8	33	32.7	0	30	0	0	39	0	0	49	0
10/15																			
8,9	25.6	22.2	22.3	22.3	22.5	22.8	22.6	22.6	22.8	22.7	44	0	0	48	0	0	52	0	0
9,10	28	24.3	24.5	24.4	24.7	25	24.8	24.9	25.1	25	18	20	0	20	22	0	24	25	0
10,11	30.6	27	27.2	27	27.5	27.8	27.6	27.5	27.8	27.6	0	32	0	0	41	0	0	49.1	0
11,12	32.8	28.7	28.9	28.6	29.4	29.7	29.4	29.7	29.9	29.6	0	31	0	0	40.6	0	0	49.3	0
12,13	34.9	30.7	30.8	30.5	31.5	31.8	31.6	31.8	32.1	31.9	0	31	0	0	41	0	0	48.6	0
13,14	36.6	33.9	34.1	33.8	33.9	34.3	34	34.6	34.8	34.5	0	32	0	0	41.4	0	0	48.7	0
14,15	39.1	36	36.3	36	37.4	37.7	37.5	38	38.3	38.1	0	36.5	0	0	42	0	0	48.4	0
15,16	37.8	35	35.3	35.1	36.3	36.6	36.4	36.8	37.1	36.9	0	15	30	0	20	29	0	31	20
10/16																			
8,9	25.9	23.4	23.5	23.4	23.5	23.7	23.5	23.7	23.9	23.8	46.2	0	0	49.5	0	0	54.7	0	0
9,10	28.1	25.8	25.9	25.7	26	26.2	26.1	26.3	26.5	26.2	19	20.1	0	24	20.3	0	20	31	0
10,11	29.7	28.1	28.3	28.1	28.5	28.7	28.6	29.2	29.5	29.3	0	34.5	0	0	43.3	0	0	51.2	0
11,12	31.9	30.6	30.9	30.7	31.4	31.6	31.3	32.4	32.6	32.3	0	33.6	0	0	42.1	0	0	53.1	0

10/17		M-1			M-2			M-3			M-1			M-2			M-3		
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_{lw}	S_{lr}	S_{lc}	S_{lw}	S_{lr}	S_{lc}	S_{lw}	S_{lr}	S_{lc}
8,9	26.7	24.4	24.6	24.5	24.9	25	24.8	25	25.2	25.1	46.2	0	0	49.5	0	0	54.7	0	0
9,10	28	26.3	26.5	26.4	26.7	26.9	26.7	26.7	27	26.8	17	22.1	0	20	24.3	0	20	31	0
10,11	30.3	28.8	29	28.8	29.3	29.5	29.4	29.7	29.9	29.7	0	34.5	0	0	43.3	0	0	51.2	0
11,12	33	31	31.2	30.9	31.6	31.8	31.7	32.1	32.3	32	0	33.6	0	0	42.1	0	0	53.1	0
12,13	35.6	32.8	33	32.7	33.7	33.9	33.8	34.2	34.5	34.3	0	33.9	0	0	43.5	0	0	51.2	0
13,14	37.4	35.6	35.9	35.7	36.7	37	36.8	37.6	37.9	37.7	0	35.9	0	0	43.8	0	0	51.6	0
14,15	39.1	37.7	38	37.8	39.6	39.8	39.5	40.7	41	40.8	0	39.8	0	0	45.3	0	0	51.1	0
15,16	37.5	37	37.2	36.9	38.4	38.7	38.5	39.5	39.8	39.6	0	20	29	0	30	24	0	26	30
10/18																			
8,9	26.6	23.9	24	23.9	24	24.2	24	24.2	24.4	24.3	47	0	0	51	0	0	55	0	0
9,10	28.8	26.3	26.4	26.2	26.5	26.7	26.6	26.8	27	26.7	15	25	0	20	25	0	20	31	0
10,11	30.4	28.6	28.8	28.6	29	29.2	29.1	29.7	30	29.8	0	35	0	0	44	0	0	51.5	0
11,12	32.6	31.1	31.4	31.2	31.9	32.1	31.8	32.9	33.1	32.8	0	34	0	0	42.5	0	0	53.4	0
10/19																			
8,9	24.5	22.2	22.4	22.3	22.7	22.8	22.6	22.8	23	22.9	49	0	0	52	0	0	57	0	0
9,10	25.8	24.1	24.3	24.2	24.5	24.7	24.5	24.5	24.8	24.6	20	22.5	0	20	26.5	0	20	33	0
10,11	28.1	26.6	26.8	26.6	27.1	27.3	27.2	27.5	27.7	27.5	0	37	0	0	44	0	0	54	0
11,12	30.8	28.8	29	28.7	29.4	29.6	29.5	29.9	30.1	29.8	0	36	0	0	43.5	0	0	54	0
12,13	33.4	30.6	30.8	30.5	31.5	31.7	31.6	32	32.3	32.1	0	36.8	0	0	41	0	0	54.4	0
13,14	35.2	33.4	33.7	33.5	34.5	34.8	34.6	35.4	35.7	35.5	0	39.2	0	0	46	0	0	51.2	0
14,15	36.9	35.5	35.8	35.6	37.4	37.6	37.3	38.5	38.8	38.6	0	41	0	0	48	0	0	53	0
15,16	35.3	34.8	35	34.7	36.2	36.5	36.3	37.3	37.6	37.4	0	20	32	0	20	36	0	20	40
10/21																			
8,9	25.1	23.1	23.2	23.1	23.2	23.4	23.2	23.4	23.6	23.5	50	0	0	54	0	0	58	0	0
9,10	26.4	25.5	25.6	25.4	25.7	25.9	25.8	26	26.2	25.9	15	29	0	20	28	0	25	30	0
10,11	28.7	27.8	28	27.8	28.2	28.4	28.3	28.9	29.2	29	0	39	0	0	46	0	0	55	0
11,12	31.4	30.3	30.6	30.4	31.1	31.3	31	32.1	32.3	32	0	38	0	0	45	0	0	55	0
10/22																			
8,9	23.7	20.8	21	20.9	21.3	21.4	21.2	21.4	21.6	21.5	54	0	0	56	0	0	61	0	0
9,10	25	22.7	22.9	22.8	23.1	23.3	23.1	23.1	23.4	23.2	26	20	0	20	28	0	20	37	0
10,11	27.3	25.2	25.4	25.2	25.7	25.9	25.8	26.1	26.3	26.1	0	40	0	0	49	0	0	56	0
11,12	30	27.4	27.6	27.3	28	28.2	28.1	28.5	28.7	28.4	0	39	0	0	48	0	0	55	0
12,13	32.6	29.2	29.4	29.1	30.1	30.3	30.2	30.6	30.9	30.7	0	38	0	0	47	0	0	55	0
13,14	34.4	32	32.3	32.1	33.1	33.4	33.2	34	34.3	34.1	0	40	0	0	47.5	0	0	53	0
14,15	36.1	34.1	34.4	34.2	36	36.2	35.9	37.1	37.4	37.2	0	44	0	0	51	0	0	55	0
15,16	34.5	33.4	33.6	33.3	34.8	35.1	34.9	35.9	36.2	36	0	22	34	0	30	28	0	24	58
10/24																			
8,9	22	21	21.2	21.1	20.6	20.8	20.7	21	21.1	20.9	57.3	0	0	61.1	0	0	65.3	0	0
9,10	23.4	22.5	22.7	22.5	22.4	22.5	22.3	22.5	22.7	22.6	22	26.9	0	20	33.4	0	25	35.9	0
10,11	24.7	23.6	23.8	23.7	23.7	23.9	23.7	23.8	24	23.7	0	42.4	0	0	51	0	0	57.5	0
11,12	26.5	25.7	25.9	25.7	26.1	26.3	26.1	26.3	26.5	26.2	0	41	0	0	50.1	0	0	57.9	0
12,13	28	27.5	27.7	27.4	28.2	28.4	28.2	28.6	28.8	28.5	0	41.6	0	0	50.5	0	0	57.7	0
13,14	30.8	29	29.1	28.9	29.5	29.7	29.5	30	30.2	30.1	0	42.3	0	0	49.9	0	0	56.8	0
14,15	34	31.4	31.6	31.3	32.2	32.4	32.1	33.6	33.9	33.7	0	48.6	0	0	54.8	0	0	59.3	0
15,16	32.1	30.5	30.7	30.5	30.6	30.8	30.6	32	32.2	31.9	0	26	35	0	35	26	0	30	37
10/26																			
8,9	23.7	21.6	21.8	21.7	21.2	21.4	21.3	21.6	21.7	21.5	59	0	0	62	0	0	66	0	0
9,10	25.1	23.1	23.3	23.1	23	23.1	22.9	23.1	23.3	23.2	30	20	0	25	30	0	35	26	0
10,11	26.4	24.2	24.4	24.3	24.3	24.5	24.3	24.4	24.6	24.3	0	45	0	0	53	0	0	58	0
11,12	28.2	26.3	26.5	26.3	26.7	26.9	26.7	26.9	27.1	26.8	0	44	0	0	51	0	0	59	0
12,13	29.7	28.1	28.3	28	28.8	29	28.8	29.2	29.4	29.1	0	44	0	0	52	0	0	59	0
13,14	32.5	29.6	29.7	29.5	30.1	30.3	30.1	30.6	30.8	30.7	0	45	0	0	51	0	0	58	0
14,15	35.7	32	32.2	31.9	32.8	33	32.7	34.2	34.5	34.3	0	50	0	0	55	0	0	61	0
15,16	33.8	31.1	31.3	31.1	31.2	31.4	31.2	32.6	32.8	32.5	0	36	26	0	20	42	0	30	38
10/28																			
8,9	22.1	20	20.1	20	20.1	20.3	20.1	20.3	20.5	20.4	60	0	0	65	0	0	68	0	0
9,10	23.4	22.4	22.5	22.3	22.6	22.8	22.7	22.9	23.1	22.8	30	22	0	26	32	0	43	20	0
10,11	25.7	24.7	24.9	24.7	25.1	25.3	25.2	25.8	26.1	25.9	0	48	0	0	55	0	0	60	0
11,12	28.4	27.2	27.5	27.3	28	28.2	27.9	29	29.2	28.9	0	46	0	0	53	0	0	61	0
10/29																			
8,9	21.2	19.7	19.9	19.8	19.3	19.5	19.4	19.7	19.8	19.6	63	0	0	63	0	0	68	0	0
9,10	22.6	21.2	21.4	21.2	21.1	21.2	21	21.2	21.4	21.3	20	33	0	22	36	0	40	23	0
10,11	23.9	22.3	22.5	22.4	22.4	22.6	22.4	22.5	22.7	22.4	0	48	0	0	56	0	0	61	0
11,12	25.7	24.4	24.6	24.4	24.8	25	24.8	25	25.2	24.9	0	46	0	0	53	0	0	62	0
12,13	27.2	26.2	26.4	26.1	26.9	27.1	26.9	27.3	27.5	27.2	0	47	0	0	54	0	0	62.5	0
13,14	30	27.7	27.8	27.6	28.2	28.4	28.2	28.7	28.9	28.8	0	47	0	0	53	0	0	61	0
14,15	33.2	30.1	30.3	30	30.9	31.1	30.8	32.3	32.6	32.4	0	53	0	0	57	0	0	64	0
15,16	31.3	29.2	29.4	29.2	29.3	29.5	29.3	30.7	30.9	30.6	0	33	23	0	25	40	0	23	45
10/30																			
8,9	21.5	20.1	20.3	20.2	19.7	19.9	19.8	20.1	20.2	20	65	0	0	65	0	0	68	0	0
9,10	22.9	21.6	21.8	21.6	21.5	21.6	21.4	21.6	21.8	21.7	30	25	0	40	21	0	30	33	0
10,11	24.2	22.7	22.9	22.8	22.8	23	22.8	22.9	23.1	22.8	0	50	0	0	60	0	0	61	0
11,12	26	24.8	25	24.8	25.2	25.4	25.2	25.4	25.6	25.3	0	48	0	0	57	0	0	62	0
10/31																			
8,9	20.8	19.2	19.4	19.3	18.8	19	18.9	19.2	19.3	19.1	67	0	0	70	0	0	74	0	0
9,10	22.2	20.7	20.9	20.7	20.6	20.7	20.5	20.7	20.9	20.8	26	30	0	25	35	0	37	31	0
10,11	23.5	21.8	22	21.9	21.9	22.1	21.9	22	22.2	21.9	0	50	0	0	59	0	0	65	0
11,12	25.3	23.9	24.1	23.9	24.3	24.5	24.3	24.5	24.7	24.4	0	47	0	0	57	0	0	66	0
12,13	26.8	25.7	25.9	25.6	26.4	26.6	26.4	26.8	27	26.7	0	47.5	0	0	56	0	0	67.3	0
13,14	29.6	27.2	27.3	27.1	27.7	27.9	27.7	28.2	28.4	28.3	0	47	0	0	54	0	0	66	0
14,15	32.8	29.6	29.8	29.5	30.4	30.6	30.3	31.8	32.1	31.9	0	55	0	0	58	0	0	68	0
15,16	30.9	28.7	28.9	28.7	28.8	29	28.8	30.2	30.4	30.1	0	35	33	0	33	35	0	36	37
11/1																			
8,9	19.9	18.3	18.5	18.4	17.9	18.1	18	18.3	18.4	18.2	75	0	0	75	0	0	76	0	0
9,10	21.3	19.8	20	19.8	19.7	19.8	19.6	19.8	20	19.9	35	25	0	40	22	0	42	30	0
10,11	22.6	20.9	21.1	21	21	21.2	21	21.1	21.3	21	0	55	0	0	60	0	0	68	0
11,12	24.4	23	23.2	23	23.4	23.6	23.4	23.6	23.8	23.5	0	52	0	0	59	0	0	67	0

11/2		M-1			M-2			M-3			M-1			M-2			M-3		
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_{lw}	S_{lg}	S_k	S_{lw}	S_{lg}	S_k	S_{lw}	S_{lg}	S_k
8,9	18.5	17.2	17.3	17.1	17.3	17.5	17.4	17.5	17.7	17.6	81.6	0	0	82.9	0	0	86.2	86.2	0
9,10	19.9	18.6	18.8	18.7	18.8	19	18.9	19	19.2	19.1	40	24.5	0	40	29.3	0	40	36.5	0
10,11	22	20.9	21	20.8	21.3	21.4	21.2	21.3	21.5	21.4	0	58	0	0	64.8	0	0	71.8	0
11,12	23.8	23.1	23.3	23.2	23.7	23.9	23.7	23.8	24	23.7	0	55.6	0	0	62.5	0	0	70.3	0
12,13	25.6	25.8	26	25.9	26.7	27	26.8	26.5	26.8	26.6	0	55.8	0	0	64.3	0	0	70.2	0
13,14	28	28.2	28.4	28.2	29	29.2	28.9	29.1	29.4	29.2	0	58.8	0	0	65.6	0	0	73.1	0
14,15	29.9	30	30.2	30	31	31.3	31.1	31.6	31.8	31.5	0	68.8	0	0	71.3	0	0	77.9	0
15,16	30	30.7	31	30.8	31.7	32	31.8	32.3	32.5	32.2	0	50	39	0	60	29	0	60	36
11/5																			
8,9	17.7	15.5	15.6	15.4	15.6	15.8	15.7	15.8	16	15.9	84	0	0	84	0	0	95	0	0
9,10	19.1	16.9	17.1	17	17.1	17.3	17.2	17.3	17.5	17.4	40	26	0	40	31	0	50	30	0
10,11	21.2	19.2	19.3	19.1	19.6	19.7	19.5	19.6	19.8	19.7	0	60	0	0	66	0	0	75	0
11,12	23	21.4	21.6	21.5	22	22.2	22	22.1	22.3	22	0	58	0	0	64	0	0	73	0
12,13	24.8	24.1	24.3	24.2	25	25.3	25.1	24.8	25.1	24.9	0	59	0	0	66	0	0	72.8	0
13,14	27.2	26.5	26.7	26.5	27.3	27.5	27.2	27.4	27.7	27.5	0	60.2	0	0	68	0	0	75	0
14,15	29.1	28.3	28.5	28.3	29.3	29.6	29.4	29.9	30.1	29.8	0	70	0	0	74	0	0	80	0
15,16	29.2	29	29.3	29.1	30	30.3	30.1	30.6	30.8	30.5	0	50	39	0	60	31	0	60	40
11/6																			
8,9	16.8	15.1	15.2	15	15.2	15.4	15.3	15.4	15.6	15.5	86	0	0	86	0	0	97	0	0
9,10	18.2	16.5	16.2	16.6	16.7	16.9	16.8	16.9	17.1	17	35	33	0	40	34	0	50	30	0
10,11	20.3	18.8	18.9	18.7	19.2	19.3	19.1	19.2	19.4	19.3	0	61	0	0	69	0	0	75	0
11,12	22.1	21	21.2	21.1	21.6	21.8	21.6	21.7	21.9	21.6	0	59	0	0	66	0	0	75	0
12,13	23.9	23.7	23.9	23.8	24.6	24.9	24.7	24.4	24.7	24.5	0	60	0	0	68	0	0	73	0
13,14	26.3	26.1	26.3	26.1	26.9	27.1	26.8	27	27.3	27.1	0	62	0	0	70	0	0	75	0
14,15	28.2	27.9	28.1	27.9	28.9	29.2	29	29.5	29.7	29.4	0	72.5	0	0	76	0	0	81	0
15,16	28.3	28.6	28.9	28.7	29.6	29.9	29.7	30.2	30.4	30.1	0	50	44	0	60	33	0	60	40
11/7																			
8,9	17.2	16	16.1	15.9	16.1	16.3	16.2	16.3	16.5	16.4	86.5	0	0	86.9	0	0	99	0	0
9,10	18.6	17.4	17.6	17.5	17.6	17.8	17.7	17.8	18	17.9	35	32	0	40	35	0	50	31.3	0
10,11	20.7	19.7	19.8	19.6	20.1	20.2	20	20.1	20.3	20.2	0	62	0	0	70	0	0	76	0
11,12	22.5	21.9	22.1	22	22.5	22.7	22.5	22.6	22.8	22.5	0	60	0	0	65	0	0	75	0
12,13	24.3	24.6	24.8	24.7	25.5	25.8	25.6	25.3	25.6	25.4	0	61	0	0	68	0	0	74	0
13,14	26.7	27	27.2	27	27.8	28	27.7	27.9	28.2	28	0	63	0	0	70	0	0	75	0
14,15	28.6	28.8	29	28.8	29.8	30.1	29.9	30.4	30.6	30.3	0	73	0	0	77	0	0	82.5	0
15,16	28.7	29.5	29.8	29.6	30.5	30.8	30.6	31.1	31.3	31	0	55	40	0	60	35	0	60	40
11/8																			
8,9	16.9	15.8	16	15.9	15.4	15.6	15.5	15.8	15.9	15.7	87	0	0	87	0	0	98.4	0	0
9,10	18.3	17.3	17.5	17.3	17.2	17.3	17.1	17.3	17.5	17.4	35	33.6	0	40	35.5	0	50	32	0
10,11	19.6	18.4	18.6	18.5	18.5	18.7	18.5	18.6	18.8	18.5	0	63	0	0	71	0	0	77	0
11,12	21.4	20.5	20.7	20.5	20.9	21.1	20.9	21.1	21.3	21	0	61	0	0	66.5	0	0	76	0
11/9																			
8,9	16.8	14.8	14.9	14.7	14.9	15.1	15	15.1	15.3	15.2	88	0	0	88	0	0	100	0	0
9,10	18.2	16.2	16.4	16.3	16.4	16.6	16.5	16.6	16.8	16.7	38	31	0	40	37	0	50	32	0
10,11	20.3	18.5	18.6	18.4	18.9	19	18.8	18.9	19.1	19	0	64	0	0	72	0	0	77	0
11,12	22.1	20.7	20.9	20.8	21.3	21.5	21.3	21.4	21.6	21.3	0	62	0	0	67	0	0	76	0
12,13	23.9	23.4	23.6	23.5	24.3	24.6	24.4	24.1	24.4	24.2	0	63	0	0	69	0	0	75	0
13,14	26.3	25.8	26	25.8	26.6	26.8	26.5	26.7	27	26.8	0	65	0	0	72	0	0	76	0
14,15	28.2	27.6	27.8	27.6	28.6	28.9	28.7	29.2	29.4	29.1	0	75	0	0	78	0	0	83	0
15,16	28.3	28.3	28.6	28.4	29.3	29.6	29.4	29.9	30.1	29.8	0	58	39	0	65	32	0	65	35
11/11																			
8,9	16.2	14.9	15.1	15	14.5	14.7	14.6	14.9	15	14.8	88	0	0	88	0	0	100	0	0
9,10	17.6	16.4	16.6	16.4	16.3	16.4	16.2	16.4	16.6	16.5	38	31	0	40	37	0	50	32	0
10,11	18.9	17.5	17.7	17.6	17.6	17.8	17.6	17.7	17.9	17.6	0	64	0	0	72	0	0	77	0
11,12	20.7	19.6	19.8	19.6	20	20.2	20	20.2	20.4	20.1	0	62	0	0	67	0	0	76	0
11/12																			
8,9	15.4	13.6	13.7	13.5	13.7	13.9	13.8	13.9	14.1	14	89.6	0	0	90	0	0	100	0	0
9,10	16.8	15	15.2	15.1	15.2	15.4	15.3	15.4	15.6	15.5	45	25	0	42	36	0	55	30	0
10,11	18.9	17.3	17.4	17.2	17.7	17.8	17.6	17.7	17.9	17.8	0	65	0	0	73	0	0	78	0
11,12	20.7	19.5	19.7	19.6	20.1	20.3	20.1	20.2	20.4	20.1	0	63.2	0	0	68	0	0	77	0
12,13	22.5	22.2	22.4	22.3	23.1	23.4	23.2	22.9	23.2	23	0	65	0	0	70.2	0	0	77.2	0
13,14	24.9	24.6	24.8	24.6	25.4	25.6	25.3	25.5	25.8	25.6	0	65	0	0	73.3	0	0	77	0
14,15	26.8	26.4	26.6	26.4	27.4	27.7	27.5	28	28.2	27.9	0	75	0	0	79.4	0	0	84.5	0
15,16	26.9	27.1	27.4	27.2	28.1	28.4	28.2	28.7	28.9	28.6	0	60	35	0	60	35	0	60	40
11/13																			
8,9	15.5	13.8	14	13.9	14.2	14.3	14.1	13.5	13.7	13.6	90	0	0	91	0	0	100	0	0
9,10	16.9	15.6	15.7	15.5	15.7	15.9	15.8	15	15.2	15	40	31	0	45	24	0	52	35	0
10,11	18.2	16.9	17.1	16.9	17	17.2	16.9	16.1	16.3	16.2	0	66	0	0	74	0	0	79	0
11,12	20	19.3	19.5	19.3	19.5	19.7	19.4	18.2	18.4	18.2	0	64	0	0	70.6	0	0	79.6	0
11/14																			
8,9	14.7	13.4	13.5	13.3	13.5	13.7	13.6	13.7	13.9	13.8	92	0	0	94	0	0	102	0	0
9,10	16.1	14.8	15	14.9	15	15.2	15.1	15.2	15.4	15.3	45	40	0	40	41	0	55	33	0
10,11	18.2	17.1	17.2	17	17.5	17.6	17.4	17.5	17.7	17.6	0	76	0	0	73	0	0	79	0
11,12	20	19.3	19.5	19.4	19.9	20.1	19.9	20	20.2	19.9	0	70	0	0	70	0	0	80	0
12,13	21.8	22	22.2	22.1	22.9	23.2	23	22.7	23	22.8	0	72	0	0	72.4	0	0	78	0
13,14	24.2	24.4	24.6	24.4	25.2	25.4	25.1	25.3	25.6	25.4	0	74	0	0	76	0	0	80	0
14,15	26.1	26.2	26.4	26.2	27.2	27.5	27.3	27.8	28	27.7	0	80	0	0	81	0	0	85	0
15,16	26.2	26.9	27.2	27	27.9	28.2	28	28.5	28.7	28.4	0	60	35	0	60	36	0	60	43
11/16																			
8,9	14.1	12.2	12.3	12.1	12.3	12.5	12.4	12.5	12.7	12.6	92.6	0	0	95	0	0	103	0	0
9,10	15.5	13.6	13.8	13.7	13.8	14	13.9	14	14.2	14.1	46	40	0	52	30	0	60	29.9	0
10,11	17.6	15.9	16	15.8	16.3	16.4	16.2	16.3	16.5	16.4	0	77.5	0	0	75	0	0	80	0
11,12	19.4	18.1	18.3	18.2	18.7	18.9	18.7	18.8	19	18.7	0	72	0	0	71.4	0	0	81.4	0
12,13	21.2	20.8	21	20.9	21.7	22	21.8	21.5	21.8	21.6	0	73	0	0	73	0	0	79	0
13,14	23.6	23.2	23.4	23.2	24	24.2	23.9	24.1	24.4	24.2	0	75	0	0	77	0	0	81	0
14,15	25.5	25	25.2	25	26	26.3	26.1	26.6	26.8	26.5	0	81	0	0	82	0	0	86	0
15,16	25.6	25.7	26	25.8	26.7	27	26.8	27.3	27.5	27.2	0	60	36	0	60	37	0	60	44

11/18		M-1			M-2			M-3			M-1			M-2			M-3		
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_{Iw}	S_{Ie}	S_{k}	S_{Iw}	S_{Ie}	S_{k}	S_{Iw}	S_{Ie}	S_{k}
8,9	14.3	12.8	13	12.9	13.2	13.3	13.1	12.5	12.7	12.6	94	0	0	97	0	0	105	0	0
9,10	15.7	14.6	14.7	14.5	14.7	14.9	14.8	14	14.2	14	50	38	0	55	30	0	60	31	0
10,11	17	15.9	16.1	15.9	16	16.2	15.9	15.1	15.3	15.2	0	79	0	0	77	0	0	82	0
11,12	18.8	18.3	18.5	18.3	18.5	18.7	18.4	17.2	17.4	17.2	0	74	0	0	73	0	0	83	0
11/19																			
8,9	13.4	12.5	12.6	12.4	12.6	12.8	12.7	12.8	13	12.9	95	0	0	95	0	0	103	0	0
9,10	14.8	13.9	14.1	14	14.1	14.3	14.2	14.3	14.5	14.4	45	44	0	55	27	0	60	29.9	0
10,11	16.9	16.2	16.3	16.1	16.6	16.7	16.5	16.6	16.8	16.7	0	79	0	0	75	0	0	80	0
11,12	18.7	18.4	18.6	18.5	19	19.2	19	19.1	19.3	19	0	75	0	0	71.4	0	0	81.4	0
12,13	20.5	21.1	21.3	21.2	22	22.3	22.1	21.8	22.1	21.9	0	76	0	0	73	0	0	80	0
13,14	22.9	23.5	23.7	23.5	24.3	24.5	24.2	24.4	24.7	24.5	0	78	0	0	77	0	0	81	0
14,15	24.8	25.3	25.5	25.3	26.3	26.6	26.4	26.9	27.1	26.8	0	85	0	0	82	0	0	86	0
15,16	24.9	26	26.3	26.1	27	27.3	27.1	27.6	27.8	27.5	0	60	36	0	60	37	0	60	44
11/20																			
8,9	13.7	12.4	12.6	12.5	12.8	12.9	12.7	12.1	12.3	12.2	95	0	0	95	0	0	103	0	0
9,10	15.1	14.2	14.3	14.1	14.3	14.5	14.4	13.6	13.8	13.6	46	43	0	56	26	0	62	27.9	0
10,11	16.4	15.5	15.7	15.5	15.6	15.8	15.5	14.7	14.9	14.8	0	79	0	0	75	0	0	80	0
11,12	18.2	17.9	18.1	17.9	18.1	18.3	18	16.8	17	16.8	0	75	0	0	71.4	0	0	81.4	0
11/22																			
8,9	12	10.5	10.6	10.5	10.3	10.4	10.2	10.4	10.5	10.3	115	0	0	107	0	0	109	0	0
9,10	13.7	12	12.1	11.9	11.6	11.8	11.7	11.8	12	11.9	50	42.4	0	60	25.5	0	60	31.5	0
10,11	15.9	13.7	13.9	13.8	13.4	13.5	13.3	13.5	13.6	13.4	0	84.8	0	0	76.9	0	0	81.8	0
11,12	17.7	15.6	15.8	15.7	15	15.2	15.1	15.2	15.4	15.2	0	81.5	0	0	74.7	0	0	82.9	0
12,13	20.1	17.7	18	17.8	16.9	17.1	17	17.3	17.5	17.4	0	82.3	0	0	77.7	0	0	81	0
13,14	21.9	19.5	19.7	19.5	19	19.2	19.1	19	19.1	18.9	0	84.9	0	0	79	0	0	83.4	0
14,15	23.8	21	21.3	21.1	20.9	21	20.8	20.5	20.7	20.5	0	92.8	0	0	86	0	0	89.8	0
15,16	26	22.5	22.8	22.6	22	22.3	22.1	21.7	22	21.8	0	60	48	0	60	51	0	60	57
11/23																			
8,9	12.1	10.2	10.4	10.3	10.6	10.7	10.5	9.9	10.1	10	115	0	0	107	0	0	109	0	0
9,10	13.5	12	12.1	11.9	12.1	12.3	12.2	11.4	11.6	11.4	50	42.4	0	60	25.5	0	60	31.5	0
10,11	14.8	13.3	13.5	13.3	13.4	13.6	13.3	12.5	12.7	12.6	0	84.8	0	0	76.9	0	0	81.8	0
11,12	16.6	15.7	15.9	15.7	15.9	16.1	15.8	14.6	14.8	14.6	0	81.5	0	0	74.7	0	0	82.9	0
11/25																			
8,9	11.7	9.9	10.1	10	10.3	10.4	10.2	9.6	9.8	9.7	116	0	0	108	0	0	110	0	0
9,10	13.1	11.7	11.8	11.6	11.8	12	11.9	11.1	11.3	11.1	55	47.7	0	60	25.5	0	60	32	0
10,11	14.4	13	13.2	13	13.1	13.3	13	12.2	12.4	12.3	0	84.8	0	0	76.9	0	0	82	0
11,12	16.2	15.4	15.6	15.4	15.6	15.8	15.5	14.3	14.5	14.3	0	81.5	0	0	74.7	0	0	84	0
11/26																			
8,9	11.5	9.7	9.8	9.7	9.5	9.6	9.4	9.6	9.7	9.5	118	0	0	110	0	0	112	0	0
9,10	13.2	11.2	11.3	11.1	10.8	11	10.9	11	11.2	11.1	58	34.4	0	60	26	0	60	31.5	0
10,11	15.4	12.9	13.1	13	12.6	12.7	12.5	12.7	12.8	12.6	0	84.8	0	0	77	0	0	82	0
11,12	17.2	14.8	15	14.9	14.2	14.4	14.3	14.4	14.6	14.4	0	81.5	0	0	75	0	0	83	0
12,13	19.6	16.9	17.2	17	16.1	16.3	16.2	16.5	16.7	16.6	0	82.3	0	0	78	0	0	81	0
13,14	21.4	18.7	18.9	18.7	18.2	18.4	18.3	18.2	18.3	18.1	0	84.9	0	0	79	0	0	84	0
14,15	23.3	20.2	20.5	20.3	20.1	20.2	20	19.7	19.9	19.7	0	92.8	0	0	86	0	0	90	0
15,16	25.5	21.7	22	21.8	21.2	21.5	21.3	20.9	21.2	21	0	60	58	0	65	45	0	65	55
11/27																			
8,9	10.9	9.5	9.7	9.6	9.9	10	9.8	9.2	9.4	9.3	120	0	0	120	0	0	120	0	0
9,10	12.3	11.3	11.4	11.2	11.4	11.6	11.5	10.7	10.9	10.7	55	46	0	60	32	0	60	39	0
10,11	13.6	12.6	12.8	12.6	12.7	12.9	12.6	11.8	12	11.9	0	80	0	0	82	0	0	86	0
11,12	15.4	15	15.2	15	15.2	15.4	15.1	13.9	14.1	13.9	0	75	0	0	80	0	0	84	0
11/28																			
8,9	11.6	10.1	10.3	10.2	10.5	10.6	10.4	9.8	10	9.9	121	0	0	120	0	0	120	0	0
9,10	13	11.9	12	11.8	12	12.2	12.1	11.3	11.5	11.3	55	46	0	60	32	0	60	39	0
10,11	14.3	13.2	13.4	13.2	13.3	13.5	13.2	12.4	12.6	12.5	0	80	0	0	82	0	0	86	0
11,12	16.1	15.6	15.8	15.6	15.8	16	15.7	14.5	14.7	14.5	0	75	0	0	80	0	0	84	0
12,13	17.3	16.6	16.9	16.7	16.9	17.2	17	15.1	15.3	15.2	0	82.3	0	0	78	0	0	81	0
13,14	19.1	18.4	18.6	18.4	17.9	18.1	18	16.8	16.9	16.7	0	84.9	0	0	79	0	0	84	0
14,15	21	19.9	20.2	20	19.8	19.9	19.7	18.3	18.5	18.3	0	92.8	0	0	86	0	0	90	0
15,16	23.2	21.4	21.7	21.5	20.9	21.2	21	19.5	19.8	19.6	0	60	60	0	60	55	0	60	61
11/30																			
8,9	10.2	9.8	9.9	9.7	9.5	9.5	9.5	9.7	9.7	9.7	112	0	0	120	0	0	120	0	0
9,10	11.9	10.9	11	10.8	10.3	10.3	10.3	10.4	10.5	10.4	55	46.6	0	55	46.8	0	60	39	0
10,11	13	12.6	12.8	12.7	11.5	11.6	11.4	11.6	11.8	11.7	0	79.1	0	0	81.7	0	0	88.5	0
11,12	14.8	13.6	13.8	13.6	12.8	12.9	12.7	13	13.3	13.1	0	74.2	0	0	79	0	0	85.2	0
12,13	16.4	15	15.2	14.9	14.3	14.5	14.4	14.6	14.8	14.6	0	74.8	0	0	80.7	0	0	87	0
13,14	18.2	16.4	16.6	16.4	15.7	15.9	15.8	16.2	16.4	16.1	0	79.9	0	0	85.1	0	0	87.1	0
14,15	19.9	17.8	18.1	17.9	17.5	17.7	17.6	18	18.2	17.9	0	92.1	0	0	93.9	0	0	99.3	0
15,16	22	19.8	20	19.8	19.2	19.4	19.3	21.2	21.4	21.1	0	60	64	0	60	61	0	60	67

2002																			
12/10		M-4			M-5			M-6			M-4			M-5			M-6		
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_{1w}	S_{1f}	S_{1c}	S_{1w}	S_{1f}	S_{1c}	S_{1w}	S_{1f}	S_{1c}
8,9	14.7	13	13	13	13.4	13.5	13.3	13.8	14	13.9	50.42	0	0	52.67	0	0	62.71	0	0
9,10	16	13.6	13.8	13.7	14.5	14.6	14.4	14.8	15	14.9	20	16.3	0	25	15.96	0	30	17.71	0
10,11	17.6	14.8	14.9	14.7	15.7	15.8	15.6	16	16.1	15.9	0	30.31	0	0	39.55	0	0	44.17	0
11,12	19.6	16	16.1	15.9	16.9	17	16.8	17.1	17.3	17.2	0	27.07	0	0	39.72	0	0	41.77	0
12,13	21.8	17.2	17.4	17.3	18.3	18.5	18.4	18.7	18.9	18.6	0	28.93	0	0	38.14	0	0	43.56	0
13,14	23.9	18.5	18.7	18.6	19.8	20	19.9	20.3	20.5	20.3	0	31.76	0	0	42.85	0	0	45.19	0
14,15	25	19.2	19.4	19.1	20.9	21.1	21	21.4	21.6	21.3	0	39.44	0	0	45.41	0	0	51.55	0
15,16	24.6	19.8	20	19.7	21.8	22	21.7	22	22.2	21.9	0	40	18.72	0	30	29.11	0	40	29.68
12/11																			
8,9	15.2	12.7	12.8	12.7	13.1	13.2	13	13.5	13.7	13.6	50.67	0	0	52.93	0	0	63.02	0	0
9,10	16.5	13.3	13.6	13.4	14.2	14.3	14.1	14.5	14.7	14.6	20.1	16.38	0	25.13	16.04	0	30.15	17.8	0
10,11	18.1	14.5	14.7	14.4	15.4	15.5	15.3	15.7	15.8	15.6	0	30.46	0	0	39.75	0	0	44.39	0
11,12	20.1	15.7	15.9	15.6	16.6	16.7	16.5	16.8	17	16.9	0	27.21	0	0	39.92	0	0	41.98	0
12,13	22.3	16.9	17.2	17	18	18.2	18.1	18.4	18.6	18.3	0	29.07	0	0	38.33	0	0	43.78	0
13,14	24.4	18.2	18.5	18.3	19.5	19.7	19.6	20	20.2	20	0	31.92	0	0	43.06	0	0	45.42	0
14,15	25.5	18.9	19.2	18.8	20.6	20.8	20.7	21.1	21.3	21	0	39.64	0	0	45.64	0	0	51.81	0
15,16	25.7	19.5	19.8	19.4	21.5	21.7	21.4	21.7	21.9	21.6	0	40.2	18.81	0	30.15	29.26	0	40.2	29.83
12/12																			
8,9	14.3	12.5	12.6	12.5	12.9	13	12.8	13.3	13.5	13.4	51.2	0	0	53.2	0	0	63.1	0	0
9,10	15.6	13.1	13.4	13.2	14	14.1	13.9	14.3	14.5	14.4	20.1	16.4	0	25.13	16.1	0	30.15	17.8	0
10,11	17.2	14.3	14.5	14.2	15.2	15.3	15.1	15.5	15.6	15.4	0	30.5	0	0	39.75	0	0	44.5	0
11,12	19.2	15.5	15.7	15.4	16.4	16.5	16.3	16.6	16.8	16.7	0	27.3	0	0	39.95	0	0	42	0
12,13	21.4	16.7	17	16.8	17.8	18	17.9	18.2	18.4	18.1	0	29.1	0	0	38.4	0	0	44	0
13,14	23.5	18	18.3	18.1	19.3	19.5	19.4	19.8	20	19.8	0	32	0	0	43.1	0	0	45.5	0
14,15	24.6	18.7	19	18.6	20.4	20.6	20.5	20.9	21.1	20.8	0	39.8	0	0	45.7	0	0	52	0
15,16	25	19.3	19.6	19.2	21.3	21.5	21.2	21.5	21.7	21.4	0	40.2	18.9	0	30.15	29.3	0	40.2	29.9
12/14																			
8,9	14.8	13.1	13.2	13.1	13.5	13.6	13.4	13.9	14.1	14	52	0	0	54	0	0	63.1	0	0
9,10	16.1	13.7	14	13.8	14.6	14.7	14.5	14.9	15.1	15	20.1	16.4	0	25.13	16.1	0	30.15	17.8	0
10,11	17.7	14.9	15.1	14.8	15.8	15.9	15.7	16.1	16.2	16	0	30.5	0	0	39.75	0	0	44.5	0
11,12	19.7	16.1	16.3	16	17	17.1	16.9	17.2	17.4	17.3	0	27.3	0	0	39.95	0	0	42	0
12,13	21.9	17.3	17.6	17.4	18.4	18.6	18.5	18.8	19	18.7	0	29.1	0	0	38.4	0	0	44	0
13,14	24	18.6	18.9	18.7	19.9	20.1	20	20.4	20.6	20.4	0	32	0	0	43.1	0	0	45.5	0
14,15	25.1	19.3	19.6	19.2	21	21.2	21.1	21.5	21.7	21.4	0	39.8	0	0	45.7	0	0	52	0
15,16	24.9	19.9	20.2	19.8	21.9	22.1	21.8	22.1	22.3	22	0	40.2	18.9	0	30.15	29.3	0	40.2	29.9
12/16																			
8,9	15.2	13.2	13.3	13.1	14.1	14.2	14.1	14.3	14.4	14.2	53.7	0	0	56.29	0	0	64.63	0	0
9,10	16.6	14.2	14.3	14.1	15.2	15.4	15.2	15.3	15.5	15.4	18.47	20	0	20	23.16	0	30	22.17	0
10,11	18.3	15	15.2	15.1	16.4	16.7	16.5	16.6	16.8	16.7	0	30.32	0	0	40.74	0	0	46.25	0
11,12	21.4	16.3	16.4	16.2	17.8	18.1	17.9	18.1	18.3	18.2	0	28.59	0	0	38.01	0	0	41.54	0
12,13	23	17.6	17.8	17.7	19.8	20	19.8	20.4	20.6	20.5	0	31.76	0	0	37.98	0	0	43.7	0
13,14	24.8	18.9	19.1	18.9	21.1	21.3	21.1	21.7	22	21.8	0	32.69	0	0	39.83	0	0	46.05	0
14,15	26	19.7	20	19.8	22	22.2	21.9	22.8	23	22.8	0	40.14	0	0	44.82	0	0	52.24	0
15,16	27.3	20.7	21	20.8	22.8	23	22.7	23.6	23.9	23.7	0	30	24.14	0	30	29.28	0	35	34.57
12/17																			
8,9	15.7	13.7	13.8	13.6	14.6	14.7	14.6	14.8	14.9	14.7	53.7	0	0	56.29	0	0	64.5	0	0
9,10	17.1	14.7	14.8	14.6	15.7	15.9	15.7	15.8	16	15.9	18.5	20	0	20	23.2	0	30	22.2	0
10,11	18.8	15.5	15.7	15.6	16.9	17.2	17	17.1	17.3	17.2	0	30.5	0	0	40.8	0	0	46.3	0
11,12	21.9	16.8	16.9	16.7	18.3	18.6	18.4	18.6	18.8	18.7	0	28.6	0	0	38	0	0	41.6	0
12,13	23.5	18.1	18.3	18.2	20.3	20.5	20.3	20.9	21.1	21	0	31.8	0	0	38	0	0	43.7	0
13,14	25.3	19.4	19.6	19.4	21.6	21.8	21.6	22.2	22.5	22.3	0	32.7	0	0	40	0	0	46.05	0
14,15	26.5	20.2	20.5	20.3	22.5	22.7	22.4	23.3	23.5	23.3	0	40.2	0	0	45	0	0	52.3	0
15,16	27.8	21.2	21.5	21.3	23.3	23.5	23.2	24.1	24.4	24.2	0	30	24.2	0	30	30	0	35	34.4
12/18																			
8,9	14.9	13.3	13.4	13.2	14.2	14.3	14.2	14.4	14.5	14.3	53	0	0	54.5	0	0	67	0	0
9,10	16.3	14.3	14.4	14.2	15.3	15.5	15.3	15.4	15.6	15.5	25	14.2	0	25	19	0	30	26.1	0
10,11	18	15.1	15.3	15.2	16.5	16.8	16.6	16.7	16.9	16.8	0	33.2	0	0	40.5	0	0	48.2	0
11,12	21.1	16.4	16.5	16.3	17.9	18.2	18	18.2	18.4	18.3	0	32	0	0	39.3	0	0	42.2	0
12,13	22.7	17.7	17.9	17.8	19.9	20.1	19.9	20.5	20.7	20.6	0	33.4	0	0	39.3	0	0	43.8	0
13,14	24.5	19	19.2	19	21.2	21.4	21.2	21.8	22.1	21.9	0	33.4	0	0	41.2	0	0	46.9	0
14,15	25.7	19.8	20.1	19.9	22.1	22.3	22	22.9	23.1	22.9	0	41.3	0	0	46.3	0	0	52	0
15,16	27	20.8	21.1	20.9	22.9	23.1	22.8	23.7	24	23.8	0	30	29	0	30	30.4	0	35	34.2
12/19																			
8,9	14.9	13.3	13.4	13.2	14.2	14.3	14.2	14.4	14.5	14.3	53.2	0	0	54.5	0	0	67	0	0
9,10	16.3	14.3	14.4	14.2	15.3	15.5	15.3	15.4	15.6	15.5	25	14.4	0	25	19.5	0	30	26.5	0
10,11	18	15.1	15.3	15.2	16.5	16.8	16.6	16.7	16.9	16.8	0	33.5	0	0	40.5	0	0	48.5	0
11,12	21.1	16.4	16.5	16.3	17.9	18.2	18	18.2	18.4	18.3	0	32	0	0	39.5	0	0	42.5	0
12,13	22.7	17.7	17.9	17.8	19.9	20.1	19.9	20.5	20.7	20.6	0	33.6	0	0	39.6	0	0	44	0
13,14	24.5	19	19.2	19	21.2	21.4	21.2	21.8	22.1	21.9	0	33.7	0	0	41.6	0	0	47	0
14,15	25.7	19.8	20.1	19.9	22.1	22.3	22	22.9	23.1	22.9	0	41.5	0	0	46.7	0	0	52.3	0
15,16	27	20.8	21.1	20.9	22.9	23.1	22.8	23.7	24	23.8	0	30	29.4	0	30	30.8	0	35	34.6
12/20																			
10,11	18.4	15.7	15.9	15.8	17.1	17.4	17.2	17.3	17.5	17.4	0	33.5	0	0	40.5	0	0	48.5	0
11,12	21.5	17	17.1	16.9	18.5	18.8	18.6	18.8	19	18.9	0	32	0	0	39.5	0	0	42.5	0
12,13	23.1	18.3	18.5	18.4	20.5	20.7	20.5	21.1	21.3	21.2	0	33.6	0	0	39.6	0	0	44	0
13,14	24.9	19.6	19.8	19.6	21.8	22	21.8	22.4	22.7	22.5	0	33.7	0	0	41.6	0	0	47	0
14,15	26.1	20.4	20.7	20.5	22.7	22.9	22.6	23.5	23.7	23.5	0	41.5	0	0	46.7	0	0	52.3	0
15,16	25.9	19.9	20.2	20	22	22.2	21.9	22.8	23.1	22.9	0	30	29.4	0	30	30.8	0	35	34.6
12/21																			
11,12	20.6	18.4	18.5	18.3	19.9	20.2	20	20.2	20.4	20.3	0	32	0	0	39.5	0	0	42.5	0
12,13	22.2	19.7	19.9	19.8	21.9	22.1	21.9	22.5	22.7	22.6	0	33.6	0	0	39.6	0	0	44	0
13,14	24	21	21.2	21	23.2	23.4	23.2	23.8	24.1	23.9	0	33.7	0	0	41.6	0	0	47	0
14,15	25.2	21.8	22.1	21.9	24.1	24.3	24	24.9	25.1	24.9	0	41.5	0	0	46.7	0	0	52.3	0
15,16	25	21.3	21.6	21.4	23.4	23.6	23.3	24.2	24.5	24.3	0	30	29.4	0	30	30.8	0	35	34.6

12/22		M-4			M-5			M-6			M-4			M-5			M-6		
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_{Ia}	S_{Ig}	S_{Ic}	S_{Ia}	S_{Ig}	S_{Ic}	S_{Ia}	S_{Ig}	S_{Ic}
8,9	16.1	13.9	14	14	14.4	14.5	14.4	14.5	14.6	14.5	53.39	0	0	54.88	0	0	67.06	0	0
9,10	18	15.1	15.3	15.2	15.9	16	15.8	16	16.2	16.1	25	14.62	0	25	19.07	0	30	26.39	0
10,11	19.8	16.3	16.5	16.3	17.2	17.4	17.2	17.5	17.7	17.6	0	33.53	0	0	40.85	0	0	48.77	0
11,12	22	17.6	17.7	17.5	18.4	18.7	18.5	19.4	19.5	19.3	0	32	0	0	39.62	0	0	42.67	0
12,13	23.5	18.1	18.4	18.2	19.9	20.1	19.8	20.8	21	20.7	0	33.53	0	0	39.62	0	0	44.2	0
13,14	25.1	19.8	20	19.9	21	21.3	21.1	22.4	22.6	22.3	0	33.53	0	0	41.45	0	0	47.24	0
14,15	26.6	20.7	21	20.8	22.3	22.6	22.2	22.8	23.1	22.9	0	41.45	0	0	46.33	0	0	53.04	0
15,16	28	22.1	22.4	22.2	23.2	23.5	23.3	24	24.3	24.1	0	30	29.44	0	30	30.96	0	35	35.1
12/23																			
8,9	15.1	13.5	13.6	13.6	14	14.1	14	14.1	14.2	14.1	53.39	0	0	54.88	0	0	67.06	0	0
9,10	17	14.7	14.9	14.8	15.5	15.6	15.4	15.6	15.8	15.7	25	14.62	0	25	19.07	0	30	26.39	0
10,11	18.8	15.9	16.1	15.9	16.8	17	16.8	17.1	17.3	17.2	0	33.53	0	0	40.85	0	0	48.77	0
11,12	21	17.2	17.3	17.1	18	18.3	18.1	19	19.1	18.9	0	32	0	0	39.62	0	0	42.67	0
12,13	22.5	17.7	18	17.8	19.5	19.7	19.4	20.4	20.6	20.3	0	33.53	0	0	39.62	0	0	44.2	0
13,14	24.1	19.4	19.6	19.5	20.6	20.9	20.7	22	22.2	21.9	0	33.53	0	0	41.45	0	0	47.24	0
12/27																			
8,9	14.3	13.3	13.4	13.4	13.8	13.9	13.8	13.9	14	13.9	53.7	0	0	53.5	0	0	64.5	0	0
9,10	15.7	14.5	14.7	14.6	15.3	15.4	15.2	15.4	15.6	15.5	18.5	20	0	20	23.2	0	30	22.2	0
10,11	17.2	15.7	15.9	15.7	16.6	16.8	16.6	16.9	17.1	17	0	30.5	0	0	40.8	0	0	46.3	0
11,12	19.2	17	17.1	16.9	17.8	18.1	17.9	18.8	18.9	18.7	0	28.6	0	0	38	0	0	41.6	0
12,13	21	17.5	17.8	17.6	19.3	19.5	19.2	20.2	20.4	20.1	0	31.8	0	0	38	0	0	43.7	0
13,14	23	19.2	19.4	19.3	20.4	20.7	20.5	21.8	22	21.7	0	32.7	0	0	40	0	0	46.05	0
14,15	24.1	20.1	20.4	20.2	21.7	22	21.6	22.2	22.5	22.3	0	40.2	0	0	45	0	0	52.3	0
15,16	23.4	19.6	19.8	19.5	20	20.3	20.1	21	21.3	21.1	0	30	24.2	0	30	30	0	35	34.4
12/28																			
8,9	14.3	12.5	12.6	12.6	13	13.1	13	13.1	13.2	13.1	53.7	0	0	53.2	0	0	64.63	0	0
9,10	16.2	13.7	13.9	13.8	14.5	14.6	14.4	14.6	14.8	14.7	18.47	20	0	20	23.16	0	30	22.17	0
10,11	18	14.9	15.1	14.9	15.8	16	15.8	16.1	16.3	16.2	0	30.32	0	0	40.74	0	0	46.25	0
11,12	20.2	16.2	16.3	16.1	17	17.3	17.1	18	18.1	17.9	0	28.59	0	0	38.01	0	0	41.54	0
12,13	21.7	16.7	17	16.8	18.5	18.7	18.4	19.4	19.6	19.3	0	31.76	0	0	37.98	0	0	43.7	0
13,14	23.3	18.4	18.6	18.5	19.6	19.9	19.7	21	21.2	20.9	0	32.69	0	0	39.83	0	0	46.05	0
14,15	24.8	19.3	19.6	19.4	20.9	21.2	20.8	21.4	21.7	21.5	0	40.14	0	0	44.82	0	0	52.24	0
15,16	24	18.8	19	18.7	19.2	19.5	19.3	20.2	20.5	20.3	0	30	24.14	0	30	29.28	0	35	34.57
12/30																			
8,9	15	13.3	13.3	13.2	13.8	13.9	13.9	13.8	14	13.9	52.11	0	0	53.34	0	0	63.7	0	0
9,10	16.4	14.1	14.2	14	14.9	15	14.8	15.2	15.3	15.1	17.98	19	0	20	22.52	0	25	25.29	0
10,11	18	15	15.2	15	16	16.2	16.1	16.5	16.7	16.5	0	31.26	0	0	39.79	0	0	45.11	0
11,12	19.1	15.8	16.1	15.9	17.3	17.4	17.2	17.7	18	17.8	0	27.48	0	0	39.62	0	0	41.64	0
12,13	20.4	17.4	17.6	17.3	18.9	19	18.8	20	20.3	20.1	0	28.54	0	0	37.49	0	0	43.59	0
13,14	22	18.6	18.8	18.5	20.3	20.5	20.2	21.6	21.9	21.7	0	30.48	0	0	39.62	0	0	45.57	0
14,15	23.3	19.3	19.6	19.4	21.4	21.6	21.3	23	23.3	23.1	0	38.83	0	0	44.96	0	0	51.69	0
15,16	23.5	20.1	20.3	20	22.2	22.5	22.3	23.8	24	23.7	0	30	26.28	0	30	28.98	0	35	34.19
2003 1/2																			
12,13	25.2	22.3	22.5	22.2	23.1	23.4	23.2	24.5	24.7	24.5	0	27.2	0	0	38.6	0	0	43	0
13,14	25.7	24.1	24.4	24.2	24.9	25.2	25	25.9	26.2	26	0	30.3	0	0	40	0	0	43	0
14,15	28.5	26.1	26.3	26	26.9	27.2	27	27.5	27.8	27.6	0	36.4	0	0	42.8	0	0	48	0
1/4																			
8,9	20.1	17.4	17.5	17.3	17.3	17.4	17.2	17.7	17.9	17.8	49.3	0	0	50.29	0	0	57	0	0
9,10	21.8	18.8	19	18.9	18.9	19.1	19	19.5	19.7	19.6	22	13.6	0	20	22.7	0	24	24.8	0
10,11	24	20	20.1	19.9	20.2	20.4	20.1	20.8	21	20.7	0	29.82	0	0	39.47	0	0	41.45	0
11,12	26.7	21.5	21.7	21.6	21.8	22	21.7	22.8	23.1	22.9	0	23.58	0	0	38.1	0	0	38.4	0
12,13	28.3	22.9	23.1	22.8	23.7	24	23.8	25.1	25.3	25.1	0	26.99	0	0	38.1	0	0	42.06	0
13,14	30	24.7	25	24.8	25.5	25.8	25.6	26.5	26.8	26.6	0	29.99	0	0	39.93	0	0	42.67	0
14,15	29	26.7	26.9	26.6	27.5	27.8	27.6	28.1	28.4	28.2	0	36.22	0	0	42.67	0	0	47.24	0
15,16	27	25.7	26	25.8	25.6	25.9	25.7	25.7	26	25.7	0	24.6	30	0	26.4	30	0	30	31
1/5																			
8,9	19.5	18	18.1	17.9	17.9	18	17.8	18.3	18.5	18.4	49.3	0	0	50.29	0	0	57	0	0
9,10	21.3	19.4	19.6	19.5	19.5	19.7	19.6	20.1	20.3	20.2	22	13.6	0	20	22.7	0	24	24.8	0
10,11	23.4	20.6	20.7	20.5	20.8	21	20.7	21.4	21.6	21.3	0	29.82	0	0	39.47	0	0	41.45	0
11,12	26	22.1	22.3	22.2	22.4	22.6	22.3	23.4	23.7	23.5	0	23.58	0	0	38.1	0	0	38.4	0
12,13	27.6	23.5	23.7	23.4	24.3	24.6	24.4	25.7	25.9	25.7	0	26.99	0	0	38.1	0	0	42.06	0
13,14	29	25.3	25.6	25.4	26.1	26.4	26.2	27.1	27.4	27.2	0	29.99	0	0	39.93	0	0	42.67	0
14,15	28.3	27.3	27.5	27.2	28.1	28.4	28.2	28.7	29	28.8	0	36.22	0	0	42.67	0	0	47.24	0
15,16	27	26.3	26.6	26.4	27.2	27.5	27.3	27.3	27.6	27.3	0	24.6	30	0	26.4	30	0	30	31
1/6																			
8,9	20	18.8	18.9	18.7	18.7	18.8	18.6	19.1	19.3	19.2	49.3	0	0	50.29	0	0	57	0	0
9,10	21.5	20.2	20.4	20.3	20.3	20.5	20.4	20.9	21.1	21	22	13.6	0	20	22.7	0	24	24.8	0
10,11	23	21.4	21.5	21.3	21.6	21.8	21.5	22.2	22.4	22.1	0	30.5	0	0	39.5	0	0	41.5	0
11,12	25.7	22.9	23.1	23	23.2	23.4	23.1	24.2	24.5	24.3	0	24.4	0	0	38.1	0	0	38.4	0
12,13	28.3	24.3	24.5	24.2	25.1	25.4	25.2	26.5	26.7	26.5	0	27.8	0	0	38.1	0	0	42.1	0
13,14	30	26.1	26.4	26.2	26.9	27.2	27	27.9	28.2	28	0	30.3	0	0	40	0	0	42.7	0
14,15	30.5	28.1	28.3	28	28.9	29.2	29	29.5	29.8	29.6	0	36.4	0	0	42.8	0	0	47.4	0
15,16	29.5	27.1	27.4	27.2	28	28.3	28.1	28.1	28.4	28.1	0	24.6	30	0	26.4	30	0	30	31
1/8																			
13,14	27.3	25.5	25.8	25.6	26.3	26.6	26.4	27.3	27.6	27.4	0	30.3	0	0	40	0	0	42.7	0
14,15	28.6	27	27.3	27.1	28.3	28.6	28.4	28.9	29.2	29	0	36.4	0	0	42.8	0	0	47.4	0
15,16	29	26.5	26.8	26.6	27.4	27.7	27.5	27.5	27.8	27.5	0	24.6	30	0	26.4	30	0	30	31
1/9																			
8,9	14.3	13	13.2	13.1	13.5	13.7	13.6	13	13.2	13.1	46.63	0	0	48.8	0	0	54	0	0
9,10	16	14.1	14.3	14	14.9	15	14.8	14.5	14.7	14.6	22	11.5	0	21	20.9	0	23	22.3	0
10,11	17.8	15.5	15.7	15.5	16.4	16.6	16.4	16	16.2	16.1	0	28.04	0	0	37.65	0	0	39.47	0
11,12	20.3	17.3	17.5	17.3	18.1	18.3	18	18.4	18.6	18.4	0	21.95	0	0	36.85	0	0	37.34	0
12,13	22	18.1	18.4	18.1	19.9	20.2	19.9	20.4	20.7	20.4	0	24.99	0	0	36.58	0	0	39.26	0
13,14	22.9	19.5	19.7	19.4	20.9	21.2	20.9	21.7	22	21.7	0	28.65	0	0	38.7	0	0	40.75	0
14,15	21.3	21.3	21.6	21.3	23.3	23.6	23.4	23.8	24.1	23.8	0	34.44	0	0	41.13	0	0	43.31	0
15,16	20	20.9	21.2	20.9	22.2	22.5	22.1	23	23.3	23	0	23.2	30	0	30	22.1	0	28	22.5

1/11		M-4			M-5			M-6			M-4			M-5			M-6		
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_{lw}	S_{lp}	S_k	S_{lw}	S_{lp}	S_k	S_{lw}	S_{lp}	S_k
8,9	16.5	15.1	15.3	15.2	15.6	15.8	15.7	15.1	15.3	15.2	46.63	0	0	48.8	0	0	54	0	0
9,10	18.2	16.2	16.4	16.1	17	17.1	16.9	16.6	16.8	16.7	22	11.5	0	21	20.9	0	23	22.3	0
10,11	20	17.6	17.8	17.6	18.5	18.7	18.5	18.1	18.3	18.2	0	28.04	0	0	37.65	0	0	39.47	0
11,12	22.7	19.4	19.6	19.4	20.2	20.4	20.1	20.5	20.7	20.5	0	21.95	0	0	36.85	0	0	37.34	0
12,13	24.5	20.2	20.5	20.2	22	22.3	22	22.5	22.8	22.5	0	24.99	0	0	36.58	0	0	39.26	0
13,14	26	21.6	21.8	21.5	23	23.3	23	23.8	24.1	23.8	0	28.65	0	0	38.7	0	0	40.75	0
14,15	27.9	23.4	23.7	23.4	25.4	25.7	25.5	25.9	26.2	25.9	0	34.44	0	0	41.13	0	0	43.31	0
15,16	27	25	25.3	25	26.3	26.6	26.2	27.1	27.4	27.1	0	23.2	30	0	30	22.1	0	28	27.5
1/12																			
8,9	17	15.3	15.5	15.4	15.8	16	15.9	15.3	15.5	15.4	46.63	0	0	48.8	0	0	54	0	0
9,10	18.5	16.4	16.6	16.3	17.2	17.3	17.1	16.8	17	16.9	22	11.5	0	21	20.9	0	23	22.3	0
10,11	20.9	17.8	18	17.8	18.7	18.9	18.7	18.3	18.5	18.4	0	28.04	0	0	37.65	0	0	39.47	0
11,12	23.5	19.6	19.8	19.6	20.4	20.6	20.3	20.7	20.9	20.7	0	21.95	0	0	36.85	0	0	37.34	0
12,13	25	21.5	21.8	21.5	23.3	23.6	23.3	23.8	24.1	23.8	0	24.99	0	0	36.58	0	0	39.26	0
13,14	26.1	22.9	23.1	22.8	24.3	24.6	24.3	25.1	25.4	25.1	0	28.65	0	0	38.7	0	0	40.75	0
14,15	27.9	24.7	25	24.7	26.7	27	26.8	27.2	27.5	27.2	0	34.44	0	0	41.13	0	0	43.31	0
15,16	28	26.3	26.6	26.3	27.6	27.9	27.5	28.4	28.7	28.4	0	23.2	30	0	30	22.1	0	28	27.5
1/14																			
8,9	15.6	14.4	14.5	14.4	13.8	13.9	13.8	14.4	14.5	14.4	45.7	0	0	47.2	0	0	51.2	0	0
9,10	17	15.3	15.5	15.3	15	15.2	15.1	15.8	16	15.9	21	11	0	18	16.7	0	20	22.4	0
10,11	18.2	16.6	16.8	16.6	16.7	16.9	16.7	17.3	17.5	17.4	0	25.8	0	0	28.39	0	0	36.45	0
11,12	19.3	18.3	18.5	18.3	18.6	18.8	18.6	20.2	20.4	20.2	0	21.18	0	0	22.37	0	0	32	0
12,13	22	19.9	20.1	19.8	20.1	20.4	20.1	21.7	21.9	21.6	0	20	0	0	21.76	0	0	32	0
13,14	23	21	21.3	21.1	21.5	21.8	21.5	23	23.3	23	0	25.5	0	0	26.6	0	0	37	0
14,15	24	22.5	22.8	22.6	23.1	23.3	23	24.2	24.5	24.2	0	32	0	0	33.52	0	0	42	0
15,16	23.3	23.2	23.5	23.3	23.8	24.1	23.9	25.7	26	25.7	0	21	25	0	22	24.8	0	22	29.8
1/16																			
8,9	21.2	19.1	19.2	19	19	19.1	18.9	19.4	19.6	19.5	45	0	0	46.8	0	0	50.4	0	0
9,10	23	20.5	20.7	20.6	20.6	20.8	20.7	21.2	21.4	21.3	20	10	0	18	16	0	19	22.4	0
10,11	25.2	21.7	21.8	21.6	21.9	22.1	21.8	22.5	22.7	22.4	0	25.5	0	0	28	0	0	33.1	0
11,12	27	23.2	23.4	23.3	23.5	23.7	23.4	24.5	24.8	24.6	0	21	0	0	22	0	0	30	0
12,13	28.3	24.6	24.8	24.5	25.4	25.7	25.5	26.8	27	26.8	0	19.8	0	0	21	0	0	31.4	0
13,14	29.1	26.4	26.7	26.5	27.2	27.5	27.3	28.2	28.5	28.3	0	25.3	0	0	26.1	0	0	36.5	0
14,15	30	28.4	28.6	28.3	29.2	29.5	29.3	29.8	30.1	29.9	0	31.6	0	0	33.2	0	0	41.4	0
15,16	28.4	27.4	27.7	27.5	28.3	28.6	28.4	28.4	28.7	28.4	0	20	22	0	22	24.3	0	22	29
1/18																			
8,9	21.5	18.4	18.5	18.3	18.3	18.4	18.2	18.7	18.9	18.8	44	0	0	46.3	0	0	50	0	0
9,10	23.3	19.8	20	19.9	19.9	20.1	20	20.5	20.7	20.6	19	9	0	17.3	16	0	19	22	0
10,11	25	21	21.1	20.9	21.2	21.4	21.1	21.8	22	21.7	0	25	0	0	27.8	0	0	33	0
11,12	25.5	22.5	22.7	22.6	22.8	23	22.7	23.8	24.1	23.9	0	20.8	0	0	21.7	0	0	29.8	0
13,14	28	25.7	26	25.8	26.5	26.8	26.6	27.5	27.8	27.6	0	25.1	0	0	26	0	0	36.2	0
14,15	30	27.7	27.9	27.6	28.5	28.8	28.6	29.1	29.4	29.2	0	31.4	0	0	33	0	0	41	0
15,16	28.4	26.7	27	26.8	27.6	27.9	27.7	27.7	28	27.7	0	20	21.8	0	22	24	0	22	28.7
1/21																			
8,9	17	16.1	16.2	16.1	16.5	16.6	16.5	16.6	16.7	16.6	42.1	0	0	39.4	0	0	48.6	0	0
9,10	19	16.6	16.8	16.6	17.4	17.5	17.3	17.6	17.8	17.6	16	13	0	10	20.9	0	19	20.6	0
10,11	21.8	17.9	18.1	17.9	18.4	18.6	18.3	18.8	19.1	18.8	0	25.3	0	0	24.96	0	0	30.48	0
11,12	22.6	18.4	18.6	18.4	19.1	19.4	19	19.5	19.7	19.4	0	20.21	0	0	19.61	0	0	33.68	0
12,13	24	19.6	19.9	19.7	20.2	20.5	20.2	20.7	21	20.7	0	21.86	0	0	19.07	0	0	32.31	0
13,14	24.5	20.5	20.8	20.6	21.1	21.4	21.1	22.1	22.4	22	0	24.12	0	0	22.49	0	0	33.53	0
14,15	25	21	21.3	21	21.8	22.1	21.9	23.2	23.5	23.2	0	29.64	0	0	27.43	0	0	37.8	0
15,16	26	22.1	22.4	22.1	22	22.4	22.1	24.1	24.4	24	0	20	22.4	0	18	20.4	0	20	28.2
1/22																			
8,9	17.5	16	16.1	16	16.4	16.5	16.4	17.2	17.3	17.1	42.1	0	0	39.4	0	0	48.6	0	0
9,10	19	16.5	16.7	16.5	17.3	17.4	17.2	18.5	18.7	18.5	16	13	0	10	20.9	0	19	20.6	0
10,11	21.2	17.8	18	17.8	18.3	18.5	18.2	19.9	20.1	19.9	0	25.3	0	0	24.96	0	0	30.48	0
11,12	22.8	18.3	18.5	18.3	19	19.3	18.9	20.8	21	20.7	0	20.21	0	0	19.61	0	0	33.68	0
12,13	25	19.5	19.8	19.6	20.1	20.4	20.1	22.1	22.4	22.1	0	21.86	0	0	19.07	0	0	32.31	0
13,14	25.4	20.4	20.7	20.5	21	21.3	21	23.4	23.7	23.4	0	24.12	0	0	22.49	0	0	33.53	0
14,15	26	20.9	21.2	20.9	21.7	22	21.8	24.1	24.4	24.1	0	29.64	0	0	27.43	0	0	37.8	0
15,16	26.4	22	22.3	22	21.9	22.3	22	25	25.3	24.9	0	20	22.4	0	18	20.4	0	20	28.2
1/28																			
8,9	17.9	15.9	16.1	16	16.4	16.5	16.4	16.5	16.6	16.5	39.53	0	0	33.4	0	0	45.1	0	0
9,10	22.3	17.8	18	17.9	18.1	18.3	18.2	18.5	18.7	18.4	12	16.6	0	10	16.2	0	15	19	0
10,11	24	19.5	19.7	19.6	19.7	19.9	19.7	20.6	20.9	20.7	0	21.92	0	0	17	0	0	29.75	0
11,12	27	21	21.2	21	20.8	21	20.7	21.5	21.8	21.6	0	20.87	0	0	16.63	0	0	30.64	0
12,13	27.5	22.1	22.4	22.2	21.6	21.9	21.6	22.7	23	22.7	0	18.77	0	0	15.86	0	0	30.07	0
13,14	27	22.6	22.9	22.6	22.2	22.5	22.3	23.7	24	23.6	0	21.86	0	0	19.33	0	0	30.42	0
14,15	28.6	23.4	23.8	23.5	23	23.3	23.1	24.6	24.9	24.7	0	26.38	0	0	25.36	0	0	33.59	0
15,16	29.1	24.3	24.5	24.2	23.5	23.8	23.4	25.2	25.5	25.2	0	12	24.3	0	16	19.4	0	20	24.2
1/30																			
8,9	18	16.3	16.5	16.4	16.8	16.9	16.8	16.9	17	16.9	38	0	0	32	0	0	44	0	0
9,10	20	18.2	18.4	18.3	18.5	18.7	18.6	18.9	19.1	18.8	12	16	0	10	15.5	0	15	18	0
10,11	23.2	19.9	20.1	20	20.1	20.3	20.1	21	21.3	21.1	0	21	0	0	17	0	0	29	0
11,12	24.8	21.4	21.6	21.4	21.2	21.4	21.1	21.9	22.2	22	0	20	0	0	16	0	0	30	0
12,13	26.6	22.5	22.8	22.6	22	22.3	22	23.1	23.4	23.1	0	18	0	0	15	0	0	29.6	0
13,14	27	23	23.3	23	22.6	22.9	22.7	24.1	24.4	24	0	21	0	0	19	0	0	29.8	0
14,15	28	23.8	24.2	23.9	23.4	23.7	23.5	25	25.3	25.1	0	26	0	0	25	0	0	33	0
15,16	28.7	24.7	24.9	24.6	23.9	24.2	23.8	25.6	25.9	25.6	0	12	23	0	16	18.8	0	20	23.5
2/4																			
9,10	21.8	19	19.2	19	18.6	18.8	18.7	19.9	20.1	20	12	11.7	0	10	5.7	0	16	16	0
10,11	23	20.2	20.5	20.3	19.6	19.8	19.6	21.2	21.4	21.2	0	19	0	0	14.48	0	0	28.22	0
11,12	25.2	21.7	22	21.7	20.5	20.7	20.6	22.9	23.1	22.8	0	16.25	0	0	8.46	0	0	28.65	0
12,13	27	23.1	23.4	23.1	21.2	21.4	21.2	25.1	25.3	25	0	15.56	0	0	8.37	0	0	27.45	0
13,14	28.6	24.7	25	24.7	22.2	22.5	22.2	26.5	26.8	26.5	0	17.99	0	0	12.15	0	0	28.96	0
14,15	31	26.6	26.9	26.6	23.4	23.7	23.4	28.1	28.4	28.1	0	22.84	0	0	18.43	0	0	31.7	0
15,16	29.6	26.9	27.2	26.9	24	24.3	24.1	28.5	28.7	28.4	0	12	18.8	0	10	14.7	0	12	26

2/5		M-4			M-5			M-6			M-4			M-5			M-6		
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_{lw}	S_{lg}	S_k	S_{lw}	S_{lg}	S_k	S_{lw}	S_{lg}	S_k
8,9	19.8	18.1	18.2	18	17.8	18	17.9	18.4	18.5	18.4	34	0	0	24	0	0	35	0	0
9,10	22.5	20	20.3	20	19.2	19.5	19.2	20.1	20.4	20.2	12	11.5	0	10	5	0	15	15	0
10,11	25	21.8	22.1	21.9	21	21.3	21	22	22.3	22.1	0	18	0	0	14	0	0	27	0
11,12	27.3	23.4	23.7	23.4	22.5	22.8	22.6	23.5	23.8	23.5	0	15	0	0	8	0	0	27	0
12,13	29.6	25.1	25.4	25.1	24	24.3	24	25.3	25.6	25.3	0	14	0	0	8	0	0	25.3	0
13,14	30	27.3	27.6	27.4	25.6	25.9	25.6	27.6	27.9	27.6	0	16	0	0	11.4	0	0	26	0
14,15	31.2	28.1	28.4	28	27.1	27.4	27.1	28.5	28.8	28.5	0	21	0	0	16	0	0	30.7	0
15,16	31	28.5	28.8	28.5	27.5	27.8	27.5	29	29.3	29	0	10	16.8	0	10	12	0	15	21
2/6																			
8,9	19	17.7	17.8	17.6	17.4	17.6	17.5	18	18.1	18	32	0	0	24.67	0	0	35.6	0	0
9,10	22	19.6	19.9	19.6	18.8	19.1	18.8	19.7	20	19.8	10	11	0	10	5.7	0	12	15	0
10,11	23.6	21.4	21.7	21.5	20.6	20.9	20.6	21.6	21.9	21.7	0	17	0	0	10	0	0	27	0
11,12	25	23	23.3	23	22.1	22.4	22.2	23.1	23.4	23.1	0	15	0	0	6	0	0	26.64	0
12,13	26.6	24.7	25	24.7	23.6	23.9	23.6	24.9	25.2	24.9	0	14	0	0	5.5	0	0	26.45	0
13,14	28	26.9	27.2	27	25.2	25.5	25.2	27.2	27.5	27.2	0	16	0	0	9	0	0	27.25	0
14,15	29.6	27.7	28	27.6	26.7	27	26.7	28.1	28.4	28.1	0	21	0	0	15	0	0	30.45	0
15,16	29	28.1	28.4	28.1	27.1	27.4	27.1	28.6	28.9	28.6	0	12	16.7	0	10	14	0	18	20
2/8																			
8,9	19.2	17.7	17.8	17.7	17.4	17.5	17.4	18	18.1	18	27.87	0	0	25.96	0	0	34.45	0	0
9,10	21.4	19.6	19.8	19.7	18.8	19	18.8	19.7	20	19.8	10	9.2	0	8	5.4	0	13	14.8	0
10,11	22.4	20.7	20.9	20.7	19.6	19.9	19.6	21.6	21.9	21.7	0	15.22	0	0	6.61	0	0	26.1	0
12,13	24.6	23	23.3	23	22.6	22.9	22.6	23.9	24.2	23.9	0	12.94	0	0	2.55	0	0	25.97	0
13,14	25.5	23.9	24.2	23.9	23.2	23.5	23.2	25.2	25.5	25.2	0	15.37	0	0	5.61	0	0	26.52	0
14,15	26.4	24.7	25	24.7	24.1	24.4	24.1	26.1	26.4	26.1	0	20.17	0	0	13.73	0	0	28.55	0
15,16	25	25.1	25.4	25.1	23.2	23.5	23.2	26.6	26.9	26.6	0	13	14.6	0	12	13.5	0	16	17.6
2/18																			
8,9	25.4	21.6	21.7	21.6	21.8	22	21.9	22	22.1	21.9	23.2	0	0	15.36	0	0	31	0	0
9,10	26.3	22.3	22.5	22.4	22	22.2	22.1	22.7	22.9	22.8	8	9.9	0	4	7.5	0	12	17.2	0
10,11	27	23.3	23.5	23.3	22.9	23	22.8	24	24.2	24.1	0	13	0	0	5	0	0	26	0
11,12	28.9	24.5	24.7	24.4	23.4	23.6	23.4	25.5	25.7	25.5	0	12	0	0	3.6	0	0	24.4	0
12,13	30.7	26.5	26.8	26.5	24.1	24.3	24	27	27.2	26.9	0	12.3	0	0	3.6	0	0	25.6	0
13,14	32	28.1	28.4	28.1	24.8	25.1	24.8	28.2	28.5	28.3	0	13.8	0	0	5	0	0	26	0
14,15	33.4	29.8	30.1	29.8	26.7	27	26.7	29.7	30	29.7	0	17.8	0	0	11	0	0	27.9	0
15,16	34.5	31.1	31.3	31	28	28.3	28.1	29.4	29.7	29.5	0	12	14.7	0	5	11.6	0	13	18.7
2/20																			
8,9	23	18.7	18.8	18.6	18.4	18.5	18.4	18.9	19	18.9	22.11	0	0	15.36	0	0	29.3	0	0
9,10	24.8	19.8	20	19.9	19.2	19.3	19.2	20.6	20.7	20.6	7	8.8	0	4	6.8	0	12	15.4	0
10,11	25.4	21	21.2	21.1	20.6	20.8	20.6	21.8	22	21.8	0	12.18	0	0	3.3	0	0	24.05	0
11,12	27	22.9	23.1	22.8	21.5	21.7	21.5	23.2	23.5	23.3	0	9.37	0	0	3.05	0	0	22.86	0
12,13	30.7	24.1	24.4	24.2	22.1	22.3	22	24.7	25	24.8	0	10.38	0	0	2.1	0	0	24.44	0
13,14	31.7	25.9	26.1	25.8	23.3	23.6	23.3	27.1	27.3	27	0	12.52	0	0	2.33	0	0	34.08	0
14,15	33	27.7	28	27.7	24.9	25.2	24.9	28.5	28.8	28.5	0	16.66	0	0	9.55	0	0	26.82	0
15,16	33.5	30.2	30.5	30.3	25.8	26.1	25.8	31.2	31.5	31.2	0	10	13.6	0	4	10.7	0	12	17.7
2/22																			
8,9	19.5	18.2	18.3	18.2	17.9	18	17.9	18.5	18.6	18.5	21	0	0	14	0	0	25.6	0	0
9,10	21	20.1	20.3	20.2	19.3	19.5	19.3	20.2	20.5	20.3	5	7.2	0	3	5.7	0	11	13.2	0
10,11	22.8	21.2	21.4	21.2	20.1	20.4	20.1	22.1	22.4	22.2	0	11.6	0	0	3	0	0	22	0
11,12	24.4	22.3	22.6	22.4	21.6	21.9	21.7	22.6	22.9	22.6	0	8.2	0	0	2.9	0	0	21	0
12,13	26	23.5	23.8	23.5	23.1	23.4	23.1	24.4	24.7	24.4	0	9.5	0	0	1.8	0	0	22.1	0
13,14	27.7	24.4	24.7	24.4	23.7	24	23.7	25.7	26	25.7	0	11.1	0	0	2	0	0	23.1	0
14,15	29	25.2	25.5	25.2	24.6	24.9	24.6	26.6	26.9	26.6	0	15.4	0	0	9	0	0	25.2	0
15,16	30	25.6	25.9	25.6	23.7	24	23.7	27.1	27.4	27.1	0	9	11.6	0	3	9.6	0	11	16
2/25																			
8,9	23.8	21.6	21.8	21.7	21	21.1	21	22.4	22.5	22.4	20	0	0	12	0	0	22	0	0
9,10	25.4	22.8	23	22.9	22.4	22.6	22.4	23.6	23.8	23.6	5	5.1	0	3	3.2	0	10	12.1	0
10,11	27	24.7	24.9	24.6	23.3	23.5	23.3	25	25.3	25.1	0	11	0	0	3	0	0	20	0
11,12	28.6	25.9	26.2	26	24.9	25.1	24.8	26.5	26.8	26.6	0	8	0	0	2.4	0	0	20	0
12,13	30.7	27.7	27.9	27.6	26.1	26.4	26.1	28.9	29.1	28.8	0	9	0	0	1	0	0	20.1	0
13,14	31.5	29.5	29.8	29.5	27.7	28	27.7	30.3	30.6	30.3	0	10.7	0	0	1.2	0	0	21	0
14,15	29.9	29	29.3	29	27.1	27.4	27.1	29.5	29.8	29.5	0	15	0	0	7	0	0	22.1	0
15,16	27.8	28.1	28.4	28.1	26.3	26.6	26.3	28.6	28.9	28.6	0	8	10	0	3	8	0	10	12
2/27																			
8,9	22.8	19.9	20	19.9	19.7	19.8	19.7	20.1	20.2	20.1	18.29	0	0	9.04	0	0	25.7	0	0
9,10	25	21.2	21.3	21.2	20.3	20.5	20.4	21.5	21.6	21.4	5	7.5	0	2	3.18	0	10	14	0
10,11	28.6	23.6	23.7	23.5	21.8	22	21.7	23.9	24	23.8	0	9.4	0	0	1.79	0	0	22.13	0
11,12	32.3	25	25.2	25	22.6	22.9	22.7	25.8	26.1	25.9	0	6.36	0	0	0	0	0	19.81	0
12,13	31.3	27.1	27.4	27.1	23.8	24	23.7	28.6	28.8	28.5	0	7.24	0	0	0	0	0	20.27	0
13,14	30.4	26.8	27	26.7	23.9	24.2	23.9	29.7	30	29.7	0	9.73	0	0	2.16	0	0	21.34	0
14,15	29.1	27.3	27.6	27.3	24.2	24.5	24.2	30.2	30.5	30.2	0	13.69	0	0	6.58	0	0	24.23	0
15,16	27	26.8	27.1	26.8	23.6	23.9	23.6	28.7	29	28.7	0	8	11.5	0	3	6.42	0	12	15.7
3/1																			
8,9	22.8	21.1	21.2	21.1	20.9	21	20.9	21.3	21.4	21.3	16.2	0	0	7.8	0	0	24	0	0
9,10	24.6	22.4	22.5	22.4	21.5	21.7	21.6	22.7	22.8	22.6	4	7.5	0	2	3.18	0	8	12	0
10,11	26	24.8	24.9	24.7	23	23.2	22.9	25.1	25.2	25	0	8	0	0	1.6	0	0	20	0
11,12	27.6	26.2	26.4	26.2	24.3	24.6	24.3	27	27.3	27.1	0	5.3	0	0	0	0	0	18	0
12,13	29.3	28.3	28.6	28.3	25.9	26.2	25.9	29.8	30	29.7	0	6.2	0	0	0	0	0	19	0
13,14	31	28.9	29.3	29	27.1	27.4	27.1	30.9	31.2	30.9	0	7.7	0	0	1.9	0	0	20	0
14,15	32.3	30	30.4	30.1	28.4	28.7	28.4	31.4	31.7	31.4	0	10.7	0	0	4.5	0	0	23	0
15,16	31.2	29.4	29.8	29.4	27.8	28.1	27.8	29.9	30.2	29.9	0	8	7	0	6	2.2	0	12	12
3/4																			
8,9	25	23.9	24	23.8	24.1	24.2	24.1	24.2	24.3	24.2	15.24	0	0	5.61	0	0	22.33	0	0
10,11	29	27.4	27.6	27.4	25.9	26.1	25.8	27.9	28.1	27.9	0	7.55	0	0	0.27	0	0	16.7	0
11,12	30.9	28.9	29.2	29	27.2	27.5	27.3	30.1	30.3	30.1	0	4.09	0	0	0	0	0	16.89	0
12,13	33.3	31.3	31.6	31.2	28.7	29	28.7	32.6	32.9	32.6	0	4.43	0	0	0	0	0	16.2	0
13,14	35	33.5	33.9	33.6	30.1	30.5	30.2	34.8	35.2	34.9	0	8.89	0	0	0.3	0	0	17.91	0
14,15	36.8	35.1	35.4	35	31.1	31.4	31	36.7	37.1	36.8	0	11.97	0	0	3.32	0	0	18.58	0
15,16	37	35.4	35.9	35.5	31.5	31.9	31.6	36.2	36.5	36.1	0	11	5.3	0	6.1	0	0	13	10

3/6		M-4			M-5			M-6			M-4			M-5			M-6		
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_{lw}	S_{lg}	S_k	S_{lw}	S_{lg}	S_k	S_{lw}	S_{lg}	S_k
8,9	25	22.3	22.4	22.2	22.2	22.4	22.3	22.6	22.7	22.6	14.5	0	0	5.6	0	0	20.9	0	0
9,10	26.8	23.9	24.1	23.9	23.4	23.7	23.4	24.2	24.4	24.3	3	6.9	0	0	3	0	6	11	0
10,11	27.9	25.8	26	25.8	25.3	25.5	25.2	26.3	26.5	26.3	0	7.4	0	0	0.25	0	0	15.8	0
11,12	28.7	27.3	27.6	27.4	26.6	26.9	26.7	27.8	28.1	27.8	0	4	0	0	0	0	0	15.3	0
12,13	29.6	29.7	30	29.6	28.5	28.8	28.5	30	30.3	30	0	4.4	0	0	0	0	0	15.6	0
13,14	31.3	31.9	32.3	32	30.6	30.9	30.6	32.4	32.8	32.5	0	6.9	0	0	0.27	0	0	17.5	0
14,15	33	33.5	33.8	33.4	32.3	32.6	32.3	34.1	34.5	34.2	0	10	0	0	3.2	0	0	18.3	0
15,16	31	32.8	33.3	32.9	31.4	31.8	31.5	33.8	34.1	33.8	0	10	5	0	6	0	0	11	9
3/8																			
8,9	26.5	23.4	23.5	23.3	23.3	23.5	23.4	23.7	23.8	23.7	14.2	0	0	4.2	0	0	18.8	0	0
9,10	27.3	25	25.2	25	24.5	24.8	24.5	25.3	25.5	25.4	3	6.7	0	0	2.2	0	6	11	0
10,11	28.4	26.9	27.1	26.9	26.4	26.6	26.3	27.4	27.6	27.4	0	7.2	0	0	0.25	0	0	15.8	0
11,12	29.6	28.4	28.7	28.5	27.7	28	27.8	28.9	29.2	28.9	0	4	0	0	0	0	0	15.3	0
12,13	31	30.8	31.1	30.7	29.6	29.9	29.6	31.1	31.4	31.1	0	4.2	0	0	0	0	0	15.6	0
13,14	32.7	33	33.4	33.1	31.7	32	31.7	33.5	33.9	33.6	0	6.3	0	0	0.27	0	0	16.5	0
14,15	34.2	34.6	34.9	34.5	33.4	33.7	33.4	35.2	35.6	35.3	0	7.8	0	0	2.2	0	0	17.3	0
15,16	32	33.9	34.4	34	32.5	32.9	32.6	34.9	35.2	34.9	0	9.5	5	0	4.5	0	0	10	6
3/10																			
8,9	26	23.9	24	23.8	23.8	24	23.9	24.2	24.3	24.2	13.5	0	0	3.5	0	0	17.6	0	0
9,10	28.1	25.5	25.7	25.5	25	25.3	25	25.8	26	25.9	2	6.9	0	0	2.2	0	8	11	0
10,11	30.4	27.4	27.6	27.4	26.9	27.1	26.8	27.9	28.1	27.9	0	5.6	0	0	0	0	0	15.8	0
11,12	31.6	28.9	29.2	29	28.2	28.5	28.3	29.4	29.7	29.4	0	4	0	0	0	0	0	15.3	0
12,13	33	31.3	31.6	31.2	30.1	30.4	30.1	31.6	31.9	31.6	0	2.4	0	0	0	0	0	15.6	0
13,14	34.5	33.5	33.9	33.6	32.2	32.5	32.2	34	34.4	34.1	0	5.8	0	0	0	0	0	16.5	0
14,15	36.2	35.1	35.4	35	33.9	34.2	33.9	35.7	36.1	35.8	0	7.9	0	0	2	0	0	17.3	0
15,16	36.6	35.9	36.4	36	34.5	34.9	34.6	36.9	37.2	36.9	0	9	5	0	3.8	0	0	10	8
3/11																			
8,9	27	25.4	25.5	25.4	24.9	25	24.9	25.8	25.9	25.8	12.98	0	0	3.02	0	0	17.3	0	0
9,10	29.2	26.8	26.9	26.8	26	26.2	26.1	27.3	27.4	27.3	2	6.64	0	0	1.83	0	6	10.8	0
10,11	31	28.6	28.7	28.5	26.8	27	26.8	29.2	29.4	29.3	0	5.4	0	0	0	0	0	15.48	0
11,12	32	29.9	30.1	29.9	27.9	28.1	27.8	30.7	30.9	30.6	0	2.73	0	0	0	0	0	15.24	0
12,13	34	31.4	31.7	31.5	29.1	29.4	29.1	32.5	32.8	32.5	0	1.47	0	0	0	0	0	15.36	0
13,14	35.6	32.8	33.1	32.9	30	30.3	29.9	34	34.3	33.9	0	5	0	0	0	0	0	15.54	0
15,16	36.6	34.7	35	34.8	31.3	31.7	31.4	34.8	35.2	34.9	0	9	3.9	0	3.35	0	0	9.4	8
3/13																			
8,9	24	22.4	22.5	22.4	22.2	22.3	22.2	22.6	22.7	22.6	12.3	0	0	2	0	0	15.4	0	0
9,10	26.3	23.7	23.8	23.7	22.8	23	22.9	24	24.1	23.9	1	6.5	0	0	1.2	0	5	10.2	0
10,11	27.4	26.1	26.2	26	24.3	24.5	24.2	26.4	26.5	26.3	0	4.6	0	0	0	0	0	15.2	0
11,12	28.5	27.5	27.7	27.5	25.6	25.9	25.6	28.3	28.6	28.4	0	2.5	0	0	0	0	0	14.8	0
12,13	29.6	29.6	29.9	29.6	27.2	27.5	27.2	31.1	31.3	31	0	1.47	0	0	0	0	0	15	0
13,14	30.5	30.2	30.6	30.3	28.4	28.7	28.4	32.2	32.5	32.2	0	4.2	0	0	0	0	0	15.2	0
14,15	31.4	31.3	31.7	31.4	29.7	30	29.7	32.7	33	32.7	0	7.6	0	0	2.2	0	0	16.1	0
15,16	30.4	30.7	31.1	30.7	29.1	29.4	29.1	31.2	31.5	31.2	0	9	2	0	2.9	0	0	9.4	6
3/14																			
8,9	23.9	21.8	21.9	21.8	21.6	21.7	21.6	22	22.1	22	12.3	0	0	2	0	0	15.4	0	0
9,10	26	23.1	23.2	23.1	22.2	22.4	22.3	23.4	23.5	23.3	0	6.5	0	0	1.2	0	5	10.2	0
10,11	27.2	25.5	25.6	25.4	23.7	23.9	23.6	25.8	25.9	25.7	0	4.6	0	0	0	0	0	15.2	0
11,12	28.5	26.9	27.1	26.9	25	25.3	25	27.7	28	27.8	0	2.5	0	0	0	0	0	14.8	0
12,13	29.7	29	29.3	29	26.6	26.9	26.6	30.5	30.7	30.4	0	1.47	0	0	0	0	0	15	0
13,14	30.5	29.6	30	29.7	27.8	28.1	27.8	31.6	31.9	31.6	0	4.2	0	0	0	0	0	15.2	0
14,15	31.4	30.7	31.1	30.8	29.1	29.4	29.1	32.1	32.4	32.1	0	7.6	0	0	2.2	0	0	16.1	0
15,16	30.7	30.1	30.5	30.1	28.5	28.8	28.5	30.6	30.9	30.6	0	9	0	0	2.9	0	0	9.4	5
3/15																			
8,9	26.3	25.7	25.8	25.6	25.6	25.8	25.7	26	26.1	26	11	0	0	1.8	0	0	14.6	0	0
9,10	28.5	27.3	27.5	27.3	26.8	27.1	26.8	27.6	27.8	27.7	0	6.5	0	0	0.6	0	5	9.3	0
10,11	30.6	29.2	29.4	29.2	28.7	28.9	28.6	29.7	29.9	29.7	0	4.2	0	0	0	0	0	14.2	0
11,12	32	30.7	31	30.8	30	30.3	30.1	31.2	31.5	31.2	0	1.8	0	0	0	0	0	13.8	0
12,13	34.5	31.1	31.4	31	29.9	30.2	29.9	31.4	31.7	31.4	0	1.4	0	0	0	0	0	13.6	0
13,14	35	33.3	33.7	33.4	32	32.3	32	33.8	34.2	33.9	0	3.5	0	0	0	0	0	13.7	0
14,15	35.3	34.9	35.2	34.8	33.7	34	33.7	35.5	35.9	35.6	0	7.6	0	0	1.5	0	0	15.1	0
15,16	34	34.4	34.9	34.5	33	33.4	33.1	35.4	35.7	35.4	0	9	0	0	2.5	0	0	9.4	4
3/17																			
8,9	26	23.7	23.8	23.7	23.2	23.3	23.2	23.6	23.7	23.6	10.52	0	0	1.28	0	0	13.82	0	0
9,10	28.5	25.4	25.6	25.5	24.5	24.8	24.6	25.6	25.8	25.6	0	6.92	0	0	0	0	4	9.7	0
10,11	30.6	26.9	27.1	26.9	25.8	26	25.8	27.2	27.5	27.3	0	3.66	0	0	0	0	0	12.44	0
11,12	32.2	28.7	28.9	28.7	27.3	27.6	27.3	29.2	29.5	29.2	0	1.13	0	0	0	0	0	12.19	0
12,13	34.5	30.6	30.9	30.7	29.2	29.5	29.2	31.4	31.7	31.4	0	1.18	0	0	0	0	0	12.5	0
13,14	35.5	32.3	32.6	32.3	30.6	30.9	30.6	33.3	33.6	33.2	0	3.64	0	0	0	0	0	12.04	0
14,15	36.3	34.2	34.5	34.2	32.4	32.7	32.3	35.3	35.7	35.4	0	7.01	0	0	0	0	0	14.02	0
15,16	35	34.7	35	34.6	32.2	32.5	32.1	35.5	35.9	35.5	0	9.4	1	0	1.89	0	0	9.4	4
3/20																			
9,10	32.8	28.6	28.8	28.7	27.7	28	27.8	28.8	29	28.8	0	6.4	0	0	0	0	4	9.7	0
10,11	34	30.1	30.3	30.1	29	29.2	29	30.4	30.7	30.5	0	3.66	0	0	0	0	0	11	0
11,12	34.8	31.9	32.1	31.9	30.5	30.8	30.5	32.4	32.7	32.4	0	1.13	0	0	0	0	0	11.2	0
12,13	35.6	33.8	34.1	33.9	32.4	32.7	32.4	34.6	34.9	34.6	0	1.18	0	0	0	0	0	11.2	0
13,14	36	35.5	35.8	35.5	33.8	34.1	33.8	36.5	36.8	36.4	0	3.5	0	0	0	0	0	11.1	0
14,15	34.4	35.4	35.7	35.4	33.6	33.9	33.5	36.5	36.9	36.6	0	6	0	0	0	0	0	12	0
15,16	32	34.9	35.2	34.8	32.4	32.7	32.3	35.7	36.1	35.7	0	8.8	1	0	1.89	0	0	9.4	4
3/22																			
8,9	28.8	25.7	25.8	25.7	25.2	25.3	25.2	25.6	25.7	25.6	8.5	0	0	0	0	0	12.5	0	0
9,10	30.6	27.4	27.6	27.5	26.5	26.8	26.6	27.6	27.8	27.6	0	6	0	0	0	0	1	9.8	0
10,11	31.4	28.9	29.1	28.9	27.8	28	27.8	29.2	29.5	29.3	0	4	0	0	0	0	0	9.5	0
11,12	32.8	30.7	30.9	30.7	29.3	29.6	29.3	31.2	31.5	31.2	0	1.3	0	0	0	0	0	9.6	0
12,13	34.1	32.6	32.9	32.7	31.2	31.5	31.2	33.4	33.7	33.4	0	1.4	0	0	0	0	0	9.3	0
13,14	36	34.3	34.6	34.3	32.6	32.9	32.6	35.3	35.6	35.2	0	3.1	0	0	0	0	0	9.7	0
14,15	37	35	35.3	35	33.2	33.5	33.1	36.1	36.5	36.2	0	5.9	0	0	0	0	0	11.5	0
15,16	35.6	34.5	34.8	34.4	32	32.3	31.9	35.3	35.7	35.3	0	8.6	0	0	0	0	0	9.8	3

3/25		M-4			M-5			M-6			M-4			M-5			M-6		
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_{lw}	S_{lg}	S_{lc}	S_{lw}	S_{lg}	S_{lc}	S_{lw}	S_{lg}	S_{lc}
8,9	26.7	24.3	24.4	24.2	24.2	24.3	24.1	24.9	25	24.9	7.73	0	0	0	0	0	12.19	0	0
9,10	28	25.8	26	25.7	25.8	26	25.8	25.9	26.1	25.9	0	5.77	0	0	0	0	1	9.3	0
10,11	29.6	27	27.3	27.1	26.9	27.1	26.8	27.3	27.5	27.3	0	3.02	0	0	0	0	0	9.3	0
11,12	31	27.9	28.2	27.8	27.8	28.1	27.8	28.2	28.5	28.3	0	1.03	0	0	0	0	0	9.14	0
12,13	32.2	29.8	30.1	29.8	28.6	28.9	28.6	30	30.3	30	0	1.1	0	0	0	0	0	8.99	0
13,14	33.4	31.7	32	31.6	30.2	30.5	30.1	32.6	33	32.7	0	2.98	0	0	0	0	0	9.36	0
14,15	34.8	32.1	33.5	32.2	31.1	31.5	31.2	33.4	33.7	33.4	0	5.68	0	0	0	0	0	10.67	0
15,16	35.6	33.7	34.2	33.7	32.5	32.8	32.1	34.6	35	34.6	0	8.07	0	0	0	0	0	9.4	3
3/29																			
8,9	31	28.6	28.8	28.7	28.1	28.3	28.1	29.2	29.4	29.3	5.72	0	0	0	0	0	7.62	0	0
9,10	32.3	29.9	30.1	29.9	29.2	29.4	29.1	31	31.1	30.9	0	3.96	0	0	0	0	0	9.14	0
10,11	33.2	31.2	31.4	31.1	30	30.3	30	32.6	32.8	32.6	0	2.44	0	0	0	0	0	7.56	0
11,12	34	32.5	32.8	32.5	31.2	31.5	31.1	34.6	34.8	34.5	0	0.61	0	0	0	0	0	4.57	0
12,13	35	34.4	34.7	34.4	32.7	33	32.6	36.6	36.9	36.6	0	0.71	0	0	0	0	0	5.33	0
13,14	36.7	35.4	35.7	35.3	33.6	33.8	33.4	37.8	38.1	37.8	0	2.54	0	0	0	0	0	8.72	0
14,15	36.4	35	35.3	34.9	32.9	33.3	32.9	37.1	37.4	37	0	4.61	0	0	0	0	0	8.23	0
15,16	34	33.9	34.3	34	31.7	32.1	31.7	35.4	35.8	35.5	0	6.1	0	0	0	0	0	7.01	0
4/1																			
8,9	31.2	28.2	28.4	28.3	28.1	28.2	28.1	28.3	28.5	28.4	4	0	0	0	0	0	5.2	0	0
9,10	32.6	30	30.2	30	29.5	29.7	29.6	30.2	30.4	30.2	0	3.9	0	0	0	0	0	6.3	0
10,11	33.9	31.4	31.6	31.3	30.8	31	30.7	31.8	32	31.8	0	2.6	0	0	0	0	0	4.7	0
11,12	35	33.5	33.8	33.5	32.9	33.2	32.9	34.2	34.4	34.1	0	1.3	0	0	0	0	0	3.6	0
12,13	36.6	35.2	35.5	35.2	34.1	34.5	34.2	36	36.3	36	0	1.2	0	0	0	0	0	4	0
13,14	37.9	36.9	37.3	37	35.7	36.1	35.7	38	38.3	37.9	0	2.4	0	0	0	0	0	5	0
14,15	39	38.2	38.7	38.3	37	37.4	37	39.5	39.9	39.5	0	3.4	0	0	0	0	0	5.9	0
15,16	38.3	37.9	38.4	37.8	36.4	36.8	36.4	39.2	39.7	39.2	0	3.8	0	0	0	0	0	5.1	0
4/3																			
8,9	32.2	28.6	28.8	28.7	28.5	28.6	28.5	28.7	28.9	28.8	3.6	0	0	0	0	0	5.1	0	0
9,10	33.7	30.4	30.6	30.4	29.9	30.1	30	30.6	30.8	30.6	0	3.5	0	0	0	0	0	6.1	0
10,11	35	31.8	32	31.7	31.2	31.4	31.1	32.2	32.4	32.2	0	2.1	0	0	0	0	0	4.6	0
11,12	36	33.9	34.2	33.9	33.3	33.6	33.3	34.6	34.8	34.5	0	1	0	0	0	0	0	3.5	0
12,13	37.1	35.6	35.9	35.6	34.5	34.9	34.6	36.4	36.7	36.4	0	1	0	0	0	0	0	3.8	0
13,14	38.8	37.3	37.7	37.4	36.1	36.5	36.1	38.4	38.7	38.3	0	2.2	0	0	0	0	0	4.9	0
14,15	40	38.6	39.1	38.7	37.4	37.8	37.4	39.9	40.3	39.9	0	3.2	0	0	0	0	0	5.8	0
15,16	39.3	38.3	38.8	38.2	36.8	37.2	36.8	39.6	40.1	39.6	0	3.5	0	0	0	0	0	4.9	0
4/5																			
8,9	32	28.8	29	28.9	28.7	28.8	28.7	28.9	29.1	29	3.37	0	0	0	0	0	5.01	0	0
9,10	33.5	30.6	30.8	30.6	30.1	30.3	30.2	30.8	31	30.8	0	3	0	0	0	0	0	6.01	0
10,11	34.8	32	32.2	31.9	31.4	31.6	31.3	32.4	32.6	32.4	0	1.92	0	0	0	0	0	4.33	0
11,12	35.6	34.1	34.4	34.1	33.5	33.8	33.5	34.8	35	34.7	0	0.71	0	0	0	0	0	3.34	0
12,13	37	35.8	36.1	35.8	34.7	35.1	34.8	36.6	36.9	36.6	0	0.81	0	0	0	0	0	3.61	0
13,14	38.6	37.5	37.9	37.6	36.3	36.7	36.3	38.6	38.9	38.5	0	2.12	0	0	0	0	0	4.87	0
14,15	39.8	38.8	39.3	38.9	37.6	38	37.6	40.1	40.5	40.1	0	3.05	0	0	0	0	0	5.69	0
15,16	41.1	40.5	41	40.4	39	39.4	39	41.8	42.3	41.8	0	3.35	0	0	0	0	0	4.78	0
4/8																			
8,9	34	29.4	29.6	29.5	29.3	29.4	29.3	29.5	29.7	29.6	3.1	0	0	0	0	0	4	0	0
9,10	35.1	31.2	31.4	31.2	30.7	30.9	30.8	31.4	31.6	31.4	0	2.2	0	0	0	0	0	5.3	0
10,11	36.2	32.6	32.8	32.5	32	32.2	31.9	33	33.2	33	0	1.8	0	0	0	0	0	4.2	0
11,12	37.7	34.7	35	34.7	34.1	34.4	34.1	35.4	35.6	35.3	0	0.5	0	0	0	0	0	3.2	0
12,13	38	36.4	36.7	36.4	35.3	35.7	35.4	37.2	37.5	37.2	0	0.62	0	0	0	0	0	3.5	0
13,14	39.1	38.1	38.5	38.2	36.9	37.3	36.9	39.2	39.5	39.1	0	2	0	0	0	0	0	4.7	0
14,15	40.4	39.4	39.9	39.5	38.2	38.6	38.2	40.7	41.1	40.7	0	2.6	0	0	0	0	0	5.2	0
15,16	41.1	41.1	41.6	41	39.6	40	39.6	42.4	42.9	42.4	0	3.2	0	0	0	0	0	4.5	0
4/10																			
8,9	34.2	29.1	29.3	29.2	29	29.1	29	29.2	29.4	29.3	2.5	0	0	0	0	0	3.2	0	0
9,10	35.7	30.9	31.1	30.9	30.4	30.6	30.5	31.1	31.3	31.1	0	2.1	0	0	0	0	0	5	0
10,11	36.7	32.3	32.5	32.2	31.7	31.9	31.6	32.7	32.9	32.7	0	1.4	0	0	0	0	0	3.5	0
11,12	37.7	34.4	34.7	34.4	33.8	34.1	33.8	35.1	35.3	35	0	0.5	0	0	0	0	0	2.4	0
12,13	38.4	36.1	36.4	36.1	35	35.4	35.1	36.9	37.2	36.9	0	0.58	0	0	0	0	0	2.9	0
13,14	39.1	37.8	38.2	37.9	36.6	37	36.6	38.9	39.2	38.8	0	1.7	0	0	0	0	0	4	0
14,15	40.4	39.1	39.6	39.2	37.9	38.3	37.9	40.4	40.8	40.4	0	2.51	0	0	0	0	0	4.8	0
15,16	41	40.8	41.3	40.7	39.3	39.7	39.3	42.1	42.6	42.1	0	2.5	0	0	0	0	0	3.3	0
4/12																			
8,9	33	29.4	29.6	29.5	29.3	29.4	29.3	29.5	29.7	29.6	2.3	0	0	0	0	0	3	0	0
9,10	34.5	31.2	31.4	31.2	30.7	30.9	30.8	31.4	31.6	31.4	0	2.1	0	0	0	0	0	4.5	0
10,11	35.5	32.6	32.8	32.5	32	32.2	31.9	33	33.2	33	0	1.4	0	0	0	0	0	3.1	0
11,12	36.5	34.7	35	34.7	34.1	34.4	34.1	35.4	35.6	35.3	0	0.5	0	0	0	0	0	2	0
12,13	37.2	36.4	36.7	36.4	35.3	35.7	35.4	37.2	37.5	37.2	0	0.58	0	0	0	0	0	1.7	0
13,14	37.9	38.1	38.5	38.2	36.9	37.3	36.9	39.2	39.5	39.1	0	1.6	0	0	0	0	0	3.5	0
14,15	39.2	39.4	39.9	39.5	38.2	38.6	38.2	40.7	41.1	40.7	0	2.51	0	0	0	0	0	4.5	0
15,16	39.8	41.1	41.6	41	39.6	40	39.6	42.4	42.9	42.4	0	2.3	0	0	0	0	0	2.6	0
4/15																			
8,9	35.4	32	32.1	31.9	31.7	31.9	31.7	32.1	32.3	32.1	2.1	0	0	0	0	0	2.99	0	0
9,10	37.1	33.5	33.7	33.5	33	33.2	33	33.9	34.1	33.8	0	2.02	0	0	0	0	0	4.38	0
10,11	37.8	34.8	35.1	34.9	33.9	34.2	33.8	35.3	35.6	35.3	0	1.51	0	0	0	0	0	2.88	0
11,12	39.4	36.6	36.9	36.6	35.4	35.8	35.4	37.4	37.7	37.3	0	0.47	0	0	0	0	0	1.16	0
12,13	41.7	38.5	38.8	38.4	36.7	37.1	36.7	39.2	39.6	39.2	0	0.55	0	0	0	0	0	1.48	0
13,14	43.4	39.8	40.2	39.8	38.5	38.9	38.5	41	41.4	40.9	0	1.55	0	0	0	0	0	3.05	0
14,15	44.7	41.6	42	41.5	39.5	40	39.5	43	43.5	43	0	2.49	0	0	0	0	0	4.33	0
15,16	42.2	41.3	41.8	41.4	38.8	39.1	38.7	44	44.5	44	0	1.95	0	0	0	0	0	2.16	0
4/17																			
8,9	35.7	32.7	32.8	32.6	32.4	32.6	32.4	32.8	33	32.8	1.9	0	0	0	0	0	2.8	0	0
9,10	37.4	34.2	34.4	34.2	33.7	33.9	33.7	34.6	34.8	34.5	0	1.9	0	0	0	0	0	4.2	0
10,11	38.1	35.5	35.8	35.6	34.6	34.9	34.5	36	36.3	36	0	1.4	0	0	0	0	0	2.5	0
11,12	39.7	37.3	37.6	37.3	36.1	36.5	36.1	38.1	38.4	38	0	0.41	0	0	0	0	0	1	0
12,13	42	39.2	39.5	39.1	37.4	37.8	37.4	39.9	40.3	39.9	0	0.5	0	0	0	0	0	1.2	0
13,14	43.7	40.5	40.9	40.5	39.2	39.6	39.2	41.7	42.1	41.6	0	1.5	0	0	0	0	0	2.8	0
14,15	45	42.3	42.7	42.2	40.2	40.7	40.2	43.7	44.2	43.7	0	2.3	0	0	0	0	0	4.1	0
15,16	42.5	42	42.5	42.1	39.5	39.8	39.4	44.7	45.2	44.7	0	1.84	0	0	0	0	0	1.9	0

4/19		M-4			M-5			M-6			M-4			M-5			M-6		
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_{lw}	S_{lg}	S_{lc}	S_{lw}	S_{lg}	S_{lc}	S_{lw}	S_{lg}	S_{lc}
8,9	34.3	31.3	31.4	31.2	31	31.2	31	31.4	31.6	31.4	1.4	0	0	0	0	0	2.5	0	0
9,10	36	32.8	33	32.8	32.3	32.5	32.3	33.2	33.4	33.1	0	1.6	0	0	0	0	0	3.1	0
10,11	36.7	34.1	34.4	34.2	33.2	33.5	33.1	34.6	34.9	34.6	0	1.2	0	0	0	0	0	2.4	0
11,12	38.3	35.9	36.2	35.9	34.7	35.1	34.7	36.7	37	36.6	0	0.4	0	0	0	0	0	0.8	0
12,13	40.6	37.8	38.1	37.7	36	36.4	36	38.5	38.9	38.5	0	0.4	0	0	0	0	0	0.9	0
13,14	42.3	39.1	39.5	39.1	37.8	38.2	37.8	40.3	40.7	40.2	0	1.3	0	0	0	0	0	2.5	0
14,15	43.6	40.9	41.3	40.8	38.8	39.3	38.8	42.3	42.8	42.3	0	1.4	0	0	0	0	0	3.5	0
15,16	41.1	40.6	41.1	40.7	38.1	38.4	38	43.3	43.8	43.3	0	1.64	0	0	0	0	0	1.5	0
4/22																			
8,9	33.3	30.1	30.4	30.1	29.7	30	29.8	29.6	30	29.7	0.87	0	0	0	0	0	1.04	0	0
9,10	35	30.9	31.2	30.9	30.3	30.6	30.4	30.8	31.2	30.9	0	1.33	0	0	0	0	0	2.99	0
10,11	35.7	32.8	33.2	32.8	31.7	32	31.6	32.9	33.3	33	0	0.94	0	0	0	0	0	2.16	0
11,12	37.3	34.1	34.5	34.1	32.9	33.2	32.9	34.9	35.3	35	0	0.32	0	0	0	0	0	0.65	0
12,13	39.6	36.9	37.3	36.9	34.7	35	34.6	36.8	37.1	36.7	0	0.41	0	0	0	0	0	0.87	0
13,14	41.3	38.2	38.6	38.2	35.3	35.7	35.2	38.1	38.5	38.2	0	1.04	0	0	0	0	0	2.27	0
14,15	42.6	39.6	40	39.6	36.1	36.6	36.2	39.6	40	39.7	0	1.25	0	0	0	0	0	3.01	0
15,16	41.1	40.2	40.6	40.2	37.3	37.7	37.3	41.2	41.5	41.1	0	0.65	0	0	0	0	0	1.25	0
4/23																			
8,9	37.4	33.3	33.6	33.3	32.9	33.2	33	32.8	33.2	32.9	0.4	0	0	0	0	0	0.85	0	0
9,10	38.7	34.1	34.4	34.1	33.5	33.8	33.6	34	34.4	34.1	0	1	0	0	0	0	0	2.5	0
10,11	40	36	36.4	36	34.9	35.2	34.8	36.1	36.5	36.2	0	0.8	0	0	0	0	0	1.86	0
11,12	41.2	37.3	37.7	37.3	36.1	36.4	36.1	38.1	38.5	38.2	0	0.3	0	0	0	0	0	0.6	0
12,13	43.9	40.1	40.5	40.1	37.9	38.2	37.8	40	40.3	39.9	0	0.32	0	0	0	0	0	0.72	0
13,14	44.4	41.4	41.8	41.4	38.5	38.9	38.4	41.3	41.7	41.4	0	1.8	0	0	0	0	0	1.8	0
14,15	46	42.8	43.2	42.8	39.3	39.8	39.4	42.8	43.2	42.9	0	0.91	0	0	0	0	0	2.7	0
15,16	44	43.4	43.8	43.4	40.5	40.9	40.5	44.4	44.7	44.3	0	0.36	0	0	0	0	0	0.9	0
4/26																			
8,9	38.4	33.8	34.1	33.8	33.4	33.7	33.5	33.3	33.7	33.4	0	0	0	0	0	0	0	0	0
9,10	39.7	34.6	34.9	34.6	34	34.3	34.1	34.5	34.9	34.6	0	0.85	0	0	0	0	0	2	0
10,11	41	36.5	36.9	36.5	35.4	35.7	35.3	36.6	37	36.7	0	0.8	0	0	0	0	0	1.7	0
11,12	42.2	37.8	38.2	37.8	36.6	36.9	36.6	38.6	39	38.7	0	0.3	0	0	0	0	0	0.6	0
12,13	44.9	40.6	41	40.6	38.4	38.7	38.3	40.5	40.8	40.4	0	0.3	0	0	0	0	0	0.65	0
13,14	45.4	41.9	42.3	41.9	39	39.4	38.9	41.8	42.2	41.9	0	1.2	0	0	0	0	0	1.7	0
14,15	47	43.3	43.7	43.3	39.8	40.3	39.9	43.3	43.7	43.4	0	0.8	0	0	0	0	0	2.3	0
15,16	45	41.9	42.3	41.9	39	39.4	39	42.9	43.2	42.8	0	0	0	0	0	0	0	0	0
4/29																			
8,9	38	33.6	33.8	33.5	33.3	33.5	33.4	33.8	34	33.8	0	0	0	0	0	0	0	0	0
9,10	39.3	35.2	35.5	35.2	34.8	35	34.8	35.7	35.9	35.6	0	0.79	0	0	0	0	0	1.75	0
10,11	40.6	36.3	36.6	36.3	35.6	35.9	35.7	36.9	37.2	36.9	0	0.67	0	0	0	0	0	1.54	0
11,12	41.8	38.5	38.9	38.6	37.6	37.9	37.6	39.4	39.7	39.3	0	0.3	0	0	0	0	0	0.59	0
12,13	44.5	40.6	41	40.7	39.4	39.7	39.3	41.7	42	41.6	0	0.26	0	0	0	0	0	0.56	0
13,14	45	42.7	43.1	42.7	41.2	41.5	41.1	44	44.4	43.9	0	0.65	0	0	0	0	0	1.6	0
14,15	46.6	44.3	44.8	44.4	42.6	43	42.6	45.8	46.3	45.9	0	0.71	0	0	0	0	0	1.77	0
15,16	44.6	44.4	44.9	44.4	42.4	42.8	42.3	46	46.5	46	0	0	0	0	0	0	0	0	0
4/30																			
8,9	38.2	33.9	34.1	33.8	33.6	33.8	33.7	34.1	34.3	34.1	0	0	0	0	0	0	0	0	0
9,10	39	35.5	35.8	35.5	35.1	35.3	35.1	36	36.2	35.9	0	0.72	0	0	0	0	0	1.52	0
10,11	40.5	36.6	36.9	36.6	35.9	36.2	36	37.2	37.5	37.2	0	0.61	0	0	0	0	0	1.32	0
11,12	42	38.8	39.2	38.9	37.9	38.2	37.9	39.7	40	39.6	0	0.2	0	0	0	0	0	0.4	0
12,13	44.2	40.9	41.3	41	39.7	40	39.6	42	42.3	41.9	0	0.18	0	0	0	0	0	0.39	0
13,14	45	43	43.4	43	41.5	41.8	41.4	44.3	44.7	44.2	0	0.6	0	0	0	0	0	1	0
14,15	46.8	44.6	45.1	44.7	42.9	43.3	42.9	46.1	46.6	46.2	0	0.6	0	0	0	0	0	1	0
15,16	45	44.7	45.2	44.7	42.7	43.1	42.6	46.3	46.8	46.3	0	0	0	0	0	0	0	0	0
5/1																			
8,9	37.5	34.1	34.3	34.1	33.8	34.1	33.9	34.4	34.6	34.4	0	0	0	0	0	0	0	0	0
9,10	38.7	35.3	35.6	35.4	35	35.2	34.9	35.9	36.1	35.8	0	0.52	0	0	0	0	0	1.2	0
10,11	39.8	36.5	36.8	36.5	35.8	36.2	35.9	37.1	37.5	37.2	0	0.41	0	0	0	0	0	1.2	0
11,12	41.6	38	38.3	38.1	37.1	37.4	37	38.9	39.3	39	0	0.2	0	0	0	0	0	0.4	0
12,13	43.5	40.5	40.8	40.4	39.1	39.5	39.1	41.3	41.6	41.2	0	0.18	0	0	0	0	0	0.39	0
13,14	45.3	42.5	42.9	42.6	40.9	41.3	40.8	43.4	43.9	43.5	0	0.4	0	0	0	0	0	1	0
14,15	45.8	44	44.4	44	42	42.5	42.1	45.7	46.1	45.6	0	0.3	0	0	0	0	0	0.95	0
15,16	45.5	44.1	44.6	44.2	41.9	42.4	42	45.9	46.3	45.8	0	0	0	0	0	0	0	0	0
5/2																			
8,9	37.9	34.3	34.5	34.3	34	34.3	34.1	34.6	34.8	34.6	0	0	0	0	0	0	0	0	0
9,10	39.1	35.5	35.8	35.6	35.2	35.4	35.1	36.1	36.3	36	0	0.4	0	0	0	0	0	1	0
10,11	40.2	36.7	37	36.7	36	36.4	36.1	37.3	37.7	37.4	0	0.3	0	0	0	0	0	1.2	0
11,12	42	38.2	38.5	38.3	37.3	37.6	37.2	39.1	39.5	39.2	0	0.2	0	0	0	0	0	0.4	0
12,13	43.9	40.7	41	40.6	39.3	39.7	39.3	41.5	41.8	41.4	0	0.18	0	0	0	0	0	0.39	0
13,14	45.7	42.7	43.1	42.8	41.1	41.5	41	43.6	44.1	43.7	0	0.4	0	0	0	0	0	1	0
14,15	46.2	44.2	44.6	44.2	42.2	42.7	42.3	45.9	46.3	45.8	0	0.2	0	0	0	0	0	0.95	0
15,16	45.9	44.3	44.8	44.4	42.1	42.6	42.2	46.1	46.5	46	0	0	0	0	0	0	0	0	0
5/3																			
8,9	39	35.2	35.4	35.2	34.9	35.2	35	35.5	35.7	35.5	0	0	0	0	0	0	0	0	0
9,10	40.2	36.4	36.7	36.5	36.1	36.3	36	37	37.2	36.9	0	0.3	0	0	0	0	0	0.95	0
10,11	41.3	37.6	37.9	37.6	36.9	37.3	37	38.2	38.6	38.3	0	0.3	0	0	0	0	0	1.2	0
11,12	43.1	39.1	39.4	39.2	38.2	38.5	38.1	40	40.4	40.1	0	0.2	0	0	0	0	0	0.4	0
12,13	45	41.6	41.9	41.5	40.2	40.6	40.2	42.4	42.7	42.3	0	0.18	0	0	0	0	0	0.39	0
13,14	46.8	43.6	44	43.7	42	42.4	41.9	44.5	45	44.6	0	0.4	0	0	0	0	0	1	0
14,15	47.3	45.1	45.5	45.1	43.1	43.6	43.2	46.8	47.2	46.7	0	0.2	0	0	0	0	0	0.95	0
15,16	47	45.2	45.7	45.3	43	43.5	43.1	47	47.4	46.9	0	0	0	0	0	0	0	0	0
5/5																			
8,9	38	34.8	35	34.8	34.5	34.8	34.6	35.1	35.3	35.1	0	0	0	0	0	0	0	0	0
9,10	39.2	36	36.3	36.1	35.7	35.9	35.6	36.6	36.8	36.5	0	0.24	0	0	0	0	0	0.91	0
10,11	40.3	37.2	37.5	37.2	36.5	36.9	36.6	37.8	38.2	37.9	0	0.43	0	0	0	0	0	1.19	0
11,12	42.2	38.7	39	38.8	37.8	38.1	37.7	39.6	40	39.7	0	0.18	0	0	0	0	0	0.4	0
12,13	44	41.2	41.5	41.1	39.8	40.2	39.8	42	42.3	41.9	0	0.21	0	0	0	0	0	0.41	0
13,14	45.8	43.2	43.6	43.3	41.6	42	41.5	44.1	44.6	44.2	0	0.43	0	0	0	0	0	1.04	0
14,15	46.3	44.7	45.1	44.7	42.7	43.2	42.8	46.4	46.8	46.3	0	0.19	0	0	0	0	0	0.98	0
15,16	46	44.8	45.3	44.9	42.6	43.1	42.7	46.6	47	46.5	0	0	0	0	0	0	0	0	0

5/6		M-4			M-5			M-6			M-4			M-5			M-6		
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_{lw}	S_{lg}	S_{lc}	S_{lw}	S_{lg}	S_{lc}	S_{lw}	S_{lg}	S_{lc}
8,9	38.4	34.4	34.6	34.4	34.1	34.4	34.2	34.7	34.9	34.7	0	0	0	0	0	0	0	0	0
9,10	39.6	35.6	35.9	35.7	35.3	35.5	35.2	36.2	36.4	36.1	0	0.18	0	0	0	0	0	0.8	0
10,11	40.7	36.8	37.1	36.8	36.1	36.5	36.2	37.4	37.8	37.5	0	0.36	0	0	0	0	0	0.92	0
11,12	42.6	38.3	38.6	38.4	37.4	37.7	37.3	39.2	39.6	39.3	0	0.15	0	0	0	0	0	0.3	0
12,13	44.4	40.8	41.1	40.7	39.4	39.8	39.4	41.6	41.9	41.5	0	0.16	0	0	0	0	0	0.3	0
13,14	46.2	42.8	43.2	42.9	41.2	41.6	41.1	43.7	44.2	43.8	0	0.3	0	0	0	0	0	0.9	0
14,15	46.7	44.3	44.7	44.3	42.3	42.8	42.4	46	46.4	45.9	0	0.15	0	0	0	0	0	0.75	0
15,16	46.4	44.4	44.9	44.5	42.2	42.7	42.3	46.2	46.6	46.1	0	0	0	0	0	0	0	0	0
5/7																			
8,9	38.8	35	35.2	35	34.7	35	34.8	35.3	35.5	35.3	0	0	0	0	0	0	0	0	0
9,10	40	36.2	36.5	36.3	35.9	36.1	35.8	36.8	37	36.7	0	0.12	0	0	0	0	0	0.52	0
10,11	41.1	37.4	37.7	37.4	36.7	37.1	36.8	38	38.4	38.1	0	0.25	0	0	0	0	0	0.85	0
11,12	43	38.9	39.2	39	38	38.3	37.9	39.8	40.2	39.9	0	0.12	0	0	0	0	0	0.15	0
12,13	44.8	41.4	41.7	41.3	40	40.4	40	42.2	42.5	42.1	0	0.1	0	0	0	0	0	0.3	0
13,14	46.6	43.4	43.8	43.5	41.8	42.2	41.7	44.3	44.8	44.4	0	0.2	0	0	0	0	0	0.9	0
14,15	47.1	44.9	45.3	44.9	42.9	43.4	43	46.6	47	46.5	0	0.15	0	0	0	0	0	0.75	0
15,16	46.8	45	45.5	45.1	42.8	43.3	42.9	46.8	47.2	46.7	0	0	0	0	0	0	0	0	0
5/8																			
8,9	40	37.7	37.9	37.7	37.4	37.7	37.5	38	38.2	38	0	0	0	0	0	0	0	0	0
9,10	41.4	38.9	39.2	39	38.6	38.8	38.5	39.5	39.7	39.4	0	0.08	0	0	0	0	0	0.41	0
10,11	42.7	40.1	40.4	40.1	39.4	39.8	39.5	40.7	41.1	40.8	0	0.2	0	0	0	0	0	0.71	0
11,12	44	41.6	41.9	41.7	40.7	41	40.6	42.5	42.9	42.6	0	0.12	0	0	0	0	0	0.15	0
12,13	46.1	44.1	44.4	44	42.7	43.1	42.7	44.9	45.2	44.8	0	0.1	0	0	0	0	0	0.29	0
13,14	48.3	46.1	46.5	46.2	44.5	44.9	44.4	47	47.5	47.1	0	0.2	0	0	0	0	0	0.72	0
14,15	50.1	47.6	48	47.6	45.6	46.1	45.7	49.3	49.7	49.2	0	0.11	0	0	0	0	0	0.51	0
15,16	49	47.7	48.2	47.8	45.5	46	45.6	49.5	49.9	49.4	0	0	0	0	0	0	0	0	0
5/9																			
8,9	40	37.2	37.4	37.2	36.9	37.2	37	37.5	37.7	37.5	0	0	0	0	0	0	0	0	0
9,10	41.4	38.4	38.7	38.5	38.1	38.3	38	39	39.2	38.9	0	0.04	0	0	0	0	0	0.3	0
10,11	42.5	39.6	39.9	39.6	38.9	39.3	39	40.2	40.6	40.3	0	0.2	0	0	0	0	0	0.65	0
11,12	43.6	41.1	41.4	41.2	40.2	40.5	40.1	42	42.4	42.1	0	0.1	0	0	0	0	0	0.15	0
12,13	45	43.6	43.9	43.5	42.2	42.6	42.2	44.4	44.7	44.3	0	0.1	0	0	0	0	0	0.28	0
13,14	47.3	45.6	46	45.7	44	44.4	43.9	46.5	47	46.6	0	0.2	0	0	0	0	0	0.65	0
14,15	48.8	47.1	47.5	47.1	45.1	45.6	45.2	48.8	49.2	48.7	0	0.05	0	0	0	0	0	0.44	0
15,16	49	47.5	48	47.6	45.3	45.8	45.4	49.3	49.7	49.2	0	0	0	0	0	0	0	0	0
5/10																			
8,9	40.6	37.2	37.4	37.2	36.7	37	36.8	37.7	37.9	37.7	0	0	0	0	0	0	0	0	0
9,10	41.8	38.4	38.7	38.5	37.9	38.1	37.8	39.2	39.4	39.1	0	0	0	0	0	0	0	0.25	0
10,11	43	39.6	39.9	39.6	38.7	39.1	38.8	40.4	40.8	40.5	0	0.2	0	0	0	0	0	0.65	0
11,12	44.9	41.1	41.4	41.2	40	40.3	39.9	42.2	42.6	42.3	0	0.1	0	0	0	0	0	0.15	0
12,13	46.2	43.6	43.9	43.5	42	42.4	42	44.6	44.9	44.5	0	0.1	0	0	0	0	0	0.28	0
13,14	47.9	44.6	45	45.7	42.8	43.2	42.7	45.8	46.3	45.9	0	0.2	0	0	0	0	0	0.65	0
14,15	47.9	46.1	46.5	47.1	43.9	44.4	44	48.1	48.5	48	0	0	0	0	0	0	0	0.32	0
15,16	46	46.2	46.7	47.3	43.8	44.3	43.9	48.3	48.7	48.2	0	0	0	0	0	0	0	0	0
5/12																			
8,9	39.1	37.2	37.4	37.1	36.8	37	36.7	37.7	37.9	37.6	0	0	0	0	0	0	0	0	0
9,10	40.5	38	38.3	38	37.3	37.6	37.3	38.7	39	38.7	0	0	0	0	0	0	0	0.24	0
10,11	41.6	39.4	39.9	39.5	38.7	39	38.6	40.5	40.8	40.5	0	0.19	0	0	0	0	0	0.62	0
11,12	42.7	40.7	41.2	40.7	39.7	40.1	39.7	41.8	42.3	41.9	0	0.09	0	0	0	0	0	0.17	0
12,13	44.1	42.5	43	42.5	41.1	41.6	41.2	43.6	44	43.6	0	0.12	0	0	0	0	0	0.27	0
13,14	46.4	43.8	44.4	43.9	42.2	42.7	42.2	45.5	45.9	45.5	0	0.25	0	0	0	0	0	0.62	0
14,15	47.9	45.9	46.5	45.9	44	44.5	44	46.6	47.2	46.7	0	0	0	0	0	0	0	0.22	0
15,16	47.3	45.3	45.9	45.3	43.2	43.7	43.2	45.4	46	45.5	0	0	0	0	0	0	0	0	0
5/13																			
8,9	39.7	37.6	37.8	37.5	37.2	37.4	37.1	38.1	38.3	38	0	0	0	0	0	0	0	0	0
9,10	41.1	38.4	38.7	38.4	37.7	38	37.7	39.1	39.4	39.1	0	0	0	0	0	0	0	0.15	0
10,11	42.2	39.8	40.3	39.9	39.1	39.4	39	40.9	41.2	40.9	0	0.15	0	0	0	0	0	0.51	0
11,12	43.3	41.1	41.6	41.1	40.1	40.5	40.1	42.2	42.7	42.3	0	0.06	0	0	0	0	0	0.17	0
12,13	44.7	42.9	43.4	42.9	41.5	42	41.6	44	44.4	44	0	0.08	0	0	0	0	0	0.19	0
13,14	47	44.2	44.8	44.3	42.6	43.1	42.6	45.9	46.3	45.9	0	0.2	0	0	0	0	0	0.4	0
14,15	48.5	46.3	46.9	46.3	44.4	44.9	44.4	47	47.6	47.1	0	0	0	0	0	0	0	0.1	0
15,16	47.9	45.7	46.3	45.7	43.6	44.1	43.6	45.8	46.4	45.9	0	0	0	0	0	0	0	0	0
5/14																			
8,9	39.7	38	38.2	37.9	37.6	37.8	37.5	38.5	38.7	38.4	0	0	0	0	0	0	0	0	0
9,10	41.1	38.8	39.1	38.8	38.1	38.4	38.1	39.5	39.8	39.5	0	0	0	0	0	0	0	0.05	0
10,11	42.2	40.2	40.7	40.3	39.5	39.8	39.4	41.3	41.6	41.3	0	0.15	0	0	0	0	0	0.4	0
11,12	43.3	41.5	42	41.5	40.5	40.9	40.5	42.6	43.1	42.7	0	0.06	0	0	0	0	0	0.17	0
12,13	44.7	43.3	43.8	43.3	41.9	42.4	42	44.4	44.8	44.4	0	0.08	0	0	0	0	0	0.19	0
13,14	47	44.6	45.2	44.7	43	43.5	43	46.3	46.7	46.3	0	0.1	0	0	0	0	0	0.35	0
14,15	48.5	46.7	47.3	46.7	44.8	45.3	44.8	47.4	48	47.5	0	0	0	0	0	0	0	0.03	0
15,16	47.9	46.1	46.7	46.1	44	44.5	44	46.2	46.8	46.3	0	0	0	0	0	0	0	0	0
5/17																			
8,9	41	38.4	38.6	38.3	38	38.2	37.9	38.9	39.1	38.8	0	0	0	0	0	0	0	0	0
9,10	42.6	39.2	39.5	39.2	38.5	38.8	38.5	39.9	40.2	39.9	0	0	0	0	0	0	0	0	0
10,11	43.8	40.6	41.1	40.7	39.9	40.2	39.8	41.7	42	41.7	0	0.08	0	0	0	0	0	0.4	0
11,12	45.7	41.9	42.4	41.9	40.9	41.3	40.9	43	43.5	43.1	0	0.05	0	0	0	0	0	0.17	0
12,13	46.9	43.7	44.2	43.7	42.3	42.8	42.4	44.8	45.2	44.8	0	0.06	0	0	0	0	0	0.17	0
13,14	48.6	45	45.6	45.1	43.4	43.9	43.4	46.7	47.1	46.7	0	0.07	0	0	0	0	0	0.3	0
14,15	50.5	47.1	47.7	47.1	45.2	45.7	45.2	47.8	48.4	47.9	0	0	0	0	0	0	0	0	0
15,16	49.6	46.5	47.1	46.5	44.4	44.9	44.4	46.6	47.2	46.7	0	0	0	0	0	0	0	0	0
5/20																			
8,9	40	38	38.2	38	37.7	38	37.8	38.2	38.5	38.3	0	0	0	0	0	0	0	0	0
9,10	41.3	39	39.3	39.1	38.6	38.9	38.5	39.5	39.8	39.6	0	0	0	0	0	0	0	0	0
10,11	42.5	40.7	41	40.6	39.8	40.3	39.9	41.3	41.7	41.4	0	0.04	0	0	0	0	0	0.31	0
11,12	43.8	41.8	42.3	41.9	40.8	41.2	40.7	42.8	43.2	42.7	0	0.04	0	0	0	0	0	0.17	0
12,13	45.7	43.5	44	43.6	42.2	42.7	42.3	44.6	45.1	44.7	0	0.05	0	0	0	0	0	0.17	0
13,14	47.9	44.3	44.8	44.4	43	43.4	42.9	45.6	46.1	45.6	0	0.03	0	0	0	0	0	0.3	0
14,15	48.3	46.4	46.9	46.4	44.7	45.2	44.7	47.9	48.4	47.9	0	0	0	0	0	0	0	0	0
15,16	48	46.8	47.3	46.8	44.6	45.1	44.7	47.6	48	47.5	0	0	0	0	0	0	0	0	0

5/21		M-4			M-5			M-6			M-4			M-5			M-6		
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_{lw}	S_{lg}	S_{lc}	S_{lw}	S_{lg}	S_{lc}	S_{lw}	S_{lg}	S_{lc}
8,9	40.3	38.5	38.7	38.5	38.2	38.5	38.3	38.7	39	38.8	0	0	0	0	0	0	0	0	0
9,10	41.6	39.5	39.8	39.6	39.1	39.4	39	40	40.3	40.1	0	0	0	0	0	0	0	0	0
10,11	42.8	41.2	41.5	41.1	40.3	40.8	40.4	41.8	42.2	41.9	0	0.02	0	0	0	0	0	0.2	0
11,12	44.1	42.3	42.8	42.4	41.3	41.7	41.2	43.3	43.7	43.2	0	0.02	0	0	0	0	0	0.13	0
12,13	46	44	44.5	44.1	42.7	43.2	42.8	45.1	45.6	45.2	0	0.02	0	0	0	0	0	0.13	0
13,14	48.2	44.8	45.3	44.9	43.5	43.9	43.4	46.1	46.6	46.1	0	0.02	0	0	0	0	0	0.2	0
14,15	48.6	45.9	46.4	45.9	44.2	44.7	44.2	47.4	47.9	47.4	0	0	0	0	0	0	0	0	0
15,16	49.3	47.2	47.7	47.2	45	45.5	45.1	48	48.4	47.9	0	0	0	0	0	0	0	0	0
5/22																			
8,9	39.7	35.1	35.3	35.1	34.8	35	34.9	35.3	35.5	35.3	0	0	0	0	0	0	0	0	0
9,10	41	35.9	36.1	35.8	35.5	35.7	35.5	36.1	36.4	36.1	0	0	0	0	0	0	0	0	0
10,11	42.2	36.8	37.1	36.8	36.3	36.6	36.3	37.9	38.2	37.9	0	0	0	0	0	0	0	0.1	0
11,12	43.5	38	38.3	37.9	37.3	37.6	37.3	39.1	39.5	39.2	0	0.01	0	0	0	0	0	0.1	0
12,13	45.4	40.1	40.5	40.2	38.6	39	38.7	40.9	41.3	41	0	0.01	0	0	0	0	0	0.09	0
13,14	47.6	42.3	42.6	42.3	40.2	40.5	40.1	42.8	43.1	42.7	0	0	0	0	0	0	0	0.09	0
14,15	48	43	43.3	43	41.7	42.1	41.7	43.6	44	43.6	0	0	0	0	0	0	0	0	0
15,16	47.7	42.7	43	42.6	41.3	41.8	41.4	43.1	43.5	43.1	0	0	0	0	0	0	0	0	0
6/9																			
8,9	36.6	33.3	33.5	33.3	33.6	33.8	33.6	33.2	33.6	33.3	0	0	0	0	0	0	0	0	0
9,10	37.7	34.2	34.4	34.2	34.3	34.5	34.3	34.1	34.5	34.2	0	0	0	0	0	0	0	0	0
10,11	39.2	36.1	36.3	36	36.5	36.8	36.5	36.4	36.7	36.3	0	0	0	0	0	0	0	0.02	0
11,12	40.5	37.7	38	37.7	37.6	37.9	37.5	37.6	38	37.7	0	0	0	0	0	0	0	0.02	0
12,13	42.2	39.3	39.6	39.3	38.7	39.2	38.7	38.7	39.1	38.6	0	0	0	0	0	0	0	0	0
13,14	43.5	40.7	41	40.6	40	40.5	40.1	40.4	40.9	40.5	0	0	0	0	0	0	0	0	0
14,15	45	42.2	42.6	42.3	41.5	42	41.6	41.9	42.4	42	0	0	0	0	0	0	0	0	0
15,16	45.5	42.5	43	42.4	42.3	42.8	42.4	42.6	43	42.5	0	0	0	0	0	0	0	0	0
6/11																			
8,9	37.4	33.6	33.8	33.6	33.9	34.1	33.9	33.5	33.9	33.6	0	0	0	0	0	0	0	0	0
9,10	38.3	34.5	34.7	34.5	34.6	34.8	34.6	34.4	34.8	34.5	0	0	0	0	0	0	0	0	0
10,11	39.6	36.4	36.6	36.3	36.8	37.1	36.8	36.7	37	36.6	0	0	0	0	0	0	0	0.02	0
11,12	40.6	38	38.3	38	37.9	38.2	37.8	37.9	38.3	38	0	0	0	0	0	0	0	0.02	0
12,13	41.6	39.6	39.9	39.6	39	39.5	39	39	39.4	38.9	0	0	0	0	0	0	0	0	0
13,14	42.9	40.6	40.9	40.5	39.9	40.4	40	40.3	40.8	40.4	0	0	0	0	0	0	0	0	0
14,15	44.2	42.1	42.5	42.2	41.4	41.9	41.5	41.8	42.3	41.9	0	0	0	0	0	0	0	0	0
15,16	43.6	42.4	42.9	42.3	42.2	42.7	42.3	42.5	42.9	42.4	0	0	0	0	0	0	0	0	0
6/12																			
8,9	36.7	33.1	33.3	33.1	33.4	33.6	33.4	33	33.4	33.1	0	0	0	0	0	0	0	0	0
9,10	37.6	34	34.2	34	34.1	34.3	34.1	33.9	34.3	34	0	0	0	0	0	0	0	0	0
10,11	38.9	35.9	36.1	35.8	36.3	36.6	36.3	36.2	36.5	36.1	0	0	0	0	0	0	0	0	0
11,12	39.9	37.5	37.8	37.5	37.4	37.7	37.3	37.4	37.8	37.5	0	0	0	0	0	0	0	0	0
12,13	40.9	39.1	39.4	39.1	38.5	39	38.5	38.5	38.9	38.4	0	0	0	0	0	0	0	0	0
13,14	42.2	40.1	40.4	40	39.4	39.9	39.5	39.8	40.3	39.9	0	0	0	0	0	0	0	0	0
14,15	43.5	41.6	42	41.7	40.9	41.4	41	41.3	41.8	41.4	0	0	0	0	0	0	0	0	0
15,16	42.9	41.9	42.4	41.8	41.7	42.2	41.8	42	42.4	41.9	0	0	0	0	0	0	0	0	0
6/13																			
8,9	36.4	32.5	32.7	32.5	32.8	33	32.8	32.4	32.8	32.5	0	0	0	0	0	0	0	0	0
9,10	37.3	33.4	33.6	33.4	33.5	33.7	33.5	33.3	33.7	33.4	0	0	0	0	0	0	0	0	0
10,11	38.6	35.3	35.5	35.2	35.7	36	35.7	35.6	35.9	35.5	0	0	0	0	0	0	0	0	0
11,12	39.6	36.9	37.2	36.9	36.8	37.1	36.7	36.8	37.2	36.9	0	0	0	0	0	0	0	0	0
12,13	40.6	38.5	38.8	38.5	37.9	38.4	37.9	37.9	38.3	37.8	0	0	0	0	0	0	0	0	0
13,14	41.9	39.5	39.8	39.4	38.8	39.3	38.9	39.2	39.7	39.3	0	0	0	0	0	0	0	0	0
14,15	43.2	41	41.4	41.1	40.3	40.8	40.4	40.7	41.2	40.8	0	0	0	0	0	0	0	0	0
15,16	42.6	41.3	41.8	41.2	41.1	41.6	41.2	41.4	41.8	41.3	0	0	0	0	0	0	0	0	0
6/15																			
8,9	37.5	33.3	33.5	33.3	33.6	33.8	33.6	33.2	33.6	33.3	0	0	0	0	0	0	0	0	0
9,10	38.4	34.2	34.4	34.2	34.3	34.5	34.3	34.1	34.5	34.2	0	0	0	0	0	0	0	0	0
10,11	39.7	36.1	36.3	36	36.5	36.8	36.5	36.4	36.7	36.3	0	0	0	0	0	0	0	0	0
11,12	40.7	37.7	38	37.7	37.6	37.9	37.5	37.6	38	37.7	0	0	0	0	0	0	0	0	0
12,13	41.7	39.3	39.6	39.3	38.7	39.2	38.7	38.7	39.1	38.6	0	0	0	0	0	0	0	0	0
13,14	43	40.3	40.6	40.2	39.6	40.1	39.7	40	40.5	40.1	0	0	0	0	0	0	0	0	0
14,15	44.3	41.8	42.2	41.9	41.1	41.6	41.2	41.5	42	41.6	0	0	0	0	0	0	0	0	0
15,16	43.7	42.1	42.6	42	41.9	42.4	42	42.2	42.6	42.1	0	0	0	0	0	0	0	0	0
6/16																			
8,9	38.5	33.7	33.9	33.7	34	34.2	34	33.6	34	33.7	0	0	0	0	0	0	0	0	0
9,10	39.4	34.6	34.8	34.6	34.7	34.9	34.7	34.5	34.9	34.6	0	0	0	0	0	0	0	0	0
10,11	40.7	36.5	36.7	36.4	36.9	37.2	36.9	36.8	37.1	36.7	0	0	0	0	0	0	0	0	0
11,12	41.7	38.1	38.4	38.1	38	38.3	37.9	38	38.4	38.1	0	0	0	0	0	0	0	0	0
12,13	42.7	39.7	40	39.7	39.1	39.6	39.1	39.1	39.5	39	0	0	0	0	0	0	0	0	0
13,14	44	40.7	41	40.6	40	40.5	40.1	40.4	40.9	40.5	0	0	0	0	0	0	0	0	0
14,15	45.3	42.2	42.6	42.3	41.5	42	41.6	41.9	42.4	42	0	0	0	0	0	0	0	0	0
15,16	44.7	42.5	43	42.4	42.3	42.8	42.4	42.6	43	42.5	0	0	0	0	0	0	0	0	0
6/17																			
8,9	39.6	34.9	35.1	34.9	35.2	35.4	35.2	34.8	35.2	34.9	0	0	0	0	0	0	0	0	0
9,10	40.9	35.8	36	35.8	35.9	36.1	35.9	35.7	36.1	35.8	0	0	0	0	0	0	0	0	0
10,11	42.1	37.7	37.9	37.6	38.1	38.4	38.1	38	38.3	37.9	0	0	0	0	0	0	0	0	0
11,12	43.4	39.3	39.6	39.3	39.2	39.5	39.1	39.2	39.6	39.3	0	0	0	0	0	0	0	0	0
12,13	45.3	40.9	41.2	40.9	40.3	40.8	40.3	40.3	40.7	40.2	0	0	0	0	0	0	0	0	0
13,14	47.5	41.9	42.2	41.8	41.2	41.7	41.3	41.6	42.1	41.7	0	0	0	0	0	0	0	0	0
14,15	47.9	43.4	43.8	43.5	42.7	43.2	42.8	43.1	43.6	43.2	0	0	0	0	0	0	0	0	0
15,16	47.6	43.7	44.2	43.6	43.5	44	43.6	43.8	44.2	43.7	0	0	0	0	0	0	0	0	0
6/20																			
8,9	35	32.5	32.7	32.5	32.8	33	32.8	32.4	32.8	32.5	0	0	0	0	0	0	0	0	0
9,10	36.4	33.4	33.6	33.4	33.5	33.7	33.5	33.3	33.7	33.4	0	0	0	0	0	0	0	0	0
10,11	38.2	35.3	35.5	35.2	35.7	36	35.7	35.6	35.9	35.5	0	0	0	0	0	0	0	0	0
11,12	40	36.9	37.2	36.9	36.8	37.1	36.7	36.8	37.2	36.9	0	0	0	0	0	0	0	0	0
12,13	41.6	38.5	38.8	38.5	37.9	38.4	37.9	37.9	38.3	37.8	0	0	0	0	0	0	0	0	0
13,14	43	39.5	39.8	39.4	38.8	39.3	38.9	39.2	39.7	39.3	0	0	0	0	0	0	0	0	0
14,15	44.7	41	41.4	41.1	40.3	40.8	40.4	40.7	41.2	40.8	0	0	0	0	0	0	0	0	0
15,16	43.5	41.3	41.8	41.2	41.1	41.6	41.2	41.4	41.8	41.3	0	0	0	0	0	0	0	0	0

6/21		M-4			M-5			M-6			M-4			M-5			M-6		
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_{lw}	S_{lg}	S_{lc}	S_{lw}	S_{lg}	S_{lc}	S_{lw}	S_{lg}	S_{lc}
8,9	34.4	31.8	32	31.8	32.1	32.3	32.1	31.7	32.1	31.8	0	0	0	0	0	0	0	0	0
9,10	35.8	32.7	32.9	32.7	32.8	33	32.8	32.6	33	32.7	0	0	0	0	0	0	0	0	0
10,11	37.6	34.6	34.8	34.5	35	35.3	35	34.9	35.2	34.8	0	0	0	0	0	0	0	0	0
11,12	39.4	36.2	36.5	36.2	36.1	36.4	36	36.1	36.5	36.2	0	0	0	0	0	0	0	0	0
12,13	41	37.8	38.1	37.8	37.2	37.7	37.2	37.2	37.6	37.1	0	0	0	0	0	0	0	0	0
13,14	42.4	38.8	39.1	38.7	38.1	38.6	38.2	38.5	39	38.6	0	0	0	0	0	0	0	0	0
14,15	44.1	40.3	40.7	40.4	39.6	40.1	39.7	40	40.5	40.1	0	0	0	0	0	0	0	0	0
15,16	42.9	40.6	41.1	40.5	40.4	40.9	40.5	40.7	41.1	40.6	0	0	0	0	0	0	0	0	0
7/1																			
8,9	34	31.2	31.4	31.2	31.5	31.7	31.5	31.1	31.5	31.2	0	0	0	0	0	0	0	0	0
9,10	35.3	32.1	32.3	32.1	32.2	32.4	32.2	32	32.4	32.1	0	0	0	0	0	0	0	0	0
10,11	36.5	34	34.2	33.9	34.4	34.7	34.4	34.3	34.6	34.2	0	0	0	0	0	0	0	0	0
11,12	37.8	35.6	35.9	35.6	35.5	35.8	35.4	35.5	35.9	35.6	0	0	0	0	0	0	0	0	0
12,13	39.7	37.2	37.5	37.2	36.6	37.1	36.6	36.6	37	36.5	0	0	0	0	0	0	0	0	0
13,14	41.9	38.2	38.5	38.1	37.5	38	37.6	37.9	38.4	38	0	0	0	0	0	0	0	0	0
14,15	42.3	39.7	40.1	39.8	39	39.5	39.1	39.4	39.9	39.5	0	0	0	0	0	0	0	0	0
15,16	42	40	40.5	39.9	39.8	40.3	39.9	40.1	40.5	40	0	0	0	0	0	0	0	0	0
7/3																			
8,9	33.3	29.8	30	29.8	30.1	30.3	30.1	29.7	30.1	29.8	0	0	0	0	0	0	0	0	0
9,10	34.6	30.7	30.9	30.7	30.8	31	30.8	30.6	31	30.7	0	0	0	0	0	0	0	0	0
10,11	35.8	32.6	32.8	32.5	33	33.3	33	32.9	33.2	32.8	0	0	0	0	0	0	0	0	0
11,12	37.1	34.2	34.5	34.2	34.1	34.4	34	34.1	34.5	34.2	0	0	0	0	0	0	0	0	0
12,13	39	35.8	36.1	35.8	35.2	35.7	35.2	35.2	35.6	35.1	0	0	0	0	0	0	0	0	0
13,14	41.2	36.8	37.1	36.7	36.1	36.6	36.2	36.5	37	36.6	0	0	0	0	0	0	0	0	0
14,15	41.6	38.3	38.7	38.4	37.6	38.1	37.7	38	-38.5	38.1	0	0	0	0	0	0	0	0	0
15,16	41.3	38.6	39.1	38.5	38.4	38.9	38.5	38.7	39.1	38.6	0	0	0	0	0	0	0	0	0
7/4																			
8,9	35.7	31.9	32.1	31.9	32.2	32.4	32.2	31.8	32.2	31.9	0	0	0	0	0	0	0	0	0
9,10	37	32.8	33	32.8	32.9	33.1	32.9	32.7	33.1	32.8	0	0	0	0	0	0	0	0	0
10,11	38.2	34.7	34.9	34.6	35.1	35.4	35.1	35	35.3	34.9	0	0	0	0	0	0	0	0	0
11,12	39.5	36.3	36.6	36.3	36.2	36.5	36.1	36.2	36.6	36.3	0	0	0	0	0	0	0	0	0
12,13	41.4	37.9	38.2	37.9	37.3	37.8	37.3	37.3	37.7	37.2	0	0	0	0	0	0	0	0	0
13,14	43.6	38.9	39.2	38.8	38.2	38.7	38.3	38.6	39.1	38.7	0	0	0	0	0	0	0	0	0
14,15	44	40.4	40.8	40.5	39.7	40.2	39.8	40.1	40.6	40.2	0	0	0	0	0	0	0	0	0
15,16	43.7	40.7	41.2	40.6	40.5	41	40.6	40.8	41.2	40.7	0	0	0	0	0	0	0	0	0
7/6																			
8,9	32	29.6	29.8	29.6	29.9	30.1	29.9	29.5	29.9	29.6	0	0	0	0	0	0	0	0	0
9,10	33.6	30.5	30.7	30.5	30.6	30.8	30.6	30.4	30.8	30.5	0	0	0	0	0	0	0	0	0
10,11	34.9	32.4	32.6	32.3	32.8	33.1	32.8	32.7	33	32.6	0	0	0	0	0	0	0	0	0
11,12	35.5	34	34.3	34	33.9	34.2	33.8	33.9	34.3	34	0	0	0	0	0	0	0	0	0
12,13	36.9	35.6	35.9	35.6	35	35.5	35	35	35.4	34.9	0	0	0	0	0	0	0	0	0
13,14	38.4	36.6	36.9	36.5	35.9	36.4	36	36.3	36.8	36.4	0	0	0	0	0	0	0	0	0
14,15	39.2	38.1	38.5	38.2	37.4	37.9	37.5	37.8	38.3	37.9	0	0	0	0	0	0	0	0	0
15,16	39	38.4	38.9	38.3	38.2	38.7	38.3	38.5	38.9	38.4	0	0	0	0	0	0	0	0	0
7/7																			
8,9	30.7	25.7	25.8	25.7	25.4	25.5	25.4	25.9	26	25.9	0	0	0	0	0	0	0	0	0
9,10	32.3	26.4	26.6	26.5	25.9	26.2	26	26.7	26.8	26.6	0	0	0	0	0	0	0	0	0
10,11	33.6	27.9	28.1	28	27.1	27.4	27.1	28.2	28.4	28.2	0	0	0	0	0	0	0	0	0
11,12	34.2	29.3	29.5	29.3	28.6	28.9	28.6	29.7	30	29.7	0	0	0	0	0	0	0	0	0
12,13	35.6	30.7	31	30.8	30.2	30.5	30.2	31.2	31.6	31.3	0	0	0	0	0	0	0	0	0
13,14	37.1	31.9	32.2	31.9	31.5	31.8	31.4	32.4	32.7	32.4	0	0	0	0	0	0	0	0	0
14,15	37.9	33.2	33.5	33.2	31.8	32.2	31.9	33.1	33.5	33.2	0	0	0	0	0	0	0	0	0
15,16	37.7	33.6	34	33.7	32.6	33	32.6	33.2	33.5	33.1	0	0	0	0	0	0	0	0	0
7/8																			
8,9	32	28	28.1	28	27.7	27.8	27.7	28.2	28.3	28.2	0	0	0	0	0	0	0	0	0
9,10	33.6	28.7	28.9	28.8	28.2	28.5	28.3	29	29.1	28.9	0	0	0	0	0	0	0	0	0
10,11	34.9	30.2	30.4	30.3	29.4	29.7	29.4	30.5	30.7	30.5	0	0	0	0	0	0	0	0	0
11,12	35.5	31.6	31.8	31.6	30.9	31.2	30.9	32	32.3	32	0	0	0	0	0	0	0	0	0
12,13	36.9	33	33.3	33.1	32.5	32.8	32.5	33.5	33.9	33.6	0	0	0	0	0	0	0	0	0
13,14	38.4	34.2	34.5	34.2	33.8	34.1	33.7	34.7	35	34.7	0	0	0	0	0	0	0	0	0
14,15	39.2	35.5	35.8	35.5	34.1	34.5	34.2	35.4	35.8	35.5	0	0	0	0	0	0	0	0	0
15,16	39	35.9	36.3	36	34.9	35.3	34.9	35.5	35.8	35.4	0	0	0	0	0	0	0	0	0
7/14																			
8,9	32.3	27.1	27.2	27.1	26.8	26.9	26.8	27.3	27.4	27.3	0	0	0	0	0	0	0	0	0
9,10	32.7	27.8	28	27.9	27.3	27.6	27.4	28.1	28.2	28	0	0	0	0	0	0	0	0	0
10,11	34.2	29.3	29.5	29.4	28.5	28.8	28.5	29.6	29.8	29.6	0	0	0	0	0	0	0	0	0
11,12	35.3	30.7	30.9	30.7	30	30.3	30	31.1	31.4	31.1	0	0	0	0	0	0	0	0	0
12,13	36.5	32.1	32.4	32.2	31.6	31.9	31.6	32.6	33	32.7	0	0	0	0	0	0	0	0	0
13,14	41.1	33.3	33.6	33.3	32.9	33.2	32.8	33.8	34.1	33.8	0	0	0	0	0	0	0	0	0
14,15	41.9	34.6	34.9	34.6	33.2	33.6	33.3	34.5	34.9	34.6	0	0	0	0	0	0	0	0	0
15,16	40.7	35	35.4	35.1	34	34.4	34	34.6	34.9	34.5	0	0	0	0	0	0	0	0	0
7/15																			
8,9	30	27.5	27.7	27.5	27.4	27.5	27.3	27.7	27.9	27.7	0	0	0	0	0	0	0	0	0
9,10	31.3	28.6	28.8	28.6	28.2	28.4	28.2	29	29.2	29	0	0	0	0	0	0	0	0	0
10,11	32.9	30	30.3	30.1	29.6	29.9	29.7	30.7	30.9	30.7	0	0	0	0	0	0	0	0	0
11,12	34.3	31.3	31.5	31.2	30.7	31	30.8	30.7	31	30.7	0	0	0	0	0	0	0	0	0
12,13	36	32.5	32.8	32.4	32	32.3	32	32.3	32.5	32.2	0	0	0	0	0	0	0	0	0
13,14	37.2	33.2	33.5	33.1	32.7	33	32.6	33.2	33.5	33.2	0	0	0	0	0	0	0	0	0
14,15	38	33.8	34.2	33.8	33.2	33.5	33.1	34.1	34.5	34.1	0	0	0	0	0	0	0	0	0
15,16	38.3	34.2	34.6	34.2	33.3	33.7	33.2	34.2	34.5	34.2	0	0	0	0	0	0	0	0	0
7/16																			
8,9	30.9	27.8	28	27.8	25.8	27.9	27.8	28	28.1	27.9	0	0	0	0	0	0	0	0	0
9,10	31.3	29	29.2	28.9	28.6	28.8	28.6	29.2	29.5	29.2	0	0	0	0	0	0	0	0	0
10,11	32.8	30.4	30.7	30.5	30.1	30.3	30	30.3	30.7	30.4	0	0	0	0	0	0	0	0	0
11,12	33.9	31.6	31.9	31.6	31	31.4	31.1	31.4	31.6	31.3	0	0	0	0	0	0	0	0	0
12,13	35.1	32.8	33.2	32.9	32.3	32.7	32.3	32.5	32.9	32.6	0	0	0	0	0	0	0	0	0
13,14	39.7	33.4	33.9	33.5	33	33.4	33	33.5	33.9	33.5	0	0	0	0	0	0	0	0	0
14,15	40.5	34.1	34.6	34.2	33.5	33.9	33.5	34.5	34.8	34.4	0	0	0	0	0	0	0	0	0
15,16	39.3	34.5	35	34.6	33.6	34.1	33.7	34.4	34.9	34.5	0	0	0	0	0	0	0	0	0

7/24		M-4			M-5			M-6			M-4			M-5			M-6		
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_{lw}	S_{lg}	S_{k}	S_{lw}	S_{lg}	S_{k}	S_{lw}	S_{lg}	S_{k}
8,9	31.3	28.2	28.3	28.2	28.3	28.5	28.4	28.2	28.3	28.2	0	0	0	0	0	0	0	0	0
9,10	32.9	29	29.2	29	29.2	29.3	29.2	28.9	29.1	28.9	0	0	0	0	0	0	0	0.07	0
10,11	34.8	30.1	30.4	30.2	30.3	30.4	30.2	30.1	30.3	30	0	0.11	0	0	0	0	0	0.43	0
11,12	36.1	31.9	32.1	31.9	31.6	31.8	31.5	31.8	32	31.7	0	0.06	0	0	0	0	0	0.19	0
12,13	37.3	32.7	33	32.7	32.4	32.7	32.4	32.9	33.2	32.9	0	0.08	0	0	0	0	0	0.23	0
13,14	38.6	33.9	34.2	33.9	33.5	33.9	33.4	34	34.4	34.1	0	0.09	0	0	0	0	0	0.44	0
14,15	39.1	34.7	35.1	34.8	34.2	34.6	34.2	35	35.3	34.9	0	0	0	0	0	0	0	0	0
15,16	38.8	35.6	35.9	35.5	34.9	35.3	34.8	34.8	35.2	34.8	0	0	0	0	0	0	0	0	0
7/28																			
8,9	30.5	27.6	27.7	27.6	27.7	27.9	27.8	27.6	27.7	27.6	0	0	0	0	0	0	0	0	0
9,10	32.3	28.4	28.6	28.4	28.6	28.7	28.6	28.3	28.5	28.3	0	0	0	0	0	0	0.14	0	0
10,11	34.2	29.5	29.8	29.6	29.7	29.8	29.6	29.5	29.7	29.4	0	0.16	0	0	0	0	0	0.8	0
11,12	35.5	31.3	31.5	31.3	31	31.2	30.9	31.2	31.4	31.1	0	0.1	0	0	0	0	0	0.33	0
12,13	36.5	32.1	32.4	32.1	31.8	32.1	31.8	32.3	32.6	32.3	0	0.14	0	0	0	0	0	0.43	0
13,14	37.8	33.3	33.6	33.3	32.9	33.3	32.8	33.4	33.8	33.5	0	0.18	0	0	0	0	0	0.6	0
14,15	38.7	34.1	34.5	34.2	33.6	34	33.6	34.4	34.7	34.3	0	0	0	0	0	0	0	0	0
15,16	38.3	35	35.3	34.9	34.3	34.7	34.2	34.2	34.6	34.2	0	0	0	0	0	0	0	0	0
8/1																			
8,9	29	24	24.1	24	23.8	23.9	23.8	23.4	23.5	23.4	0	0	0	0	0	0	0	0	0
9,10	30.5	25.2	25.3	25.2	25	25.1	24.9	24.7	24.9	24.7	0	0	0	0	0	0	0	0.07	0
10,11	31.8	26.8	27	26.8	26.2	26.4	26.2	26.5	26.7	26.4	0	0.1	0	0	0	0	0	0.44	0
11,12	33.5	28.7	28.9	28.6	27.8	28	27.7	27.8	28.1	27.8	0	0.06	0	0	0	0	0	0.19	0
12,13	34.8	30.4	30.7	30.4	29.3	29.6	29.3	29.6	29.9	29.5	0	0.07	0	0	0	0	0	0.25	0
13,14	35.5	31.9	32.2	31.8	30.6	30.9	30.6	31.7	32	31.6	0	0.09	0	0	0	0	0	0.43	0
14,15	34.6	33.5	33.8	33.5	31.4	31.8	31.5	33.6	33.9	33.5	0	0	0	0	0	0	0	0	0
15,16	33.6	34	34.3	33.9	32.6	33	32.7	34.1	34.4	34	0	0	0	0	0	0	0	0	0
8/3																			
8,9	28	26.2	26.3	26.2	26	26.1	26	25.6	25.7	25.6	0	0	0	0	0	0	0	0	0
9,10	29.4	27.4	27.5	27.4	27.2	27.3	27.1	26.9	27.1	26.9	0	0	0	0	0	0	0	1.1	0
10,11	30.6	29	29.2	29	28.4	28.6	28.4	28.7	28.9	28.6	0	0.5	0	0	0	0	0	0.75	0
11,12	32	30.9	31.1	30.8	30	30.2	29.9	30	30.3	30	0	0.22	0	0	0	0	0	0.45	0
12,13	33.9	32.6	32.9	32.6	31.5	31.8	31.5	31.8	32.1	31.7	0	0.35	0	0	0	0	0	0.7	0
13,14	35.3	34.1	34.4	34	32.8	33.1	32.8	33.9	34.2	33.8	0	0.6	0	0	0	0	0	0.62	0
14,15	37.2	35.7	36	35.7	33.6	34	33.7	35.8	36.1	35.7	0	0	0	0	0	0	0	0.54	0
15,16	38	37.1	37.4	37	35.7	36.1	35.8	37.2	37.5	37.1	0	0	0	0	0	0	0	0	0
8/8																			
8,9	29.8	27	27.1	27	26.8	26.9	26.8	26.4	26.5	26.4	0	0	0	0	0	0	0	0	0
9,10	31.2	28.2	28.3	28.2	28	28.1	27.9	27.7	27.9	27.7	0.1	0.2	0	0	0	0	0.3	1.1	0
10,11	32.4	29.8	30	29.8	29.2	29.4	29.2	29.5	29.7	29.4	0	0.33	0	0	0	0	0	0.87	0
11,12	33.8	31.7	31.9	31.6	30.8	31	30.7	30.8	31.1	30.8	0	0.28	0	0	0	0	0	0.45	0
12,13	35.7	33.4	33.7	33.4	32.3	32.6	32.3	32.6	32.9	32.5	0	0.3	0	0	0	0	0	0.61	0
13,14	37.1	34.9	35.2	34.8	33.6	33.9	33.6	34.7	35	34.6	0	0.55	0	0	0	0	0	0.8	0
14,15	39	36.5	36.8	36.5	34.4	34.8	34.5	36.6	36.9	36.5	0	0.31	0	0	0	0	0	0.8	0
15,16	39.8	37.9	38.2	37.8	36.5	36.9	36.6	38	38.3	37.9	0	0	0	0	0	0	0	0	0
8/11																			
8,9	31.1	28.7	28.8	28.6	28.7	28.9	28.7	28.8	29	28.8	0	0	0	0	0	0	0	0	0
9,10	32.5	29.8	30	29.8	29.8	30.1	29.9	30	30.3	30.1	0.2	0.31	0	0	0	0	0.33	1.1	0
10,11	33.7	31.2	31.4	31.2	31.4	31.6	31.3	31.3	31.6	31.3	0	0.53	0	0	0	0	0	1.3	0
11,12	35.1	32.3	32.6	32.3	32.5	32.8	32.5	32.8	33.1	32.8	0	0.17	0	0	0	0	0	0.45	0
12,13	37	34	34.3	34	33.7	34.1	33.8	34.3	34.6	34.2	0	0.25	0	0	0	0	0	0.61	0
13,14	38.4	35.3	35.6	35.3	35	35.4	35.1	35.6	36	35.7	0	0.55	0	0	0	0	0	1.41	0
14,15	40.3	36.5	36.9	36.6	36.2	36.6	36.1	37.2	37.6	37.2	0	0.49	0	0	0	0	0	1.3	0
15,16	41.1	38.2	38.6	38.1	37.9	38.3	37.8	38.5	38.8	38.4	0	0	0	0	0	0	0	0	0

2002 12/27		M-7			M-8			M-9			M-10			M-11			M-7			M-8			M-9			M-10			M-11		
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_{lw}	S_{lg}	S_{le}	S_{lw}	S_{lg}	S_{le}	S_{lw}	S_{lg}	S_{le}	S_{lw}	S_{lg}	S_{le}	S_{lw}	S_{lg}	S_{le}
8,9	14.1	9.5	9.6	9.6	9.5	9.5	9.5	9.5	9.6	9.5	9.5	9.5	9.5	9.4	9.6	9.5	0	0	12	0	0	12	0	4	25	0	5	25	0	0	12
9,10	15.5	11	11.2	11	10.8	11	10.9	10.8	11.2	11	11	11.1	10.9	11	11.2	11	0	23	25	0	22	20	0	44	8	0	45	10	0	20	24
10,11	17	13.3	13.5	13.3	13	13.3	13	13.3	13.6	13.4	13.3	13.4	13.2	13.4	13.7	13.4	0	56	6	0	55	4	0	72	0	0	83.5	0	0	55	6
11,12	19	14.8	15.2	14.9	14.5	14.7	14.4	14.6	15	14.7	14.8	15	14.9	14.7	15	14.6	0	96	0	0	84	0	0	76	0	0	96	0	0	96	0
12,13	20.8	16	16.5	16.1	15.5	15.8	15.6	15.8	16.2	15.9	16	16.4	16.1	15.8	16	15.9	0	103	0	0	80	0	0	80	0	0	110	0	0	103.5	0
13,14	22.8	17.6	18	17.7	16.8	17.2	16.7	17.5	17.8	17.5	17.6	17.9	17.7	17.6	17.8	17.7	0	56	0	0	55	0	0	62.5	0	0	110	0	0	60	0
14,15	23.9	19	19.3	19	17.6	18.1	17.8	18.5	19	18.6	18.9	19.1	19	18.4	18.8	18.6	4	45	0	4	44	0	0	54	0	0	64	0	5	44	0
15,16	23.2	18.5	18.7	18.5	17	17.5	17.1	18	18.5	18.2	18.4	18.6	18.3	18	18.5	18.2	10	10	0	10	11	0	5	20	0	10	20	0	9	10	0
12/28																															
8,9	14.3	9.6	9.8	9.6	9.6	9.6	9.5	9.5	9.7	9.5	9.5	9.7	9.5	9.4	9.7	9.5	0	0	12	0	0	12	0	4	25	0	5	25	0	0	12
9,10	15.8	11.1	11.3	11	10.8	11.2	11	10.8	11.3	11	11	11.3	10.9	11	11.3	11	0	22	25	0	20	20	0	41	8	0	42	10	0	20	24
10,11	17.4	13.3	13.6	13.3	13	13.5	13.1	13.3	13.7	13.4	13.3	13.6	13.2	13.4	13.7	13.4	0	55	6	0	52	4	0	70	0	0	82	0	0	51	6
11,12	19.5	14.9	15.3	14.9	14.5	14.9	14.5	14.6	15.1	14.7	14.8	15.1	14.9	14.7	15.4	14.6	0	95	0	0	81	0	0	73	0	0	93	0	0	93	0
12,13	21.5	16.1	16.6	16.1	15.5	16	15.7	15.8	16.3	15.9	16	16.5	16.1	15.8	16.3	15.9	0	102	0	0	78	0	0	76	0	0	108	0	0	100	0
13,14	23.6	17.7	18.2	17.7	16.8	17.3	16.8	17.5	17.9	17.5	17.6	18	17.7	17.6	18.1	17.7	0	55	0	0	50	0	0	60	0	0	108	0	0	52	0
14,15	24.8	19.1	19.5	19	17.6	18.2	17.9	18.5	19.2	18.6	18.9	19.1	18.9	18.4	19.2	18.6	4	44	0	4	40	0	0	50	0	0	61	0	5	41	0
15,16	23.6	18.6	18.8	18.5	17	17.6	17.2	18	18.4	18.2	18.4	18.6	18.4	18	18.6	18.2	10	9	0	10	8	0	5	18	0	10	17	0	9	8	0
12/29																															
8,9	14.8	9.7	9.8	9.6	9.5	9.7	9.6	9.7	9.9	9.6	9.6	9.8	9.5	9.3	9.6	9.4	0	0	12	0	0	12	0	4	25	0	5	25	0	0	12
9,10	16.1	11.6	11.7	11.5	11	11.2	11.1	11.4	11.6	11.3	11.2	11.4	11.1	10.9	11.2	11	0	22	25	0	20	20	0	41	8	0	42	10	0	20	24
10,11	17.8	14.1	14.2	14	13.2	13.4	13.3	14.3	14.5	14.2	14.6	14.8	14.5	14.3	14.6	14.4	0	55	6	0	52	4	0	70	0	0	82	0	0	51	6
11,12	21	16.6	16.7	16.5	15.3	15.5	15.4	16.1	16.3	16	17.1	17.3	17	16.6	16.9	16.7	0	95	0	0	81	0	0	73	0	0	93	0	0	93	0
12,13	22.7	18.5	18.6	18.4	17.1	17.3	17.2	17.7	17.9	17.6	19.1	19.3	19	18.3	18.6	18.4	0	102	0	0	78	0	0	76	0	0	108	0	0	100	0
13,14	24.1	20.1	20.2	20	19.2	19.4	19.3	19.9	20.1	19.8	21.6	21.8	21.5	20.7	21	20.8	0	55	0	0	50	0	0	60	0	0	108	0	0	52	0
14,15	26	22.3	22.4	22.2	21.1	21.3	21.2	22.1	22.3	22	22.4	22.5	22.3	21.9	22.2	22	4	44	0	4	40	0	0	50	0	0	61	0	5	41	0
15,16	25.5	22.4	22.8	22.6	22	22.2	22.1	22.7	22.9	22.6	23.1	23.1	23	22.6	22.9	22.7	10	9	0	10	8	0	5	18	0	10	17	0	9	8	0
12/30																															
8,9	15	9.5	9.6	9.4	9.5	9.7	9.6	9.7	9.9	9.6	9.6	9.8	9.5	9.4	9.6	9.4	0	0	12	0	0	12	0	4	25	0	5	20	0	0	10
9,10	16.3	11.3	11.5	11.2	11	11.2	11.1	11.4	11.6	11.3	11.2	11.4	11.1	11.2	11.3	11	0	20	23	0	18	20	0	35	8	0	40	10	0	20	22
10,11	17.5	13.8	14	13.7	13.2	13.4	13.3	13.2	13.5	13.3	13.3	13.6	13.4	13.7	13.8	13.5	0	50	2	0	50	4	0	65	0	0	80	0	0	49	2
11,12	19.1	15.6	15.8	15.5	15.3	15.5	15.4	15.5	15.6	15.4	15.6	15.7	15.5	15.4	15.6	15.3	0	90	0	0	78	0	0	68	0	0	89	0	0	89	0
12,13	20.4	17	17.2	16.9	16.8	17	17.2	17	17.2	16.9	17.1	17.4	17.1	17.2	17.5	17.1	0	100	0	0	79	0	0	70	0	0	97	0	0	96	0
13,14	22	18.7	19	18.8	18.5	18.6	18.4	18.7	19	18.8	18.7	19.1	18.8	18.8	19	18.5	0	50	0	0	48	0	0	55	0	0	99	0	0	50	0
14,15	23.3	21	21.2	21	20.8	21	20.7	21	21.1	20.9	21	21.3	21	21	21.2	20.9	4	40	0	4	38	0	0	45	0	0	58	0	3	38	0
15,16	23.5	21.2	21.3	21.2	21	21.1	20.8	20.8	21	20.7	20.7	20.9	20.8	21.3	21.5	21.1	8	9	0	10	8	0	5	13	0	8	10	0	9	8	0
2003 1/4																															
8,9	20.1	16	16.1	15.9	15.8	16	15.7	15.9	16.1	15.8	16	16.2	16.1	15.8	16	15.9	0	0	12	0	0	12	0	7	25	0	10	20	0	2	10
9,10	21.8	17.9	18	17.8	17.3	17.5	17.2	17.9	18	17.8	18	18.1	17.9	17.6	17.8	17.6	0	15	20	0	15	15	0	38	9	0	50	10	0	15	20
10,11	24	20.3	20.4	20.2	19.2	19.5	19.1	20.5	20.6	20.4	20.7	20.8	20.6	20.4	20.6	20.4	0	55	5	0	50	4	0	64	0	0	78	0	0	55	2
11,12	26.7	21.8	21.9	21.7	21.5	22	21.7	23.1	23.3	23	23.8	23.9	23.7	21.8	22	21.8	0	89.25	0	0	69	0	0	69	0	0	84	0	0	88	0
12,13	28.3	23.7	23.8	23.6	23	23.4	23.1	25	25.2	25.1	25.2	25.3	25.1	23.8	24	23.9	0	96	0	0	74	0	0	76	0	0	84	0	0	89	0
13,14	30	26.4	26.5	26.3	25	25.5	25.1	25.8	26	25.8	26.3	26.5	26.2	26.3	26.5	26.3	0	67	0	0	59	0	0	60	0	0	94	0	0	60	0
14,15	29	26.5	26.7	26.3	25.5	26	25.7	26.3	26.5	26.2	27	27.1	26.9	26.5	26.7	26.5	4	30	0	4	26	0	0	59	0	0	55	0	3	34	0
15,16	27	25.7	26	25.8	24.5	24.8	24.3	25.4	25.6	25.3	25.8	26	25.8	25.7	26	25.8	5	5	0	10	2	0	5	20	0	8	25	0	9	2	0
1/5																															
8,9	19.5	15.8	16	15.9	15.8	16	15.8	15.9	16.1	16.1	15.8	16.2	16	15.7	16	15.8	0	0	10	0	0	5	0	7	25	0	10	20	0	2	5
9,10	21.3	17.6	17.8	17.7	17.5	17.7	17.5	17.8	18	18	17.8	18.1	17.9	17.5	17.8	17.6	0	15	18	0	15	5	0	35	5	0	50	10	0	15	15
10,11	23.4	19.3	19.5	19.4	19.1	19.4	19.2	19.6	19.8	19.7	20	20.3	20.1	19.2	19.5	19.3	0	55	0	0	50	0	0	62	0	0	78	0	0	52	0
11,12	26	20.9	21	20.7	20.7	20.9	20.6	21.3	21.5	21.3	21.9	22.2	21.8	20.3	20.5	20.4	0	90	0	0	66	0	0	66	0	0	84	0	0	85	0
12,13	27.6	22.7	22.8	22.6	21.8	22	21.9	23	23.2	23.1	23.3	23.6	23.2	22.8	23	22.7	0	95	0	0	72	0	0	75	0	0	84	0	0	85	0
13,14	29	24.3	24.4	24.1	23.5	23.6	23.4	24.6	25	24.7	24.8	25.2	24.7	24.3	24.5	24.2	0	65	0	0	55	0	0	58	0	0	94	0	0	56	0
14,15	28.3	24.5	24.7	24.4	24.2	24.5	24.3	25.5	25.8	25.6	25.6	26.1	25.8	25	25.4	25.1	0	27	0	0	25	0	0	55	0	0	55	0	0	32	0
15,16	27	24	24.3	24.1	23.7	23.8	23.6	24.4	24.7	24.5	25	25.5	25.1	24.4	24.8	24.5	5	6	0	5	2	0	0	20	0	8	25	0	4	2	0

1/6		M-7			M-8			M-9			M-10			M-11			M-7			M-8			M-9			M-10			M-11		
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_{hw}	S_{tg}	S_{te}	S_{hw}	S_{tg}	S_{te}	S_{hw}	S_{tg}	S_{te}	S_{hw}	S_{tg}	S_{te}	S_{hw}	S_{tg}	S_{te}
8,9	20	15.8	16.1	15.9	15.8	16	15.7	15.5	16.1	15.7	15.8	16.2	15.9	15.7	16	15.8	0	0	10	0	0	5	0	7	25	0	10	20	0	2	5
9,10	21.5	17.6	18	17.6	17.3	17.5	17.2	17.7	18	17.7	17.7	18.1	17.8	17.3	17.8	17.3	0	15	18	0	15	5	0	35	5	0	50	10	0	15	15
10,11	23	20	20.4	20.1	19.1	19.5	19.1	20.2	20.6	20.3	20.5	20.8	20.5	20.2	20.6	20.1	0	55	0	0	50	0	0	62	0	0	78	0	0	52	0
11,12	25.7	21.5	21.9	21.6	21.6	22	21.7	22.8	23.3	23	23.5	23.9	23.6	21.6	22	21.5	0	90	0	0	66	0	0	66	0	0	84	0	0	85	0
12,13	28.3	23.5	23.8	23.6	22.9	23.4	23.1	24.8	25.2	24.9	24.9	25.3	24.9	23.5	24	23.6	0	95	0	0	72	0	0	75	0	0	84	0	0	85	0
13,14	30	26	26.5	26.1	25	25.5	25.1	25.6	26	25.5	26	26.5	26	26	26.5	25.9	0	65	0	0	55	0	0	58	0	0	94	0	0	56	0
14,15	30.5	26.4	26.7	26.4	25.4	26	25.6	26	26.5	26	26.5	27.1	26.5	26.3	26.7	26.2	0	27	0	0	25	0	0	55	0	0	55	0	0	32	0
15,16	29.5	25.6	26	25.7	24.4	24.8	24.5	25.3	25.6	25.4	25.4	26	25.6	25.7	26	25.8	5	6	0	5	2	0	0	20	0	8	25	0	4	2	0
1/8																															
12,13	27.3	22.5	22.8	22.6	22.1	22.4	22.1	24.1	24.3	24	24.1	24.4	24	23.4	24	23.5	0	95	0	0	70	0	0	72	0	0	81	0	0	85	0
13,14	28.6	24.6	25	24.7	23.9	24.5	24	24.6	25.1	24.8	25.2	25.5	25.2	25.1	25.5	25	0	65	0	0	55	0	0	56	0	0	90	0	0	56	0
14,15	29	25.1	25.7	25.3	24.6	25	24.5	25.1	25.5	25.1	25.7	26.3	25.8	26.1	26.7	26.2	4	25	0	4	22	0	0	57	0	0	51	0	3	30	0
1/9																															
8,9	14.3	11.4	11.6	11.5	10.8	11.2	11	11.5	11.7	11.6	11.8	12.2	12.9	11.4	11.7	11.5	0	0	10	0	0	5	0	7	20	0	10	15	0	2	5
9,10	16	13.1	13.3	13.2	12.3	12.5	12.2	12.7	13	12.7	13.7	14.1	13.8	13.3	13.4	13.2	0	15	10	0	15	0	0	35	2	0	40	3	0	15	10
10,11	17.8	15.3	15.5	15.2	14.1	14.4	14.2	14.2	14.6	14.3	14.5	14.8	14.5	15.3	15.6	15.2	0	60	0	0	50	0	0	60	0	0	75	0	0	50	0
11,12	20.3	17.6	18	17.7	16.6	17	16.7	16.8	17.2	17	17.5	17.9	17.6	17.7	18.1	17.7	0	75	0	0	66	0	0	62	0	0	80	0	0	75	0
12,13	22	19	19.3	18.9	18.9	19.3	19.1	18.8	19.2	19	19.9	20.3	19.9	19.2	19.5	19.2	0	85	0	0	70	0	0	70	0	0	80	0	0	85	0
13,14	22.9	20.1	20.4	20	20.2	20.5	20.1	20.7	21	20.7	21	21.5	21	20.1	20.4	20.2	0	65	0	0	53	0	0	55	0	0	90	0	0	60	0
14,15	21.3	19.2	19.5	19.2	19.6	20	19.6	20.3	20.5	20.3	20.5	21.1	20.5	19.2	19.5	19.3	4	29	0	0	25	0	0	50	0	0	53	0	0	30	0
15,16	20	18.6	19	18.7	18.4	18.8	18.4	19.3	19.6	19.4	19.4	20	19.6	18.8	19.1	18.7	5	6	0	5	2	0	0	15	0	8	15	0	4	2	0
1/10																															
14,15	21	17.7	17.9	17.6	17.5	17.6	17.4	18	18.3	18.1	18.6	19.1	18.7	17.5	17.7	17.6	4	29	0	0	25	0	0	50	0	0	53	0	0	30	0
15,16	18.9	16.5	16.8	16.6	16	16.4	16.2	17.6	17.8	17.5	18	18.3	18	16.5	16.8	16.6	5	6	0	5	2	0	0	15	0	8	15	0	4	2	0
1/11																															
8,9	16.5	14.3	14.5	14.2	14	14.2	13.9	14.5	14.7	14.6	14.8	15.2	14.9	14	14.2	14	0	0	10	0	0	10	0	7	15	0	8	15	0	0	0
9,10	18.2	15.6	15.8	15.5	14.8	15.1	14.8	15.7	16	15.7	15.7	16.1	15.8	14.9	15.2	14.8	0	15	5	0	15	0	0	35	2	0	35	3	0	12	5
10,11	20	17.6	18	17.6	16.1	16.4	16.2	17.7	17.6	17.7	17.5	17.8	17.5	16.6	17	16.6	0	57	0	0	50	0	0	55	0	0	70	0	0	55	0
11,12	22.7	19.2	19.4	19.1	17.6	18	18.7	19.8	20.2	20	19.5	19.9	19.6	18.2	18.2	18.1	0	72	0	0	65	0	0	60	0	0	65	0	0	70	0
12,13	24.5	20.4	20.6	20.3	18.9	19.3	19.1	20.8	21.2	21	20.9	21.3	20.9	19.4	19.6	19.3	0	82	0	0	68	0	0	66	0	0	68	0	0	80	0
13,14	26	22	22.4	22	20.2	20.5	20.1	21.7	22	21.7	22	22.3	22	20	20.4	20	0	67	0	0	50	0	0	58	0	0	80	0	0	65	0
14,15	27.9	24.1	24.4	24	22.6	22.8	19.6	23.3	23.5	23.2	23.5	24.1	23.5	22.1	22.4	22	0	30	0	0	22	0	0	52	0	0	50	0	0	30	0
15,16	27	23.1	23.3	23	21.8	22	21.9	22.3	22.6	22.4	22.4	23	22.6	21.1	21.3	21	2	6	0	2	2	0	0	10	0	0	10	0	0	6	0
1/12																															
8,9	17	12.9	13	12.9	12.9	13.1	12.9	12.9	13	12.9	13	13.1	13	13	13.1	13	0	0	10	0	0	10	0	8	15	0	8	15	0	0	10
9,10	18.5	15.6	15.8	15.6	14.7	14.9	14.7	15.6	15.7	15.6	15.8	15.9	15.8	15.6	15.8	15.6	0	23.5	0	0	23.5	0	0	35	5	0	35	5	0	24	0
10,11	20.9	17.2	17.4	17.2	16.4	16.6	16.4	17.4	17.5	17.4	17.6	17.7	17.6	16.8	17	16.9	0	60	0	0	50	0	0	59.25	0	0	72	0	0	56	0
11,12	23.5	19.5	19.7	19.5	18.7	18.9	18.7	19.7	19.8	19.7	19.9	20.1	19.9	19	19.1	18.9	0	77	0	0	59.25	0	0	64	0	0	81	0	0	68	0
12,13	25	21.7	21.9	21.7	21.1	21.3	21.1	21.8	22	21.8	22	22.2	22	21.2	21.5	21.3	0	85	0	0	72.25	0	0	73	0	0	90	0	0	80	0
13,14	26.1	23	23.2	23	22.3	22.5	22.3	23.1	23.3	23.1	23.3	23.5	23.2	22.4	22.6	22.3	0	66	0	0	53	0	0	66	0	0	94.5	0	0	60	0
14,15	27.9	24	24.3	24	23.7	23.9	23.7	24.6	24.8	24.6	24.6	25	24.7	23.5	23.8	23.6	0	28.5	0	0	26.9	0	0	45	0	0	50	0	0	28	0
15,16	28	24.6	25	24.8	24	24.2	24	25.5	25.7	25.5	25.3	25.6	25.4	24.2	24.5	24.3	0	10	0	0	10	0	2	10	0	5	15	0	0	10	0
1/14																															
8,9	15.6	11.2	11.4	11.2	11	11.2	10.9	11.4	11.5	11.4	11.5	11.6	11.5	11.1	11.3	11.1	0	0	8	0	0	8	0	8	12	0	8	12	0	0	10
9,10	17	12.9	13.2	12.9	12.2	12.5	12.2	13.1	13.4	13.2	13.2	13.5	13.3	12.8	13.1	12.8	0	20	0	0	20	0	0	30	2	0	35	2	0	22	0
10,11	18.2	15.2	15.4	15.2	13.8	14.1	13.9	15.8	16	15.7	15.9	16.1	15.8	15.1	15.3	15.1	0	56	0	0	46	0	0	55	0	0	70	0	0	56	0
11,12	19.3	16.3	16.5	16.2	15.2	15.5	15.2	16.6	17	16.5	16.7	17.1	16.6	16.2	16.4	16.1	0	72	0	0	55	0	0	60	0	0	78	0	0	68	0
12,13	22	17.6	17.9	17.7	16.4	16.6	16.3	17.9	18.3	18	18	18.4	18.1	17.5	17.8	17.6	0	82	0	0	65.6	0	0	70	0	0	86	0	0	80	0
14,15	24	21.1	21.5	21.2	19.2	19.6	19.2	21.6	21.8	21.7	21.7	21.9	21.8	21	21.4	21.1	0	25	0	0	25	0	0	42	0	0	45	0	0	25	0
15,16	23.3	20.6	21	20.7	18.6	18.8	18.7	21	21.2	21.1	21.1	21.3	21.2	20.5	20.9	20.6	0	8	0	0	7	0	2	8	0	5	12	0	0	8	0
1/15																															
8,9	21.5	17.6	17.9	17.7	17.3	17.5	17.3	17.8	18.1	17.9	17.7	18	17.8	17.5	17.9	17.7	0	0	10	0	0	10	0	5	10	0	7	8	0	0	8
9,10	22.7	18.9	19.2	18.9	18.3	18.6	18.4	19.1	19.3	19.2	19	19.4	19.1	18.8	19.1	18.8	0	18	0	0	15	0	0	25	2	0	25	2	0	20	0
10,11	24	21	21.3	20.9	20.2	20.5	20.1	21.2	21.5	21.2	21.1	21.4	21.1	20.9	23.2	20.9	0	55	0	0	45	0	0	55	0	0	65	0	0	55	0
11,12	27.6	23.3	23.6	23.2	22.4	22.8	22.5	23.5	23.8	23.5	23.4	23.7	23.4	23.2	23.5	23.1	0	70	0	0	52	0	0	60	0	0	75	0	0	65	0

1/16		M-7			M-8			M-9			M-10			M-11			M-7			M-8			M-9			M-10			M-11		
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_{hw}	S_{lg}	S_{le}	S_{hw}	S_{lg}	S_{le}	S_{hw}	S_{lg}	S_{le}	S_{hw}	S_{lg}	S_{le}	S_{hw}	S_{lg}	S_{le}
8,9	21.2	16.2	16.5	16.3	16	16.4	16.1	16.6	16.8	16.5	16.6	16.9	16.5	16.2	16.4	16.3	0	0	10	0	0	10	0	7	8	0	7	8	0	0	8
9,10	23	18.1	18.3	18	17.5	17.9	17.6	18	18.4	17.9	18	18.5	17.9	18.1	18.2	18	0	18	0	0	17	0	0	26	0	0	30	0	0	20	0
10,11	25.2	20.8	21	20.7	19.3	19.7	19.4	20.6	21.1	20.8	20.6	21.2	20.8	20.8	20.9	20.7	0	52	0	0	42	0	0	50	0	0	65	0	0	52	0
11,12	27	22.6	23	22.5	21.4	21.8	21.3	22.7	23.2	22.6	22.7	23.2	22.6	22.6	22.9	22.5	0	70	0	0	51	0	0	55	0	0	75	0	0	68	0
12,13	28.3	24	24.5	24.1	23	23.5	23	24.5	25	24.6	24.5	25.1	24.6	24	24.4	24.1	0	80	0	0	62	0	0	65	0	0	85	0	0	78	0
13,14	29.1	25.5	26.1	25.4	24.6	25.2	24.6	25.7	26.3	25.8	25.7	26.4	25.8	25.5	26	25.4	0	60	0	0	50	0	0	60	0	0	88	0	0	56	0
14,15	30	27.1	27.6	27	25.9	26.4	25.8	27.3	27.8	27.2	27.3	27.9	27.2	27.1	27.5	27	0	21	0	0	20	0	0	40	0	0	45	0	0	22	0
15,16	28.4	25.6	25.9	25.5	24	24.5	24.1	26.1	26.7	26.2	26.1	26.8	26.2	25.6	25.8	25.5	0	7	0	0	5	0	0	7	0	0	7	0	0	7	0
1/17																															
8,9	22	18.6	19	18.7	18.3	18.5	18.3	18.8	19.1	18.9	18.7	19	18.8	17.5	17.9	17.7	0	0	8	0	0	8	0	10	8	0	10	8	0	0	10
9,10	23.1	19.9	19.3	19	19.3	19.6	19.4	20.1	20.3	20.2	20	20.4	20.1	18.8	19.1	18.8	0	16	0	0	14	0	0	22	0	0	22	0	0	18	0
10,11	25	22	22.3	21.9	20.3	21.5	21.1	22.2	22.5	22.2	22.1	22.4	22.1	20.9	23.2	20.9	0	52	0	0	44	0	0	51	0	0	61	0	0	50	0
11,12	27.6	24.3	24.6	24.2	23.4	23.9	23.3	24.5	24.8	24.5	24.4	24.7	24.4	23.2	23.5	23.1	0	68	0	0	50	0	0	56	0	0	71	0	0	60	0
1/18																															
8,9	21.5	16	16.4	16	16	16.4	16.1	16.6	16.8	16.5	16.6	16.9	16.5	16.2	16.4	16.3	0	0	8	0	0	8	0	10	7	0	10	7	0	0	10
9,10	23.3	17.6	17.9	17.6	17.5	17.9	17.6	18	18.4	17.9	18	18.5	17.9	18.1	18.2	18	0	18	0	0	17	0	0	26	0	0	30	0	0	20	0
10,11	25	20.5	20.7	20.5	19.3	19.7	19.4	20.6	21.1	20.8	20.6	21.2	20.8	20.8	20.9	20.7	0	52	0	0	42	0	0	50	0	0	65	0	0	52	0
11,12	25.5	21.9	22.2	21.8	21.4	21.8	21.3	22	22.5	22.1	21.7	22.2	21.8	21.6	21.9	21.5	0	70	0	0	51	0	0	55	0	0	75	0	0	68	0
12,13	26.3	23	23.4	22.9	22.2	22.6	22.3	23.5	24	23.6	23.5	24.1	23.6	23	23.4	23.1	0	80	0	0	62	0	0	65	0	0	85	0	0	78	0
13,14	28	24.5	25.1	24.6	23.6	24.2	23.6	24.7	25.3	24.8	24.7	25.4	24.8	24.5	25	24.6	0	60	0	0	50	0	0	60	0	0	88	0	0	56	0
14,15	30	26.1	26.6	26	24.9	25.4	24.8	26.3	26.8	26.2	26.3	26.9	26.4	26.1	26.5	26	0	21	0	0	20	0	0	40	0	0	45	0	0	22	0
15,16	28.4	25.6	25.9	25.5	24	24.5	24.1	25.1	25.7	25.2	25.1	25.8	25.2	25.6	25.8	25.5	0	7	0	0	8	0	7	10	0	7	13	0	0	7	0
1/20																															
8,9	16	11.6	12	11.7	11.3	11.5	11.3	11.8	12.1	11.9	11.7	12	11.8	11.5	11.9	11.7	0	0	8	0	0	8	0	10	8	0	10	8	0	0	10
9,10	17.9	13	13.3	12.9	12.3	12.6	12.4	13.1	13.3	13.2	13	13.4	13.1	12.8	13.1	12.8	0	16	0	0	14	0	0	22	0	0	22	0	0	18	0
10,11	19.7	15	15.3	14.9	14.3	14.5	14.1	15.2	15.5	15.2	15.1	15.4	15.1	14.9	15.2	14.9	0	52	0	0	44	0	0	51	0	0	61	0	0	50	0
11,12	21	16.3	16.6	16.2	15.4	15.9	15.3	16.5	16.8	16.5	16.4	16.7	16.4	16.2	16.5	16.1	0	68	0	0	50	0	0	56	0	0	71	0	0	60	0
1/21																															
8,9	16.6	12	12.4	12	12	12.4	12.1	12.6	12.8	12.5	12.6	12.9	12.5	12.2	12.4	12.3	0	4	8	0	4	8	0	10	7	0	10	7	0	0	10
9,10	18	13.6	13.9	13.6	13.5	13.9	13.6	14	14.4	14.9	14	14.5	14.9	13.1	13.2	13	0	18	0	0	17	0	0	26	0	0	30	0	0	20	0
10,11	18.9	15.5	15.7	15.5	15.3	15.7	15.4	15.6	16.1	15.8	15.6	16.2	15.8	14.8	14.9	14.7	0	55	0	0	42	0	0	50	0	0	65	0	0	52	0
11,12	20.3	16.9	17.2	17.8	16.4	16.8	16.3	17	17.5	17.1	16.7	17.2	16.8	15.6	15.9	15.5	0	70	0	0	51	0	0	55	0	0	75	0	0	68	0
12,13	22.5	18	18.4	17.9	17.2	17.6	17.3	18.5	19	18.6	17.5	18.1	17.6	17	17.4	17.1	0	80	0	0	62	0	0	65	0	0	85	0	0	78	0
13,14	24	19.5	20.1	19.6	18.6	19.2	18.6	19.7	20.3	19.8	18.7	19.4	18.8	19.5	20	19.6	0	60	0	0	50	0	0	60	0	0	88	0	0	56	0
14,15	26	21.1	21.6	21.2	19.9	20.4	19.8	21.3	21.8	21.2	20.3	20.9	20.4	21.1	21.5	21	0	21	0	0	20	0	0	40	0	0	45	0	0	22	0
15,16	24.5	20.6	20.9	20.5	20	20.5	20.1	20.1	20.7	20.2	19.5	20.1	19.6	20.6	20.8	20.5	7	7	0	7	8	0	7	10	0	7	13	0	3	7	0
1/22																															
8,9	17.5	13.9	14.1	13.9	13.9	14.1	13.9	13.8	14	13.7	13.8	14.1	13.9	13.8	14	13.7	0	3	7	0	3	7	0	12	7	0	12	7	0	0	10
9,10	19	15.8	16	15.8	15.8	16	15.8	15.7	16	15.6	15.6	16	15.7	15.8	16.1	15.7	0	16	0	0	16	0	0	32	0	0	37	0	0	16	0
10,11	21.2	17.5	17.8	17.6	17.6	17.9	17.8	17.6	17.9	17.5	17.7	18	17.6	17.8	18.1	17.9	0	58	0	0	47.25	0	0	48	0	0	66	0	0	55	0
11,12	22.8	18.7	19	18.7	18.7	19	18.8	18.9	19.3	18.9	19.2	19.5	19.1	19	19.6	19.1	0	73.5	0	0	68	0	0	54.5	0	0	80	0	0	68.25	0
12,13	25	20.5	20.9	20.6	20.6	21	20.7	20.7	21	20.6	21	21.3	20.9	21	21.3	20.9	0	88	0	0	75.25	0	0	62	0	0	80	0	0	88	0
13,14	25.4	22.1	22.5	22.2	21.4	21.9	21.5	21.6	22	21.7	22.4	22.8	22.5	21.8	22.1	21.7	0	55	0	0	50	0	0	52	0	0	70	0	0	50	0
14,15	26	23.1	23.6	23.2	22.2	22.6	22.1	22.8	23.2	22.9	23	23.5	23.1	22.9	23.4	23	0	25.25	0	0	24	0	0	40	0	0	40	0	0	25	0
15,16	26.4	24.5	25	24.6	22.8	23.2	22.9	23.2	23.6	23.1	24.2	24.7	24.4	23.5	24	23.6	8	8	0	5	5	0	7	12	0	7	12	0	3	8	0
1/25																															
12,13	23	18.5	18.9	18.6	18.6	19	18.7	18.7	19	18.6	19	19.3	18.9	19	19.3	18.9	0	88	0	0	75.25	0	0	62	0	0	80	0	0	88	0
13,14	24.3	19.1	19.5	19.2	19.4	19.9	19.5	19.6	20	19.7	20.4	20.8	20.5	19.8	20.1	19.7	0	55	0	0	50	0	0	52	0	0	70	0	0	50	0
14,15	25.7	20.1	20.6	20.2	20.2	20.6	20.1	20.8	21.2	20.9	21	21.5	21.1	20.9	21.4	21	0	25.25	0	0	24	0	0	40	0	0	40	0	0	25	0
15,16	24.5	20.5	21	20.6	20.8	20.2	20.9	21.2	21.6	21.1	22.2	22.7	22.4	21.5	22	21.6	8	8	0	5	5	0	7	12	0	7	12	0	3	8	0
1/29																															
8,9	19	15.6	16	15.7	15.3	15.5	15.3	14.8	15.1	14.9	14.7	15	14.8	14.5	14.9	14.7	0	0	0	0	0	0	0	10	0	0	10	0	0	0	0
9,10	20.8	17	17.3	16.9	16.2	16.6	16.4	16.1	16.3	16.2	15	15.4	15.1	16.8	17.1	16.8	0	15	0	0	14	0	0	22	0	0	22	0	0	18	0
10,11	22.3	18	18.3	17.9	17.3	17.5	17.1	17.2	17.5	17.2	16.1	16.4	16.1	17.9	18.2	17.9	0	50	0	0	44	0	0	51	0	0	61	0	0	50	0
11,12	24	19.3	19.5	19.1	18.4	18.9	18.3	18.5	18.8	18.5	17.4	17.7	17.4	18.2	18.5	18.1	0	65	0	0	50	0	0	56	0	0	71	0	0	60	0

1/30		M-7			M-8			M-9			M-10			M-11		
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III
8,9	18	15.1	15.2	15.1	14.7	15	14.8	15	15.1	15	15	15.2	15.1	14.9	15	14.9
9,10	20	16.4	16.5	16.4	16.3	16.6	16.4	16.5	16.7	16.6	16.9	17.1	16.9	16.8	16.9	16.8
10,11	23.2	18.8	19	18.8	18	18.3	18.1	18.2	18.4	18.1	19.2	19.4	19.2	18.9	19.1	18.9
11,12	24.8	21.4	21.6	21.4	20.7	21	20.7	20.8	21.1	20.8	21.7	22	21.7	21.1	21.3	21.1
12,13	26.6	21.8	22.1	21.8	21.1	21.4	21.1	21.3	21.6	21.3	22.3	22.6	22.2	21.7	22	21.8
13,14	27	23	23.3	23	22.4	22.8	22.5	22.5	22.9	22.6	23.4	23.8	23.5	22.6	22.9	22.7
14,15	28	24.2	24.6	24.2	23.6	24	23.7	23.6	24	23.7	24.6	25	24.7	23.8	24.2	23.9
15,16	28.7	24.8	25.2	24.8	24.3	24.7	24.4	24.6	24.9	24.6	25.3	25.7	25.4	24.6	25	24.7
1/31																
8,9	18.3	14.6	15	14.7	14.3	14.5	14.3	13.8	14.1	13.9	13.7	14	13.8	14.5	14.9	14.7
9,10	20	16	16.3	16.9	15.2	15.6	15.4	15.1	15.3	15.2	14	14.4	14.1	16.8	17.1	16.8
10,11	21.2	17	17.3	17.9	16.3	16.5	16.1	16.2	16.5	16.2	15.1	15.4	15.1	17.9	18.2	17.9
11,12	22.6	18.3	18.5	18.1	17.4	17.9	17.6	17.5	17.8	17.5	16.4	16.7	16.4	18.2	18.5	18.1
2/3																
8,9	20.1	16	16.1	15.9	15.8	16	15.7	15.9	16.1	15.8	16	16.2	16.1	15.8	16	15.9
9,10	21.8	17.9	18	17.8	17.3	17.5	17.2	17.9	18	17.8	18	18.1	17.9	17.6	17.8	17.6
10,11	24	20.3	20.4	20.2	19.2	19.5	19.1	20.5	20.6	20.4	20.7	20.8	20.6	20.4	20.6	20.4
11,12	25.8	21	21.3	20.9	20.8	21	20.7	23.1	23.3	23	23.8	23.9	23.7	21.8	22	21.8
2/4																
8,9	19	15	15.1	15	14.8	15	14.7	14.9	15.1	14.8	15	15.2	15.1	14.9	15.1	14.9
9,10	21.8	16.9	17	16.8	16.3	16.5	16.2	16.9	17	16.8	17	17.1	16.9	16.8	17	16.7
10,11	23	18.3	18.5	18.2	18.1	18.5	18.1	18.5	18.6	18.4	18.7	18.8	18.6	18.2	18.5	18.1
11,12	25.2	19.8	19.9	19.7	19.5	20	19.7	19.1	19.3	19	19.8	19.9	19.7	19.6	19.9	19.6
12,13	27	22	22.3	21.9	22	22.4	22.1	21.3	21.7	21.3	21.2	21.5	21.1	21.9	22.3	21.8
13,14	28.6	23.4	23.5	23.3	23	23.5	23.1	22.8	23	22.8	22.3	22.5	22.2	23.3	23.5	23.2
14,15	31	25.5	25.7	25.3	24.5	25	24.7	24.3	24.5	24.2	24	24.1	23.9	25.4	25.7	25.3
15,16	29.6	25.7	26	25.8	25.5	25.8	25.3	24.8	25.2	24.7	24.3	24.7	24.4	25.6	26	25,8
2/5																
8,9	19.8	15.8	16	15.9	15.9	16.2	15.9	15.6	15.7	15.5	15.6	15.9	15.5	15.8	16	15.7
9,10	22.5	18.1	18.3	18.1	17.7	18	17.6	17.3	17.6	17.3	17.9	18.2	17.8	17.7	17.9	17.6
10,11	25	20.6	20.8	20.6	20	20.3	20	18.6	19	18.7	20.4	20.7	20.3	19.6	19.9	19.5
11,12	27.3	22.5	23	22.6	21.6	22	21.7	20.4	20.8	20.5	22.2	22.5	22.1	22.8	23.1	22.7
12,13	29.6	24.6	25	24.7	23.8	24.1	23.7	23.1	23.4	23.1	24.2	24.6	24.3	24.5	24.8	24.4
13,14	30	26	26.3	25.9	25.1	25.5	25	24.6	25	24.7	25.6	26	25.7	25.7	26	25.6
14,15	31.2	27.3	27.7	27.4	26.4	26.8	26.5	25.7	26.1	25.8	26.9	27.3	27	26.5	26.9	26.5
15,16	31	27.9	28.3	27.9	27	27.4	27.1	26.2	26.5	26.1	27.4	27.8	27.5	27.1	27.5	27.2
2/6																
8,9	19	15.1	15.4	15.2	15.2	15.6	15.4	15.1	15.4	15.1	15.1	15.4	15.2	15	15.4	15.2
9,10	22	17.1	17.3	17.1	16.7	17	16.8	16.3	16.6	16.3	16.9	17.2	16.8	17	17.3	17.1
10,11	23.6	18.6	18.8	18.6	18	18.3	18	17.6	18	17.7	17.7	18	17.7	18.4	18.8	18.6
11,12	25	19.5	20	19.6	19.6	20	19.7	18.4	18.8	18.5	18.9	19.3	19	19.5	19.9	19.6
12,13	26.6	20.6	21	20.7	20.8	21.1	20.7	20.1	20.4	20.1	20.2	20.6	20.3	20.6	21	20.6
13,14	28	22	22.3	21.9	22.1	22.5	22.1	22	22.4	22	21.8	22.2	21.8	22	22.1	21.9
14,15	29.6	23.3	23.7	23.4	23.4	23.8	23.5	23.7	24.1	23.8	23.1	23.4	23.1	23.3	23.6	23.4
15,16	29	23.9	24.3	23.9	24	24.4	24.1	24.2	24.5	24.1	24.4	24.8	24.5	23.8	24.2	23.9
2/7																
8,9	21	16.5	16.7	16.5	16	16.3	16	16.2	16.5	16.3	16.4	16.7	16.4	16.4	16.7	16.3
9,10	22.2	18	18.3	18	17.9	18.2	17.8	18.1	18.4	18.1	18.3	18.5	18.2	18.1	18.4	18.1
10,11	24	20.3	20.4	20.2	19.2	19.5	19.1	20.5	20.6	20.4	20.7	20.8	20.6	20.4	20.6	20.4
11,12	25.8	21	21.3	20.9	20.8	21	20.7	21.1	21.3	21	21.8	21.9	21.7	21.8	22	21.8

1/30	M-7			M-8			M-9			M-10			M-11		
TIME	S_{lw}	S_{lg}	S_{le}	S_{lw}	S_{lg}	S_{le}	S_{lw}	S_{lg}	S_{le}	S_{lw}	S_{lg}	S_{le}	S_{lw}	S_{lg}	S_{le}
8,9	0	0	0	0	0	0	0	5	5	0	8	7	0	0	0
9,10	0	10	0	0	10	0	0	24.5	0	0	33.2	0	0	10	0
10,11	0	52.4	0	0	35	0	0	42	0	0	54	0	0	57.4	0
11,12	0	60	0	0	61	0	0	44	0	0	66	0	0	60	0
12,13	0	72	0	0	66.5	0	0	47	0	0	70	0	0	68	0
13,14	0	66	0	0	47.4	0	0	48.25	0	0	58	0	0	55	0
14,15	0	22.75	0	0	20	0	0	30	0	0	30	0	0	16.5	0
15,16	0	0	0	0	0	0	0	10	0	0	16.5	0	0	0	0
1/31															
8,9	0	0	0	0	0	0	0	5	5	0	6	6	0	0	0
9,10	0	10	0	0	10	0	0	22.5	0	0	31	0	0	10	0
10,11	0	50	0	0	32	0	0	40	0	0	52	0	0	55	0
11,12	0	56	0	0	58	0	0	42	0	0	62	0	0	58	0
2/3															
8,9	0	0	8	0	0	8	0	7	20	0	7	20	0	0	8
9,10	0	15	15	0	15	11	0	38	7	0	50	5	0	15	15
10,11	0	55	0	0	50	0	0	64	0	0	78	0	0	55	0
11,12	0	85	0	0	65	0	0	65	0	0	80	0	0	1	0
2/4															
8,9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	0	4	5	0	5	4	0	7	5	0	30	6	0	5	4
10,11	0	50	0	0	30	0	0	30	0	0	58	0	0	50	0
11,12	0	80	0	0	55	0	0	49	0	0	64	0	0	78	0
12,13	0	85	0	0	70	0	0	56	0	0	64	0	0	69	0
13,14	0	62	0	0	55	0	0	40	0	0	74	0	0	50	0
14,15	0	20	0	0	20	0	0	39	0	0	35	0	0	22	0
15,16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/5															
8,9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	0	9	0	0	9	0	0	12	0	0	26.8	0	0	9	0
10,11	0	42	0	0	29.5	0	0	18	0	0	36.5	0	0	40	0
11,12	0	56	0	0	48	0	0	31.6	0	0	48	0	0	50	0
12,13	0	64	0	0	51.5	0	0	36	0	0	55	0	0	60	0
13,14	0	55	0	0	45.37	0	0	28	0	0	52	0	0	45.37	0
14,15	0	12.5	0	0	12.5	0	0	24	0	0	21	0	0	9	0
15,16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/6															
8,9	0	9	0	0	9	0	0	10	0	0	26	0	0	7	0
9,10	0	40	0	0	29	0	0	18	0	0	36	0	0	40	0
10,11	0	55	0	0	47	0	0	31	0	0	45	0	0	50	0
11,12	0	64	0	0	51	0	0	35	0	0	52	0	0	60	0
12,13	0	55	0	0	45	0	0	25	0	0	50	0	0	45	0
13,14	0	12	0	0	12	0	0	20	0	0	20	0	0	9	0
14,15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15,16															
2/7															
8,9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	0	7	0	0	7	0	0	8	0	0	25	0	0	5	0
10,11	0	40	0	0	29	0	0	18	0	0	36	0	0	40	0
11,12	0	52	0	0	45	0	0	30	0	0	42	0	0	48	0

2/8		M-7			M-8			M-9			M-10			M-11		
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III
8,9	19.2	15.1	15.4	15.2	15.2	15.6	15.4	15.1	15.4	15.1	15.1	15.4	15.2	15.1	15.4	15.2
9,10	21.4	16.5	16.8	16.5	16.2	16.5	16.2	16.3	16.6	16.3	16.9	17.2	16.8	16.5	16.8	16.5
10,11	22.4	17.6	17.8	17.6	17	17.3	17	17.6	18	17.7	17.7	18	17.7	17.6	17.8	17.6
11,12	23.5	18.5	19	18.6	18.2	18.5	18.2	18.4	18.8	18.5	18.9	19.3	19	18.5	19	18.6
12,13	24.6	19.6	20	19.7	19.5	19.8	19.7	19.5	19.8	19.6	20.2	20.6	20.3	19.6	20	19.7
13,14	25.5	21	21.3	20.9	20.8	21.1	20.8	21	21.4	21	21.8	22.2	21.8	21	21.3	20.9
14,15	26.4	22.3	22.7	22.4	21.6	22	21.6	22.7	23.1	22.8	23.1	23.4	23.1	22.3	22.7	22.4
15,16	25	21.9	22.3	21.9	21	21.4	21.1	22.2	22.5	22.1	22.4	22.8	22.5	21.9	22.3	21.9
2/18																
8,9	24	20.9	20.8	20.9	21	21.2	21.1	21	21.2	21.1	21.2	21.3	21.2	21.2	21.3	21.1
9,10	25.7	21.8	22.3	21.8	21.7	21.9	21.7	21.8	22	21.8	21.6	21.8	21.6	21.6	21.8	21.6
10,11	27	23.8	24.1	23.9	23	23.2	22.9	23.7	24.1	23.8	23	23.3	23	22.8	23.2	22.9
11,12	28.9	24.8	25.2	24.9	24	24.4	24.1	24.7	25	24.7	25.1	25.4	25.2	24.7	25.1	24.8
12,13	30.7	26.4	26.7	26.3	25.6	26	25.7	26	26.3	26	25.6	26	25.7	25.6	25.9	25.6
13,14	32	27.8	28.1	27.9	27.2	27.5	27.5	27.5	27.8	27.6	27.3	27.6	27.2	27	27.5	27.1
14,15	33.4	28.7	29	28.6	28.1	28.4	28	28.6	28.9	28.5	28.4	28.7	28.5	28	28.4	28
15,16	34.5	29.7	30.2	29.8	28.6	29	28.7	29.2	29.6	29.3	29.7	30	29.7	29.3	29.8	29.4
2/20																
8,9	23.3	18.1	18.4	18.2	18.2	18.6	18.4	18.1	18.4	18.2	18	18.3	18.2	18.1	18.4	18.1
9,10	25	19.5	19.8	19.5	19.2	19.6	19.3	18.9	19.2	18.8	19.4	19.7	19.5	19.3	19.6	19.3
10,11	26.7	20.6	20.8	20.6	20	20.4	20.1	19.6	20	19.7	20.5	20.7	20.6	20.6	21	20.7
11,12	28.4	21.5	22	21.6	21.2	21.5	21.5	20.9	21.3	21	21.4	21.9	21.6	21.4	21.8	21.5
12,13	29	22.6	23	22.7	22.5	22.8	22.7	21.2	21.6	21.3	22.5	22.9	22.7	22.5	22.8	22.6
13,14	30.6	24	24.4	24.1	23.8	24.1	23.8	22.8	23.2	22.8	23.9	24.3	24.1	23	23.4	23
14,15	31.9	25.3	25.7	25.4	24.6	25	24.6	24.1	24.4	24.2	25.2	25.6	25.4	24.7	25.1	24.8
15,16	30	25	25.3	25	24	24.4	24.1	23.4	23.8	23.5	24.9	25.2	25	24.2	24.5	24.1
2/21																
8,9	21.4	16.4	16.7	16.4	16.2	16.5	16.3	16	16.3	16	16.5	16.7	16.5	16.4	16.7	16.3
9,10	23	18.3	18.5	18.2	18.1	18.4	18.1	17.9	18.2	17.8	18	18.3	18	18.1	18.4	18.1
10,11	24.4	20.7	20.8	20.6	20.5	20.6	20.4	19.2	19.5	19.1	20.3	20.4	20.2	20.4	20.6	20.4
11,12	26	22.8	22.9	22.7	22.1	22.3	22	21.8	22	21.7	22	22.3	21.9	21.8	22	21.8
2/22																
8,9	19.5	16.1	16.4	16.2	16.1	16.4	16.1	16.2	16.6	16.4	16.1	16.4	16.2	16	16.3	16.2
9,10	21	17.5	17.8	17.5	17.3	17.6	17.3	17.2	17.6	17.3	17.9	18.2	17.8	17.4	17.7	17.5
10,11	22.8	18.6	18.8	18.6	18.6	19	18.7	18	18.4	18.1	18.6	19	18.7	18.5	18.7	18.6
11,12	24.4	19.5	20	19.6	19.4	19.8	19.5	19.2	19.5	19.4	19.9	20.3	20	19.4	19.9	19.6
12,13	26	20.6	21	20.6	20.5	20.8	20.6	20.5	20.8	20.7	20.2	20.6	20.3	20.5	20.9	20.7
13,14	27.7	22	22.4	22.1	22	22.4	22	21.8	22.1	21.8	21.8	22.2	21.8	22	22.3	22.1
14,15	29	23.3	23.7	23.4	22.7	23.1	22.8	22.6	23	22.6	23.1	23.4	23.2	23.2	23.6	23.4
15,16	30	24	24.3	24	23.2	23.5	23.1	23	23.4	23.1	23.8	24.1	23.8	23.9	24.2	24
2/24																
8,9	21.4	16.5	16.7	16.5	16.2	16.5	16.3	16	16.3	16	16.4	16.7	16.4	16.4	16.7	16.4
9,10	23.8	18.1	18.4	18.1	18.1	18.4	18.1	17.9	18.2	17.8	18.3	18.5	18.2	18	18.4	18
10,11	25.7	20.6	20.9	20.6	20.6	20.9	20.6	19.6	19.9	19.6	21	21.4	21	20.5	20.9	20.5
11,12	28	22.3	22.6	22.3	22.5	22.8	22.4	22	22.4	22	22.9	23.2	22.8	22.2	22.6	22.2
2/25																
8,9	23.8	19.7	20	19.8	20.2	20.4	20.3	20	20.2	20	20.3	20.5	20.3	20	20.2	20
9,10	25.4	21.5	21.8	21.5	21.6	22	21.7	21.3	21.7	21.4	21.6	21.9	21.6	21.4	21.7	21.5
10,11	27	23.3	23.6	23.3	22.7	23.1	22.8	22.5	22.9	22.6	22.7	23	22.7	23.1	23.4	23.1
11,12	28.6	24	24.5	24.2	23.5	23.8	23.4	23.3	23.6	23.3	23.5	23.8	23.5	23.7	24.1	23.7
12,13	30.7	25.5	25.9	25.6	24.5	24.9	24.6	24	24.4	24.1	24.6	25	24.6	24.6	25.1	24.6
13,14	31.5	27.1	27.5	27.2	25.6	26	25.7	25	25.3	25	25.6	26	25.6	25.7	26.2	25.8
14,15	29.9	27.7	28	27.7	26.9	27.3	27	25.7	26.1	25.7	27	27.4	27.1	27.1	27.5	27
15,16	27.8	27.5	27.8	27.5	27	27.4	27.1	26.1	26.6	26.2	27.3	27.7	27.4	27.3	27.7	27.2

2/8	M-7			M-8			M-9			M-10			M-11		
TIME	S_{hw}	S_{lg}	S_{le}	S_{hw}	S_{lg}	S_{le}	S_{hw}	S_{lg}	S_{le}	S_{hw}	S_{lg}	S_{le}	S_{hw}	S_{lg}	S_{le}
8,9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	0	9	0	0	8	0	0	8	0	0	25	0	0	5	0
10,11	0	40	0	0	26	0	0	15	0	0	35	0	0	36	0
11,12	0	55	0	0	45	0	0	30	0	0	42	0	0	48	0
12,13	0	64	0	0	50	0	0	32	0	0	50	0	0	56	0
13,14	0	55	0	0	42	0	0	22	0	0	48	0	0	47	0
14,15	0	12	0	0	10	0	0	18	0	0	17	0	0	6	0
15,16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/18															
8,9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	0	4.5	0	0	4.5	0	0	9	0	0	11	0	0	6	0
10,11	0	22.8	0	0	17.5	0	0	20	0	0	25	0	0	19	0
11,12	0	36	0	0	20	0	0	31.25	0	0	33	0	0	28	0
12,13	0	48	0	0	28.75	0	0	40	0	0	44	0	0	40	0
13,14	0	35	0	0	19	0	0	30	0	0	28	0	0	20	0
14,15	0	8	0	0	6	0	0	11.6	0	0	11	0	0	5	0
15,16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/20															
8,9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	0	7	0	0	6	0	0	5	0	0	22	0	0	5	0
10,11	0	38	0	0	24	0	0	13	0	0	32	0	0	35	0
11,12	0	52	0	0	44	0	0	28	0	0	40	0	0	46	0
12,13	0	62	0	0	48	0	0	30	0	0	48	0	0	55	0
13,14	0	52	0	0	40	0	0	20	0	0	45	0	0	45	0
14,15	0	10	0	0	8	0	0	12	0	0	15	0	0	5	0
15,16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/21															
8,9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	0	7	0	0	6	0	0	5	0	0	22	0	0	5	0
10,11	0	38	0	0	24	0	0	13	0	0	32	0	0	35	0
11,12	0	52	0	0	44	0	0	28	0	0	40	0	0	46	0
2/22															
8,9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	0	5	0	0	4	0	0	0	0	0	15	0	0	0	0
10,11	0	36	0	0	22	0	0	10	0	0	32	0	0	35	0
11,12	0	52	0	0	44	0	0	28	0	0	40	0	0	46	0
12,13	0	62	0	0	48	0	0	30	0	0	48	0	0	55	0
13,14	0	52	0	0	40	0	0	20	0	0	45	0	0	45	0
14,15	0	8	0	0	5	0	0	5	0	0	10	0	0	0	0
15,16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2/24															
8,9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	0	5	0	0	3	0	0	0	0	0	15	0	0	3	0
10,11	0	38	0	0	24	0	0	13	0	0	32	0	0	35	0
11,12	0	52	0	0	44	0	0	28	0	0	40	0	0	46	0
2/25															
8,9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0
10,11	0	32	0	0	22	0	0	8	0	0	25	0	0	25	0
11,12	0	42	0	0	35	0	0	15	0	0	30	0	0	38	0
12,13	0	55	0	0	40	0	0	20	0	0	38	0	0	45	0
13,14	0	45	0	0	25	0	0	12	0	0	35	0	0	35	0
14,15	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0
15,16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

2/26		M-7			M-8			M-9			M-10			M-11			M-7			M-8			M-9			M-10			M-11		
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_{hw}	S_{lg}	S_{le}	S_{hw}	S_{lg}	S_{le}	S_{hw}	S_{lg}	S_{le}	S_{hw}	S_{lg}	S_{le}	S_{hw}	S_{lg}	S_{le}
8,9	23.5	19.5	19.7	19.5	19.9	20.2	19.9	19.7	20	19.8	20	20.3	20	19.7	20	19.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	25	21.2	21.5	21.2	21.2	21.6	21.3	21	21.3	21.1	21.3	21.6	21.3	21	21.4	21.1	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0
10,11	26.7	23	23.3	22.9	22.3	22.7	22.3	22.2	22.5	22.2	22.3	22.7	22.2	22.7	23.1	22.8	0	30	0	0	20	0	0	7	0	0	20	0	0	21	0
11,12	28	23.6	24	23.5	23.1	23.5	23.2	23	23.3	22.9	23.1	23.5	23.2	23.2	23.7	23.3	0	40	0	0	32	0	0	10	0	0	28	0	0	35	0
2/27																															
8,9	26.5	24.2	24.4	24.1	24	24.3	24.1	24	24.2	24	24.3	24.5	24.1	24	24.2	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	28	25.3	25.6	25.2	24.8	25.1	24.8	25.3	25.7	25.4	25.6	25.9	25.6	25.4	25.7	25.5	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0
10,11	29.3	26.5	26.8	26.4	25.7	26.1	25.8	26.5	26.9	26.6	26.7	27	26.6	26.1	26.4	26.1	0	28	0	0	20	0	0	5	0	0	15	0	0	15	0
11,12	31	27.4	27.1	27	26.5	26.8	26.4	27.3	27.6	27.3	27.5	27.8	27.5	27.7	28.1	27.7	0	40	0	0	20	0	0	7	0	0	20	0	0	30	0
12,13	32.3	28.1	28.4	28.1	27.5	27.9	27.6	28	28.4	28.1	28.6	29	28.6	28.6	29.1	29.6	0	50	0	0	35	0	0	15	0	0	20	0	0	27	0
13,14	33	29	29.3	29	28.6	29	28.7	29	29.3	29	29.6	30	29.6	29.7	30.2	29.8	0	32	0	0	12	0	0	5	0	0	23	0	0	17	0
14,15	32.1	29.5	29.8	29.5	28.9	29.2	29	28.7	29.1	28.7	29	29.4	29.1	29.1	29.5	29	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0
15,16	31.1	29.1	29.3	29	28.2	28.6	28.2	28.1	28.5	28.2	28.3	28.7	28.4	28.3	28.7	28.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/1																															
8,9	22.8	19.5	19.6	19.4	19	19.3	19.1	19.3	19.5	19.1	19	19.2	19	19	19.3	19.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	24.6	20.7	20.9	20.6	20.6	20.9	20.7	20.6	20.9	20.6	20.3	20.7	20.4	20.4	20.7	20.5	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
10,11	26	23	23.3	22.9	22.7	23.1	22.8	21.7	22	21.6	21.5	21.9	21.6	22.1	22.4	22.1	0	28	0	0	18	0	0	3	0	0	12	0	0	12	0
11,12	27.6	24.4	24.7	24.4	23.5	23.8	23.4	22.5	22.8	22.5	22.4	22.8	22.5	23.7	24.1	23.7	0	40	0	0	16	0	0	5	0	0	18	0	0	26	0
12,13	29.3	25.1	25.4	25	24.5	24.9	24.6	23.6	24	23.6	24	24.4	24.1	24.6	25.1	24.6	0	50	0	0	31	0	0	12	0	0	16	0	0	25	0
13,14	31	26	26.3	26	25.6	26	25.7	24.6	25	24.6	25	25.3	25	25.7	26.2	25.8	0	32	0	0	10	0	0	3	0	0	20	0	0	15	0
14,15	32.3	27.4	27.8	27.4	26.9	27.2	27	26	26.4	26.1	26.7	27.1	26.7	27.1	27.4	27	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
15,16	31.2	26.8	27.2	26.7	26.2	26.6	26.2	25.4	25.7	25.4	26.1	26.5	26.2	26	26.7	26.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/3																															
8,9	22	19	19.4	19	19	19.3	19.1	19.1	19.3	19.1	18.9	19.2	19	19	19.3	19.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	23.6	20.1	20.4	20.1	20.1	20.3	20	20.1	20.4	20.1	19.6	19.9	19.7	20.4	20.7	20.5	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
10,11	25	21.5	21.9	21.6	21.2	21.5	21.2	21	21.3	21	21.5	21.9	21.6	21.1	21.4	21.1	0	27	0	0	18	0	0	3	0	0	10	0	0	12	0
11,12	26.6	22.4	22.8	22.4	22	22.4	22	22	22.3	22	22.4	22.8	22.5	22.7	23	22.7	0	39	0	0	15	0	0	5	0	0	16	0	0	25	0
3/4																															
8,9	25	21.1	21.2	21	20.6	21	20.7	20.8	21	20.8	20.8	21	20.7	20.9	21.2	20.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	26.8	22.2	22.5	22.2	22.2	22.4	22.2	21.9	22.2	21.9	21.7	22	21.6	21.7	22.1	21.8	0	0	0	0	0	0	0	0	0	0	2.5	0	0	0	0
10,11	29	23.6	24	23.7	23.5	23.8	23.5	22.9	23.2	22.9	23.1	23.5	23.2	23.3	23.7	23.4	0	21	0	0	12	0	0	4	0	0	10.9	0	0	16	0
11,12	30.9	25.3	25.7	25.3	24.1	24.5	24.2	23.6	24	23.7	24	24.3	23.9	24.1	24.4	24.1	0	35	0	0	18	0	0	10.5	0	0	22	0	0	21	0
12,13	33.3	26.9	27.2	26.8	25.2	25.5	25.1	24.9	25.2	24.8	25.2	25.6	25.3	25.6	26	25.7	0	42.5	0	0	21	0	0	11	0	0	22.1	0	0	27	0
13,14	35	28.2	28.5	28.1	26.1	26.4	26.1	25.6	26	25.7	26.5	26.8	26.5	26.8	27.1	26.7	0	30	0	0	16	0	0	8	0	0	14.5	0	0	11	0
14,15	36.8	28.7	29	28.6	26.3	26.7	26.4	26.1	26.5	26.2	27	27.4	27.1	27.1	27.6	27.2	0	0	0	0	0	0	0	0	0	0	2.5	0	0	0	0
15,16	37	28.4	28.8	28.3	25.8	26.2	25.8	25.8	26.2	25.7	26.5	26.8	26.4	27	27.4	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/5																															
8,9	21.3	19	19.1	19	18.9	19.3	19.1	19.1	19.3	19	18.9	19.2	18.9	19	19.4	19.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	23.5	20.1	20.3	20.1	20	20.3	20	20.1	20.4	20	19.6	19.9	19.6	20.4	20.8	20.5	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
10,11	25.2	21.5	21.8	21.6	21.1	21.5	21.2	21	21.3	20.9	21.5	21.9	21.5	21.1	21.5	21.1	0	25	0	0	15	0	0	3	0	0	7	0	0	10	0
3/6																															
8,9	25	21	21.3	21	20.5	20.8	20.6	20.7	20.9	20.7	20.7	21	20.7	20.7	21	20.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	26.8	22.1	22.5	22.2	22	22.4	22.1	21.7	22.2	21.8	21.6	22	21.6	21.5	21.9	21.6	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
10,11	27.9	23.5	24	23.6	23.4	23.8	23.4	22.8	23.2	22.8	23.1	23.4	23.2	23.1	23.5	23.2	0	20	0	0	10	0	0	2	0	0	10	0	0	15	0
11,12	28.7	25.2	25.7	25.3	24	24.4	24	23.6	24.1	23.7	23.9	24.3	23.9	24	24.3	24.1	0	32	0	0	16	0	0	10	0	0	20	0	0	20	0
12,13	29.6	26.8	27.2	26.8	25.1	25.4	25.1	24.8	25.2	24.7	25.2	25.6	25.1	25.4	25.8	25.3	0	41	0	0	20	0	0	10	0	0	21	0	0	25	0
13,14	31.3	28.1	28.5	28.2	26.1	26.5	26	25.6	26	25.6	26.4	26.8	26.5	26.8	27.1	26.7	0	28	0	0	15	0	0	7	0	0	12	0	0	10	0
14,15	33	28.6	29	28.7	26.5	26.8	26.4	26.1	26.5	26.1	27	27.4	27.1	27.1	27.5	27.2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
15,16	31	27.9	28.3	28	25.8	26.2	25.7	25.8	26.1	25.7	26.5	26.7	26.4	26.6	26.9	26.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/7																															
8,9	28	25.2	25.5	25.3	24	24.4	24	23.6	24	23.7	23.9	24.3	23.9	24	24.3	24.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	29.4	26.8	27	26.8	25	25.4	25.1	24.6	25.1	24.7	25.2	25.6	25.1	25.2	25.6	25.3	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
10,11	31	28	28.5	28.2	26.1	26.5	26	25.5	25.9	25.6	26.4	26.8	26.5	26.8	27.1	26.7	0	25	0	0	15	0	0	3	0	0	9	0	0	10	0
11,12	32.3	28.6	29	28.7	26.4	26.8	26.4	26	26.4	26.1	27	27.4	27.1	27.1	27.4	27.1	0	36	0	0	12	0	0	4	0	0	15	0	0	22	0

3/8		M-7			M-8			M-9			M-10			M-11			M-7			M-8			M-9			M-10			M-11		
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_{hw}	S_{tg}	S_{te}	S_{hw}	S_{tg}	S_{te}	S_{hw}	S_{tg}	S_{te}	S_{hw}	S_{tg}	S_{te}	S_{hw}	S_{tg}	S_{te}
8,9	26.5	21.3	21.6	21.3	21.5	21.8	21.6	20.8	21	20.8	21	21.3	21	21	21.3	20.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	27.3	22.4	22.8	22.4	22.1	22.5	22.1	22.1	22.4	22	22.1	22.5	22.3	21.9	22.3	21.9	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
10,11	28.4	23.7	24.1	23.6	23.5	23.8	23.4	23	23.3	23	23.4	23.7	23.3	23.1	23.5	23.2	0	20	0	0	10	0	0	2	0	0	10	0	0	12	0
11,12	29.6	25.2	25.6	25.3	24.6	24.9	24.7	24.5	24.8	24.4	24.9	25.2	24.9	24	24.3	24.1	0	30	0	0	15	0	0	9	0	0	20	0	0	20	0
12,13	31	26.7	27.1	26.7	26.1	26.4	26.1	25.8	26.2	25.8	26.2	26.5	26.1	25.4	25.8	25.3	0	36	0	0	18	0	0	9	0	0	20	0	0	22	0
13,14	32.7	28.3	28.7	28.3	27.1	27.5	27.1	26.6	27	27.7	27.4	27.8	27.5	26.8	27.1	26.7	0	25	0	0	12	0	0	7	0	0	11	0	0	10	0
14,15	34.2	29.6	30	29.7	28.6	28.9	28.6	28.1	28.5	28.2	28	28.4	28.1	28.2	28.6	28.2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
15,16	32	28.9	29.3	29	26.8	27.2	26.7	26.8	27.1	26.7	27.5	27.8	27.4	27.6	27.9	27.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/10																															
8,9	26	20.6	21	20.7	21	21.2	21	20.5	20.8	20.5	20.7	21	20.8	21	21.4	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	28.1	22	22.3	22	22.2	22.5	22.2	21.6	21.9	21.6	22	22.3	22	22	22.3	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10,11	30.4	23.7	24.1	23.7	24.1	24.4	24.1	22.7	23.1	22.8	23.1	23.5	23.2	23.5	23.8	23.5	0	18	0	0	9	0	0	1.5	0	0	4.5	0	0	6.5	0
11,12	31.6	26.4	26.8	26.5	26.3	26.7	26.4	24	24.3	24.1	24.3	24.6	24.2	25	25.4	25	0	26	0	0	14.75	0	0	4.25	0	0	5.5	0	0	12.5	0
12,13	33	28.1	28.4	28	28.4	28.7	28.3	25.8	26.1	25.7	26.4	26.8	26.3	27.7	28	27.7	0	32	0	0	22	0	0	5.5	0	0	10.5	0	0	16.25	0
13,14	34.5	29.6	30	29.7	29.6	30	29.7	27.5	27.9	27.6	28	28.3	27.9	28.6	29	28.6	0	18	0	0	16	0	0	10.5	0	0	6.5	0	0	14.25	0
14,15	36.2	31.5	31.8	31.4	31.5	31.8	31.4	28.7	29.1	28.6	28.8	29.4	28.9	30	30.5	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15,16	36.6	31.8	32.3	31.9	31.7	32.1	31.8	29.2	29.7	29.2	29.5	29.9	29.6	30.1	30.4	30.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/11																															
8,9	27	22	22.3	22	22.2	22.5	22.2	21.6	21.9	21.6	22	22.3	22	22	22.3	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	29.2	23.7	24.1	23.7	24.1	24.4	24.1	22.7	23.1	22.8	23.1	23.5	23.2	23.5	23.8	23.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10,11	31	26.4	26.8	26.5	26.3	26.7	26.4	24	24.3	24.1	24.3	24.6	24.2	25	25.4	25	0	16	0	0	8	0	0	0	0	0	4	0	0	5	0
11,12	32	28.1	28.4	28	28.4	28.7	28.3	25.8	26.1	25.7	26.4	26.8	26.3	27.7	28	27.7	0	25	0	0	13	0	0	4	0	0	5	0	0	10	0
12,13	34	29.6	30	29.7	29.6	30	29.7	27.5	27.9	27.6	28	28.3	27.9	28.6	29	28.6	0	30	0	0	21	0	0	5	0	0	10	0	0	15	0
13,14	35.6	31.5	31.8	31.4	31.5	31.8	31.4	28.7	29.1	28.6	28.8	29.4	28.9	30	30.5	30	0	17	0	0	15	0	0	9	0	0	5	0	0	14	0
14,15	37	32	32.3	31.9	32	32.4	32	29.2	29.7	29.2	29.5	29.9	29.6	30.1	30.4	30.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15,16	36.6	32.6	33	32.7	32.7	33	32.6	31	31.3	31	30.6	31	30.7	31.1	31.5	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/13																															
8,9	24	20	20.3	20	20.2	20.5	20.2	19.6	19.9	19.6	20	20.3	20	20	20.3	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	26.3	21.7	22.1	21.7	21.4	21.7	21.4	20.7	21.1	20.8	21.1	21.5	21.2	21.7	22	21.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10,11	27.4	23.4	23.8	23.5	23.3	23.7	23.4	22	22.3	22.1	22.3	22.6	22.2	23.4	23.7	23.2	0	15	0	0	8	0	0	0	0	0	4	0	0	5	0
11,12	28.5	25.1	25.4	25	25.4	25.7	25.3	23.8	24.1	23.7	23.4	23.8	23.3	25	25.4	25	0	22	0	0	13	0	0	4	0	0	5	0	0	10	0
12,13	29.6	26.6	27	26.7	26.6	27	26.7	24.5	24.9	24.6	25	25.3	24.9	26.6	27	26.6	0	28	0	0	21	0	0	5	0	0	10	0	0	15	0
13,14	30.5	27.5	27.8	27.4	27.5	27.8	27.4	25.7	26.1	25.6	26.8	27.4	26.9	27.3	27.8	27.4	0	16	0	0	15	0	0	9	0	0	5	0	0	14	0
14,15	31.4	28	28.3	27.9	28	28.4	28	27.2	27.7	27.2	27.5	27.9	27.6	27.8	28.3	27.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15,16	30.4	27.5	27.8	27.5	27.7	28	27.6	27	27.3	27	26.6	27	26.7	27.5	27.8	27.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/14																															
8,9	23.9	20	20.2	19.9	20.2	20.4	20.2	19.5	19.8	19.6	20	20.2	20	19.9	20.3	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	26	21.7	22	21.6	21.4	21.6	21.4	20.7	21	20.6	21.1	21.4	21.2	21.7	22	21.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10,11	27.2	23.4	23.7	23.3	23.3	23.5	23.2	21.8	22.2	21.9	22.1	22.5	22.2	23.3	23.7	23.2	0	12	0	0	7	0	0	0	0	0	0	0	0	5	0
11,12	28.5	25	25.4	24.9	25.1	25.5	25.2	23.6	23.9	23.6	23.3	23.7	23.3	25.1	25.4	25	0	20	0	0	11	0	0	4	0	0	5	0	0	6	0
12,13	29.7	26.5	27	26.6	26.6	27	26.7	24.5	24.9	24.6	24.8	25.2	24.9	26.6	26.9	26.6	0	26	0	0	20	0	0	5	0	0	5	0	0	9	0
13,14	30.5	27.3	27.8	27.3	27.4	27.7	27.3	25.7	26	25.6	26.8	27.3	26.9	27.3	27.7	27.4	0	15	0	0	12	0	0	5	0	0	5	0	0	11	0
14,15	31.4	27.8	28.3	27.8	28	28.4	28	27.2	27.6	27.2	27.5	27.9	27.4	27.7	28.2	27.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15,16	30.7	27.3	27.8	27.4	27.6	27.9	27.6	26.8	27.1	26.7	26.6	27	26.7	27.5	27.8	27.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/15																															
8,9	26.3	21.7	22	21.6	21.4	21.6	21.4	20.7	21	20.6	21.1	21.4	21.2	21.7	22	21.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	28.5	23.4	23.7	23.3	23.3	23.5	23.2	21.8	22.2	21.9	22.1	22.5	22.2	23.3	23.7	23.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10,11	30.6	25	25.4	24.9	25.1	25.5	25.2	23.6	23.9	23.6	23.3	23.7	23.3	25.1	25.4	25	0	10	0	0	6	0	0	0	0	0	0	0	0	4	0
11,12	32	26.5	27	26.6	26.6	27	26.7	24.5	24.9	24.6	24.8	25.2	24.9	26.6	26.9	26.6	0	20	0	0	10	0	0	4	0	0	5	0	0	5	0
12,13	34.5	27.3	27.8	27.3	27.4	27.7	27.3	25.7	26	25.6	26.8	27.3	26.9	27.3	27.7	27.4	0	25	0	0	20	0	0	5	0	0	5	0	0	8	0
13,14	35	28.3	28.7	28.4	28	28.4	28	27.2	27.6	27.2	27.5	27.9	27.4	27.7	28.2	27.8	0	13	0	0	11	0	0	5	0	0	5	0	0	10	0
14,15	35.3	29.8	30.3	29.8	28.9	29.4	28.9	28.8	29.1	28.7	28.6	29	28.7	28.5	28.9	28.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15,16	34	29.5	29.9	29.6	28.3	28.7	28.3	27.9	28.3	27.9	28	28.4	28.1	28	28.4	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

3/17		M-7			M-8			M-9			M-10			M-11		
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III
8,9	26	20.7	21	20.6	20.4	20.7	20.4	20.7	21	20.6	21.1	21.4	21.2	21.7	22	21.7
9,10	28.5	22.4	22.7	22.3	22.3	22.5	22.2	21.8	22.2	21.9	22.1	22.5	22.2	23.3	23.7	23.2
10,11	30.6	24	24.4	23.9	24.1	24.5	24.2	23.6	23.9	23.6	23.7	24	23.7	25.1	25.4	25
11,12	32.2	25.9	26.3	25.9	25.6	26	25.7	24.5	24.9	24.6	25.2	25.5	25	26.6	26.9	26.6
12,13	34.5	27.3	27.8	27.3	27.4	27.7	27.3	25.7	26	25.6	26.8	27.3	26.9	27.3	27.7	27.4
13,14	35.5	28.7	29	28.7	28.4	28.9	28.5	27.2	27.6	27.2	28	28.4	27.9	28.2	28.5	28.1
14,15	36.3	30.3	30.7	30.3	29.4	29.9	29.5	28.8	29.1	28.7	28.9	29.1	28.7	28.5	28.9	28.5
15,16	35	29.7	30	29.7	29	29.4	28.9	27.9	28.3	27.9	28	28.4	28.1	28	28.4	28
3/20																
8,9	31.6	26.2	26.5	26.1	26.1	26.4	26.1	26	26.3	26	26.2	26.4	26.2	26	26.3	26
9,10	32.8	27.6	28	27.7	27.6	27.9	27.5	27.1	27.5	27.1	27.2	27.6	27.3	27.2	27.5	27.2
10,11	34	29.7	30	29.6	28.7	29	28.6	28.3	28.7	28.3	28	28.4	28.1	28.4	28.8	28.4
11,12	34.8	30.7	31.2	30.8	29.7	30.1	29.8	29	29.4	28.9	29.2	29.6	29.3	29.2	29.5	29.2
12,13	35.6	32.7	33	32.6	31.3	31.6	31.2	30.1	30.5	30.1	30	30.4	30.1	30.5	30.9	30.5
13,14	36	33.6	34	33.7	32.1	32.4	32	31	31.4	31	30.6	31	30.7	31.4	31.9	31.4
14,15	34.4	33.8	34.2	33.7	31.6	32	31.7	30	30.4	30	30	30.4	30.1	32.3	32.7	32.3
15,16	32	32.6	33	32.7	30.6	31	30.7	29	29.3	29	29.2	29.5	29.1	31.8	32.2	31.8
3/21																
8,9	29.2	22.3	22.6	22.3	22	22.3	22	21.8	22.2	21.9	22	22.3	22	22.1	22.4	22.1
9,10	31	23.9	24.3	23.9	23.8	24.2	23.8	23.4	23.7	23.4	23.3	23.6	23.3	23.1	23.4	23
10,11	32.4	25.6	26	25.5	25.3	25.7	25.2	24.5	24.9	24.5	24.4	24.8	24.4	24.6	24.9	24.6
11,12	33.9	27.1	27.6	27.2	27	27.4	27	25.7	26	25.6	25.5	25.9	25.6	25.3	25.7	25.4
3/22																
8,9	28.8	22.4	22.7	22.3	22.3	22.5	22.2	21.8	22.2	21.9	22.1	22.5	22.2	23.3	23.7	23.2
9,10	30.6	24	24.4	23.9	24.1	24.5	24.2	23.6	23.9	23.6	23.7	24	23.7	25.1	25.4	25
10,11	31.4	25.9	26.3	25.9	25.6	26	25.7	24.5	24.9	24.6	25.2	25.5	25	26.6	26.9	26.6
11,12	32.8	27.3	27.8	27.3	27.4	27.7	27.3	25.7	26	25.6	26.8	27.3	26.9	27.3	27.7	27.4
12,13	34.1	28.7	29	28.7	28.4	28.9	28.5	27.2	27.6	27.2	28	28.4	27.9	28.2	28.5	28.1
13,14	36	30.3	30.7	30.3	29.4	29.9	29.5	28.8	29.1	28.7	28.9	29.1	28.7	28.5	28.9	28.5
14,15	37	32	32.5	32.1	31	31.4	30.9	30.2	30.6	30.1	30.1	30.5	30.1	29.9	30.4	30
15,16	35.6	32.6	33	32.7	31.6	32	31.7	30.5	30.9	30.5	30.5	30.9	30.5	30.8	31.2	30.8
3/24																
8,9	26.7	20.8	21.1	20.7	20.5	20.7	20.4	20.7	21.1	20.6	21.1	21.4	21.2	21.7	22	21.7
9,10	28	22.4	22.7	22.4	22.3	22.6	22.2	21.8	22.3	21.9	22.2	22.5	22.2	23.2	23.7	23.2
10,11	29.9	24	24.4	24	24.2	24.5	24.2	23.6	24	23.6	23.7	24.1	23.7	25.1	25.4	25
11,12	32	25.9	26.4	26	25.6	26.1	25.7	24.5	25	24.6	25.2	25.6	25.1	26.4	26.8	26.5
3/25																
8,9	26.7	22.7	23	22.6	22.6	22.8	22.5	22.1	22.5	22.2	22.4	22.8	22.5	23.6	24	23.5
9,10	28	24.3	24.7	24.3	24.4	24.8	24.5	23.9	24.2	23.9	24	24.3	24	25.4	25.7	25.3
10,11	29.6	26.3	26.7	26.3	26	26.4	26	24.8	25.2	24.9	25.5	25.8	25.3	26.9	27.2	26.9
11,12	31	27.6	28	27.6	27.7	28	27.6	26	26.3	25.9	27.1	27.6	27.2	27.6	28	27.7
12,13	32.2	29.1	29.4	29	28.8	29.2	28.8	27.5	27.9	27.5	28.3	28.7	28.2	28.5	28.8	28.4
13,14	33.4	30.6	31	30.6	29.7	30.3	29.8	29.1	29.4	29	29.2	29.4	29	28.8	29.2	28.8
14,15	34.8	32.3	32.8	32.4	31.3	31.7	31.2	30.5	30.9	30.4	30.4	30.8	30.4	30.2	30.7	30.3
15,16	35.6	32.9	33.4	33	31.9	32.4	32	30.8	31.2	30.8	30.8	31.2	30.8	31.1	31.5	31.1
3/26																
8,9	26.8	20.7	21.1	20.7	20.4	20.6	20.4	20.7	21	20.6	21.1	21.3	21.1	21.7	22	21.7
9,10	28.2	22.3	22.6	22.4	22.3	22.7	22.2	21.8	22.2	21.9	22.1	22.5	22.2	23.2	23.6	23.2
10,11	30.1	24.1	24.4	24	24.1	24.5	24.2	23.7	24	23.6	23.7	24	23.7	25.1	25.4	25
11,12	32.3	25.8	26.2	25.7	25.7	26.1	25.7	24.6	25	24.6	25.2	25.5	25.1	26.4	26.8	26.4
3/28																
8,9	30.4	29.1	29.4	29	28.8	29.2	28.8	27.5	27.9	27.5	28.3	28.7	28.2	28.5	28.8	28.4
9,10	32	30.6	31	30.6	29.7	30.3	29.8	29.1	29.4	29	29.2	29.4	29	28.8	29.2	28.8
10,11	33.6	32.3	32.8	32.4	31.3	31.7	31.2	30.5	30.9	30.4	30.4	30.8	30.4	30.2	30.7	30.3
11,12	35.5	32.9	33.4	33	31.9	32.4	32	30.8	31.2	30.8	30.8	31.2	30.8	31.1	31.5	31.1

3/17	M-7			M-8			M-9			M-10			M-11		
TIME	S_{tw}	S_{tg}	S_{tc}	S_{tw}	S_{tg}	S_{tc}	S_{tw}	S_{tg}	S_{tc}	S_{tw}	S_{tg}	S_{tc}	S_{tw}	S_{tg}	S_{tc}
8,9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10,11	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0
11,12	0	20	0	0	10	0	0	0	0	0	5	0	0	5	0
12,13	0	22	0	0	20	0	0	5	0	0	5	0	0	5	0
13,14	0	10	0	0	10	0	0	0	0	0	5	0	0	8	0
14,15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15,16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/20															
8,9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10,11	0	10	0	0	6	0	0	0	0	0	0	0	0	0	0
11,12	0	17	0	0	8	0	0	0	0	0	2	0	0	5	0
12,13	0	20	0	0	9	0	0	0	0	0	2	0	0	6	0
13,14	0	10	0	0	6	0	0	0	0	0	0	0	0	0	0
14,15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15,16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/21															
8,9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10,11	0	10	0	0	6	0	0	0	0	0	0	0	0	0	0
11,12	0	17	0	0	8	0	0	0	0	0	2	0	0	5	0
3/22															
8,9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10,11	0	10	0	0	6	0	0	0	0	0	0	0	0	0	0
11,12	0	17	0	0	8	0	0	0	0	0	0	0	0	0	0
12,13	0	20	0	0	9	0	0	0	0	0	0	0	0	0	0
13,14	0	10	0	0	6	0	0	0	0	0	0	0	0	0	0
14,15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15,16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/24															
8,9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10,11	0	10	0	0	6	0	0	0	0	0	0	0	0	0	0
11,12	0	17	0	0	8	0	0	0	0	0	0	0	0	0	0
3/25															
8,9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10,11	0	10	0	0	5	0	0	0	0	0	0	0	0	0	0
11,12	0	15	0	0	7	0	0	0	0	0	0	0	0	0	0
12,13	0	20	0	0	8	0	0	0	0	0	0	0	0	0	0
13,14	0	10	0	0	6	0	0	0	0	0	0	0	0	0	0
14,15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15,16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/26															
8,9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10,11	0	10	0	0	5	0	0	0	0	0	0	0	0	0	0
11,12	0	15	0	0	7	0	0	0	0	0	0	0	0	0	0
3/28															
8,9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10,11	0	8	0	0	5	0	0	0	0	0	0	0	0	0	0
11,12	0	12	0	0	5	0	0	0	0	0	0	0	0	0	0

3/29		M-7			M-8			M-9			M-10			M-11			M-7			M-8			M-9			M-10			M-11		
TIME	T_s	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_{hw}	S_{lg}	S_{le}	S_{hw}	S_{lg}	S_{le}	S_{hw}	S_{lg}	S_{le}	S_{hw}	S_{lg}	S_{le}	S_{hw}	S_{lg}	S_{le}
8,9	31	27	27.3	27	26.5	26.9	26.6	26.8	27	26.8	26.6	26.8	26.6	26.5	26.8	26.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	32.3	28.3	28.6	28.3	27.6	28	27.7	28	28.3	28	27.6	27.8	27.5	27.7	28	27.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10,11	33.2	29.6	30	29.7	29	29.4	29.1	28.6	29.1	28.7	28.6	29	28.5	28.6	28.9	28.5	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0
11,12	34	31	31.4	31	30.2	30.6	30.3	30.2	30.5	30.1	29.8	30.2	29.7	29.5	30	29.6	0	10	0	0	3	0	0	0	0	0	0	0	0	0	0
12,13	35	32	32.3	32	31.2	31.5	31.1	31	31.4	31.1	30.7	31	30.6	30.5	30.8	30.4	0	15	0	0	5	0	0	0	0	0	0	0	0	0	0
13,14	36.7	33.2	33.6	33.3	32.3	32.6	32.2	32.1	32.5	32.2	31.6	32	31.6	31.7	32	31.6	0	7	0	0	2	0	0	0	0	0	0	0	0	0	0
14,15	36.4	34	34.3	33.9	33.4	33.8	33.5	33.3	33.6	33.2	33.4	33.8	33.5	32.5	33	32.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15,16	34	33.2	33.5	33.2	32.6	33	32.7	32	32.4	32	32.1	32.5	32.2	32	32.3	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/31																															
8,9	30.4	28.3	28.6	28.3	27.6	28	27.7	28	28.3	28	27.6	27.8	27.5	27.7	28	27.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	32	29.6	30	29.7	29	29.4	29.1	28.6	29.1	28.7	28.6	29	28.5	28.6	28.9	28.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10,11	33.6	32	32.3	32	31.2	31.5	31.1	31	31.4	31.1	30.7	31	30.6	30.5	30.8	30.4	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0
11,12	35.5	33.2	33.6	33.3	32.3	32.6	32.2	32.1	32.5	32.2	31.6	32	31.6	31.7	32	31.6	0	10	0	0	5	0	0	0	0	0	0	0	0	0	0
4/2																															
8,9	32.2	29.6	30	29.7	29	29.4	29.1	28.6	29.1	28.7	28.6	29	28.5	28.6	28.9	28.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	34	32	32.3	32	31.2	31.5	31.1	31	31.4	31.1	30.7	31	30.6	30.5	30.8	30.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10,11	35.8	33.2	33.6	33.3	32.3	32.6	32.2	32.1	32.5	32.2	31.6	32	31.6	31.7	32	31.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11,12	37.3	34.4	34.8	34.5	33.5	33.8	33.4	33.3	33.6	33.3	32.5	32.8	32.4	32.7	33.1	32.7	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0
4/3																															
8,9	32.2	28.8	29	28.8	28.9	29.1	28.9	28.1	28.4	28.1	28.3	28.6	28.3	28.4	28.1	28.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	33.7	29.6	30	29.7	29.7	30	29.6	29.4	29.7	29.3	29.2	29.5	29.1	29.6	30	29.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10,11	35	31.2	31.6	31.3	31.2	31.5	31.1	31	31.4	31	30.5	30.8	30.4	30.6	31	30.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11,12	36	32	32.3	32	32	32.3	32	31.2	31.6	31.3	31	31.3	31	31.2	31.5	31.1	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0
12,13	37.1	33.1	33.4	33.1	33	33.4	33	32.2	32.5	32.1	31.6	32	31.7	32.2	32.6	32.2	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0
13,14	38.8	34.2	34.6	34.3	34.2	34.6	34.3	33.1	33.5	33.2	32.9	33.3	32.9	33.3	33.7	33.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14,15	40	35	35.3	35	35.1	35.5	35.1	34	34.4	34	33.6	34	33.7	34	34.4	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15,16	41.3	36.1	36.6	36.2	36.1	36.4	36.1	34.2	34.7	34.3	34.2	34.5	34.2	34.7	35.1	34.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/4																															
8,9	30	28.6	29	28.7	28.4	28.8	28.5	28.3	28.7	28.4	28.2	28.5	28.2	28.6	28.9	28.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	31.7	30	30.3	30	29.7	30.1	29.7	30	30.4	30.1	29.7	30.1	29.8	29.5	29.8	29.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10,11	33	31.2	31.6	31.3	31.3	31.6	31.2	31.1	31.5	31.2	30.6	31	30.6	30.7	31	30.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11,12	34.3	32.4	32.8	32.5	32.5	32.8	32.4	32.3	32.6	32.3	31.5	31.8	31.4	31.7	32.1	31.7	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0
4/5																															
9,10	33.5	29.5	29.8	29.7	29.6	30	29.6	29.3	29.7	29.3	29.1	29.5	29.1	29.5	30	29.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10,11	34.8	31.1	31.4	31.3	31.1	31.5	31.1	30.9	31.4	31	30.4	30.8	30.4	30.5	31	30.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11,12	35.6	31.9	32.3	32	31.9	32.3	32	31.1	31.6	31.3	30.9	31.3	31	31.1	31.5	31.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12,13	37	33	33.4	33.1	32.9	33.4	33	32.1	32.5	32.1	31.5	32	31.7	32.1	32.6	32.2	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0
13,14	38.6	34.1	34.6	34.3	34.1	34.6	34.3	33	33.5	33.2	32.8	33.3	32.9	33.2	33.7	33.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14,15	39.8	34.9	35.3	35	35	35.5	35.1	33.9	34.4	34	33.5	34	33.7	39.9	34.4	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15,16	41.1	36	36.5	36.2	36	36.4	36.1	34.1	34.5	34.3	34.1	34.5	34.2	34.6	35	34.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4/7																															
8,9	35.5	30.6	31	30.7	30.4	30.8	30.5	30.3	30.7	30.4	30.2	30.5	30.2	30.6	30.9	30.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	36.8	32	32.3	32	31.7	32.1	31.7	32	32.4	32.1	31.7	32.1	31.8	31.5	31.8	31.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10,11	37	33.2	33.6	33.3	33.3	33.6	33.2	33.1	33.5	33.2	32.6	33	32.6	32.7	33	32.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11,12	37.6	34.4	34.8	34.5	34.5	34.8	34.4	34.3	34.6	34.3	33.5	33.8	33.4	33.7	34.1	33.7	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0
4/8																															
8,9	34	29.5	29.8	29.7	29.6	30	29.6	29.3	29.7	29.3	29.1	29.5	29.1	29.5	30	29.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9,10	35.1	31.1	31.4	31.3	31.1	31.5	31.1	30.9	31.4	31	30.4	30.8	30.4	30.5	31	30.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10,11	36.2	31.9	32.3	32	31.9	32.3	32	31.1	31.6	31.3	30.9	31.3	31	31.1	31.5	31.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11,12	37.7	33	33.4	33.1	32.9	33.4	33	32.1	32.5	32.1	31.5	32	31.7	32.1	32.6	32.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12,13	38	34.1	34.6	34.3	34.1	34.6	34.3	33	33.5	33.2	32.8	33.3	32.9	33.2	33.7	33.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13,14	39.1	34.9	35.3	35	35	35.5	35.1	33.9	34.4	34	33.5	34	33.7	39.9	34.4	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14,15	40.4	36	36.5	36.2	36	36.4	36.1	34.1	34.5	34.3	34.1	34.5	34.2	34.6	35	34.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15,16	41.1	37.2	37.5	37.1	37.1	37.4	37	35.2	35.5	35.1	35.2	35.6	35.1	35.7	36	35.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

4/9		M-7			M-8			M-9			M-10			M-11			M-7	M-8	M-9	M-10	M-11
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_i	S_i	S_i	S_i	S_i
8,9	34.5	30.5	30.8	30.5	30.4	30.8	30.5	30.3	30.7	30.4	30.2	30.5	30.2	30.6	30.9	30.5	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
9,10	35.7	31.8	32.2	31.9	31.7	32.1	31.7	32	32.4	32.1	31.7	32.1	31.8	31.5	31.8	31.4	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
10,11	37	33.1	33.5	33.1	33	33.4	33	33.1	33.5	33.2	32.8	33.2	32.8	32.7	33	32.6	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
11,12	37.6	34.2	34.5	34.1	34.1	34.4	34	34.3	34.6	34.3	33.7	34	33.7	33.7	34.1	33.7	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
4/10																					
8,9	34.2	27.7	28.1	27.8	27.5	27.8	27.4	27.6	27.9	27.5	27.2	27.5	27.1	27.1	27.4	27.1	0	0	0	0	0
9,10	35.7	28.7	29	28.6	28.1	28.5	28.2	28.3	28.7	28.4	27.8	28.1	27.7	27.6	28	27.7	0	0	0	0	0
10,11	36.7	29.7	30.1	29.8	28.9	29.3	29	29.2	29.6	29.3	28.1	28.5	28.2	28	28.4	28.1	50	25.5	35	5	16
11,12	37.7	30.5	30.8	30.6	29.8	30.1	29.7	30	30.3	30	28.7	29.1	28.6	28.6	29	28.7	55	25	30	5	0
12,13	38.4	31.6	31.9	31.5	30.9	31.2	30.9	30.8	31.2	30.9	30	30.3	30	29.8	30.1	29.7	55	12.5	34.25	3	0.7
13,14	39.1	32.6	33	32.5	31.8	32.1	31.7	31.7	32	31.6	30.5	30.9	30.5	30 2	30.6	30.3	55	15	27.5	3	0.8
14,15	40.4	34.2	34.6	34.3	33	33.4	33.1	32.9	33.3	33	31	31.4	31	31.3	31.5	31.2	55	27.5	27.5	4	0
15,16	41	35.8	36.2	35.7	34.2	34.6	34.3	34.5	34.9	34.6	31.6	32.1	31.6	32	32.5	32	50	30	27	4	15
4/11																					
8,9	35.2	28.9	29.2	28.8	29.1	29.4	29	29	29.3	28.9	28.7	29.1	28.8	29.5	29.8	29.5	0	0	0	0	0
9,10	34.5	30.4	30.8	30.5	30.3	30.6	30.3	30.3	30.7	30.4	30.1	30.5	30.2	30.6	30.9	30.5	50	25	35	3	15
10,11	35.7	31.7	32.1	31.8	31.6	32	31.7	32	32.4	32.1	31.7	32.1	31.8	31.5	31.8	31.4	55	25	30	5	0
11,12	36.7	33	33.3	33	33	33.4	33	33.1	33.5	33.2	32.7	33.1	32.8	32.7	33	32.6	55	12	32	3	0
4/12																					
8,9	33	26.7	27	26.8	26.4	26.8	26.5	26.5	26.9	26.6	26.1	26.5	26.2	26	26.4	26.1	0	0	0	0	0
9,10	34.5	27.6	27.9	27.7	27.1	27.5	27.2	27.3	27.7	27.4	26.7	27.1	26.8	26.6	27	26.7	0	0	0	0	0
10,11	35.5	28.7	29	28.8	27.9	28.3	28	28.2	28.6	28.3	27.1	27.5	27.2	27	27.4	27.1	48	25	32	4	12
11,12	36.5	29.4	29.7	29.5	28.7	29.1	28.8	28.9	29.3	29	27.7	28.1	27.8	27.6	28	27.7	52	24	28	4	0
12,13	37.2	30.5	30.8	30.6	29.8	30.2	29.9	29.8	30.2	29.9	28.6	29	28.7	28.7	29.1	28.8	52	12	33	3	0
13,14	37.9	31.6	31.9	31.7	30.7	31.1	30.8	30.6	31	30.7	29.1	29.5	29.2	29.2	29.6	29.3	52	14	27	3	0
14,15	39.2	33.2	33.5	33.3	32	32.4	32.1	31.9	32.3	32	29.6	30	29.7	29.8	30.2	29.9	51	26	27	4	0
15,16	39.8	34.8	35.1	34.9	33.2	33.6	33.3	33.5	33.9	33.6	30.2	30.6	30.3	30.6	31	30.7	49	29	26	3	12
4/14																					
8,9	32.2	26.8	27.2	26.9	27.1	27.4	27	27	27.3	27.8	26.7	27.1	26.8	26.5	26.8	26.6	0	0	0	0	0
9,10	33.5	28.4	28.8	28.5	28.3	28.6	28.3	28.3	28.7	28.4	28.1	28.5	28.2	27.6	28	27.7	48	25	32	4	12
10,11	34.7	29.7	30.1	29.8	29.6	30	29.7	29	29.4	29.1	28.8	29.3	28.9	28.5	28.9	28.4	52	24	28	4	0
11,12	36	31	31.3	31	31	31.4	31	31.1	31.5	31.2	30.7	31.1	30.8	29.8	30.2	29.7	52	12	33	3	0
4/15																					
8,9	35.4	27.7	28	27.6	27.7	28	27.6	27.7	28	27.6	27.4	27.8	27.4	27.4	27.7	27.3	0	0	0	0	0
9,10	37.1	28.5	28.8	28.4	28.9	29.2	28.8	28.5	28.8	28.4	28.1	28.5	28.1	28.4	28.7	28.3	0	0	0	0	0
10,11	37.8	31.6	31.9	31.5	31	31.3	30.9	30.4	30.7	30.3	29.5	29.9	29.5	29.3	29.6	29.2	48	25	32	4	12
11,12	39.4	34.5	34.8	34.4	33	33.3	32.9	31.7	32	31.6	30.7	31.1	30.7	30.6	30.9	30.5	52	24	28	4	0
12,13	41.7	36.3	36.6	36.2	34.8	35.1	34.7	34.5	34.8	34.4	32.5	32.9	32.5	32.4	32.7	32.3	52	12	33	3	0
13,14	43.4	36.8	37.1	36.7	36.2	36.5	36.1	35.8	36.1	35.7	33.2	33.6	33.2	33.1	33.4	33	52	14	27	3	0
14,15	44.7	37.6	37.9	37.5	37.7	38	37.6	37.2	37.5	37.1	34.1	34.5	34.1	33.7	34	33.6	51	26	27	4	0
15,16	42.2	38.2	38.5	38.1	39.2	39.5	39.1	37.8	38.1	37.7	35.2	35.6	35.2	34.3	34.6	34.2	49	29	26	3	12
4/16																					
8,9	35	27.5	27.8	27.6	27.5	27.8	27.6	27.5	27.8	27.4	27.4	27.7	27.4	27.4	27.7	27.3	0	0	0	0	0
9,10	36.6	28.5	28.8	28.4	28.7	29.2	28.6	28.5	28.8	28.4	28.1	28.4	28.1	28.4	28.7	28.3	48	25	32	4	12
10,11	37.8	31.6	31.9	31.5	31	31.3	30.9	30.4	30.7	30.3	29.5	29.9	29.5	29.3	29.6	29.2	52	24	28	4	0
11,12	39.2	34.5	34.8	34.4	33	33.3	32.9	31.7	32	31.6	30.7	31.1	30.7	30.6	30.9	30.5	52	12	33	3	0
4/17																					
8,9	35.7	28.6	29	28.7	28.5	28.9	28.6	29	29.3	29	28.6	28.9	28.7	28.5	28.7	28.4	0	0	0	0	0
9,10	37.4	29.5	29.8	29.4	29.7	30.1	29.8	29.8	30.1	29.8	29.2	29.5	29.3	29.3	29.7	29.4	37.5	24.75	19.5	0	0
10,11	38.1	32.6	32.9	32.5	31.8	32.2	31.9	31.7	32.1	31.7	30.6	30.9	30.5	30.3	30.6	30.4	50	25	17.25	0	0
11,12	39.7	35.6	35.8	35.5	33.8	34.2	33.9	33	33.4	33	31.8	32.1	31.8	31.6	31.9	31.5	48.4	20.25	13.12	0	0
12,13	42	37.2	37.6	37.3	35.7	36	35.6	35.8	36.2	35.8	33.6	33.9	33.5	33.4	33.7	33.3	55	10	0	0	0
13,14	43.7	37.7	38.1	37.7	37	37.4	37.1	37.1	37.5	37.1	34.2	34.6	34.1	34.1	34.4	34.1	50	28	19.75	0	0
14,15	45	38.5	38.9	38.6	38.5	38.9	38.6	38.5	38.9	38.5	35	35.5	35.1	35	35.4	35	43.75	20	18	0	0
15,16	42.5	39.1	39.5	39.2	40.1	40.4	40	39.1	39.5	39.1	36.2	36.6	36.2	35.1	35.6	35.2	0	0	0	0	0

4/18		M-7			M-8			M-9			M-10			M-11			M-7	M-8	M-9	M-10	M-11
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_i	S_i	S_i	S_i	S_i
8,9	33.2	25.5	25.8	25.6	25.5	25.8	25.6	25.7	26.1	25.7	25.4	25.7	25.4	25.3	25.8	25.4	0	0	0	0	0
9,10	34.8	27	27.4	27	26.8	27.2	26.8	26.5	26.9	26.6	27.1	27.5	27.1	27.4	27.8	27.3	35	21	18	0	0
10,11	36.3	28.6	28.9	28.6	28.2	28.6	28.2	28.4	28.7	28.3	28.6	28.9	28.5	29	29.4	29.1	48	22	17	0	0
11,12	38	30.1	30.5	30.1	29.7	30.1	29.8	30.1	30.5	30.2	30	30.4	29.9	30.3	30.6	30.2	45	20	13	0	0
4/19																					
8,9	34.3	27.5	27.9	27.6	27.4	27.8	27.5	27.9	28.2	27.9	27.5	27.8	27.6	27.4	27.6	27.3	0	0	0	0	0
9,10	36	28.4	28.7	28.3	28.6	29	28.7	28.7	29	28.7	28.1	28.4	28.2	28.2	28.6	28.3	35	24.75	18	0	0
10,11	36.7	31.5	31.8	31.4	30.7	31.1	30.8	30.6	31	30.6	29.5	29.8	29.4	29.2	29.5	29.3	48	21	15	0	0
11,12	38.3	34.5	34.7	34.4	32.7	33.1	32.8	31.9	32.3	31.9	30.7	31	30.7	30.5	30.8	30.4	46	18	11	0	0
12,13	40.6	36.1	36.5	36.2	34.6	34.9	34.5	34.7	35.1	34.7	32.5	32.8	32.4	32.3	32.6	32.2	51	8	0	0	0
13,14	42.3	36.6	37	36.6	35.9	36.3	36	36	36.4	36	33.1	33.5	33	33	33.3	33	50	19	17	0	0
14,15	43.6	37.4	37.8	37.5	37.4	37.8	37.5	37.4	37.8	37.4	33.9	34.4	34	33.9	34.3	33.9	40	15	16	0	0
15,16	41.1	38	38.4	38.1	39	39.3	38.9	38	38.4	38	35.1	35.5	35.1	34	34.5	34.1	0	0	0	0	0
4/21																					
8,9	32.2	24.5	24.8	24.6	24.5	24.8	24.6	24.7	25.1	24.7	24.4	24.7	24.4	24.3	24.8	24.4	0	0	0	0	0
9,10	33.8	26	26.4	26	25.8	26.2	25.8	25.5	25.9	25.6	26.1	26.5	26.1	26.4	26.8	26.3	35	21	18	0	0
10,11	35.3	27.6	27.9	27.6	27.2	27.6	27.2	27.4	27.7	27.3	27.6	27.9	27.5	28	28.4	28.1	48	22	15	0	0
11,12	37	29.1	29.5	29.1	28.7	29.1	28.8	29.1	29.5	29.2	29	29.4	28.9	29.3	29.6	29.2	45	20	11	0	0
4/22																					
8,9	33.3	26.9	27.3	27	26.8	27.2	26.9	27.3	27.6	27.3	26.9	27.2	27	26.8	27	26.7	0	0	0	0	0
9,10	35	27.8	28.1	27.7	28	28.4	28.1	28.1	28.4	28.1	27.5	27.8	27.6	27.6	28	27.7	32	24	18	0	0
10,11	35.7	30.9	31.2	30.8	30.1	30.5	30.2	30	30.4	30	28.9	29.2	28.8	28.6	28.9	28.7	45	20	15	0	0
11,12	37.3	33.9	34.1	33.8	32.1	32.5	32.2	31.3	31.7	31.3	30.1	30.4	30.1	29.9	30.2	29.8	43	18	11	0	0
12,13	39.6	35.5	35.9	35.6	34	34.3	33.9	34.1	34.5	34.1	31.9	32.2	31.8	31.7	32	31.6	50	8	0	0	0
13,14	41.3	36	36.4	36	35.3	35.7	35.4	35.4	35.8	35.4	32.5	32.9	32.4	32.4	32.7	32.4	50	19	15	0	0
14,15	42.6	36.8	37.2	36.9	36.8	37.2	36.9	36.8	37.2	36.8	33.3	33.8	33.4	33.3	33.7	33.3	40	15	14	0	0
15,16	41.1	37.4	37.8	37.5	38.4	38.7	38.3	37.4	37.8	37.4	34.5	34.9	34.5	33.4	33.9	33.5	0	0	0	0	0
4/23																					
8,9	34.2	27.5	27.9	27.6	27.4	27.8	27.5	27.9	28.2	27.9	27.5	27.8	27.6	27.4	27.6	27.3	0	0	0	0	0
9,10	35.8	28.4	28.7	28.3	28.6	29	28.7	28.7	29	28.7	28.1	28.4	28.2	28.2	28.6	28.3	25	25	16.25	0	0
10,11	36.7	31.5	31.8	31.4	30.7	31.1	30.8	30.6	31	30.6	29.5	29.8	29.4	29.2	29.5	29.3	37.5	18	11	0	0
11,12	38.3	34.5	34.7	34.4	32.7	33.1	32.8	31.9	32.3	31.9	30.7	31	30.7	30.5	30.8	30.4	40.6	18	10.5	0	0
4/24																					
8,9	37.4	29.9	30.3	30	29.3	29.5	29.3	29.3	29.6	29.2	28.6	28.9	28.5	28.8	29.2	28.8	0	0	0	0	0
9,10	38.7	31.6	31.8	31.5	30.5	30.8	30.5	30.5	30.9	30.6	29.2	29.5	29.1	29.5	29.8	29.5	25	25	16.25	0	0
10,11	40	33.7	34.1	33.8	31.4	31.8	31.5	31	31.4	31	29.7	30.1	29.8	30	30.4	30	37.5	18	11	0	0
11,12	41.2	34.6	35	34.7	33	33.5	33.2	32.2	32.7	32.3	31	31.3	30.9	31.3	31.8	31.4	40.6	18	10.5	0	0
12,13	43.9	37	37.4	37.1	35.2	35.6	35.2	34.5	34.8	34.4	31.8	32.2	31.9	32.2	32.6	32.2	44	5	0	0	0
13,14	44.4	38.6	39	38.7	37.7	38.1	37.8	36.6	36.9	36.5	33.6	33.8	33.5	33.6	34	33.5	52.25	18.58	15	0	0
14,15	46	40	40.5	40.1	39	39.5	39.1	37.6	38	37.7	34	34.4	34.1	34	34.5	34.1	37.5	11	11	0	0
15,16	44	41.1	41.5	41.2	40	40.4	40.1	39.2	39.5	39.1	35	35.4	35	35	35.4	34.9	0	0	0	0	0
4/25																					
8,9	38.7	31.6	31.8	31.5	31.4	31.8	31.5	31	31.4	31	29.7	30.1	29.8	30	30.4	30	0	0	0	0	0
9,10	40	33.7	34.1	33.8	33	33.5	33.2	32.2	32.7	32.3	31	31.3	30.9	31.3	31.8	31.4	22	22	15	0	0
10,11	41.2	34.6	35	34.7	34.1	34.4	34	33.9	34.2	33.8	33.3	33.8	33.4	33.3	33.7	33.3	35	18	8	0	0
11,12	42.6	36.8	37.2	36.9	35.8	36.4	35.9	35	35.4	34.9	34.7	35.1	34.7	34.6	34.9	34.5	38	10	7	0	0
4/26																					
8,9	38.4	30.6	30.9	30.6	30	30.2	30	30	30.3	29.9	29.3	29.6	29.2	29.5	29.9	29.5	0	0	0	0	0
9,10	39.7	32.3	32.4	32.1	31.2	31.5	31.2	31.2	31.6	31.3	29.9	30.2	29.8	30.2	30.5	30.2	20	25	15	0	0
10,11	41	34.4	34.7	34.4	32.1	32.5	32.2	31.7	32.1	31.7	30.4	30.8	30.5	30.7	31.1	30.7	32	17	6	0	0
11,12	42.2	35.3	35.6	35.3	33.7	34.2	33.9	32.9	33.4	33	31.7	32	31.6	32	32.5	32.1	35	15	5	0	0
12,13	44.9	37.7	38	37.7	35.9	36.3	35.9	35.2	35.5	35.1	32.5	32.9	32.6	32.9	33.3	32.9	40	5	0	0	0
13,14	45.4	39.3	39.6	39.3	38.4	38.8	38.5	37.3	37.6	37.2	34.3	34.5	34.2	34.3	34.7	34.2	47	15	5	0	0
14,15	47	40.7	41.1	40.7	39.7	40.2	39.8	38.3	38.7	38.4	34.7	35.1	34.8	34.7	35.2	34.8	30	11	6	0	0
15,16	45	41.8	42.1	41.8	40.7	41.1	40.8	39.9	40.2	39.8	35.7	36.1	35.7	35.7	36.1	35.6	0	0	0	0	0

4/28		M-7			M-8			M-9			M-10			M-11			M-7	M-8	M-9	M-10	M-11
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_i	S_i	S_i	S_i	S_i
8,9	38	30.9	31.1	30.8	30.7	31.1	30.8	30.6	30.9	30.7	30.7	31	30.7	30.3	30.8	30.4	0	0	0	0	0
9,10	39.3	32.7	33.1	32.8	32.4	32.8	32.5	31.6	32	31.7	31.3	31.6	31.3	31.5	31.9	31.6	18	22	15	0	0
10,11	40.5	33.9	34.3	34	33	33.4	33	32.8	33.2	32.7	32.6	33	32.7	32.7	33.1	32.7	30	15	5	0	0
11,12	41.9	35.1	35.5	35.2	34.8	35.2	34.8	34	34.4	34.1	33.8	34.2	33.7	33.9	34.3	33.9	32	10	3	0	0
4/29																					
8,9	38	30.2	30.5	30.2	29.6	29.8	29.6	29.6	29.9	29.5	28.9	29.2	28.8	29.1	29.5	29.1	0	0	0	0	0
9,10	39.3	31.9	32	31.7	30.8	31.1	30.8	30.8	31.2	30.9	29.5	29.8	29.4	29.8	30.1	29.8	20	25	15	0	0
10,11	40.6	34	34.3	34	31.7	32.1	31.8	31.3	31.7	31.3	30	30.4	30.1	30.3	30.7	30.3	32	17	6	0	0
11,12	41.8	34.9	35.2	34.9	33.3	33.8	33.5	32.5	33	32.6	31.3	31.6	31.2	31.6	32.1	31.7	35	15	5	0	0
12,13	44.5	37.3	37.6	37.3	35.5	35.9	35.5	34.8	35.1	34.7	32.1	32.5	32.2	32.5	32.9	32.5	40	5	0	0	0
13,14	45	38.9	39.2	38.9	38	38.4	38.1	36.9	37.2	36.8	33.9	34.1	33.8	33.9	34.3	33.8	47	15	5	0	0
14,15	46.6	40.3	40.7	40.3	39.3	39.8	39.4	37.9	38.3	38	34.3	34.7	34.4	34.3	34.8	34.4	30	11	6	0	0
15,16	44.6	41.4	41.7	41.4	40.3	40.7	40.4	39.5	39.8	39.4	35.3	35.7	35.3	35.3	35.7	35.2	0	0	0	0	0
4/30																					
8,9	38.2	29.2	29.5	29.3	28.9	29.2	29	28.9	29.2	28.8	28.5	28.7	28.3	28.7	29.1	28.8	0	0	0	0	0
9,10	39	31.6	31.9	31.7	30.9	31.2	31	31	31.3	30.9	29.8	30	29.6	29.7	30.1	29.8	12.5	17.5	15	0	0
10,11	40.5	34	34.3	34.1	31.8	32.1	31.9	31.8	32.1	31.7	30.3	30.5	30.1	29.9	30.3	30	25	14.5	5	0	0
11,12	42	35.3	35.6	35.4	32.8	33.1	32.9	32.8	33.1	32.7	31	31.2	30.8	31.1	31.5	31.2	38.5	9	0	0	0
12,13	44.2	37.8	38.1	37.9	35.2	35.5	35.3	34.4	34.7	34.3	31.8	32	31.6	31.8	32.2	31.9	27.5	3	0	0	0
13,14	45	39.6	39.9	39.7	38.9	39.2	39	37.6	37.9	37.5	33.8	34	33.6	33.9	34.3	34	37.8	8	0	0	0
14,15	46.8	41.1	41.4	41.2	40.4	40.7	40.5	38.9	39.2	38.8	34.8	35	34.6	34.8	35.2	34.9	25	10.5	2.25	0	0
15,16	45	42.3	42.6	42.4	41.3	41.6	41.4	40	40.3	39.9	35.4	35.6	35.2	35.3	35.7	35.4	0	0	0	0	0
5/1																					
8,9	37.5	28.2	28.5	28.1	27.9	28.2	27.8	28.3	28.6	28.2	28.2	28.5	28.1	27.7	28.2	27.8	0	0	0	0	0
9,10	38.7	30.2	30.5	30.1	29.7	30	29.6	29.7	30	29.6	29.2	29.5	29.1	28.8	29.3	28.9	10	12	10	0	0
10,11	39.8	32.7	33	32.6	31	31.3	30.9	30.7	31	30.6	30.1	30.4	30	29.7	30.2	29.8	20	12	8	0	0
11,12	41.6	34.2	34.5	34.1	32.3	32.6	32.2	32.1	32.4	32	30.7	31	30.6	30.6	31.1	30.7	30	6	0	0	0
12,13	43.5	36.5	36.8	36.4	33.4	33.7	33.3	32.8	33.1	32.7	31.4	31.7	31.3	31.4	31.9	31.5	22	3	0	0	0
13,14	45.3	38.2	38.5	38.1	34.9	35.2	34.8	34	34.3	33.9	32.3	32.6	32.2	32.2	32.7	32.3	30	4	0	0	0
14,15	45.8	40.3	40.6	40.2	36.2	36.5	36.1	35.2	35.5	35.1	32.2	32.5	32.1	33	33.5	33.1	20	6	2.5	0	0
15,16	45.5	42.1	42.4	42	37.9	38.2	37.8	35.8	36.1	35.7	33.7	34	33.6	33.5	34	33.6	0	0	0	0	0
5/2																					
8,9	37.9	28.5	28.9	28.4	28.3	28.6	28.9	28.7	29	28.5	28.6	28.9	28.5	28.1	28.6	28.2	0	0	0	0	0
9,10	39.1	30.5	30.9	30.4	30.1	30.4	30.7	30.1	30.4	29.9	29.6	29.9	29.5	29.2	29.7	29.3	7	7	0	0	0
10,11	40.2	33	33.4	32.9	31.4	31.7	32	31.1	31.4	30.9	30.5	30.8	30.4	30.1	30.6	30.2	20	4.5	2.5	0	0
11,12	42	34.5	34.9	34.4	32.7	33	33.3	32.5	32.8	32.3	31.1	31.4	31	31	31.5	31.1	30	1.4	0	0	0
12,13	43.9	36.8	37.2	36.7	33.8	34.1	34.4	33.2	33.5	33	31.8	32.1	31.7	31.8	32.3	31.9	25	1	0	0	0
13,14	45.7	38.5	38.9	38.4	35.3	35.6	35.9	34.4	34.7	34.2	32.7	33	32.6	32.6	33.1	32.7	30	1.5	0	0	0
14,15	46.2	40.6	41	40.5	36.6	36.9	37.2	35.6	35.9	35.4	32.6	32.9	32.5	33.4	33.9	33.5	20	4.5	2.5	0	0
15,16	45.9	42.4	42.8	42.3	38.3	38.6	38.9	36.2	36.5	36	34.1	34.4	34	33.9	34.4	34	0	0	0	0	0
5/3																					
8,9	39	29.7	30	29.6	29.4	29.7	29.3	29.8	30.1	29.7	29.7	30	29.6	29.2	29.5	29.1	0	0	0	0	0
9,10	40.2	31.7	32	31.6	31.2	31.5	31.1	31.2	31.5	31.1	30.7	31	30.6	30.3	30.6	30.2	7	7	0	0	0
10,11	41.3	34.2	34.5	34.1	32.5	32.8	32.4	32.2	32.5	32.1	31.6	31.9	31.5	31.2	31.5	31.1	20	4.5	2.5	0	0
11,12	43.1	35.7	36	35.6	33.8	34.1	33.7	33.6	33.9	33.5	32.2	32.5	32.1	32.1	32.4	32	30	1.4	0	0	0
12,13	45	38	38.3	37.9	34.9	35.2	34.8	34.3	34.6	34.2	32.9	33.2	32.8	32.9	33.2	32.8	25	1	0	0	0
13,14	46.8	39.7	40	39.6	36.4	36.7	36.3	35.5	35.8	35.4	33.8	34.1	33.7	33.7	34	33.6	30	1.5	0	0	0
14,15	47.3	41.8	42.1	41.7	37.7	38	37.6	36.7	37	36.6	33.7	34	33.6	34.5	34.8	34.4	20	4.5	2.5	0	0
15,16	47	43.6	43.9	43.5	39.4	39.7	39.3	37.3	37.6	37.2	35.2	35.5	35.1	35	35.3	34.9	0	0	0	0	0

5/5		M-7			M-8			M-9			M-10			M-11			M-7	M-8	M-9	M-10	M-11
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_i	S_i	S_i	S_i	S_i
8,9	38	28.6	29	28.5	28.3	28.7	28.2	28.7	29.1	28.6	28.6	29	28.5	28.1	28.5	28	0	0	0	0	0
9,10	39.2	30.6	31	30.5	30.1	30.5	30	30.1	30.5	30	29.6	30	29.5	29.2	29.6	29.1	5	5	0	0	0
10,11	40.3	33.1	33.5	33	31.4	31.8	31.3	31.1	31.5	31	30.5	30.9	30.4	30.1	30.5	30	20	4	1	0	0
11,12	42.2	34.6	35	34.5	32.7	33.1	32.6	32.5	32.9	32.4	31.1	31.5	31	31	31.4	30.9	30	0	0	0	0
12,13	44	36.9	37.3	36.8	33.8	34.2	33.7	33.2	33.6	33.1	31.8	32.2	31.7	31.8	32.2	31.7	25	0	0	0	0
13,14	45.8	38.6	39	38.5	35.3	35.7	35.2	34.4	34.8	34.3	32.7	33.1	32.6	32.6	33	32.5	30	0	0	0	0
14,15	46.3	40.7	41.1	40.6	36.6	37	36.5	35.6	36	35.5	32.6	33	32.5	33.4	33.8	33.3	20	4	1	0	0
15,16	46	42.5	42.9	42.4	38.3	38.7	38.2	36.2	36.6	36.1	34.1	34.5	34	33.9	34.3	33.8	0	0	0	0	0
5/6																					
8,9	38.4	28.9	29.2	28.8	28.6	28.9	28.5	28.9	29.3	28.8	28.9	29.2	28.8	28.3	28.7	28.4	0	0	0	0	0
9,10	39.6	30.8	31.2	30.8	30.4	30.7	30.3	30.4	30.7	30.3	29.8	30.2	29.9	29.4	29.8	29.3	5	5	0	0	0
10,11	40.7	33.4	33.7	33.5	31.6	32	31.7	31.5	31.7	31.4	30.7	31.1	30.6	30.4	30.7	30.3	18	3	1	0	0
11,12	42.6	34.7	35.2	34.8	32.9	33.3	32.8	32.7	33.1	32.6	31.4	31.7	31.3	31.3	31.6	31.2	27	0	0	0	0
12,13	44.4	37.1	37.5	37	34	34.4	33.9	33.5	33.8	33.4	32	32.4	31.9	31.9	32.4	32	22	0	0	0	0
13,14	46.2	38.8	39.2	38.9	35.5	35.9	35.4	34.6	35	34.7	32.8	33.3	32.9	32.8	33.2	32.9	27	0	0	0	0
14,15	46.7	40.9	41.3	41	36.8	37.2	36.9	35.8	36.2	35.7	32.7	33.2	32.8	33.7	34	33.6	18	3	1	0	0
15,16	46.4	42.7	43.1	42.6	38.5	38.9	38.6	36.5	36.8	36.4	34.4	34.7	34.3	34	34.5	34.1	0	0	0	0	0
5/7																					
8,9	38.8	29.1	29.4	29	28.8	29.1	28.7	29.1	29.5	29	29.1	29.4	29	28.5	28.9	28.6	0	0	0	0	0
9,10	40	31	31.4	31	30.6	30.9	30.5	30.6	30.9	30.5	30	30.4	30.1	29.6	30	29.5	6.6	5	0	0	0
10,11	41.1	33.6	33.9	33.7	31.8	32.2	31.9	31.7	31.9	31.6	30.9	31.3	30.8	30.6	30.9	30.5	18.8	3	1	0	0
11,12	43	34.9	35.4	35	33.1	33.5	33	32.9	33.3	32.8	31.6	31.9	31.5	31.5	31.8	31.4	25	0	0	0	0
12,13	44.8	37.3	37.7	37.2	34.2	34.6	34.1	33.7	34	33.6	32.2	32.6	32.1	32.1	32.6	32.2	26	0	0	0	0
13,14	46.6	39	39.4	39.1	35.7	36.1	35.6	34.8	35.2	34.9	33	33.5	33.1	33	33.4	33.1	18.8	0	0	0	0
14,15	47.1	41.1	41.5	41.2	37	37.4	37.1	36	36.4	35.9	32.9	33.4	33	33.9	34.2	33.8	4.7	3	1	0	0
15,16	46.8	42.9	43.3	42.8	38.7	39.1	38.8	36.7	37	36.6	34.6	34.9	34.5	34.2	34.7	34.3	0	0	0	0	0
5/8																					
8,9	40	29.6	30	29.7	29.5	30	29.6	29.8	30.3	29.9	29.5	29.7	29.4	29.4	29.9	29.5	0	0	0	0	0
9,10	41.4	32.6	32.9	32.6	32.1	32.5	32.1	31.6	32	31.7	31.6	31.9	31.5	31.1	31.5	31.2	5	1	0	0	0
10,11	42.7	34.7	35.1	34.7	33.4	33.9	33.5	32.5	32.9	32.4	32.1	32.6	32.2	31.9	32.3	31.8	18	1	0	0	0
11,12	44	35.9	36.3	35.8	34.5	35	34.6	33.7	34.2	33.8	33.4	33.9	33.5	33.3	33.7	33.2	25	0	0	0	0
12,13	46.1	38.1	38.5	38.2	35.7	36.1	35.6	35.5	36	35.6	34.3	34.8	34.5	34.7	35.1	34.6	22	0	0	0	0
13,14	48.3	40.2	40.7	40.3	37.6	38	37.5	37	37.5	37.1	35.5	35.9	35.4	35.5	36	35.6	25	0	0	0	0
14,15	50.1	43.1	43.5	43	38.8	39.3	38.9	38.5	38.9	38.4	36.6	37	36.5	36.4	36.8	36.4	18	1	0	0	0
15,16	49	44.2	44.8	44.3	39.8	40.2	39.7	39.3	39.9	39.4	37.6	38	37.5	37.4	38	37.6	0	0	0	0	0
5/9																					
8,9	40	31.6	32	31.7	32	32.4	32	31.6	32	31.7	31.6	31.9	31.5	31.1	31.5	31.2	0	0	0	0	0
9,10	41.4	33.4	33.8	33.3	33.4	33.9	33.5	32.5	32.9	32.4	32.1	32.6	32.2	31.9	32.3	31.8	5	0	0	0	0
10,11	42.5	35	35.4	34.9	34.5	35	34.6	33.7	34.2	33.8	33.4	33.9	33.5	33.3	33.7	33.2	17	0	0	0	0
11,12	43.6	36.1	36.5	36.2	35.7	36.1	35.6	35.5	36	35.6	35.3	35.8	35.5	35.7	36.1	35.6	22	0	0	0	0
12,13	45	37.7	38.1	38.7	37.6	38	37.5	37	37.5	37.1	36.8	37.1	36.7	36.5	37	36.6	20	0	0	0	0
13,14	47.3	39.3	39.7	39.2	38.8	39.3	38.9	38.5	38.9	38.4	38	38.4	38.1	38.2	38.6	38.1	22	0	0	0	0
14,15	48.8	40.6	41	40.6	39.8	40.2	39.7	39.3	39.9	39.4	39.4	39.8	39.3	39.4	39	39.3	17	0	0	0	0
15,16	49	42	42.5	42.1	41.1	41.5	41	41	41.5	41	40.2	40.6	40.1	40.3	40.7	40.2	0	0	0	0	0
5/10																					
8,9	40.2	31.6	32.1	31.7	32	32.5	32	31.6	32.1	31.7	31.6	31.9	31.5	31.1	31.6	31.2	0	0	0	0	0
9,10	41.6	33.4	33.9	33.3	33.4	34	33.5	32.5	33	32.4	32.1	32.6	32.2	31.9	32.4	31.8	5	0	0	0	0
10,11	42.7	35	35.6	34.9	34.5	35.1	34.6	33.7	34.3	33.8	33.4	33.9	33.5	33.3	33.8	33.2	17	0	0	0	0
11,12	43.8	36.1	36.6	36.2	35.7	36.2	35.6	35.5	36.1	35.6	35.3	35.8	35.5	35.7	36.2	35.6	22	0	0	0	0
12,13	45.2	37.7	38.2	38.7	37.6	38.1	37.5	37	37.6	37.1	36.8	37.1	36.7	36.5	37.1	36.6	20	0	0	0	0
13,14	47.5	39.3	39.8	39.2	38.8	39.4	38.9	38.5	39	38.4	38	38.4	38.1	38.2	38.7	38.1	22	0	0	0	0
14,15	49	40.6	41.1	40.6	39.8	40.3	39.7	39.3	40	39.4	39.4	39.8	39.3	39.4	39.1	39.3	17	0	0	0	0
15,16	48.2	42	42.6	42.1	41.1	41.6	41	41	41.6	41	40.2	40.6	40.1	40.3	40.8	40.2	0	0	0	0	0

S/12		M-7			M-8			M-9			M-10			M-11			M-7	M-8	M-9	M-10	M-11
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_i	S_i	S_i	S_i	S_i
8,9	39.1	30.5	31	30.6	30.9	31.4	30.9	30.5	31	30.6	30.5	30.8	30.4	30	30.5	30.1	0	0	0	0	0
9,10	40.5	32.3	32.8	32.2	32.3	32.9	32.4	31.4	31.9	31.3	31	31.5	31.1	30.8	31.3	30.7	5	0	0	0	0
10,11	41.6	33.9	34.5	33.8	33.4	34	33.5	32.6	33.2	32.7	32.3	32.8	32.4	32.2	32.7	32.1	17	0	0	0	0
11,12	42.7	35	35.5	35.1	34.6	35.1	34.5	34.4	35	34.5	34.2	34.7	34.4	34.6	35.1	34.5	22	0	0	0	0
12,13	44.1	36.6	37.1	37.6	36.5	37	36.4	35.9	36.5	36	35.7	36	35.6	35.4	36	35.5	20	0	0	0	0
13,14	46.4	38.2	38.7	38.1	37.7	38.3	37.8	37.4	37.9	37.3	36.9	37.3	37	37.1	37.6	37	22	0	0	0	0
14,15	47.9	39.5	40	39.5	38.7	39.2	38.6	38.2	38.9	38.3	38.3	38.7	38.2	38.3	38	38.2	17	0	0	0	0
15,16	47.3	40.2	40.6	40.1	40	40.5	39.9	39.9	40.5	39.9	39.1	39.5	39	39.2	39.7	39.1	0	0	0	0	0
5/13																					
8,9	39.7	30.8	31.3	30.9	31.2	31.7	31.2	30.5	31	30.6	30.8	31.1	30.7	30.3	30.8	30.4	0	0	0	0	0
9,10	41.1	32.6	33.1	32.5	32.6	33.2	32.7	31.4	31.9	31.3	31.3	31.8	31.4	31.1	31.6	31	5	0	0	0	0
10,11	42.2	34.2	34.8	34.1	33.7	34.3	33.8	32.6	33.2	32.7	32.6	33.1	32.7	32.5	33	32.4	17	0	0	0	0
11,12	43.3	35.3	35.8	35.4	34.9	35.4	34.8	34.4	35	34.5	34.5	35	34.7	34.9	35.4	34.8	22	0	0	0	0
12,13	44.7	36.9	37.4	37.9	36.8	37.3	36.7	35.9	36.5	36	36	36.3	35.9	35.7	36.3	35.8	20	0	0	0	0
13,14	47	38.5	39	38.4	38	38.6	38.1	37.4	37.9	37.3	37.2	37.6	37.3	37.4	37.9	37.3	22	0	0	0	0
14,15	48.5	39.8	40.3	39.8	39	39.5	38.9	38.2	38.9	38.3	38.6	39	38.5	38.6	38.3	38.5	17	0	0	0	0
15,16	47.9	40.5	40.9	40.4	40.3	40.8	40.2	39.9	40.5	39.9	39.4	39.8	39.3	39.5	40	39.4	0	0	0	0	0
5/14																					
8,9	39.7	31.1	31.6	31.9	31.8	32	31.5	31.1	31.6	31.2	31.1	31.4	31	30.6	31.1	30.7	0	0	0	0	0
9,10	41.1	32.9	33.4	33.7	33.7	33.5	33	31.7	31.9	31.3	31.6	32.1	31.7	31.4	31.9	31.3	5	0	0	0	0
10,11	42.2	34.5	35.1	35.4	35.4	34.6	34.1	32.9	33.2	32.7	32.9	33.4	33	32.8	33.3	32.7	15	0	0	0	0
11,12	43.3	35.6	36.1	36.4	36.4	35.7	35.1	34.7	35	34.5	34.8	35.3	35	35.2	35.7	35.1	20	0	0	0	0
12,13	44.7	37.2	37.7	38	38	37.6	37	36.2	36.5	36	36.3	36.6	36.2	36	36.6	36.1	18	0	0	0	0
13,14	47	38.8	39.3	39.6	39.6	38.9	38.4	37.7	37.9	37.3	37.5	37.9	37.6	37.7	38.2	37.6	20	0	0	0	0
14,15	48.5	40.1	40.6	40.9	40.9	39.8	39.2	38.5	38.9	38.3	38.9	39.3	38.8	38.9	38.6	38.8	15	0	0	0	0
15,16	47.9	40.8	41.2	41.5	41.5	41.1	40.5	40.2	40.5	39.9	39.7	40.1	39.6	39.8	40.3	39.7	0	0	0	0	0
5/17																					
8,9	41	31.2	31.6	31.2	31	31.4	30.9	31	31.4	31	30.7	31.1	30.7	30.5	30.8	30.4	0	0	0	0	0
9,10	42.6	33.1	33.5	33.2	32.1	32.5	32.2	32.3	32.6	32.3	32.1	32.5	32.1	31.6	32	31.7	2	0	0	0	0
10,11	43.8	35.1	35.5	35.2	33.5	33.9	33.6	33.6	34	33.5	33.4	33.7	33.4	33.1	33.5	33.2	15	0	0	0	0
11,12	45.7	36.6	37	36.5	34.9	35.3	35	34.8	35.2	38.9	34.2	34.5	34.1	33.7	34.1	33.6	20	0	0	0	0
12,13	46.9	38.3	38.8	38.4	36.2	36.6	36.2	36.4	36.9	36.5	35.4	35.9	35.5	34.9	35.3	35	18	0	0	0	0
13,14	48.6	40.8	41.2	40.7	37.2	37.6	37.2	37.1	37.5	37.2	37	37.4	36.9	36.4	36.8	36.5	15	0	0	0	0
14,15	50.5	43.6	44	43.5	38.6	39	38.7	38.3	38.7	38.4	38.2	38.6	38.3	37.6	38	37.5	2	0	0	0	0
15,16	49.6	44.4	44.8	44.3	38.9	39.3	39	38.6	39	38.6	38.8	39.2	38.9	38.2	38.6	38.3	0	0	0	0	0
5/20																					
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_i	S_h	S_h	S_h	S_h
8,9	40	28.8	29.2	28.9	28.8	29.2	28.9	28.9	29.2	28.8	29	29.3	29	28.8	29.2	28.7	0	0	0	0	0
9,10	41.3	29.9	30.2	29.8	29.8	30.1	29.7	29.6	30	29.7	30.2	30	30.5	29.9	30.2	29.8	0	78	80	85	80
10,11	42.5	33.7	34.1	33.6	32.7	33	32.6	32.2	32.6	32.1	32.1	32.5	32.2	32.2	32.6	32.3	10	66.7	72.9	75	78
11,12	43.8	35.9	36.3	35.8	34.8	35.2	34.9	33.7	34.1	33.6	33.7	34.1	33.8	34	34.3	33.9	15	63.35	72.9	75	75
12,13	45.7	38	38.5	38.1	36.8	37.2	36.7	36.1	36.5	36.2	35.6	36	35.7	35.8	36.1	35.7	15	63.7	75.6	75	75
13,14	47.9	40.4	40.7	40.3	38.8	39.2	38.8	38	38.3	37.9	37.9	38.3	37.8	37.8	38.3	37.9	12.4	64	75.6	78	78
14,15	48.3	41.8	42.2	41.7	40.7	41.2	40.8	39.9	40.2	39.8	39.8	40.2	39.7	39.9	40.2	39.8	0	76.2	79	85	75
15,16	48	42.7	43.2	42.8	41.1	41.5	41.2	40.6	41.1	40.7	39.9	40.3	39.8	40.6	41	40.5	0	0	0	0	0
5/21																					
8,9	40.3	29.1	29.5	29.2	29.1	29.5	29.2	29.2	29.5	29.1	29.3	29.6	29.3	29.1	29.5	29	0	0	0	0	0
9,10	41.6	30.2	30.5	30.1	30.1	30.4	30	29.9	30.3	30	30.5	30.3	30.8	30.2	30.5	30.1	0	79	80	85	80
10,11	42.8	34	34.4	33.9	33	33.3	32.9	32.5	32.9	32.4	32.4	32.8	32.5	32.5	32.9	32.6	10	67	72.9	75	78
11,12	44.1	36.2	36.6	36.1	35.1	35.5	35.2	34	34.4	33.9	34	34.4	34.1	34.3	34.6	34.2	15	64	72.9	75	75
12,13	46	38.3	38.8	38.4	37.1	37.5	37	36.4	36.8	36.5	35.9	36.3	36	36.1	36.4	36	15	64	75.6	75	75
13,14	48.2	40.7	41	40.6	39.1	39.5	39.1	38.3	38.6	38.2	38.2	38.6	38.1	38.1	38.6	38.2	10	65	75.6	78	78
14,15	48.6	42.1	42.5	42	41	41.5	41.1	40.2	40.5	40.1	40.1	40.5	40	40.2	40.5	40.1	0	77	79	85	75
15,16	49.3	43	43.5	43.1	41.4	41.8	41.5	40.9	41.4	41	40.2	40.6	40.1	40.9	41.3	40.8	0	0	0	0	0

5/22		M-7			M-8			M-9			M-10			M-11			M-7	M-8	M-9	M-10	M-11
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_l	S_h	S_h	S_h	S_h
8,9	39.7	28.7	29.1	28.8	28.7	29.1	28.8	28.8	29.1	28.7	28.9	29.2	28.9	28.7	29.1	28.6	0	0	0	0	0
9,10	41	29.8	30.1	29.7	29.7	30	29.6	29.5	29.9	29.6	30.1	29.9	30.4	29.8	30.1	29.7	0	82	81	86	82
10,11	42.2	33.6	34	33.5	32.6	32.9	32.5	32.1	32.5	32	32	32.4	32.1	32.1	32.5	32.2	8	70	74	77	80
11,12	43.5	35.8	36.2	35.7	34.7	35.1	34.8	33.6	34	33.5	33.6	34	33.7	33.9	34.2	33.8	10	65	74	77	77
12,13	45.4	37.9	38.4	38	36.7	37.1	36.6	36	36.4	36.1	35.5	35.9	35.6	35.7	36	35.6	10	65	76	78	77
13,14	47.6	40.3	40.6	40.2	38.7	39.1	38.7	37.9	38.2	37.8	37.8	38.2	37.7	37.7	38.2	37.8	8	66	77	80	80
14,15	48	41.7	42.1	41.6	40.6	41.1	40.7	39.8	40.1	39.7	39.7	40.1	39.6	39.8	40.1	39.7	0	79	78	82	77
15,16	47.7	42.6	43.1	42.7	41	41.4	41.1	40.5	41	40.6	39.8	40.2	39.7	40.5	40.9	40.4	0	0	0	0	0
6/8																					
8,9	38.4	30.2	30.6	30.3	30.2	30.6	30.3	30.3	30.6	30.2	30.4	30.7	30.4	30.2	30.6	30.1	0	0	0	0	0
9,10	39.3	31.3	31.6	31.2	31.2	31.5	31.1	31	31.4	31.1	31.6	31.4	31.9	31.3	31.6	31.2	0	0	0	0	0
10,11	40.6	35.1	35.5	35	34.1	34.4	34	33.6	34	33.5	33.5	33.9	33.6	33.6	34	33.7	5	63	72.8	75	73
11,12	41.6	37.3	37.7	37.2	36.2	36.6	36.3	35.1	35.5	35	35.1	35.5	35.2	35.4	35.7	35.3	10	63.5	65	70	68
12,13	43.4	39.4	39.9	39.5	38.2	38.6	38.1	37.5	37.9	37.6	37	37.4	37.1	37.2	37.5	37.1	10	63.5	65	70	68.2
13,14	44.9	41.8	42.1	41.7	40.2	40.6	40.2	39.4	39.7	39.3	39.3	39.7	39.2	39.2	39.7	39.3	5.5	66.9	72	75	73
14,15	46.4	43.2	43.6	43.1	42.1	42.6	42.2	41.3	41.6	41.2	41.2	41.6	41.1	41.3	41.6	41.2	0	0	0	0	0
15,16	46.9	44.1	44.6	44.2	42.5	42.9	42.6	42	42.5	42.1	41.3	41.7	41.2	42	42.4	41.9	0	0	0	0	0
6/9																					
8,9	37	30	30.3	29.7	29.8	30.2	29.8	29.9	30.2	30	29.6	30	29.7	29.8	30.1	29.9	0	0	0	0	0
9,10	37.9	30.9	31.3	31	31.1	31.5	31	30.9	31.4	31	30.6	31	30.5	30.8	31.3	30.9	0	0	0	0	0
10,11	39.2	33.1	33.6	33.2	32.7	33.2	32.8	32.6	33	32.5	32.1	32.6	32.2	32.5	32.9	32.4	5	65	71	75	71
11,12	40.2	35	35.4	35.1	34.8	35.2	34.9	34.6	35	34.7	34.3	34.6	34.2	34.5	34.9	34.6	10	62	65	70	70
12,13	42	36.7	37.1	36.6	35.9	36.2	35.8	36.6	36.9	36.5	35.4	35.8	35.5	35.8	36.1	35.7	10	62	65	70	70
13,14	43.5	38	38.4	37.9	37.3	37.6	37.2	37.7	38.1	37.6	36.7	37.1	36.6	36.9	37.3	36.8	5	65	72	75	71
14,15	45	39.8	40.2	39.8	38.8	39.3	38.9	39.6	40	39.5	38	38.5	37.9	38.4	38.8	38.3	0	0	0	0	0
15,16	45.5	40.3	40.6	40.3	39.8	40.2	39.8	39.8	40.3	39.8	38.8	39.3	38.9	38.6	39.1	38.6	0	0	0	0	0
6/10																					
11,12	39	32.5	32.9	32.6	32.4	32.8	32.5	31.6	32	31.7	31.9	32.2	31.8	31.9	32.3	32	8	60	62	67	67
12,13	40.8	34.2	34.6	34.1	33.5	33.8	33.4	32.9	33.3	33	33	33.4	33.1	33.2	33.5	33.1	8	60	62	67	67
13,14	42.3	35.5	35.9	35.4	34.9	35.2	34.8	34.1	34.5	34	34.3	34.7	34.2	34.3	34.7	34.2	5	62	70	72	70
14,15	43.8	37.3	37.7	37.3	36.4	36.9	36.5	35.5	35.9	35.4	35.6	36.1	35.5	35.8	36.2	35.7	0	0	0	0	0
6/11																					
8,9	37.4	29	29.3	28.9	28.9	29.3	28.9	28.8	29.2	28.8	28.7	29.1	28.8	28.7	29	28.8	0	0	0	0	0
9,10	38.3	29.9	30.3	30	30.2	30.6	30.1	30	30.3	29.9	29.7	30.1	29.6	29.7	30.2	29.8	0	0	0	0	0
10,11	39.6	32.1	32.6	32.2	31.8	32.3	31.9	31.2	31.6	31.1	31.2	31.7	31.3	31.4	31.8	31.3	4	62	70	72	70
11,12	40.6	34	34.4	34.1	33.9	34.3	34	33.1	33.5	33.2	33.4	33.7	33.3	33.4	33.8	33.5	9	60	63	68	68
12,13	41.6	35.7	36.1	35.6	35	35.3	34.9	34.4	34.8	34.5	34.5	34.9	34.6	34.7	35	34.6	9	60	63	68	68
13,14	42.9	37	37.4	36.9	36.4	36.7	36.3	35.6	36	35.5	35.8	36.2	35.7	35.8	36.2	35.7	4	62	70	72	70
14,15	44.2	38.8	39.2	38.8	37.9	38.4	38	37	37.4	36.9	37.1	37.6	37	37.3	37.7	37.2	0	0	0	0	0
15,16	43.6	39.3	39.6	39.2	38.9	39.3	38.9	37.6	38.1	37.7	37.5	37.8	37.4	37.5	38	37.5	0	0	0	0	0
6/12																					
8,9	36.7	28.8	29.1	28.7	28.7	29.1	28.7	28.6	29	28.6	28.5	28.9	28.6	28.5	28.8	28.6	0	0	0	0	0
9,10	37.6	29.7	30.1	29.8	30	30.4	29.9	29.8	30.1	29.7	29.5	29.9	29.4	29.5	30	29.6	0	0	0	0	0
10,11	38.9	31.9	32.4	32	31.6	32.1	31.7	31	31.4	30.9	31	31.5	31.1	31.2	31.6	31.1	4	65	68	74	69
11,12	39.9	33.8	34.2	33.9	33.7	34.1	33.8	32.9	33.3	33	33.2	33.5	33.1	33.2	33.6	33.3	6	58	62	67	70
12,13	40.9	35.5	35.9	35.4	34.8	35.1	34.7	34.2	34.6	34.3	34.3	34.7	34.4	34.5	34.8	34.4	6	58	62	70	68
13,14	42.2	36.8	37.2	36.7	36.2	36.5	36.1	35.4	35.8	35.3	35.6	36	35.5	35.6	36	35.5	4	62	68	74	69
14,15	43.5	38.6	39	38.6	37.7	38.2	37.8	36.8	37.2	36.7	36.9	37.4	36.8	37.1	37.5	37	0	0	0	0	0
15,16	42.9	39.1	39.4	39	38.7	39.1	38.7	37.4	37.9	37.5	37.3	37.6	37.2	37.3	37.8	37.3	0	0	0	0	0

6/13		M-7			M-8			M-9			M-10			M-11			M-7	M-8	M-9	M-10	M-11
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_l	S_h	S_h	S_h	S_h
8,9	36.4	28.5	28.8	28.4	28.4	28.8	28.4	28.3	28.7	28.3	28.2	28.6	28.3	28.2	28.5	28.3	0	0	0	0	0
9,10	37.3	29.4	29.8	29.5	29.7	30.1	29.6	29.5	29.8	29.4	29.2	29.6	29.1	29.2	29.7	29.3	0	0	0	0	0
10,11	38.6	31.6	32.1	31.7	31.3	31.8	31.4	30.7	31.1	30.6	30.7	31.2	30.8	30.9	31.3	30.8	4	65	68	74	69
11,12	39.6	33.5	33.9	33.6	33.4	33.8	33.5	32.6	33	32.7	32.9	33.2	32.8	32.9	33.3	33	6	58	62	67	70
12,13	40.6	35.2	35.6	35.1	34.5	34.8	34.4	33.9	34.3	34	34	34.4	34.1	34.2	34.5	34.1	6	58	62	70	68
13,14	41.9	36.5	36.9	36.4	35.9	36.2	35.8	35.1	35.5	35	35.3	35.7	35.2	35.3	35.7	35.2	4	62	68	74	69
14,15	43.2	38.3	38.7	38.3	37.4	37.9	37.5	36.5	36.9	36.4	36.6	37.1	36.5	36.8	37.2	36.7	0	0	0	0	0
15,16	42.6	38.8	39.1	38.7	38.4	38.8	38.4	37.1	37.6	37.2	37	37.3	36.9	37	37.5	37	0	0	0	0	0
6/14																					
8,9	38.2	30	30.4	30.1	30	30.4	30.1	30.1	30.4	30	30.2	30.5	30.2	30	30.4	29.9	0	0	0	0	0
9,10	39.1	31.1	31.4	31	31	31.3	30.9	30.8	31.2	30.9	31.4	31.2	31.7	31.1	31.4	31	0	0	0	0	0
10,11	40.4	34.9	35.3	34.8	33.9	34.2	33.8	33.4	33.8	33.3	33.3	33.7	33.4	33.4	33.8	33.5	4	65	68	74	69
11,12	41.4	37.1	37.5	37	36	36.4	36.1	34.9	35.3	34.8	34.9	35.3	35	35.2	35.5	35.1	6	58	62	67	70
12,13	43.2	39.2	39.7	39.3	38	38.4	37.9	37.3	37.7	37.4	36.8	37.2	36.9	37	37.3	36.9	6	58	62	70	68
13,14	44.7	41.6	41.9	41.5	40	40.4	40	39.2	39.5	39.1	39.1	39.5	39	39	39.5	39.1	4	62	68	74	69
14,15	46.2	43	43.4	42.9	41.9	42.4	42	41.1	41.4	41	41	41.4	40.9	41.1	41.4	41	0	0	0	0	0
15,16	46.7	43.9	44.4	44	42.3	42.7	42.4	41.8	42.3	41.9	41.1	41.5	41	41.8	42.2	41.7	0	0	0	0	0
6/15																					
8,9	37.5	29.5	29.8	29.4	29.4	29.8	29.4	29.3	29.7	29.3	29.2	29.6	29.3	29.2	29.5	29.3	0	0	0	0	0
9,10	38.4	30.4	30.8	30.5	30.7	31.1	30.6	30.5	30.8	30.4	30.2	30.6	30.1	30.2	30.7	30.3	0	0	0	0	0
10,11	39.7	32.6	33.1	32.7	32.3	32.8	32.4	31.7	32.1	31.6	31.7	32.2	31.8	31.9	32.3	31.8	4	62	65	72	66
11,12	40.7	34.5	34.9	34.6	34.4	34.8	34.5	33.6	34	33.7	33.9	34.2	33.8	33.9	34.3	34	5	58	62	67	68
12,13	41.7	36.2	36.6	36.1	35.5	35.8	35.4	34.9	35.3	35	35	35.4	35.1	35.2	35.5	35.1	5	58	62	70	68
13,14	43	37.5	37.9	37.4	36.9	37.2	36.8	36.1	36.5	36	36.3	36.7	36.2	36.3	36.7	36.2	4	62	65	72	67
14,15	44.3	39.3	39.7	39.3	38.4	38.9	38.5	37.5	37.9	37.4	37.6	38.1	37.5	37.8	38.2	37.7	0	0	0	0	0
15,16	43.7	39.8	40.1	39.7	39.4	39.8	39.4	38.1	38.6	38.2	38	38.3	37.9	38	38.5	38	0	0	0	0	0
6/16																					
8,9	38.5	30.5	30.8	30.4	30.4	30.8	30.4	30.3	30.7	30.3	30.2	30.6	30.3	30.2	30.5	30.3	0	0	0	0	0
9,10	39.4	31.4	31.8	31.5	31.7	32.1	31.6	31.5	31.8	31.4	31.2	31.6	31.1	31.2	31.7	31.3	0	0	0	0	0
10,11	40.7	33.6	34.1	33.7	33.3	33.8	33.4	32.7	33.1	32.6	32.7	33.2	32.8	32.9	33.3	32.8	4	62	65	72	66
11,12	41.7	35.5	35.9	35.6	35.4	35.8	35.5	34.6	35	34.7	34.9	35.2	34.8	34.9	35.3	35	5	58	62	67	68
12,13	42.7	37.2	37.6	37.1	36.5	36.8	36.4	35.9	36.3	36	36	36.4	36.1	36.2	36.5	36.1	5	58	62	70	68
13,14	44	38.5	38.9	38.4	37.9	38.2	37.8	37.1	37.5	37	37.3	37.7	37.2	37.3	37.7	37.2	4	62	65	72	67
14,15	45.3	40.3	40.7	40.3	39.4	39.9	39.5	38.5	38.9	38.4	38.6	39.1	38.5	38.8	39.2	38.7	0	0	0	0	0
15,16	44.7	40.8	41.1	40.7	40.4	40.8	40.4	39.1	39.6	39.2	39	39.3	38.9	39	39.5	39	0	0	0	0	0
6/17																					
8,9	39.6	28.6	29	28.7	28.6	29	28.7	28.7	29	28.6	28.8	29.1	28.8	28.6	29	28.5	0	0	0	0	0
9,10	40.9	29.7	30	29.6	29.6	29.9	29.5	29.4	29.8	29.5	30	29.8	30.3	29.7	30	29.6	0	0	0	0	0
10,11	42.1	33.5	33.9	33.4	32.5	32.8	32.4	32	32.4	31.9	31.9	32.3	32	32	32.4	32.1	4	60	62	70	65
11,12	43.4	35.7	36.1	35.6	34.6	35	34.7	33.5	33.9	33.4	33.5	33.9	33.6	33.8	34.1	33.7	4	58	60	67	66
12,13	45.3	37.8	38.3	37.9	36.6	37	36.5	35.9	36.3	36	35.4	35.8	35.5	35.6	35.9	35.5	4	58	60	68	66
13,14	47.5	40 2	40.5	40.1	38.6	39	38.6	37.8	38.1	37.7	37.7	38.1	37.6	37.6	38.1	37.7	4	60	62	70	65
14,15	47.9	41.6	42	41.5	40.5	41	40.6	39.7	40	39.6	39.6	40	39.5	39.7	40	39.6	0	0	0	0	0
15,16	47.6	42.5	43	42.6	40.9	41.3	41	40.4	40.9	40.5	39.7	40.1	39.6	40.4	40.8	40.3	0	0	0	0	0
6/20																					
8,9	35	28.5	28.8	28.6	28.2	28.6	28.3	28.4	28.7	28.4	28.2	28.6	28.3	28.2	28.5	28.1	0	0	0	0	0
9,10	36.4	30.1	30.4	30.1	29.6	30	29.7	29.7	30.1	29.6	29.4	29.8	29.5	29.2	29.6	29.3	0	0	0	0	0
10,11	38.2	31.8	32	31.9	31.2	31.6	31.3	31	31.5	31.1	31	31.4	30.9	30.6	31	30.5	2.5	58	70	70	72
11,12	40	32.9	33.3	33	32.1	32.5	32.2	31.9	32.3	31.8	31.7	32.1	31.6	31.7	32.1	31.7	4	60	62	65	65
12,13	41 6	34.6	35.1	34.7	34	34.4	34.1	33 7	34	33.6	33.2	33.7	33 3	33.5	33.8	33.4	4	60	62	65	65
13,14	43	36.1	36.6	36.2	35.4	35.8	35.3	34.8	35.2	34.7	34.2	34.6	34.3	34.3	34.7	34.2	3	62	68 5	70	68
14,15	44 7	37.6	38	37.6	36.6	37	36.5	35.9	36.4	35.8	35.6	36	35.5	35.6	36.2	35.7	0	0	0	0	0
15,16	43.5	37 9	38.4	38	36.5	36.9	36.6	35.4	36	35.5	35.1	35.5	35.2	35.3	35.8	35.4	0	0	0	0	0

6/21		M-7			M-8			M-9			M-10			M-11			M-7	M-8	M-9	M-10	M-11
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_l	S_h	S_h	S_h	S_h
8,9	34.4	28.1	28.4	28.2	27.8	28.2	27.9	28	28.3	28	27.8	28.2	27.9	27.8	28.1	27.7	0	0	0	0	0
9,10	35.8	29.7	30	29.7	29.2	29.6	29.3	29.3	29.7	29.2	29	29.4	29.1	28.8	29.2	28.9	0	0	0	0	0
10,11	37.6	31.4	31.6	31.5	30.8	31.2	30.9	30.6	31.1	30.7	30.6	31	30.5	30.2	30.6	30.1	1	55	66	68	70
11,12	39.4	32.5	32.9	32.6	31.7	32.1	31.8	31.5	31.9	31.4	31.3	31.7	31.2	31.3	31.7	31.3	2	58	60	62	62
12,13	41	34.2	34.7	34.3	33.6	34	33.7	33.3	33.6	33.2	32.8	33.3	32.9	33.1	33.4	33	3	58	60	62	62
13,14	42.4	35.7	36.2	35.8	35	35.4	34.9	34.4	34.8	34.3	33.8	34.2	33.9	33.9	34.3	33.8	1	60	65	66	65
14,15	44.1	37.2	37.6	37.2	36.2	36.6	36.1	35.5	36	35.4	35.2	35.6	35.1	35.2	35.8	35.3	0	0	0	0	0
15,16	42.9	37.5	38	37.6	36.1	36.5	36.2	35	35.6	35.1	34.7	35.1	34.8	34.9	35.4	35	0	0	0	0	0
6/22																					
8,9	34.1	27.8	28.1	27.9	27.5	27.9	27.6	27.7	28	27.7	27.5	27.9	27.6	27.5	27.8	27.4	0	0	0	0	0
9,10	35.5	29.4	29.7	29.4	28.9	29.3	29	29	29.4	28.9	28.7	29.1	28.8	28.5	28.9	28.6	0	0	0	0	0
10,11	37.3	31.1	31.3	31.2	30.5	30.9	30.6	30.3	30.8	30.4	30.3	30.7	30.2	29.9	30.3	29.8	0	51	62	65	67
6/23																					
8,9	35.7	29.4	29.7	29.5	29.1	29.5	29.2	29.3	29.6	29.3	29.1	29.5	29.2	29.1	29.4	29	0	0	0	0	0
9,10	37.1	31	31.3	31	30.5	30.9	30.6	30.6	31	30.5	30.3	30.7	30.4	30.1	30.5	30.2	0	0	0	0	0
10,11	38.9	32.7	32.9	32.8	32.1	32.5	32.2	31.9	32.4	32	31.9	32.3	31.8	31.5	31.9	31.4	3	60	70	70	72
11,12	40.7	33.8	34.2	33.9	33	33.4	33.1	32.8	33.2	32.7	32.6	33	32.5	32.6	33	32.6	4	60	62	65	65
12,13	42.3	35.5	36	35.6	34.9	35.3	35	34.6	34.9	34.5	34.1	34.6	34.2	34.4	34.7	34.3	4	60	62	65	65
13,14	43.7	37	37.5	37.1	36.3	36.7	36.2	35.7	36.1	35.6	35.1	35.5	35.2	35.2	35.6	35.1	3	62	68	70	68
14,15	45.4	38.5	38.9	38.5	37.5	37.9	37.4	36.8	37.3	36.7	36.5	36.9	36.4	36.5	37.1	36.6	0	0	0	0	0
15,16	44.2	38.8	39.3	38.9	37.4	37.8	37.5	36.3	36.9	36.4	36	36.4	36.1	36.2	36.7	36.3	0	0	0	0	0
6/24																					
8,9	35.4	29.2	29.5	29.3	28.9	29.3	29	29.1	29.4	29.1	28.9	29.3	29	28.9	29.2	28.8	0	0	0	0	0
9,10	36.8	30.8	31.1	30.8	30.3	30.7	30.4	30.4	30.8	30.3	30.1	30.5	30.2	29.9	30.3	30	0	0	0	0	0
10,11	38.6	32.5	32.7	32.6	31.9	32.3	32	31.7	32.2	31.8	31.7	32.1	31.6	31.3	31.7	31.2	4	60	62	70	65
11,12	40.4	33.6	34	33.7	32.8	33.2	32.9	32.6	33	32.5	32.4	32.8	32.3	32.4	32.8	32.4	4	58	60	67	66
12,13	42	35.3	35.8	35.4	34.7	35.1	34.8	34.4	34.7	34.3	33.9	34.4	34	34.2	34.5	34.1	4	58	60	68	66
13,14	43.4	36.8	37.3	36.9	36.1	36.5	36	35.5	35.9	35.4	34.9	35.3	35	35	35.4	34.9	4	60	62	70	65
14,15	45.1	38.3	38.7	38.3	37.3	37.7	37.2	36.6	37.1	36.5	36.3	36.7	36.2	36.3	36.9	36.4	0	0	0	0	0
15,16	43.9	38.6	39.1	38.7	37.2	37.6	37.3	36.1	36.7	36.2	35.8	36.2	35.9	36	36.5	36.1	0	0	0	0	0
6/25																					
8,9	34.6	28.5	28.8	28.6	28.2	28.6	28.3	28.4	28.7	28.4	28.2	28.6	28.3	28.2	28.5	28.1	0	0	0	0	0
9,10	36	30.1	30.4	30.1	29.6	30	29.7	29.7	30.1	29.6	29.4	29.8	29.5	29.2	29.6	29.3	0	0	0	0	0
10,11	37.8	31.8	32	31.9	31.2	31.6	31.3	31	31.5	31.1	31	31.4	30.9	30.6	31	30.5	4	60	62	70	65
11,12	39.6	32.9	33.3	33	32.1	32.5	32.2	31.9	32.3	31.8	31.7	32.1	31.6	31.7	32.1	31.7	4	58	60	67	66
12,13	41.2	34.6	35.1	34.7	34	34.4	34.1	33.7	34	33.6	33.2	33.7	33.3	33.5	33.8	33.4	4	58	60	68	66
13,14	42.6	36.1	36.6	36.2	35.4	35.8	35.3	34.8	35.2	34.7	34.2	34.6	34.3	34.3	34.7	34.2	4	60	62	70	65
14,15	44.3	37.6	38	37.6	36.6	37	36.5	35.9	36.4	35.8	35.6	36	35.5	35.6	36.2	35.7	0	0	0	0	0
15,16	43.1	37.9	38.4	38	36.5	36.9	36.6	35.4	36	35.5	35.1	35.5	35.2	35.3	35.8	35.4	0	0	0	0	0
6/26																					
11,12	35.8	29.1	29.4	29	29.3	29.7	29.4	29.4	29.7	29.4	28.8	29.1	28.9	28.9	29.3	29	5	58	62	67	68
12,13	36.7	32.2	32.5	32.1	31.4	31.8	31.5	31.3	31.7	31.3	30.2	30.5	30.1	29.9	30.2	30	5	58	62	70	68
13,14	38.3	35.2	35.4	35.1	33.4	33.8	33.5	32.6	33	32.6	31.4	31.7	31.4	31.2	31.5	31.1	4	62	65	72	67
14,15	40.6	36.8	37.2	36.8	35.8	36.2	35.7	35.1	35.6	35	34.8	35.2	34.7	34.8	35.4	34.9	0	0	0	0	0
15,16	39.4	37.1	37.6	37.2	35.7	36.1	35.8	34.6	35.2	34.7	34.3	34.7	34.4	34.5	35	34.6	0	0	0	0	0
6/27																					
8,9	37.6	30.3	30.6	30.4	30	30.4	30.1	30.2	30.5	30.2	30	30.4	30.1	28.2	28.5	28.1	0	0	0	0	0
9,10	39	31.9	32.2	31.9	31.4	31.8	31.5	31.5	31.9	31.4	31.2	31.6	31.3	29.2	29.6	29.3	0	0	0	0	0
10,11	40.8	33.6	33.8	33.7	33	33.4	33.1	32.8	33.3	32.9	32.8	33.2	32.7	30.6	31	30.5	4	62	65	72	66
11,12	42.6	34.7	35.1	34.8	33.9	34.3	34	33.7	34.1	33.6	33.5	33.9	33.4	31.7	32.1	31.7	5	58	62	67	68
12,13	44.2	36.4	36.9	36.5	35.8	36.2	35.9	35.5	35.8	35.4	35	35.5	35.1	33.5	33.8	33.4	5	58	62	70	68

6/28		M-7			M-8			M-9			M-10			M-11			M-7	M-8	M-9	M-10	M-11
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_i	S_h	S_h	S_h	S_h
8,9	37.7	30	30.3	30.1	29.7	30.1	29.8	29.9	30.2	29.9	29.7	30.1	29.8	29.7	30	29.6	0	0	0	0	0
9,10	39.2	31.6	31.9	31.6	31.1	31.5	31.2	31.2	31.6	31.1	30.9	31.3	31	30.7	31.1	30.8	0	0	0	0	0
10,11	40.7	33.3	33.5	33.4	32.7	33.1	32.8	32.5	33	32.6	32.5	32.9	32.4	32.1	32.5	32	4	65	68	74	69
11,12	41.4	34.4	34.8	34.5	33.6	34	33.7	33.4	33.8	33.3	33.2	33.6	33.1	33.2	33.6	33.2	6	58	62	67	70
12,13	42.2	36.1	36.6	36.2	35.5	35.9	35.6	35.2	35.5	35.1	34.7	35.2	34.8	35	35.3	34.9	6	58	62	70	68
13,14	44	37.6	38.1	37.7	36.9	37.3	36.8	36.3	36.7	36.2	35.7	36.1	35.8	35.8	36.2	35.7	4	62	68	74	69
14,15	44.7	39.1	39.5	39.1	38.1	38.5	38	37.4	37.9	37.3	37.1	37.5	37	37.1	37.7	37.2	0	0	0	0	0
15,16	44	39.4	39.9	39.5	38	38.4	38.1	36.9	37.5	37	36.6	37	36.7	36.8	37.3	36.9	0	0	0	0	0
6/29																					
8,9	34.9	27.8	28.1	27.9	27.5	27.9	27.6	27.7	28	27.7	27.5	27.9	27.6	27.5	27.8	27.4	0	0	0	0	0
9,10	36.4	29.4	29.7	29.4	28.9	29.3	29	29	29.4	28.9	28.7	29.1	28.8	28.5	28.9	28.6	0	0	0	0	0
10,11	37.9	31.1	31.3	31.2	30.5	30.9	30.6	30.3	30.8	30.4	30.3	30.7	30.2	29.9	30.3	29.8	4	65	68	74	69
11,12	38.6	32.2	32.6	32.3	31.4	31.8	31.5	31.2	31.6	31.1	31	31.4	30.9	31	31.4	31	6	58	62	67	70
12,13	39.4	33.9	34.4	34	33.3	33.7	33.4	33	33.3	32.9	32.5	33	32.6	32.8	33.1	32.7	6	58	62	70	68
13,14	41.2	35.4	35.9	35.5	34.7	35.1	34.6	34.1	34.5	34	33.5	33.9	33.6	33.6	34	33.5	4	62	68	74	69
14,15	41.9	36.9	37.3	36.9	35.9	36.3	35.8	35.2	35.7	35.1	34.9	35.3	34.8	34.9	35.5	35	0	0	0	0	0
15,16	41.2	37.2	37.7	37.3	35.8	36.2	35.9	34.7	35.3	34.8	34.4	34.8	34.5	34.6	35.1	34.7	0	0	0	0	0
7/1																					
8,9	34	27.3	27.7	27.4	27.3	27.7	27.4	27.4	27.7	27.3	27.5	27.8	27.5	27.3	27.7	27.2	0	0	0	0	0
9,10	35.3	28.4	28.7	28.3	28.3	28.6	28.2	28.1	28.5	28.2	28.7	28.5	29	28.4	28.7	28.3	0	0	0	0	0
10,11	36.5	29	29.4	28.9	28	28.3	27.9	27.5	27.9	27.4	27.4	27.8	27.5	27.5	27.9	27.6	4	62	70	72	70
11,12	37.8	31.2	31.6	31.1	30.1	30.5	30.2	29	29.4	28.9	29	29.4	29.1	29.3	29.6	29.2	9	60	63	68	68
12,13	39.7	33.3	33.8	33.4	32.1	32.5	32	31.4	31.8	31.5	30.9	31.3	31	31.1	31.4	31	9	60	63	68	68
13,14	41.9	34.4	34.8	34.3	33.3	33.7	33.4	32.2	32.6	32.1	32.2	32.6	32.3	32.5	32.8	32.4	4	62	70	72	70
14,15	42.3	35.7	36	35.6	34.1	34.5	34.1	33.3	33.6	33.2	33.2	33.6	33.1	33.1	33.6	33.2	0	0	0	0	0
15,16	42	37.1	37.5	37	36	36.5	36.1	35.2	35.5	35.1	35.1	35.5	35	35.2	35.5	35.1	0	0	0	0	0
7/3																					
8,9	33.3	26.7	27.1	26.8	26.4	26.8	26.4	26.4	26.4	26.3	26.5	26.8	26.4	26.3	26.6	26.2	0	0	0	0	0
9,10	34.6	27.8	28.1	27.7	27.3	27.6	27.3	28.1	28.5	28.2	27.2	27.6	27.3	27.4	27.7	27.3	0	0	0	0	0
10,11	35.8	29.6	30.2	29.8	29.2	29.7	29.3	29.7	30.1	29.6	29.4	29.7	29.3	28.7	29.1	29.8	4	62	70	72	70
11,12	37.1	30.8	31.3	30.9	30.6	31.1	30.7	31.2	31.6	31.1	30.6	31.1	30.7	30.5	30.9	30.6	9	60	63	68	68
12,13	39	32.9	33.3	33	32.3	32.7	32.2	32.6	33	32.7	32.3	32.7	32.4	32.3	32.6	32.2	9	60	63	68	68
13,14	41.2	34.3	34.8	34.3	34.3	34.7	34.3	34.5	34.8	34.4	34.3	34.7	34.3	34.3	34.8	34.4	4	62	70	72	70
14,15	41.6	36.7	37.2	36.8	36.2	36.7	36.3	36.4	36.7	36.3	36.2	36.7	36.3	36.4	36.7	36.3	0	0	0	0	0
15,16	41.3	36	36.5	36.1	36.6	37	36.7	36.1	36.6	36.2	36.6	37	36.6	36.1	36.5	36.2	0	0	0	0	0
7/4																					
8,9	35.7	28.8	29.2	28.9	28.5	28.9	28.5	28.3	28.5	28.4	28.6	28.9	28.5	28.4	28.7	28.3	0	0	0	0	0
9,10	37	29.9	30.2	29.8	29.4	29.7	29.4	30.2	30.6	30.3	29.3	29.7	29.4	29.5	29.8	29.4	0	0	0	0	0
10,11	38.2	31.7	32.3	31.9	31.3	31.8	31.4	31.8	32.2	31.7	31.5	31.8	31.4	30.8	31.2	31.9	5	63	72.8	75	73
11,12	39.5	32.9	33.4	33	32.7	33.2	32.8	33.3	33.7	33.2	32.7	33.2	32.8	32.6	33	32.7	10	63.5	65	70	68
12,13	41.4	35	35.4	35.1	34.4	34.8	34.3	34.7	35.1	34.8	34.4	34.8	34.5	34.4	34.7	34.3	10	63.5	65	70	68.2
13,14	43.6	36.4	36.9	36.4	36.4	36.8	36.4	36.6	36.9	36.5	36.4	36.8	36.4	36.4	36.9	36.5	5.5	66.9	72	75	73
14,15	44	38.8	39.3	38.9	38.3	38.8	38.4	38.5	38.8	38.4	38.3	38.8	38.4	38.5	38.8	38.4	0	0	0	0	0
15,16	43.7	38.1	38.6	38.2	38.7	39.1	38.8	38.2	38.7	38.3	38.7	39.1	38.7	38.2	38.6	38.3	0	0	0	0	0
7/5																					
8,9	35.7	28.8	29.2	28.9	28.5	28.9	28.5	28.3	28.5	28.4	28.6	28.9	28.5	28.4	28.7	28.3	0	0	0	0	0
9,10	37	29.9	30.2	29.8	29.4	29.7	29.4	30.2	30.6	30.3	29.3	29.7	29.4	29.5	29.8	29.4	0	0	0	0	0
10,11	38.2	31.7	32.3	31.9	31.3	31.8	31.4	31.8	32.2	31.7	31.5	31.8	31.4	30.8	31.2	31.9	6	63	73	75	73
11,12	39.5	32.9	33.4	33	32.7	33.2	32.8	33.3	33.7	33.2	32.7	33.2	32.8	32.6	33	32.7	10	65	65	72	70
12,13	41.4	35	35.4	35.1	34.4	34.8	34.3	34.7	35.1	34.8	34.4	34.8	34.5	34.4	34.7	34.3	10	65	65	72	70
13,14	43.6	36.4	36.9	36.4	36.4	36.8	36.4	36.6	36.9	36.5	36.4	36.8	36.4	36.4	36.9	36.5	6	67	73	75	73
14,15	44	38.8	39.3	38.9	38.3	38.8	38.4	38.5	38.8	38.4	38.3	38.8	38.4	38.5	38.8	38.4	0	0	0	0	0
15,16	43.7	38.1	38.6	38.2	38.7	39.1	38.8	38.2	38.7	38.3	38.7	39.1	38.7	38.2	38.6	38.3	0	0	0	0	0

7/6		M-7			M-8			M-9			M-10			M-11			M-7	M-8	M-9	M-10	M-11
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_i	S_h	S_h	S_h	S_h
8,9	32	27.1	27.4	27.2	26.9	27.3	27	26.8	27.2	26.7	26.5	27.1	26.6	26.6	27.1	26.7	0	0	0	0	0
9,10	33.6	28.2	28.6	28.2	28.2	28.6	28.3	28	28.4	28.1	27.9	28.3	27.8	27.9	28.3	28	0	0	0	0	0
10,11	34.9	29.2	29.6	29.3	28.9	29.3	29	28.8	29.2	28.9	28.6	29	28.7	28.7	29.1	28.8	5	65	75	75	75
11,12	35.5	30.7	31	30.6	30.3	30.7	30.2	30.1	30.5	30.2	29.9	30.3	30	30	30.4	30.1	8	68	68	72	73
12,13	36.9	32.8	33.2	32.9	31.6	32	31.7	31.2	31.6	31.3	27.7	31.1	27.6	30.8	31.2	30.9	10	68	68	72	73
13,14	38.4	34.6	35	34.7	33.8	34.2	33.8	33.4	33.8	33.5	32.8	33.2	32.7	33	33.4	33.1	7	67	75	75	75
14,15	39.2	34.9	35.4	35	34.2	34.6	34.1	33.8	34.2	33.9	33.4	33.7	33.3	33.6	34	33.7	0	0	0	0	0
15,16	39	35.1	35.5	35.2	34.1	34.5	34.2	33.6	34	33.7	33.2	33.5	33.1	33.4	33.9	33.5	0	0	0	0	0
7/7																					
8,9	30.7	26.5	26.8	26.6	26.3	26.7	26.4	26.2	26.6	26.1	25.9	26.4	26	26.6	27.1	26.7	0	0	0	0	0
9,10	32.3	27.6	28	27.6	27.6	28	27.7	27.4	27.8	27.5	27.3	27.7	27.2	27,9	28.3	28	0	0	0	0	0
10,11	33.6	28.6	29	28.7	28.3	28.7	28.4	28.2	28.6	28.3	28	28.4	28.1	28.7	29.1	28.8	6	67	77	77	77
11,12	34.2	30.1	30.4	30	29.7	30.1	29.6	29.5	29.9	29.6	29.3	29.7	29.4	30	30.4	30.1	10	70	70	72	75
12,13	35.6	32.2	32.6	32.3	31	31.4	31.1	30.6	31	30.7	27.1	30.5	27	30.8	31.2	30.9	10	70	70	72	73
13,14	37.1	34	34.4	34.1	33.2	33.6	33.2	32.8	33.2	32.9	32.2	32.6	32.1	33	33.4	33.1	8	67	77	75	75
14,15	37.9	34.3	34.8	34.4	33.6	34	33.5	33.2	33.6	33.3	32.8	33.1	32.7	33.6	34	33.7	0	0	0	0	0
15,16	37.7	34.5	34.9	34.6	33.5	33.9	33.6	33	33.4	33.1	32.6	32.9	32.5	33.4	33.9	33.5	0	0	0	0	0
7/8																					
8,9	32	27.1	27.4	27.2	26.9	27.3	27	26.8	27.2	26.7	26.5	27.1	26.6	26.6	27.1	26.7	0	0	0	0	0
9,10	33.6	28.2	28.6	28.2	28.2	28.6	28.3	28	28.4	28.1	27.9	28.3	27.8	27.9	28.3	28	0	0	0	0	0
10,11	34.9	29.2	29.6	29.3	28.9	29.3	29	28.8	29.2	28.9	28.6	29	28.7	28.7	29.1	28.8	7	68	77	78	77
11,12	35.5	30.7	31	30.6	30.3	30.7	30.2	30.1	30.5	30.2	29.9	30.3	30	30	30.4	30.1	12	70	72	74	75
12,13	36.9	32.8	33.2	32.9	31.6	32	31.7	31.2	31.6	31.3	27.7	31.1	27.6	30.8	31.2	30.9	12	70	72	74	75
13,14	38.4	34.6	35	34.7	33.8	34.2	33.8	33.4	33.8	33.5	32.8	33.2	32.7	33	33.4	33.1	10	67	77	77	78
14,15	39.2	34.9	35.4	35	34.2	34.6	34.1	33.8	34.2	33.9	33.4	33.7	33.3	33.6	34	33.7	0	0	0	0	0
15,16	39	35.1	35.5	35.2	34.1	34.5	34.2	33.6	34	33.7	33.2	33.5	33.1	33.4	33.9	33.5	0	0	0	0	0
7/13																					
8,9	30.6	25.9	26.2	26	25.7	26.1	25.8	25.6	26	25.5	25.3	25.9	25.4	25.4	25.9	25.5	0	0	0	0	0
9,10	31	27	27.4	27	27	27.4	27.1	26.8	27.2	26.9	26.7	27.1	26.6	26.7	27.1	26.8	0	10	15	15	10
10,11	32.5	28	28.4	28.1	27.7	28.1	27.8	27.6	28	27.7	27.4	27.8	27.5	27.5	27.9	27.6	7	70	77	80	78
11,12	33.6	29.5	29.8	29.4	29.1	29.5	29	28.9	29.3	29	28.7	29.1	28.8	28.8	29.2	28.9	12	70	72	74	75
12,13	34.8	31.6	32	31.7	30.4	30.8	30.5	30	30.4	30.1	26.5	29.9	26.4	29.6	30	29.7	12	70	72	74	75
13,14	39.4	33.4	33.8	33.5	32.6	33	32.6	32.2	32.6	32.3	31.6	32	31.5	31.8	32.2	31.9	10	67	77	80	78
14,15	40.2	33.7	34.2	33.8	33	33.4	32.9	32.6	33	32.7	32.2	32.5	32.1	32.4	32.8	32.5	0	10	15	15	10
15,16	39	33.9	34.3	34	32.9	33.3	33	32.4	32.8	32.5	32	32.3	31.9	32.2	32.7	32.3	0	0	0	0	0
7/14																					
8,9	32.3	27.2	27.5	27.3	27	27.4	27.1	26.9	27.3	26.8	26.6	27.2	26.7	26.7	27.2	26.8	0	0	0	0	0
9,10	32.7	28.3	28.7	28.3	28.3	28.7	28.4	28.1	28.5	28.2	28	28.4	27.9	28	28.4	28.1	0	15	23	20	15
10,11	34.2	29.3	29.7	29.4	29	29.4	29.1	28.9	29.3	29	28.7	29.1	28.8	28.8	29.2	28.9	7	72	77	80	78
11,12	35.3	30.8	31.1	30.7	30.4	30.8	30.3	30.2	30.6	30.3	30	30.4	30.1	30.1	30.5	30.2	12	70	72	74	75
12,13	36.5	32.9	33.3	33	31.7	32.1	31.8	31.3	31.7	31.4	27.8	31.2	27.7	30.9	31.3	31	12	70	72	74	75
13,14	41.1	34.7	35.1	34.8	33.9	34.3	33.9	33.5	33.9	33.6	32.9	33.3	32.8	33.1	33.5	33.2	10	69	77	80	78
14,15	41.9	35	35.5	35.1	34.3	34.7	34.2	33.9	34.3	34	33.5	33.8	33.4	33.7	34.1	33.8	0	18	20	20	16
15,16	40.7	35.2	35.6	35.3	34.2	34.6	34.3	33.7	34.1	33.8	33.3	33.6	33.2	33.5	34	33.6	0	0	0	0	0
7/15																					
8,9	32.6	27.5	27.8	27.6	27.3	27.7	27.4	27.2	27.6	27.1	26.9	27.5	27	27	27.5	27.1	0	0	0	0	0
9,10	33	28.6	29	28.6	28.6	29	28.7	28.4	28.8	28.5	28.3	28.7	28.2	28.3	28.7	28.4	0	20	25	24	15
10,11	34.5	29.6	30	29.7	29.3	29.7	29.4	29.2	29.6	29.3	29	29.4	29.1	29.1	29.5	29.2	8	72	77	80	78
11,12	35.6	31.1	31.4	31	30.7	31.1	30.6	30.5	30.9	30.6	30.3	30.7	30.4	30.4	30.8	30.5	12	70	72	74	75
12,13	36.8	33.2	33.6	33.3	32	32.4	32.1	31.6	32	31.7	28.1	31.5	28	31.2	31.6	31.3	12	70	72	74	75
13,14	41.4	35	35.4	35.1	34.2	34.6	34.2	33.8	34.2	33.9	33.2	33.6	33.1	33.4	33.8	33.5	10	70	77	80	78
14,15	42.2	35.3	35.8	35.4	34.6	35	34.5	34.2	34.6	34.3	33.8	34.1	33.7	34	34.4	34.1	0	20	25	25	14
15,16	41	35.5	35.9	35.6	34.5	34.9	34.6	34	34.4	34.1	33.6	33.9	33.5	33.8	34.3	33.9	0	0	0	0	0

7/16		M-7			M-8			M-9			M-10			M-11			M-7	M-8	M-9	M-10	M-11
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	Si	Si	Si	Si	Si
8,9	30.9	26.2	26.5	26.3	26	26.4	26.1	25.9	26.3	25.8	25.6	26.2	25.7	25.7	26.2	25.8	0	0	0	0	0
9,10	31.3	27.3	27.7	27.3	27.3	27.7	27.4	27.1	27.5	27.2	27	27.4	26.9	27	27.4	27.1	0	25	32	30	15
10,11	32.8	28.3	28.7	28.4	28	28.4	28.1	27.9	28.3	28	27.7	28.1	27.8	27.8	28.2	27.9	8	75	77	80	78
11,12	33.9	29.8	30.1	29.7	29.4	29.8	29.3	29.2	29.6	29.3	29	29.4	29.1	29.1	29.5	29.2	12	72	72	74	75
12,13	35.1	31.9	32.3	32	30.7	31.1	30.8	30.3	30.7	30.4	26.8	30.2	26.7	29.9	30.3	30	12	72	72	74	75
13,14	39.7	33.7	34.1	33.8	32.9	33.3	32.9	32.5	32.9	32.6	31.9	32.3	31.8	32.1	32.5	32.2	10	72	77	80	78
14,15	40.5	34	34.5	34.1	33.3	33.7	33.2	32.9	33.3	33	32.5	32.8	32.4	32.7	33.1	32.8	0	25	32	30	14
15,16	39.3	34.2	34.6	34.3	33.2	33.6	33.3	32.7	33.1	32.8	32.3	32.6	32.2	32.5	33	32.6	0	0	0	0	0
7/17																					
14,15	33.9	30.7	31.1	30.8	29.5	29.9	29.6	29.1	29.5	29.2	25.6	29	25.5	28.7	29.1	28.8	0	32	40	40	20
15,16	38.5	32.5	32.9	32.6	31.7	32.1	31.7	31.3	31.7	31.4	30.7	31.1	30.6	30.9	31.3	31	0	0	0	0	0
7/18																					
8,9	30	28.6	29	28.7	28.4	28.8	28.5	28.3	28.7	28.4	28.2	28.5	28.2	28.6	28.9	28.5	0	0	0	0	0
9,10	31.7	30	30.3	30	29.7	30.1	29.7	30	30.4	30.1	29.7	30.1	29.8	29.5	29.8	29.4	0	36	44	41	30
10,11	33	31.2	31.6	31.3	31.3	31.6	31.2	31.1	31.5	31.2	30.6	31	30.6	30.7	31	30.6	8	75	77	80	78
7/20																					
8,9	30	24.7	25	24.8	24.6	25	24.7	24.5	24.9	24.6	24.6	24.9	24.7	24.4	24.8	24.5	0	0	0	0	0
9,10	31.6	26.3	26.7	26.4	26.1	26.5	26.2	26	26.3	26	25.6	26	25.7	25.7	26.1	25.8	0	45	60	55	40
10,11	33.5	27.4	27.8	27.5	27.2	27.5	27.3	26.8	27.2	26.9	26.4	26.9	26.5	26.7	27	26.7	8	72	74	77	80
11,12	34.8	28.6	29	28.7	28	28.4	28.1	27.7	28	27.6	27.1	27.5	27.2	27.4	27.8	27.3	10	65	74	77	77
12,13	36	30.9	31.3	30.8	29.6	30	29.6	29.4	29.7	29.3	28.4	28.8	28.3	28.8	29.2	28.9	10	65	76	78	77
13,14	37.3	32	32.4	32.1	30.1	30.4	30	29.6	30.1	29.7	28.9	29.3	29	29.1	29.4	29	8	66	77	80	80
14,15	37.8	32.6	33	32.7	31.1	31.6	31.2	30.7	31	30.6	29.8	30.2	29.9	30.2	30.5	30.1	0	44	58	54	37
15,16	37.5	32.9	33.3	32.8	31.6	32	31.7	30.9	31.3	30.8	30.2	30.5	30.1	30.5	30.9	30.6	0	0	0	0	0
7/24																					
8,9	31.3	25.5	25.8	25.6	25.4	25.8	25.5	25.3	25.7	25.4	25.4	25.7	25.5	25.2	25.6	25.3	0	0	0	0	0
9,10	32.9	27.1	27.5	27.2	26.9	27.3	27	26.8	27.1	26.8	26.4	26.8	26.5	26.5	26.9	26.6	0	58	80	85	80
10,11	34.8	28.2	28.6	28.3	28	28.3	28.1	27.6	28	27.7	27.2	27.7	27.3	27.5	27.8	27.5	10	67	72	75	78
11,12	36.1	29.4	29.8	29.5	28.8	29.2	28.9	28.5	28.8	28.4	27.9	28.3	28	28.2	28.6	28.1	15	64	73	75	75
12,13	37.3	31.7	32.1	31.6	30.4	30.8	30.4	30.2	30.5	30.1	29.2	29.6	29.1	29.6	30	29.7	15	63	75	75	75
14,15	39.1	33.4	33.8	33.5	31.9	32.4	32	31.5	31.8	31.4	30.6	31	30.7	31	31.3	30.9	0	55	79	85	75
15,16	38.8	33.7	34.1	33.6	32.4	32.8	32.5	31.7	32.1	31.6	31	31.3	30.9	31.3	31.7	31.4	0	0	0	0	0
7/27																					
8,9	29.2	23.8	24	23.7	23.7	24.1	23.8	23.6	24	23.7	23.4	23.9	23.5	23.6	24	23.7	0	0	0	0	0
9,10	31	24.5	24.8	24.4	24.6	25	24.7	24.4	24.8	24.4	24.3	24.7	24.4	24.5	24.8	24.4	3.5	60	80	85	80
10,11	32.9	25.5	25.9	25.5	25.6	25.9	25.5	25.4	25.7	25.3	25.2	25.6	25.3	25.2	25.6	25.3	19	67	72	75	78
11,12	34.2	26.7	27.1	26.6	26.6	27	26.7	26.5	26.8	26.4	26.2	26.5	26.1	26.1	26.4	26	22	64	73	75	75
12,13	35.2	28.1	28.5	28.2	27.9	28.3	27.9	27.6	28	27.7	26.9	27.3	26.8	26.9	27.3	27	22	63	75	75	75
13,14	36.5	29.4	29.9	29.5	29.1	29.5	29.2	28.9	29.2	28.8	28	28.4	28.1	28.2	28.5	28.1	18	64	75	78	78
14,15	37.4	30.9	31.3	30.8	30.5	30.9	30.6	30.2	30.5	30.1	28.6	29	28.6	28.9	29.3	29	3	58	79	85	75
15,16	37	31.1	31.5	31	30.6	31	30.6	30.3	30.8	30.4	29	29.3	28.9	29.4	29.7	29.3	0	0	0	0	0
7/28																					
8,9	30.5	24.5	24.7	24.4	24.4	24.8	24.5	24.3	24.7	24.4	24.1	24.6	24.2	24.3	24.7	24.4	0	0	0	0	0
9,10	32.3	25.2	25.5	25.1	25.3	25.7	25.4	25.1	25.5	25.1	25	25.4	25.1	25.2	25.5	25.1	3	60	80	85	80
10,11	34.2	26.2	26.6	26.2	26.3	26.6	26.2	26.1	26.4	26	25.9	26.3	26	25.9	26.3	26	20	68	75	75	78
11,12	35.5	27.4	27.8	27.3	27.3	27.7	27.4	27.2	27.5	27.1	26.9	27.2	26.8	26.8	27.1	26.7	22	65	73	75	75
12,13	36.5	28.8	29.2	28.9	28.6	29	28.6	28.3	28.7	28.4	27.6	28	27.5	27.6	28	27.7	22	65	75	75	75
13,14	37.8	30.1	30.6	30.2	29.8	30.2	29.9	29.6	29.9	29.5	28.7	29.1	28.8	28.9	29.2	28.8	18	64	75	78	78
14,15	38.7	31.6	32	31.5	31.2	31.6	31.3	30.9	31.2	30.8	29.3	29.7	29.3	29.6	30	29.7	3	60	81	85	75
15,16	38.3	31.8	32.2	31.7	31.3	31.7	31.3	31	31.5	31.1	29.7	30	29.6	30.1	30.4	30	0	0	0	0	0
7/29																					
9,10	32.9	25.5	25.9	25.5	25.6	25.9	25.5	25.4	25.7	25.3	25.2	25.6	25.3	25.2	25.6	25.3	3.5	62	83	89	82
10,11	34.2	26.7	27.1	26.6	26.6	27	26.7	26.5	26.8	26.4	26.2	26.5	26.1	26.1	26.4	26	19	70	75	77	80
11,12	35.2	28.1	28.5	28.2	27.9	28.3	27.9	27.6	28	27.7	26.9	27.3	26.8	26.9	27.3	27	22	65	74	75	75
12,13	36.5	29.8	30.2	29.9	29.6	30	29.6	29.3	29.7	29.4	29.6	30	29.5	29.6	30	29.7	22	65	75	75	75

8/1		M-7			M-8			M-9			M-10			M-11			M-7	M-8	M-9	M-10	M-11
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_i	S_i	S_i	S_i	S_i
8,9	29	25.4	25.6	25.3	25.2	25.5	25.3	25.2	25.4	25.2	25.5	25.7	25.3	25.2	25.4	25.2	0	0	0	0	0
9,10	30.5	26.5	26.8	26.4	26	26.3	26	26.5	26.9	26.6	26.8	27.1	26.8	26.6	26.9	26.7	5	0	0	0	0
10,11	31.8	27.7	28	27.6	26.9	27.3	27	27.7	28.1	27.8	27.9	28.2	27.8	27.3	27.6	27.3	17	0	0	0	0
11,12	33.5	28.6	28.3	28.2	27.7	28	27.6	28.5	28.8	28.5	28.7	29	28.7	28.9	29.3	28.9	22	0	0	0	0
12,13	34.8	29.3	29.6	29.3	28.7	29.1	28.8	29.2	29.6	29.3	29.8	30.2	29.8	29.8	30.3	30.8	20	0	0	0	0
13,14	35.5	30.2	30.5	30.2	29.8	30.2	29.9	30.2	30.5	30.2	30.8	31.2	30.8	30.9	31.4	31	22	0	0	0	0
14,15	34.6	30.7	31	30.7	30.1	30.4	30.2	29.9	30.3	29.9	30.2	30.6	30.3	30.3	30.7	30.2	17	0	0	0	0
15,16	33.6	30.3	30.5	30.2	29.4	29.8	29.4	29.3	29.7	29.4	29.5	29.9	29.6	29.5	29.9	29.4	0	0	0	0	0
8/3																					
8,9	28	23.5	23.8	23.4	23.4	23.8	23.5	23.4	23.7	23.3	23.3	23.8	23.4	23.4	23.7	23.3	0	0	0	0	0
9,10	29.4	24.1	24.5	24.2	24	24.4	24.1	24.1	24.4	24	24	24.4	24.1	23.9	24.3	24	7	6	0	0	0
10,11	30.6	24.6	25.1	24.7	24.6	25	24.7	24.6	24.9	24.5	24.3	24.7	24.4	24.3	24.8	24.4	21.5	4	5	0	0
11,12	32	26.6	27	26.5	26.5	26.8	26.4	26.1	26.5	26.2	25.7	26.1	25.8	25.5	25.9	25.6	26	0.5	0	0	0
12,13	33.9	27.9	28.3	27.9	27.6	28	27.7	26.8	27.2	26.9	26.4	26.8	26.5	26.1	26.5	26.2	25	0.5	0	0	0
13,14	35.3	29.1	29.5	29.2	28.7	29.1	27.8	28.2	28.6	28.1	27.6	28	27.7	27.4	27.7	27.3	24	0.75	0	0	0
14,15	37.2	30.5	30.9	30.4	30	30.4	30.1	29.5	29.9	29.4	28.8	29.2	28.9	28.6	29	28.7	8	4	7.5	0	0
15,16	38	30.9	31.3	31	30.5	30.9	30.6	30	30.4	30	29.5	29.9	29.4	29.4	29.7	29.3	0	0	0	0	0
8/7																					
8,9	32.2	27.3	27.6	27.2	27.2	27.6	27.3	27.2	27.5	27.1	27.1	27.6	27.2	27.2	27.5	27.1	0	0	0	0	0
9,10	33.6	27.9	28.3	28	27.8	28.2	27.9	27.9	28.2	27.8	27.8	28.2	27.9	27.7	28.1	27.8	7	6	0	0	0
10,11	34.8	28.4	28.9	28.5	28.4	28.8	28.5	28.4	28.7	28.3	28.1	28.5	28.2	28.1	28.6	28.2	21.5	4	5	0	0
11,12	36.2	30.4	30.8	30.3	30.3	30.6	30.2	29.9	30.3	30	29.5	29.9	29.6	29.3	29.7	29.4	26	0.5	0	0	0
12,13	38.1	31.7	32.1	31.7	31.4	31.8	31.5	30.6	31	30.7	30.2	30.6	30.3	29.9	30.3	30	25	0.5	0	0	0
13,14	39.5	32.9	33.3	33	32.5	32.9	31.6	32	32.4	31.9	31.4	31.8	31.5	31.2	31.5	31.1	24	0.75	0	0	0
14,15	41.4	34.3	34.7	34.2	33.8	34.2	33.9	33.3	33.7	33.2	32.6	33	32.7	32.4	32.8	32.5	8	4	7.5	0	0
15,16	42.2	34.7	35.1	34.8	34.3	34.7	34.4	33.8	34.2	33.8	33.3	33.7	33.2	33.2	33.5	33.1	0	0	0	0	0
8/8																					
8,9	29.8	25.1	25.4	25	25	25.4	25.1	25	25.3	24.9	24.9	25.4	25	25	25.3	24.9	0	0	0	0	0
9,10	31.2	25.7	26.1	25.8	25.6	26	25.7	25.7	26	25.6	25.6	26	25.7	25.5	25.9	25.6	5	5	0	0	0
10,11	32.4	26.2	26.7	26.3	26.2	26.6	26.3	26.2	26.5	26.1	25.9	26.3	26	25.9	26.4	26	20	4	1	0	0
11,12	33.8	28.2	28.6	28.1	28.1	28.4	28	27.7	28.1	27.8	27.3	27.7	27.4	27.1	27.5	27.2	30	0	0	0	0
12,13	35.7	29.5	29.9	29.5	29.2	29.6	29.3	28.4	28.8	28.5	28	28.4	28.1	27.7	28.1	27.8	25	0	0	0	0
13,14	37.1	30.7	31.1	30.8	30.3	30.7	29.4	29.8	30.2	29.7	29.2	29.6	29.3	29	29.3	28.9	30	0	0	0	0
14,15	39	32.1	32.5	32	31.6	32	31.7	31.1	31.5	31	30.4	30.8	30.5	30.2	30.6	30.3	20	4	1	0	0
15,16	39.8	32.5	32.9	32.6	32.1	32.5	32.2	31.6	32	31.6	31.1	31.5	31	31	31.3	30.9	0	0	0	0	0
8/9																					
8,9	30.6	26	26.3	25.9	25.9	26.3	26	25.9	26.2	25.8	25.8	26.3	25.9	25.9	26.2	25.8	0	0	0	0	0
9,10	32	26.6	27	26.7	26.5	26.9	26.6	26.6	26.9	26.5	26.5	26.9	26.6	26.4	26.8	26.5	5	5	0	0	0
10,11	33.2	27.1	27.6	27.2	27.1	27.5	27.2	27.1	27.4	27	26.8	27.2	26.9	26.8	27.3	26.9	20	4	1	0	0
11,12	34.6	29.1	29.5	29	29	29.3	28.9	28.6	29	28.7	28.2	28.6	28.3	28	28.4	28.1	30	0	0	0	0
12,13	36.5	30.4	30.8	30.4	30.1	30.5	30.2	29.3	29.7	29.4	28.9	29.3	29	28.6	29	28.7	25	0	0	0	0
8/11																					
8,9	31.1	26.3	26.6	26.2	26.2	26.6	26.3	26.2	26.5	26.1	26.1	26.6	26.2	26.2	26.5	26.1	0	0	0	0	0
9,10	32.5	26.9	27.3	27	26.8	27.2	26.9	26.9	27.2	26.8	26.8	27.2	26.9	26.7	27.1	26.8	10	12	10	0	0
10,11	33.7	27.4	27.9	27.5	27.4	27.8	27.5	27.4	27.7	27.3	27.1	27.5	27.2	27.1	27.6	27.2	20	12	8	0	0
11,12	35.1	29.4	29.8	29.3	29.3	29.6	29.2	28.9	29.3	29	28.5	28.9	28.6	28.3	28.7	28.4	30	6	0	0	0
12,13	37	30.7	31.1	30.7	30.4	30.8	30.5	29.6	30	29.7	29.2	29.6	29.3	28.9	29.3	29	22	3	0	0	0
13,14	38.4	31.9	32.3	32	31.5	31.9	30.6	31	31.4	30.9	30.4	30.8	30.5	30.2	30.5	30.1	30	4	0	0	0
14,15	40.3	33.3	33.7	33.2	32.8	33.2	32.9	32.3	32.7	32.2	31.6	32	31.7	31.4	31.8	31.5	20	6	2.5	0	0
15,16	41.1	33.7	34.1	33.8	33.3	33.7	33.4	32.8	33.2	32.8	32.3	32.7	32.2	32.2	32.5	32.1	0	0	0	0	0
8/12																					
8,9	32.3	27.2	27.5	27.1	27.1	27.5	27.2	27.1	27.4	27	27	27.5	27.1	27.1	27.4	27	0	0	0	0	0
9,10	33.7	27.8	28.2	27.9	27.7	28.1	27.8	27.8	28.1	27.7	27.7	28.1	27.8	27.6	28	27.7	12.5	17.5	15	0	0
10,11	34.9	28.3	28.8	28.4	28.3	28.7	28.4	28.3	28.6	28.2	28	28.4	28.1	28	28.5	28.1	25	14.5	5	0	0
11,12	36.3	30.3	30.7	30.2	30.2	30.5	30.1	29.8	30.2	29.9	29.4	29.8	29.5	29.2	29.6	29.3	38.5	9	0	0	0

8/13		M-7			M-8			M-9			M-10			M-11			M-7	M-8	M-9	M-10	M-11
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_i	S_i	S_i	S_i	S_i
8,9	30	24.3	24.3	24.3	24.4	24.4	24.4	24.2	24.2	24.2	24.2	24.2	24.2	24.3	24.3	24.3	0	0	0	0	0
9,10	31.2	25	25	25	25.1	25.1	25.1	24.9	24.9	24.9	24.8	24.8	24.8	25	25	25	20	25	15	0	0
10,11	32	26.2	26.2	26.2	26.3	26.3	26.3	25.9	25.9	25.9	25.7	25.7	25.7	25.9	25.9	25.9	32	17	6	0	0
11,12	33.3	28	28	28	27.7	27.7	27.7	27.2	27.2	27.2	26.9	26.9	26.9	27	27	27	35	15	5	0	0
12,13	34.5	29.9	29.9	29.9	29.4	29.4	29.4	28.8	28.8	28.8	28.4	28.4	28.4	28.7	28.7	28.7	40	5	0	0	0
13,14	35.5	31.2	31.2	31.2	30.9	30.9	30.9	30	30	30	29.5	29.5	29.5	29.8	29.8	29.8	47	15	5	0	0
14,15	37.1	32	32	32	31.6	31.6	31.6	30.8	30.8	30.8	30.1	30.1	30.1	30.3	30.3	30.3	30	11	6	0	0
15,16	38.4	32.4	32.4	32.4	32.1	32.1	32.1	31.3	31.3	31.3	30.6	30.6	30.6	30.8	30.8	30.8	0	0	0	0	0
8/14																					
8,9	31.2	25	25	25	25.1	25.1	25.1	24.9	24.9	24.9	24.8	24.8	24.8	25	25	25	0	0	0	0	0
9,10	32	26.2	26.2	26.2	26.3	26.3	26.3	25.9	25.9	25.9	25.7	25.7	25.7	25.9	25.9	25.9	18	22	15	0	0
10,11	33.3	28	28	28	27.7	27.7	27.7	27.2	27.2	27.2	26.9	26.9	26.9	27	27	27	30	15	5	0	0
11,12	34.5	29.9	29.9	29.9	29.4	29.4	29.4	28.8	28.8	28.8	28.4	28.4	28.4	28.7	28.7	28.7	32	10	3	0	0
8/15																					
8,9	31.9	27.1	27.4	27	27	27.4	27.1	27	27.3	26.9	26.9	27.4	27	27	27.3	26.9	0	0	0	0	0
9,10	33.3	27.7	28.1	27.8	27.6	28	27.7	27.7	28	27.6	27.6	28	27.7	27.5	27.9	27.6	20	25	15	0	0
10,11	34.5	28.2	28.7	28.3	28.2	28.6	28.3	28.2	28.5	28.1	27.9	28.3	28	27.9	28.4	28	32	17	6	0	0
11,12	35.9	30.2	30.6	30.1	30.1	30.4	30	29.7	30.1	29.8	29.3	29.7	29.4	29.1	29.5	29.2	35	15	5	0	0
12,13	37.8	31.5	31.9	31.5	31.2	31.6	31.3	30.4	30.8	30.5	30	30.4	30.1	29.7	30.1	29.8	40	5	0	0	0
13,14	39.2	32.7	33.1	32.8	32.3	32.7	31.4	31.8	32.2	31.7	31.2	31.6	31.3	31	31.3	30.9	47	15	5	0	0
14,15	41.1	34.1	34.5	34	33.6	34	33.7	33.1	33.5	33	32.4	32.8	32.5	32.2	32.6	32.3	30	11	6	0	0
15,16	41.9	34.5	34.9	34.6	34.1	34.5	34.2	33.6	34	33.6	33.1	33.5	33	33	33.3	32.9	0	0	0	0	0
8/16																					
8,9	30.6	26	26.3	25.9	25.9	26.3	26	25.9	26.2	25.8	25.8	26.3	25.9	25.9	26.2	25.8	0	0	0	0	0
9,10	32	26.6	27	26.7	26.5	26.9	26.6	26.6	26.9	26.5	26.5	26.9	26.6	26.4	26.8	26.5	20	25	15	0	0
10,11	33.2	27.1	27.6	27.2	27.1	27.5	27.2	27.1	27.4	27	26.8	27.2	26.9	26.8	27.3	26.9	32	17	6	0	0
11,12	34.6	29.1	29.5	29	29	29.3	28.9	28.6	29	28.7	28.2	28.6	28.3	28	28.4	28.1	35	15	5	0	0
12,13	36.5	30.4	30.8	30.4	30.1	30.5	30.2	29.3	29.7	29.4	28.9	29.3	29	28.6	29	28.7	40	5	0	0	0
13,14	37.9	31.6	32	31.7	31.2	31.6	30.3	30.7	31.1	30.6	30.1	30.5	30.2	29.9	30.2	29.8	47	15	5	0	0
14,15	39.8	33	33.4	32.9	32.5	32.9	32.6	32	32.4	31.9	31.3	31.7	31.4	31.1	31.5	31.2	30	11	6	0	0
15,16	40.6	33.4	33.8	33.5	33	33.4	33.1	32.5	32.9	32.5	32	32.4	31.9	31.9	32.2	31.8	0	0	0	0	0
8/19																					
8,9	29.4	25.6	25.9	25.5	25.5	25.9	25.6	25.5	25.8	25.4	25.4	25.9	25.5	25.5	25.8	25.4	0	0	0	0	0
9,10	30.8	26.2	26.6	26.3	26.1	26.5	26.2	26.2	26.5	26.1	26.1	26.5	26.2	26	26.4	26.1	25	25	16.25	0	0
10,11	32	26.7	27.2	26.8	26.7	27.1	26.8	26.7	27	26.6	26.4	26.8	26.5	26.4	26.9	26.5	37.5	18	11	0	0
11,12	33.4	28.7	29.1	28.6	28.6	28.9	28.5	28.2	28.6	28.3	27.8	28.2	27.9	27.6	28	27.7	40.6	18	10.5	0	0
8/20																					
8,9	32.3	25.2	25.5	25.3	25.1	25.4	25	24.8	25.2	24.9	24.7	25.1	24.8	24.7	25	24.7	0	0	0	0	0
9,10	33.9	25.7	26.1	25.8	25.6	26	25.5	25.4	25.9	25.5	25.3	25.7	25.4	25.4	25.8	25.3	20	25	15	0	0
10,11	35.3	27.3	27.7	27.2	27.1	27.5	27.2	27	27.4	27.1	26.6	27	26.6	26.7	27.1	26.6	32	17	6	0	0
11,12	36.1	28.1	28.5	28.2	27.9	28.4	28	27.9	28.2	27.8	27.5	27.9	27.5	27.6	28	27.7	35	15	5	0	0
12,13	38	29	29.4	28.9	28.6	29.1	28.7	28.4	28.8	28.5	28.1	28.5	28.2	28.2	28.6	28.3	40	5	0	0	0
13,14	38.8	30.7	31	30.6	30.2	30.6	30.2	29.4	29.9	29.5	29	29.4	29	29.4	29.7	29.3	47	15	5	0	0
14,15	39.6	31.7	32.1	31.6	31.4	31.8	31.3	30.2	30.6	30.1	29.8	30.2	29.7	30	30.4	30.1	30	11	6	0	0
15,16	39.5	32.6	33	32.5	32.3	32.6	32.2	31.1	31.5	31.2	30.3	30.7	30.3	30.7	31.1	30.6	0	0	0	0	0
8/21																					
8,9	31.7	24.7	25	24.8	24.6	24.9	24.5	24.3	24.7	24.4	24.2	24.6	24.3	24.2	24.5	24.2	0	0	0	0	0
9,10	33.3	25.2	25.6	25.3	25.1	25.5	25	24.9	25.4	25	24.8	25.2	24.9	24.9	25.3	24.8	35	21	18	0	0
10,11	34.7	26.8	27.2	26.7	26.6	27	26.7	26.5	26.9	26.6	26.1	26.5	26.1	26.2	26.6	26.1	48	22	15	0	0
11,12	35.5	27.6	28	27.7	27.4	27.9	27.5	27.4	27.7	27.3	27	27.4	27	27.1	27.5	27.2	45	20	11	0	0

8/22		M-7			M-8			M-9			M-10			M-11			M-7	M-8	M-9	M-10	M-11
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_i	S_i	S_i	S_i	S_i
8,9	29.9	24.4	24.7	24.5	24.3	24.6	24.2	24	24.4	24.1	23.9	24.3	24	23.9	24.2	23.9	0	0	0	0	0
9,10	31.5	24.9	25.3	25	24.8	25.2	24.7	24.6	25.1	24.7	24.5	24.9	24.6	24.6	25	24.5	30	25	18	0	0
10,11	32.9	26.5	26.9	26.4	26.3	26.7	26.4	26.2	26.6	26.3	25.8	26.2	25.8	25.9	26.3	25.8	42.8	22	15	0	0
11,12	33.7	27.3	27.7	27.4	27.1	27.6	27.2	27.1	27.4	27	26.7	27.1	26.7	26.8	27.2	26.9	45	19	11	0	0
12,13	35.6	28.2	28.6	28.1	27.8	28.3	27.9	27.6	28	27.7	27.3	27.7	27.4	27.4	27.8	27.5	50	8	0	0	0
13,14	36.4	29.9	30.2	29.8	29.4	29.8	29.4	28.6	29.1	28.7	28.2	28.6	28.2	28.6	28.9	28.5	51	24	17.5	0	0
14,15	37.2	30.9	31.3	30.8	30.6	31	30.5	29.4	29.8	29.3	29	29.4	28.9	29.2	29.6	29.3	40	15	15	0	0
15,16	37.1	31.8	32.2	31.7	31.5	31.8	31.4	30.3	30.7	30.4	29.5	29.9	29.5	29.9	30.3	29.8	0	0	0	0	0
8/23																					
8,9	31.3	26.5	26.9	26.4	26.3	26.7	26.4	26.2	26.6	26.3	25.8	26.2	25.8	25.9	26.3	25.8	0	0	0	0	0
9,10	32.9	27.3	27.7	27.4	27.1	27.6	27.2	27.1	27.4	27	26.7	27.1	26.7	26.8	27.2	26.9	30	25	18	0	0
10,11	34.3	28.2	28.6	28.1	27.8	28.3	27.9	27.6	28	27.7	27.3	27.7	27.4	27.4	27.8	27.5	42.8	22	15	0	0
11,12	35.1	29	29.4	28.9	28.6	29.1	28.7	28.4	28.8	28.5	28.1	28.5	28.2	28.2	28.6	28.3	45	19	11	0	0
12,13	37	30.7	31	30.6	30.2	30.6	30.2	29.4	29.9	29.5	29	29.4	29	29.4	29.7	29.3	50	8	0	0	0
8/25																					
8,9	30.8	25.4	25.7	25.5	25.3	25.6	25.2	25	25.4	25.1	24.9	25.3	25	24.9	25.2	24.9	0	0	0	0	0
9,10	31.4	25.9	26.3	26	25.8	26.2	25.7	25.6	26.1	25.7	25.5	25.9	25.6	25.6	26	25.5	37.5	24.75	19.5	0	0
10,11	32.7	27.5	27.9	27.4	27.3	27.7	27.4	27.2	27.6	27.3	26.8	27.2	26.8	26.9	27.3	26.8	50	25	17.25	0	0
11,12	34	28.3	28.7	28.4	28.1	28.6	28.2	28.1	28.4	28	27.7	28.1	27.7	27.8	28.2	27.9	48.4	20.25	13.12	0	0
12,13	35.2	29.2	29.6	29.1	28.8	29.3	28.9	28.6	29	28.7	28.3	28.7	28.4	28.4	28.8	28.5	55	10	0	0	0
13,14	36.4	30.9	31.2	30.8	30.4	30.8	30.4	29.6	30.1	29.7	29.2	29.6	29.2	29.6	29.9	29.5	50	28	19.75	0	0
14,15	37.1	31.9	32.3	31.8	31.6	32	31.5	30.4	30.8	30.3	30	30.4	29.9	30.2	30.6	30.3	43.75	20	18	0	0
15,16	36.7	32.8	33.2	32.7	32.5	32.8	32.4	31.3	31.7	31.4	30.5	30.9	30.5	30.9	31.3	30.8	0	0	0	0	0
8/26																					
8,9	29.4	24.8	25.1	24.9	24.7	25	24.6	24.4	24.8	24.5	24.3	24.7	24.4	24.3	24.6	24.9	0	0	0	0	0
9,10	30	25.3	25.7	25.4	25.2	25.6	25.1	25	25.5	25.1	24.9	25.3	25	25	25.4	25.5	48	25	32	4	12
10,11	31.3	26.9	27.3	26.8	26.7	27.1	26.8	26.6	27	26.7	26.2	26.6	26.2	26.3	26.7	26.8	52	24	28	4	0
11,12	32.6	27.7	28.1	27.8	27.5	28	27.6	27.5	27.8	27.4	27.1	27.5	27.1	27.2	27.6	27.9	52	12	33	3	0
8/27																					
8,9	31.8	24.9	25.2	24.8	24.6	24.9	24.5	24.7	25	24.6	24.8	25.2	24.7	24.7	25.1	24.8	0	0	0	0	0
9,10	33	25.8	26.2	25.8	25.7	26	25.6	25.5	25.9	25.6	25.4	25.8	25.5	25.3	25.7	25.4	48	25	32	4	12
10,11	34.9	27.1	27.5	27.2	27	27.4	27.1	26.8	27.2	26.9	26.4	26.8	26.5	26.4	26.8	26.5	52	24	28	4	0
11,12	35.5	27.9	28.3	28	27.6	28	27.7	27.7	28.1	27.8	27.5	27.9	27.6	27.5	27.8	27.5	52	12	33	3	0
12,13	36.8	28.7	29.1	28.6	28.3	28.7	28.4	28.6	28.9	28.5	28.3	28.6	28.2	28.2	28.5	28.1	52	14	27	3	0
13,14	38.5	30.3	30.7	30.4	29.6	30	29.7	29.4	29.8	29.5	28.7	29	28.6	29	29.4	28.5	51	26	27	4	0
14,15	39.2	31.5	31.8	31.4	30.6	30.9	30.5	30.8	31.2	30.9	29.7	30.1	29.7	30.3	30.6	30.2	49	29	26	3	12
15,16	38.6	31.6	32	31.7	30.8	31.2	30.7	31.1	31.5	31.2	30.3	30.7	30.4	30.8	31.1	30.7	0	0	0	0	0
8/28																					
8,9	31.4	26.4	26.7	26.5	26.3	26.6	26.2	26	26.4	26.1	25.9	26.3	26	25.9	26.2	26.5	0	0	0	0	0
9,10	32	26.9	27.3	27	26.8	27.2	26.7	26.6	27.1	26.7	26.5	26.9	26.6	26.6	27	27.1	48	25	32	4	12
10,11	33.3	28.5	28.9	28.4	28.3	28.7	28.4	28.2	28.6	28.3	27.8	28.2	27.8	27.9	28.3	28.4	52	24	28	4	0
11,12	34.5	29.3	29.7	29.4	29.1	29.6	29.2	29.1	29.4	29	28.7	29.1	28.7	28.8	29.2	29.5	52	12	33	3	0
8/29																					
8,9	31.4	24.6	24.9	24.5	24.3	24.6	24.2	24.4	24.7	24.3	24.5	24.9	24.4	24.4	24.8	24.5	0	0	0	0	0
9,10	32.6	25.5	25.9	25.5	25.4	25.7	25.3	25.2	25.6	25.3	25.1	25.5	25.2	25	25.4	25.1	48	25	32	4	12
10,11	34.5	26.8	27.2	26.9	26.7	27.1	26.8	26.5	26.9	26.6	26.1	26.5	26.2	26.1	26.5	26.2	52	24	28	4	0
11,12	35.1	27.6	28	27.7	27.3	27.7	27.4	27.4	27.8	27.5	27.2	27.6	27.3	27.2	27.5	27.2	52	12	33	3	0
12,13	36.4	28.4	28.8	28.3	28	28.4	28.1	28.3	28.6	28.2	28	28.3	27.9	27.9	28.2	27.8	52	14	27	3	0
13,14	38.1	30	30.4	30.1	29.3	29.7	29.4	29.1	29.5	29.2	28.4	28.7	28.3	28.7	29.1	28.2	51	26	27	4	0
14,15	38.8	31.2	31.5	31.1	30.3	30.6	30.2	30.5	30.9	30.6	29.4	29.8	29.4	30	30.3	29.9	49	29	26	3	12
15,16	38.2	30.9	31.2	30.8	29.9	30.2	29.8	30.7	31.2	30.8	30	30.4	30.1	30.5	30.8	30.4	0	0	0	0	0

9/1		M-7			M-8			M-9			M-10			M-11			M-7	M-8	M-9	M-10	M-11
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_1	S_1	S_1	S_1	S_1
8,9	29.8	25.4	25.6	25.3	25.2	25.5	25.3	25.2	25.4	25.2	25.5	25.7	25.3	25.2	25.4	25.2	0	0	0	0	0
9,10	31.3	26.5	26.8	26.4	26	26.3	26	26.5	26.9	26.6	26.8	27.1	26.8	26.6	26.9	26.7	50	25.5	35	5	16
10,11	32.6	27.7	28	27.6	26.9	27.3	27	27.7	28.1	27.8	27.9	28.2	27.8	27.3	27.6	27.3	55	25	30	5	0
11,12	34.3	28.6	28.3	28.2	27.7	28	27.6	28.5	28.8	28.5	28.7	29	28.7	28.9	29.3	28.9	55	12.5	34.25	3	0.7
12,13	35.6	29.3	29.6	29.3	28.7	29.1	28.8	29.2	29.6	29.3	29.8	30.2	29.8	29.8	30.3	30.8	55	15	27.5	3	0.8
13,14	36.3	30.2	30.5	30.2	29.8	30.2	29.9	30.2	30.5	30.2	30.8	31.2	30.8	30.9	31.4	31	55	27.5	27.5	4	0
14,15	35.4	30.7	31	30.7	30.1	30.4	30.2	29.9	30.3	29.9	30.2	30.6	30.3	30.3	30.7	30.2	50	30	27	4	15
15,16	34.4	30.3	30.5	30.2	29.4	29.8	29.4	29.3	29.7	29.4	29.5	29.9	29.6	29.5	29.9	29.4	0	0	0	0	0
9/3																					
12,13	33.6	29.6	30	29.7	28.1	28.5	28.2	28.4	28.8	28.5	28	28.3	28.1	28.1	28.4	28	70	20	32	6	8
13,14	34.9	31.4	31.8	31.3	29	29.3	29.1	30	30.3	30.1	28.7	29.1	28.8	28.9	29.2	28.8	65	33	33	8	5
14,15	36.3	32.5	32.8	32.4	29.8	30.2	29.9	30.8	31.1	30.7	29.7	29.9	29.6	29.6	30	29.7	55	30	30	8	22.5
15,16	35.8	32	32.4	32.1	30.2	30.6	30.3	30.9	31.4	31	30	30.3	29.9	30	30.4	29.9	0	0	0	0	0
9/4																					
8,9	30.6	26.3	26.7	26.4	26.2	26.5	26.3	26.2	26.5	26.3	26	26.4	26.1	26	26.4	26.1	0	0	0	0	0
9,10	32	27	27.4	27.1	26.9	27.3	27	26.9	27.2	26.8	26.9	27.2	26.9	26.8	27.2	26.9	58	35	40	10	20
10,11	33.7	28.7	29.1	28.6	28.2	28.5	28.3	28.3	28.7	28.3	28	28.4	28.1	28	28.3	27.9	65	40	32.5	10	7
11,12	34.6	29.9	30.3	30	29	29.4	29.1	29.3	29.6	29.2	28.9	29.2	28.8	28.9	29.3	29	70	15	36	8	10
12,13	35.9	31.8	32.2	31.9	30.3	30.7	30.4	30.6	31	30.7	30.2	30.5	30.3	30.3	30.6	30.2	70	20	32	6	8
13,14	37.2	33.6	34	33.5	31.2	31.5	31.3	32.2	32.5	32.3	30.9	31.3	31	31.1	31.4	31	65	33	33	8	5
14,15	38.8	34.7	35	34.6	32	32.4	32.1	33	33.3	32.9	31.9	32.1	31.8	31.8	32.2	31.9	55	30	30	8	22.5
15,16	38	34.2	34.6	34.3	32.4	32.8	32.5	33.1	33.6	33.2	32.2	32.5	32.1	32.2	32.6	32.1	0	0	0	0	0
9/6																					
8,9	28.9	25.1	25.5	25.2	25	25.3	25.1	25	25.3	25.1	24.8	25.2	24.9	24.8	25.2	24.9	0	0	0	0	0
9,10	30.3	25.8	26.2	25.9	25.7	26.1	25.8	25.7	26	25.6	25.7	26	25.7	25.6	26	25.7	60	32	38	8	18
10,11	31.7	27.5	27.9	27.4	27	27.3	27.1	27.1	27.5	27.1	26.8	27.2	26.9	26.8	27.1	26.7	63	35	30	7	7
11,12	32.2	28.7	29.1	28.8	27.8	28.2	27.9	28.1	28.4	28	27.7	28	27.6	27.7	28.1	27.8	68	15	32	6	9
12,13	33.6	30.6	31	30.7	29.1	29.5	29.2	29.4	29.8	29.5	29	29.3	29.1	29.1	29.4	29	68	18	30	6	8
13,14	35.1	32.4	32.8	32.3	30	30.3	30.1	31	31.3	31.1	29.7	30.1	29.8	29.9	30.2	29.8	62	30	30	8	5
14,15	36.8	33.5	33.8	33.4	30.8	31.2	30.9	31.8	32.1	31.7	30.7	30.9	30.6	30.6	31	30.7	53	28	28	8	18
15,16	36.3	33	33.4	33.1	31.2	31.6	31.3	31.9	32.4	32	31	31.3	30.9	31	31.4	30.9	0	0	0	0	0
9/10																					
8,9	29.7	26.2	26.5	26.3	25.9	26.3	26	25.8	26.2	25.9	25.9	26.2	26	25.9	26.3	26	0	0	0	0	0
9,10	31.9	27.6	27.9	27.7	27.2	27.5	27.3	26.9	27.3	27	26.9	27.3	27	26.9	27.3	27	0	0	0	0	0
10,11	34	29.2	29.6	29.3	28.9	29.3	29	28.4	28.7	28.3	28.2	28.6	28.3	28.2	28.6	28.3	5	2.5	0	0	0
11,12	35.7	30.7	31.1	30.8	30.4	30.7	30.3	29.6	30	29.6	29.5	29.9	29.6	29.6	30	29.7	8	3.3	0	0	0
12,13	37.5	32.5	32.9	32.6	32.2	32.5	32.3	31.4	31.7	31.3	31.2	31.5	31.1	31.3	31.6	31.2	10	4.5	0	0	0
13,14	38	33.8	34.2	33.8	33.2	33.6	33.3	32.3	32.6	32.3	32	32.4	32.1	32.1	32.5	32.2	4	2	0	0	0
14,15	36.6	34.6	35	34.5	33.8	34.2	33.8	33.7	34.1	33.8	33.4	33.8	33.5	33.5	33.9	33.4	0	0	0	0	0
15,16	35.6	33.8	34.2	33.7	33.4	33.7	33.3	32.9	33.3	32.9	32.6	33	32.7	32.7	33.1	32.7	0	0	0	0	0
9/11																					
8,9	29.5	25.9	26.2	26	25.6	26	25.7	25.5	25.9	25.6	25.6	25.9	25.7	25.6	26	25.7	0	0	0	0	0
9,10	31.7	27.3	27.6	27.4	26.9	27.2	27	26.6	27	26.7	26.6	27	26.7	26.6	27	26.7	0	0	0	0	0
11,12	35.5	30.4	30.8	30.5	30.1	30.4	30	29.3	29.7	29.3	29.2	29.6	29.3	29.3	29.7	29.4	10	3	0	0	0
12,13	37.3	32.2	32.6	32.3	31.9	32.2	32	31.1	31.4	31	30.9	31.2	30.8	31	31.3	30.9	15	5	0	0	0
13,14	37.8	33.5	33.9	33.5	32.9	33.3	33	32	32.3	32	31.7	32.1	31.8	31.8	32.2	31.9	7	2	0	0	0
14,15	36.4	34.3	34.7	34.2	33.5	33.9	33.5	33.4	33.8	33.5	33.1	33.5	33.2	33.2	33.6	33.1	0	0	0	0	0
15,16	35.4	33.5	33.9	33.4	33.1	33.4	33	32.6	33	32.6	32.3	32.7	32.4	32.4	32.8	32.4	0	0	0	0	0
9/12																					
8,9	32.3	28.6	29	28.7	28.3	28.7	28.4	27.8	28.1	27.7	27.6	28	27.7	27.6	28	27.7	0	0	0	0	0
9,10	34.4	30.1	30.5	30.2	29.8	30.1	29.7	29	29.4	29	28.9	29.3	29	29	29.4	29.1	0	0	0	0	0
10,11	36.1	31.9	32.3	32	31.6	31.9	31.7	30.8	31.1	30.7	30.6	30.9	30.5	30.7	31	30.6	8	0	0	0	0
11,12	37.9	33.2	33.6	33.2	32.6	33	32.7	31.7	32	31.7	31.4	31.8	31.5	31.5	31.9	31.6	10	3	0	0	0
12,13	38.4	34	34.4	33.9	33.2	33.6	33.2	33.1	33.5	33.2	32.8	33.2	32.9	32.9	33.3	32.8	15	5	0	0	0
13,14	37	33.2	33.6	33.1	32.8	33.1	32.7	32.3	32.7	32.3	32	32.4	32.1	32.1	32.5	32.1	7	2	0	0	0

9/13		M-7			M-8			M-9			M-10			M-11			M-7	M-8	M-9	M-10	M-11
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_I	S_I	S_I	S_I	S_I
8,9	31	28.1	28.4	28.2	27.8	28.2	27.9	27.7	28.1	27.8	27.8	28.1	27.9	27.8	28.2	27.9	0	0	0	0	0
9,10	32.8	29.5	29.8	29.6	29.1	29.4	29.2	28.8	29.2	28.9	28.8	29.2	28.9	28.8	29.2	28.9	0	0	0	0	0
10,11	34.5	31.1	31.5	31.2	30.8	31.2	30.9	30.3	30.6	30.2	30.1	30.5	30.2	30.1	30.5	30.2	8	0	0	0	0
11,12	36.2	32.6	33	32.7	32.3	32.6	32.2	31.5	31.9	31.5	31.4	31.8	31.5	31.5	31.9	31.6	10	3	0	0	0
12,13	37.5	34.4	34.8	34.5	34.1	34.4	34.2	33.3	33.6	33.2	33.1	33.4	33	33.2	33.5	33.1	15	5	0	0	0
13,14	38.4	35.7	36.1	35.7	35.1	35.5	35.2	34.2	34.5	34.2	33.9	34.3	34	34	34.4	34.1	7	2	0	0	0
14,15	39.3	36.5	36.9	36.4	35.7	36.1	35.7	35.6	36	35.7	35.3	35.7	35.4	35.4	35.8	35.3	0	0	0	0	0
15,16	38.2	35.7	36.1	35.6	35.3	35.6	35.2	34.8	35.2	34.8	34.5	34.9	34.6	34.6	35	34.6	0	0	0	0	0
9/14																					
8,9	29.2	26.4	26.7	26.5	26.1	26.5	26.2	26	26.4	26.1	26.1	26.4	26.2	26.1	26.5	26.2	0	0	0	0	0
9,10	31	27.8	28.1	27.9	27.4	27.7	27.5	27.1	27.5	27.2	27.1	27.5	27.2	27.1	27.5	27.2	0	0	0	0	0
10,11	32.7	29.4	29.8	29.5	29.1	29.5	29.2	28.6	28.9	28.5	28.4	28.8	28.5	28.4	28.8	28.5	10	5	0	0	0
11,12	34.4	30.9	31.3	31	30.6	30.9	30.5	29.8	30.2	29.8	29.7	30.1	29.8	29.8	30.2	29.9	15	7	0	0	0
12,13	35.7	32.7	33.1	32.8	32.4	32.7	32.5	31.6	31.9	31.5	31.4	31.7	31.3	31.5	31.8	31.4	20	8	0	0	0
13,14	36.6	34	34.4	34	33.4	33.8	33.5	32.5	32.8	32.5	32.2	32.6	32.3	32.3	32.7	32.4	10	6	0	0	0
14,15	37.5	34.8	35.2	34.7	34	34.4	34	33.9	34.3	34	33.6	34	33.7	33.7	34.1	33.6	0	0	0	0	0
15,16	36.4	34	34.4	33.9	33.6	33.9	33.5	33.1	33.5	33.1	32.8	33.2	32.9	32.9	33.3	32.9	0	0	0	0	0
9/15																					
8,9	29.6	26.6	26.9	26.7	26.3	26.7	26.4	26.2	26.6	26.3	26.3	26.6	26.4	26.3	26.7	26.4	0	0	0	0	0
9,10	31.4	28	28.3	28.1	27.6	27.9	27.7	27.3	27.7	27.4	27.3	27.7	27.4	27.3	27.7	27.4	0	0	0	0	0
10,11	33.1	29.6	30	29.7	29.3	29.7	29.4	28.8	29.1	28.7	28.6	29	28.7	28.6	29	28.7	10	5	0	0	0
9/16																					
8,9	31.6	28	28.3	28.1	27.7	28.1	27.8	27.6	28	27.7	27.7	28	27.8	27.7	28.1	27.8	0	0	0	0	0
9,10	33.4	29.4	29.7	29.5	29	29.3	29.1	28.7	29.1	28.8	28.7	29.1	28.8	28.7	29.1	28.8	0	0	0	0	0
10,11	35.1	31	31.4	31.1	30.7	31.1	30.8	30.2	30.5	30.1	30	30.4	30.1	30	30.4	30.1	10	5	0	0	0
11,12	36.8	32.5	32.9	32.6	32.2	32.5	32.1	31.4	31.8	31.4	31.3	31.7	31.4	31.4	31.8	31.5	15	7	0	0	0
9/19																					
8,9	28	25.2	25.6	25.3	25.2	25.5	25.1	25.2	25.5	25.3	25.2	25.5	25.3	25.3	25.6	25.4	0	0	0	0	0
9,10	29.6	26	26.3	26.1	28.8	26.2	28.9	25.9	26.2	26	25.8	26.2	25.9	25.8	26.2	25.9	0	0	0	0	0
10,11	31.5	27.5	27.9	27.6	27.5	27.8	27.5	27.3	27.7	27.4	27.4	27.8	27.4	27.4	27.8	27.5	10	6	0	0	0
11,12	33.2	29.2	29.6	29.3	29.2	29.5	29.1	28.9	29.3	29	29	29.4	29.1	29.2	29.5	29.1	17	8	0	0	0
12,13	35.1	30.9	31.3	31	30.6	31	30.7	30.3	30.7	30.4	30.6	31	30.7	30.7	31.1	30.8	20	9	0	0	0
13,14	36.6	32.1	32.5	32.1	31.8	32.2	31.9	31	31.4	31.1	31.4	31.8	31.5	31.8	32.2	31.9	10	6	0	0	0
14,15	37.5	33.8	34.1	33.7	33.4	33.8	33.5	32.4	32.9	32.5	32.9	33.2	32.8	33.2	33.5	33.2	0	0	0	0	0
15,16	38	34.5	34.8	34.4	33.9	34.3	34	32.8	33.3	32.9	33.2	33.6	33.2	33.6	34	33.7	0	0	0	0	0
9/22																					
8,9	29.5	26.3	26.7	26.4	26.3	26.6	26.2	26.3	26.6	26.4	26.3	26.6	26.4	26.4	26.7	26.5	0	0	0	0	0
9,10	31.1	27.1	27.4	27.2	29.9	27.3	30	27	27.3	27.1	26.9	27.3	27	26.9	27.3	27	0	0	0	0	0
10,11	33	28.6	29	28.7	28.6	28.9	28.6	28.4	28.8	28.5	28.5	28.9	28.5	28.5	28.9	28.6	5	5	0	0	0
11,12	34.7	30.3	30.7	30.4	30.3	30.6	30.2	30	30.4	30.1	30.1	30.5	30.2	30.3	30.6	30.2	20	10	0	5	5
12,13	36.6	32	32.4	32.1	31.7	32.1	31.8	31.4	31.8	31.5	31.7	32.1	31.8	31.8	32.2	31.9	22	20	5	5	5
13,14	38.1	33.2	33.6	33.2	32.9	33.3	33	32.1	32.5	32.2	32.5	32.9	32.6	32.9	33.3	33	10	10	0	5	8
14,15	39	34.9	35.2	34.8	34.5	34.9	34.6	33.5	34	33.6	34	34.3	33.9	34.3	34.6	34.3	0	0	0	0	0
15,16	39.5	35.6	35.9	35.5	35	35.4	35.1	33.9	34.4	34	34.3	34.7	34.3	34.7	35.1	34.8	0	0	0	0	0
9/23																					
8,9	29.8	27.1	27.4	27.2	29.9	27.3	30	27	27.3	27.1	26.9	27.3	27	26.9	27.3	27	0	0	0	0	0
9,10	31.4	28.6	29	28.7	28.6	28.9	28.6	28.4	28.8	28.5	28.5	28.9	28.5	28.5	28.9	28.6	0	0	0	0	0
10,11	33.3	30.3	30.7	30.4	30.3	30.6	30.2	30	30.4	30.1	30.1	30.5	30.2	30.3	30.6	30.2	5	5	0	0	0
11,12	34.8	32	32.4	32.1	31.7	32.1	31.8	31.4	31.8	31.5	31.7	32.1	31.8	31.8	32.2	31.9	20	10	0	5	5
12,13	37	33.2	33.6	33.2	32.9	33.3	33	32.1	32.5	32.2	32.5	32.9	32.6	32.9	33.3	33	22	20	5	5	5
13,14	38.2	34.9	35.2	34.8	34.5	34.9	34.6	33.5	34	33.6	34	34.3	33.9	34.3	34.6	34.3	10	10	0	5	8
14,15	39	35.6	35.9	35.5	35	35.4	35.1	33.9	34.4	34	34.3	34.7	34.3	34.7	35.1	34.8	0	0	0	0	0
15,16	38.6	35	35.4	35.1	34.6	35.1	34.7	34.1	34.5	34	33.9	34.4	34	34.2	34.5	34.1	0	0	0	0	0

9/28		M-7			M-8			M-9			M-10			M-11			M-7	M-8	M-9	M-10	M-11
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_t	S_t	S_t	S_t	S_t
8,9	29.1	25.7	26	25.8	25.6	25.9	25.7	25.6	25.9	25.5	25.5	25.8	25.4	25.2	25.6	25.3	0	0	0	0	0
9,10	30	26.8	27.2	26.9	26.8	27.1	26.9	26.7	27	26.7	26.4	26.8	26.5	26.5	26.8	26.4	0	0	0	0	0
10,11	31.8	27.7	28.1	27.8	27.7	28	27.8	27.5	27.9	27.6	27.2	27.6	27.3	27.2	27.6	27.3	10	6	0	0	4
11,12	33.3	29.2	29.5	29.2	28.8	29.2	28.8	28.6	29	28.7	28.4	28.7	28.3	28.5	28.9	28.6	20	10	4	5	5
12,13	35.8	30.6	31	30.7	30.2	30.6	30.2	29.9	30.3	30	29.6	30	29.7	29.7	30.1	29.8	25	20	5	5	8
13,14	37	31.5	31.8	31.4	30.8	31.1	30.7	30.2	30.6	30.3	30.1	30.5	30.2	30.3	30.6	30.2	13	11	5	5	10
14,15	35.8	32.7	33	32.6	31.9	32.3	31.8	31.2	31.5	31.1	30.8	31.2	30.9	30.9	31.3	30.8	0	0	0	0	0
15,16	34.6	32.5	32.8	32.4	31.5	31.9	31.5	30.8	31.2	30.8	30.4	30.8	30.5	30.5	30.9	30.5	0	0	0	0	0
9/30																					
8,9	30.3	26.5	26.8	26.6	26.4	26.7	26.5	26.4	26.7	26.3	26.3	26.6	26.2	26	26.4	26.1	0	0	0	0	0
9,10	31.2	27.6	28	27.7	27.6	27.9	27.7	27.5	27.8	27.5	27.2	27.6	27.3	27.3	27.6	27.2	0	0	0	0	0
10,11	33	28.5	28.9	28.6	28.5	28.8	28.6	28.3	28.7	28.4	28	28.4	28.1	28	28.4	28.1	12	7	0	0	5
11,12	34.5	30	30.3	30	29.6	30	29.6	29.4	29.8	29.5	29.2	29.5	29.1	29.3	29.7	29.4	20	11	4	5	6
12,13	37	31.4	31.8	31.5	31	31.4	31	30.7	31.1	30.8	30.4	30.8	30.5	30.5	30.9	30.6	26	20	5	5	9
13,14	38.2	32.3	32.6	32.2	31.6	31.9	31.5	31	31.4	31.1	30.9	31.3	31	31.1	31.4	31	15	12	5	5	11
14,15	37	33.5	33.8	33.4	32.7	33.1	32.6	32	32.3	31.9	31.6	32	31.7	31.7	32.1	31.6	0	0	0	0	0
15,16	35.8	33.3	33.6	33.2	32.3	32.7	32.3	31.6	32	31.6	31.2	31.6	31.3	31.3	31.7	31.3	0	0	0	0	0
10/1																					
8,9	30.6	28.1	28.3	28	27.9	28.2	28	27.9	28.1	27.9	28.2	28.4	28	27.9	28.1	27.9	0	0	0	0	0
9,10	32.1	29.2	29.5	29.1	28.7	29	28.7	29.2	29.6	29.3	29.5	29.8	29.5	29.3	29.6	29.4	0	0	0	0	0
10,11	33.4	30.4	30.7	30.3	29.6	30	29.7	30.4	30.8	30.5	30.6	30.9	30.5	30	30.3	30	15	8	0	4	5
11,12	35.1	31.3	31	30.9	30.4	30.7	30.3	31.2	31.5	31.2	31.4	31.7	31.4	31.6	32	31.6	22	13	4	5	10
12,13	36.4	32	32.3	32	31.4	31.8	31.5	31.9	32.3	32	32.5	32.9	32.5	32.5	33	33.5	28	21	5	10	15
13,14	37.1	32.9	33.2	32.9	32.5	32.9	32.6	32.9	33.2	32.9	33.5	33.9	33.5	33.6	34.1	33.7	16	15	9	5	14
14,15	36.2	33.4	33.7	33.4	32.8	33.1	32.9	32.6	33	32.6	32.9	33.3	33	33	33.4	32.9	0	0	0	0	0
15,16	35.2	33	33.2	32.9	32.1	32.5	32.1	32	32.4	32.1	32.2	32.6	32.3	32.2	32.6	32.1	0	0	0	0	0
10/2																					
8,9	29.8	26.9	27.1	26.8	26.7	27	26.8	26.7	26.9	26.7	27	27.2	26.8	26.7	26.9	26.7	0	0	0	0	0
9,10	31.3	28	28.3	27.9	27.5	27.8	27.5	28	28.4	28.1	28.3	28.6	28.3	28.1	28.4	28.2	0	0	0	0	0
10,11	32.6	29.2	29.5	29.1	28.4	28.8	28.5	29.2	29.6	29.3	29.4	29.7	29.3	28.8	29.1	28.8	16	8	0	4	5
11,12	34.3	30.1	29.8	29.7	29.2	29.5	29.1	30	30.3	30	30.2	30.5	30.2	30.4	30.8	30.4	25	13	4	5	10
12,13	35.6	30.8	31.1	30.8	30.2	30.6	30.3	30.7	31.1	30.8	31.3	31.7	31.3	31.3	31.8	32.3	30	21	5	10	15
13,14	36.3	31.7	32	31.7	31.3	31.7	31.4	31.7	32	31.7	32.3	32.7	32.3	32.4	32.9	32.5	17	15	9	5	14
14,15	35.4	32.2	32.5	32.2	31.6	31.9	31.7	31.4	31.8	31.4	31.7	32.1	31.8	31.8	32.2	31.7	0	0	0	0	0
15,16	34.4	31.8	32	31.7	30.9	31.3	30.9	30.8	31.2	30.9	31	31.4	31.1	31	31.4	30.9	0	0	0	0	0
10/4																					
8,9	29.5	26.3	26.5	26.2	26.1	26.4	26.2	26.1	26.3	26.1	26.4	26.6	26.2	26.1	26.3	26.1	0	0	0	0	0
9,10	30.9	27.4	27.7	27.3	26.9	27.2	26.9	27.4	27.8	27.5	27.7	28	27.7	27.5	27.8	27.6	0	0	0	0	0
10,11	32	28.6	28.9	28.5	27.8	28.2	27.9	28.6	29	28.7	28.8	29.1	28.7	28.2	28.5	28.2	18	9	1.5	4.5	6.5
11,12	33.4	29.5	29.2	29.1	28.6	28.9	28.5	29.4	29.7	29.4	29.6	29.9	29.6	29.8	30.2	29.8	26	14.75	4.25	5.5	12.5
10/5																					
8,9	28.6	24.9	25.3	25	25	25.4	25.1	24.9	25.3	25	25	25.3	24.9	25	25.4	25.1	0	0	0	0	0
9,10	29.7	26	26.4	26.1	26.1	26.4	26	25.9	26.3	25.9	26	26.4	26.1	26.1	26.5	26.2	0	0	0	0	0
10,11	31	27.3	27.7	27.4	27.1	27.5	27.2	27.2	27.5	27.2	27.1	27.5	27.2	27.2	27.6	27.3	20	12.5	3	5	7.5
11,12	32.9	28.4	28.8	28.3	27.9	28.3	28	27.9	28.2	27.8	27.9	28.3	28	28	28.4	28.1	28.5	16	5	6	15
12,13	35	29.8	30.2	29.7	29.2	29.6	29.3	29.2	29.5	29.1	29.1	29.5	29.2	29.2	29.6	29.3	35	25	6	12	18
13,14	36	30.6	31	30.6	30	30.4	30.1	29.8	30.2	29.9	29.9	30.3	30	30	30.4	30.1	20	18.5	12	7.5	16
14,15	37.2	32.4	32.8	32.3	31.6	32	31.7	31.4	31.7	31.3	31.4	31.8	31.5	31.6	32	31.5	0	0	0	0	0
15,16	37.5	33	33.4	33	31.9	32.3	32	31.6	32	31.6	31.7	32.1	31.8	31.9	32.3	32	0	0	0	0	0

10/6		M-7			M-8			M-9			M-10			M-11			M-7	M-8	M-9	M-10	M-11
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_l	S_l	S_l	S_l	S_l
8,9	28.5	24.9	25.3	25	24.7	25.1	24.8	24.9	25.3	25	25	25.3	24.9	25	25.4	25.1	0	0	0	0	0
9,10	29.4	26	26.4	26.1	25.9	26.2	25.8	25.9	26.3	25.9	26	26.4	26.1	26.1	26.5	26.2	0	0	0	0	0
10,11	30.5	27.3	27.7	27.4	27.1	27.5	27.2	27.2	27.5	27.2	27.1	27.5	27.2	27.2	27.6	27.3	20	12.5	3	5	7.5
11,12	31.7	28.4	28.8	28.3	27.9	28.3	28	27.9	28.2	27.8	27.9	28.3	28	28	28.4	28.1	28.5	16	5	6	15
12,13	32.8	29.8	30.2	29.7	29.2	29.6	29.3	29.2	29.5	29.1	29.1	29.5	29.2	29.2	29.6	29.3	35	25	6	12	18
13,14	34	30.6	31	30.6	30	30.4	30.1	29.8	30.2	29.9	29.9	30.3	30	30	30.4	30.1	20	18.5	12	7.5	16
14,15	35.2	31.8	32.2	31.9	31.6	32	31.7	31.4	31.7	31.3	31.4	31.8	31.5	31.6	32	31.5	0	0	0	0	0
15,16	34.6	31.2	31.5	31.1	30.9	31.3	30.8	30.6	31	30.7	30.7	31.1	30.8	30.9	31.3	31	0	0	0	0	0
10/8																					
8,9	27.2	24.1	24.5	24.2	23.9	24.3	24	24.1	24.5	24.2	24.2	24.5	24.1	24.2	24.6	24.3	0	0	0	0	0
9,10	28.1	25.2	25.6	25.3	25.1	25.4	25	25.1	25.5	25.1	25.2	25.6	25.3	25.3	25.7	25.4	0	0	0	2	0
10,11	29.2	26.5	26.9	26.6	26.3	26.7	26.4	26.4	26.7	26.4	26.3	26.7	26.4	26.4	26.8	26.5	20	10	2	10	15
11,12	30.4	27.6	28	27.5	27.1	27.5	27.2	27.1	27.4	27	27.1	27.5	27.2	27.2	27.6	27.3	32	16	10	20	20
12,13	31.5	29	29.4	28.9	28.4	28.8	28.5	28.4	28.7	28.3	28.3	28.7	28.4	28.4	28.8	28.5	41	20	10	21	25
13,14	32.7	29.8	30.2	29.8	29.2	29.6	29.3	29	29.4	29.1	29.1	29.5	29.2	29.2	29.6	29.3	28	15	7	12	10
14,15	33.9	31	31.4	31.1	30.8	31.2	30.9	30.6	30.9	30.5	30.6	31	30.7	30.8	31.2	30.7	0	0	0	2	0
15,16	33.3	30.4	30.7	30.3	30.1	30.5	30	29.8	30.2	29.9	29.9	30.3	30	30.1	30.5	30.2	0	0	0	0	0
10/9																					
8,9	27.6	24.4	24.8	24.5	24.2	24.6	24.3	24.4	24.8	24.5	24.5	24.8	24.4	24.5	24.9	24.6	0	0	0	0	0
9,10	28.5	25.5	25.9	25.6	25.4	25.7	25.3	25.4	25.8	25.4	25.5	25.9	25.6	25.6	26	25.7	0	0	0	2	0
10,11	29.6	26.8	27.2	26.9	26.6	27	26.7	26.7	27	26.7	26.6	27	26.7	26.7	27.1	26.8	20	10	2	10	15
11,12	30.8	27.9	28.3	27.8	27.4	27.8	27.5	27.4	27.7	27.3	27.4	27.8	27.5	27.5	27.9	27.6	32	16	10	20	20
10/10																					
8,9	28.1	25.2	25.6	25.3	25.1	25.4	25	25.1	25.5	25.1	25.2	25.6	25.3	25.3	25.7	25.4	0	0	0	0	0
9,10	29.3	26.5	26.9	26.6	26.3	26.7	26.4	26.4	26.7	26.4	26.3	26.7	26.4	26.4	26.8	26.5	0	0	0	2	0
10,11	30.2	27.6	28	27.5	27.1	27.5	27.2	27.1	27.4	27	27.1	27.5	27.2	27.2	27.6	27.3	20	10	2	10	15
11,12	31.6	29	29.4	28.9	28.4	28.8	28.5	28.4	28.7	28.3	28.3	28.7	28.4	28.4	28.8	28.5	32	16	10	20	20
12,13	32.9	29.8	30.2	29.8	29.2	29.6	29.3	29	29.4	29.1	29.1	29.5	29.2	29.2	29.6	29.3	41	20	10	21	25
13,14	34	31	31.4	31.1	30.8	31.2	30.9	30.6	30.9	30.5	30.6	31	30.7	30.8	31.2	30.7	28	15	7	12	10
14,15	34.9	31.7	32.1	31.6	31.4	31.8	31.4	31.7	32.1	31.7	31.5	31.8	31.4	31.4	31.8	31.3	0	0	0	2	0
15,16	35.2	32	32.4	32.1	31.8	32.1	31.7	32.3	32.8	32.4	32	32.4	32	31.9	32.4	31.9	0	0	0	0	0
10/11																					
12,13	31	28.7	29.1	28.6	28.1	28.5	28.2	28.1	28.4	28	28	28.4	28.1	28.1	28.5	28.2	0	0	0	0	0
13,14	32.2	29.5	29.9	29.5	28.9	29.3	29	28.7	29.1	28.8	28.8	29.2	28.9	28.9	29.3	29	0	0	0	3	0
14,15	33.4	30.7	31.1	30.8	30.5	30.9	30.6	30.3	30.6	30.2	30.3	30.7	30.4	30.5	30.9	30.4	27	18	3	10	12
15,16	32.8	30.1	30.4	30	29.8	30.2	29.7	29.5	29.9	29.6	29.6	30	29.7	29.8	30.2	29.9	39	15	5	16	25
10/13																					
8,9	24.9	23	23	23	23.1	23.1	23.1	23	23	23	23.1	23.1	23.1	23.1	23.1	23.1	0	0	0	0	0
9,10	26.8	24.5	24.5	24.5	24.4	24.4	24.4	24.3	24.3	24.3	24.4	24.4	24.4	24.4	24.4	24.4	0	0	0	4	0
10,11	29.2	26.3	26.3	26.3	26	26	26	25.9	25.9	25.9	26.1	26.1	26.1	26.1	26.1	26.1	25	16	6	12.5	18
11,12	31	27.7	27.7	27.7	27.2	27.2	27.2	27	27	27	27.4	27.4	27.4	27.3	27.3	27.3	38	23	12.5	25	25
12,13	32.3	29	29	29	28.4	28.4	28.4	28.3	28.3	28.3	28.7	28.7	28.7	28.6	28.6	28.6	45	26.5	15	26	30
13,14	33.5	30.1	30.1	30.1	29.1	29.1	29.1	29	29	29	29.5	29.5	29.5	29.4	29.4	29.4	35	20	10	18.3	15
14,15	34.7	31.6	31.6	31.6	30.3	30.3	30.3	30.2	30.2	30.2	30.8	30.8	30.8	30.7	30.7	30.7	0	0	0	5	0
15,16	35	31.9	31.9	31.9	30.7	30.7	30.7	30.6	30.6	30.6	31.2	31.2	31.2	31.1	31.1	31.1	0	0	0	0	0
10/18																					
8,9	25	22.7	23	22.8	22.7	23.1	22.8	22.6	23	22.7	22.7	23.1	22.8	23.1	23.4	23.1	0	0	0	0	0
9,10	26.3	24.1	24.5	24.2	24	24.4	24.1	23.9	24.3	24	23.9	24.4	24	24.1	24.4	24	0	0	0	0	10
10,11	28	25.9	26.3	26	25.6	26	25.7	25.5	25.9	25.6	25.7	26.1	25.8	25.7	26.1	25	25	32	22	8	25
11,12	29.2	27.4	27.7	27.3	26.8	27.2	26.8	26.6	27	26.7	27	27.4	27.1	27.3	27.3	25.8	38	42	35	15	30
12,13	31.4	28.6	29	28.5	28.1	28.4	28	27.9	28.3	27.9	28.3	28.7	28.3	28.2	28.6	28.3	45	55	40	20	38
13,14	32.8	29.7	30.1	29.6	28.7	29.1	28.6	28.6	29	28.6	29.2	29.5	29.3	29	29.4	29.4	35	45	25	12	35
14,15	34.1	31.2	31.6	31.1	29.9	30.3	29.8	29.8	30.2	29.7	30.4	30.8	30.5	30.4	30.7	30.3	0	0	0	0	8
15,16	33.5	30.6	31	30.7	29.7	30	29.6	30.2	30.6	30.1	31	31.4	30.9	30.7	31.1	30.8	0	0	0	0	0

10/19		M-7			M-8			M-9			M-10			M-11			M-7	M-8	M-9	M-10	M-11
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_I	S_I	S_I	S_I	S_I
8,9	26.3	23.6	23.9	23.7	23.6	24	23.7	23.5	23.9	23.6	23.6	24	23.7	24	24.3	24	0	0	0	0	0
9,10	27.6	25	25.4	25.1	24.9	25.3	25	24.8	25.2	24.9	24.8	25.3	24.9	25	25.3	24.9	5	4	0	15	0
10,11	29.3	26.8	27.2	26.9	26.5	26.9	26.6	26.4	26.8	26.5	26.6	27	26.7	26.6	27	25.9	36	22	10	32	35
11,12	30.5	28.3	28.6	28.2	27.7	28.1	27.7	27.5	27.9	27.6	27.9	28.3	28	28.2	28.2	26.7	52	44	28	40	46
12,13	32.7	29.5	29.9	29.4	29	29.3	28.9	28.8	29.2	28.8	29.2	29.6	29.2	29.1	29.5	29.2	62	48	30	48	55
13,14	34.1	30.6	31	30.5	29.6	30	29.5	29.5	29.9	29.5	30.1	30.4	30.2	29.9	30.3	30.3	52	40	20	45	45
14,15	35.4	32.1	32.5	32	30.8	31.2	30.7	30.7	31.1	30.6	31.3	31.7	31.4	31.3	31.6	31.2	8	5	5	10	0
15,16	34.8	31.5	31.9	31.6	30.6	30.9	30.5	31.1	31.5	31	31.9	32.3	31.8	31.6	32	31.7	0	0	0	0	0
10/20																					
8,9	25.4	22.8	23.1	22.9	22.8	23.2	22.9	22.7	23.1	22.8	22.8	23.2	22.9	23.2	23.5	23.2	0	0	0	0	0
9,10	26.7	24.2	24.6	24.3	24.1	24.5	24.2	24	24.4	24.1	24	24.5	24.1	24.2	24.5	24.1	5	4	0	15	0
10,11	28.4	26	26.4	26.1	25.7	26.1	25.8	25.6	26	25.7	25.8	26.2	25.9	25.8	26.2	25.1	36	22	10	32	35
11,12	29.6	27.5	27.8	27.4	26.9	27.3	26.9	26.7	27.1	26.8	27.1	27.5	27.2	27.4	27.4	25.9	52	44	28	40	46
12,13	31.8	28.7	29.1	28.6	28.2	28.5	28.1	28	28.4	28	28.4	28.8	28.4	28.3	28.7	28.4	62	48	30	48	55
10/22																					
8,9	23.9	21.1	21.5	21.2	21.1	21.5	21.2	21.2	21.6	21.3	21.1	21.5	21.2	21.2	21.6	21.3	0	0	0	0	0
9,10	25.1	21.9	22.3	22	21.8	22.2	21.9	22	22.4	22.1	22	22.4	22.1	22.1	22.4	22.1	7	6	5	22	5
10,11	26.9	23.3	23.7	23.4	23.2	23.6	23.3	23.3	23.7	23.4	23.3	23.7	23.4	23.4	23.7	23.3	38	24	13	32	35
11,12	29.3	25.2	25.6	25.3	25	25.4	25.1	25.1	25.6	25.2	25	25.4	25.1	25.2	25.6	25.3	52	44	28	40	46
12,13	31	26.7	27.1	26.8	26.3	26.7	26.4	26.5	27	26.6	26.2	26.6	26.3	26.7	27	26.6	62	48	30	48	55
13,14	32.4	27.7	28.1	27.8	27.1	27.5	27.2	27.4	27.9	27.5	27.2	27.6	27.3	27.5	27.9	27.4	52	40	20	45	45
14,15	33.6	28.6	29	28.7	27.9	28.3	28	28.3	28.8	28.4	28	28.4	28.1	28.4	28.8	28.3	10	8	12	15	5
15,16	34.8	29.4	29.8	29.5	28.4	28.8	28.5	28.9	29.4	29	28.5	28.9	28.6	29	29.4	29	0	0	0	0	0
10/23																					
8,9	25.3	21.9	22.3	22	21.8	22.2	21.9	22	22.4	22.1	22	22.4	22.1	22.1	22.4	22.1	0	0	0	0	0
9,10	26.5	23.3	23.7	23.4	23.2	23.6	23.3	23.3	23.7	23.4	23.3	23.7	23.4	23.4	23.7	23.3	7	6	5	22	5
10,11	28.3	25.2	25.6	25.3	25	25.4	25.1	25.1	25.6	25.2	25	25.4	25.1	25.2	25.6	25.3	38	24	13	32	35
11,12	30.7	26.7	27.1	26.8	26.3	26.7	26.4	26.5	27	26.6	26.2	26.6	26.3	26.7	27	26.6	52	44	28	40	46
12,13	32.4	27.7	28.1	27.8	27.1	27.5	27.2	27.4	27.9	27.5	27.2	27.6	27.3	27.5	27.9	27.4	62	48	30	48	55
13,14	33.8	28.6	29	28.7	27.9	28.3	28	28.3	28.8	28.4	28	28.4	28.1	28.4	28.8	28.3	52	40	20	45	45
14,15	35	29.4	29.8	29.5	28.4	28.8	28.5	28.9	29.4	29	28.5	28.9	28.6	29	29.4	29	10	8	12	15	5
15,16	34.2	28.8	29.2	28.7	27.9	28.4	28	28.2	28.6	28.1	27.9	28.3	27.9	28.3	28.8	28.4	0	0	0	0	0
10/24																					
8,9	24.7	20.6	21	20.7	20.5	20.9	20.6	20.7	21.1	20.8	20.7	21.1	20.8	20.8	21.1	20.8	0	0	0	0	0
9,10	25.9	22	22.4	22.1	21.9	22.3	22	22	22.4	22.1	22	22.4	22.1	22.1	22.4	22	6	6	5	20	5
10,11	27.7	23.9	24.3	24	23.7	24.1	23.8	23.8	24.3	23.9	23.7	24.1	23.8	23.9	24.3	24	37	23	12	32	35
11,12	30.1	25.4	25.8	25.5	25	25.4	25.1	25.2	25.7	25.3	24.9	25.3	25	25.4	25.7	25.3	51	43	28	40	45
12,13	31.8	26.4	26.8	26.5	25.8	26.2	25.9	26.1	26.6	26.2	25.9	26.3	26	26.2	26.6	26.1	61	47	30	48	55
13,14	33.2	27.3	27.7	27.4	26.6	27	26.7	27	27.5	27.1	26.7	27.1	26.8	27.1	27.5	27	51	40	20	45	45
14,15	34.4	28.1	28.5	28.2	27.1	27.5	27.2	27.6	28.1	27.7	27.2	27.6	27.3	27.7	28.1	27.7	9	8	10	12	4
15,16	33.6	27.5	27.9	27.4	26.6	27.1	26.7	26.9	27.3	26.8	26.6	27	26.6	27	27.5	27.1	0	0	0	0	0
10/27																					
8,9	23.6	19.8	20.2	19.9	19.7	20.1	19.8	19.8	20.2	19.9	19.8	20.2	19.9	19.9	20.2	19.8	0	0	0	0	0
9,10	24.8	20.6	21	20.7	20.5	20.9	20.6	20.7	21.1	20.8	20.7	21.1	20.8	20.8	21.1	20.8	6	6	5	20	5
10,11	26.6	22	22.4	22.1	21.9	22.3	22	22	22.4	22.1	22	22.4	22.1	22.1	22.4	22	37	23	12	32	35
11,12	29	23.9	24.3	24	23.7	24.1	23.8	23.8	24.3	23.9	23.7	24.1	23.8	23.9	24.3	24	51	43	28	40	45
12,13	30.7	25.4	25.8	25.5	25	25.4	25.1	25.2	25.7	25.3	24.9	25.3	25	25.4	25.7	25.3	61	47	30	48	55
13,14	32.1	26.4	26.8	26.5	25.8	26.2	25.9	26.1	26.6	26.2	25.9	26.3	26	26.2	26.6	26.1	51	40	20	45	45
14,15	33.3	27.3	27.7	27.4	26.6	27	26.7	27	27.5	27.1	26.7	27.1	26.8	27.1	27.5	27	9	8	10	12	4
15,16	33.5	28.1	28.5	28.2	27.1	27.5	27.2	27.6	28.1	27.7	27.2	27.6	27.3	27.7	28.1	27.7	0	0	0	0	0
10/28																					
8,9	22.7	18.8	19.2	18.9	18.7	19.1	18.8	18.8	19.2	18.9	18.8	19.2	18.9	18.9	19.2	18.8	0	0	0	0	0
9,10	23.9	19.6	20	19.7	19.5	19.9	19.6	19.7	20.1	19.8	19.7	20.1	19.8	19.8	20.1	19.8	5.5	5	5	20	5
10,11	25.7	21	21.4	21.1	20.9	21.3	21	21	21.4	21.1	21	21.4	21.1	21.1	21.4	21	35	22	12	32	35
11,12	28.1	22.9	23.3	23	22.7	23.1	22.8	22.8	23.3	22.9	22.7	23.1	22.8	22.9	23.3	23	48	36	28	40	45

10/30		M-7			M-8			M-9			M-10			M-11			M-7	M-8	M-9	M-10	M-11
TIME	T_s	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_l	S_l	S_l	S_l	S_l
8,9	22	19.5	19.8	19.5	19.4	19.8	19.5	19.4	19.7	19.3	19.3	19.6	19.4	19.4	19.8	19.5	0	0	0	0	0
9,10	24.1	21.5	21.8	21.4	21.4	21.6	21.3	21.4	21.7	21.3	21.5	21.8	21.6	21.2	21.6	21.3	5.5	5	11	22	8
10,11	25.8	22.5	22.9	22.4	22.4	22.7	22.3	22.5	22.8	22.4	22.8	23.1	22.7	22.4	22.7	22.5	30.5	22.4	19	30	30
11,12	27.8	24.2	24.5	24.1	24	24.3	24	24	24.4	24.1	24.4	24.8	24.4	24	24.4	24.1	45	30.6	31.5	40	40
12,13	29.9	25.7	26.1	25.7	25.6	25.9	25.5	25.6	26	25.7	26	26.4	26	25.7	26	25.6	55.6	40	38	46	45
13,14	31.2	27.1	27.5	27.2	27	27.4	27.1	27	27.4	27.1	27.6	28	27.7	27.1	27.5	27.1	45	30	28	40	30
14,15	32.5	28.4	28.8	28.5	28.2	28.6	28.3	28.2	28.5	28.3	28.9	29.2	28.9	28.2	28.6	28.3	10	8	18	15	7
15,16	33.6	29.8	30.2	29.9	29	29.4	29.1	29.2	29.5	29.2	29.7	30.1	29.8	29.2	29.5	29.1	0	0	0	0	0
11/3																					
8,9	22	19.3	19.6	19.3	19.2	19.6	19.3	19.2	19.5	19.1	19.1	19.4	19.2	19.2	19.6	19.3	0	0	0	0	0
9,10	24.1	21.3	21.6	21.2	21.2	21.4	21.1	21.2	21.5	21.1	21.3	21.6	21.4	21	21.4	21.1	9	8	8	25	5
10,11	25.8	22.3	22.7	22.2	22.2	22.5	22.1	22.3	22.6	22.2	22.6	22.9	22.5	22.2	22.5	22.3	40	26	15	35	36
11,12	27.8	24	24.3	23.9	23.8	24.1	23.8	23.8	24.2	23.9	24.2	24.6	24.2	23.8	24.2	23.9	55	45	30	42	48
12,13	29.9	25.5	25.9	25.5	25.4	25.7	25.3	25.4	25.8	25.5	25.8	26.2	25.8	25.5	25.8	25.4	64	50	32	50	56
13,14	31.2	26.9	27.3	27	26.8	27.2	26.9	26.8	27.2	26.9	27.4	27.8	27.5	26.9	27.3	26.9	55	42	22	48	47
14,15	32.5	28.2	28.6	28.3	28	28.4	28.1	28	28.3	28.1	28.7	29	28.7	28	28.4	28.1	12	10	18	17	6
15,16	32	27.7	28.1	27.7	28.8	29.2	28.9	29	29.3	29	29.5	29.9	29.6	29	29.3	28.9	0	0	0	0	0
11/5																					
8,9	22.3	19.5	19.8	19.5	19.4	19.8	19.5	19.4	19.7	19.3	19.3	19.6	19.4	19.4	19.8	19.5	0	0	0	0	0
9,10	24.4	21.5	21.8	21.4	21.4	21.6	21.3	21.4	21.7	21.3	21.5	21.8	21.6	21.2	21.6	21.3	7	7	8	25	5
10,11	26.1	22.5	22.9	22.4	22.4	22.7	22.3	22.5	22.8	22.4	22.8	23.1	22.7	22.4	22.7	22.5	40	29	18	36	40
11,12	28.1	24.2	24.5	24.1	24	24.3	24	24	24.4	24.1	24.4	24.8	24.4	24	24.4	24.1	52	45	30	42	48
12,13	30.2	25.7	26.1	25.7	25.6	25.9	25.5	25.6	26	25.7	26	26.4	26	25.7	26	25.6	63	50	32	50	56
13,14	31.5	27.1	27.5	27.2	27	27.4	27.1	27	27.4	27.1	27.6	28	27.7	27.1	27.5	27.1	52	40	20	45	45
14,15	32.8	28.4	28.8	28.5	28.2	28.6	28.3	28.2	28.5	28.3	28.9	29.2	28.9	28.2	28.6	28.3	10	8	15	15	6
15,16	32.3	28.5	28.9	28.4	28.4	28.8	28.5	28.4	28.8	28.5	29.1	29.5	29.2	28.4	28.8	28.5	0	0	0	0	0
11/6																					
8,9	21.5	19.3	19.6	19.2	19.2	19.5	19.3	19.3	19.5	19.2	19.4	19.8	19.5	19.3	19.5	19.7	0	0	0	0	0
9,10	23.6	20.8	21.1	20.7	20.6	20.9	20.5	20.8	21	20.7	20.7	21	20.8	21.3	21.6	21.2	10	10	15	30	10
10,11	24.9	22.2	22.5	22.1	22	22.3	21.9	22	22.4	22.1	22.2	22.6	21.3	22.1	22.4	22	45	30	20	38	45
11,12	26.3	23.3	23.6	23.2	22.9	23.3	23	22.9	23.3	23	23.8	24.3	23.9	23.2	23.5	23.1	55	50	32	50	50
12,13	27.7	24.5	24.9	24.6	24.1	24.5	24.2	24.1	24.4	24	25	25.4	25	24.4	24.7	24.3	65	52	38.5	57.5	55
13,14	29	26.2	26.5	26.3	25.7	26	25.6	25.4	25.8	25.5	26.3	26.7	26.4	25.9	26.3	26	52	46	30	55	48
14,15	31.3	27.6	28	27.7	27.1	27.5	27.2	26.8	27.2	26.9	27.9	28.3	28	27.4	27.7	27.3	15	15	26	25	10
15,16	32	28.2	28.5	28.1	27.8	28.2	27.9	27.3	27.7	27.4	29	29.4	29	28.1	28.4	28.1	0	0	0	0	0
11/7																					
8,9	21.5	19.3	19.6	19.2	19.2	19.5	19.3	19.3	19.5	19.2	19.4	19.8	19.5	19.3	19.5	19.7	0	0	0	0	0
9,10	23.6	20.8	21.1	20.7	20.6	20.9	20.5	20.8	21	20.7	20.7	21	20.8	21.3	21.6	21.2	10	10	15	30	10
10,11	24.9	22.2	22.5	22.1	22	22.3	21.9	22	22.4	22.1	22.2	22.6	21.3	22.1	22.4	22	45	30	20	38	45
11,12	26.3	23.3	23.6	23.2	22.9	23.3	23	22.9	23.3	23	23.8	24.3	23.9	23.2	23.5	23.1	55	50	32	50	50
12,13	27.7	24.5	24.9	24.6	24.1	24.5	24.2	24.1	24.4	24	25	25.4	25	24.4	24.7	24.3	65	52	38.5	57.5	55
13,14	29	26.2	26.5	26.3	25.7	26	25.6	25.4	25.8	25.5	26.3	26.7	26.4	25.9	26.3	26	52	46	30	55	48
14,15	31.3	27.6	28	27.7	27.1	27.5	27.2	26.8	27.2	26.9	27.9	28.3	28	27.4	27.7	27.3	15	15	26	25	10
15,16	32	28.2	28.5	28.1	27.8	28.2	27.9	27.3	27.7	27.4	29	29.4	29	28.1	28.4	28.1	0	0	0	0	0
11/8																					
8,9	21.1	19.1	19.4	19	19	19.3	19.1	19.1	19.3	19	19.2	19.6	19.3	19.1	19.3	19.5	0	0	0	0	0
9,10	23.2	20.6	20.9	20.5	20.4	20.7	20.3	20.6	20.8	20.5	20.5	20.8	20.6	21.1	21.4	21	9	9	12	26.8	9
10,11	24.5	22	22.3	21.9	21.8	22.1	21.7	21.8	22.2	21.9	22	22.4	21.1	21.9	22.2	21.8	42	29.5	18	36.5	40
11,12	25.9	23.1	23.4	23	22.7	23.1	22.8	22.7	23.1	22.8	23.6	24.1	23.7	23	23.3	22.9	56	48	31.6	48	50
12,13	27.3	24.3	24.7	24.4	23.9	24.3	24	23.9	24.2	23.8	24.8	25.2	24.8	24.2	24.5	24.1	64	51.5	36	55	60
13,14	28.6	26	26.3	26.1	25.5	25.8	25.4	25.2	25.6	25.3	26.1	26.5	26.2	25.7	26.1	25.8	55	45.37	28	52	45 37
14,15	30.9	27.4	27.8	27.5	26.9	27.3	27	26.6	27	26.7	27.7	28.1	27.8	27.2	27.5	27.1	12.5	12.5	24	21	9
15,16	31.6	28	28.3	27.9	27.6	28	27.7	27.1	27.5	27.2	28.8	29.2	28.8	27.9	28.2	27.9	0	0	0	0	0

11/9		M-7			M-8			M-9			M-10			M-11			M-7	M-8	M-9	M-10	M-11
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_I	S_I	S_I	S_I	S_I
8,9	22.2	18.7	19	18.6	18.6	18.9	18.7	18.7	18.9	18.6	18.8	19.2	18.9	18.7	18.9	19.1	0	0	0	0	0
9,10	23.5	20.2	20.5	20.1	20	20.3	19.9	20.2	20.4	20.1	20.1	20.4	20.2	20.7	21	20.6	9	9	12	26.8	9
10,11	24.9	21.6	21.9	21.5	21.4	21.7	21.3	21.4	21.8	21.5	21.6	22	20.7	21.5	21.8	21.4	42	29.5	18	36.5	40
11,12	27	22.7	23	22.6	22.3	22.7	22.4	22.3	22.7	22.4	23.2	23.7	23.3	22.6	22.9	22.5	56	48	31.6	48	50
11/10																					
8,9	21.9	18.9	19.2	18.8	18.8	19.1	18.9	18.9	19.1	18.8	19	19.4	19.1	18.9	19.1	19.3	2	2	5	6	2
9,10	24	20.4	20.7	20.3	20.2	20.5	20.1	20.4	20.6	20.3	20.3	20.6	20.4	20.9	21.2	20.8	10	10	16	27	9
10,11	25.3	21.8	22.1	21.7	21.6	21.9	21.5	21.6	22	21.7	21.8	22.2	20.9	21.7	22	21.6	46	32	22	37	42
11,12	26.7	22.9	23.2	22.8	22.5	22.9	22.6	22.5	22.9	22.6	23.4	23.9	23.5	22.8	23.1	22.7	58	50	35	49	55
12,13	28.1	24.1	24.5	24.2	23.7	24.1	23.8	23.7	24	23.6	24.6	25	24.6	24	24.3	23.9	70	53	40	56	65
13,14	29.4	25.8	26.1	25.9	25.3	25.6	25.2	25	25.4	25.1	25.9	26.3	26	25.5	25.9	25.6	59	47	35	55	50
14,15	31.7	27.2	27.6	27.3	26.7	27.1	26.8	26.4	26.8	26.5	27.5	27.9	27.6	27	27.3	26.9	15	15	29	25	12
15,16	32.4	27.8	28.1	27.7	27.4	27.8	27.5	26.9	27.3	27	28.6	29	28.6	27.7	28	27.7	2	2	5	6	2
11/13																					
8,9	21.3	18.6	18.9	18.5	18.5	18.8	18.6	18.6	18.8	18.5	18.7	19.1	18.8	18.6	18.8	19	2	2	5	6	2
9,10	23.4	20.1	20.4	20	19.9	20.2	19.8	20.1	20.3	20	20	20.3	20.1	20.6	20.9	20.5	10	10	18	28	10
10,11	24.7	21.5	21.8	21.4	21.3	21.6	21.2	21.3	21.7	21.4	21.5	21.9	20.6	21.4	21.7	21.3	47	35	25	38	43
11,12	26.1	22.6	22.9	22.5	22.2	22.6	22.3	22.2	22.6	22.3	23.1	23.6	23.2	22.5	22.8	22.4	60	52	37	50	56
12,13	27.5	23.8	24.2	23.9	23.4	23.8	23.5	23.4	23.7	23.3	24.3	24.7	24.3	23.7	24	23.6	72	55	42	57	66
13,14	28.8	25.5	25.8	25.6	25	25.3	24.9	24.7	25.1	24.8	25.6	26	25.7	25.2	25.6	25.3	60	48	37	56	51
14,15	31.1	26.9	27.3	27	26.4	26.8	26.5	26.1	26.5	26.2	27.2	27.6	27.3	26.7	27	26.6	18	16	30	56	13
15,16	31.8	27.5	27.8	27.4	27.1	27.5	27.2	26.6	27	26.7	28.3	28.7	28.3	27.4	27.7	27.4	2	2	5	6	2
11/15																					
8,9	19.3	17.7	18	17.8	17.8	18	17.8	17.8	18	17.7	17.7	18	17.8	17.6	17.9	17.7	5	5	12	15	5
9,10	21.4	19	19.3	19.1	19.1	19.3	19	19	19.3	19.1	19	19.3	19.1	18.9	19.2	19	12.6	12	30	36	10
10,11	23.6	20.5	20.8	20.5	20.4	20.7	20.5	20.3	20.6	20.2	20.7	21	20.8	20.5	20.8	20.4	55	40	45	57.8	52
11,12	25.2	22.3	22.6	22.2	21.9	22.2	21.8	21.8	22.1	21.9	22.7	23	22.7	22.2	22.6	22.3	62.7	65	49	69	60
12,13	27.1	23.2	23.6	23.2	22.6	23	22.7	23	23.2	22.9	23.8	24.1	23.7	23	23.4	23.1	78	72	55	72	70
13,14	28.4	24.7	25.1	24.8	24	24.3	24.1	24.4	24.7	24.3	25.2	25.6	25.3	24.4	24.8	24.5	70	50	52	62	58
14,15	29.2	25.5	25.9	25.6	24.6	24.9	24.5	25.2	25.5	25.2	26.2	26.6	26.3	25.2	25.5	25.1	26	20	30	35	19
15,16	30.9	26.6	27	26.6	25.5	25.9	25.5	26	26.3	25.9	27.5	27.8	27.4	26.2	26.6	26.3	5	6	10	19	5
11/16																					
8,9	19.1	16.9	17.2	17	17	17.2	17	17	17.2	16.9	16.9	17.2	17	16.8	17.1	16.9	9	8	12	15	8
9,10	21.2	18.2	18.5	18.3	18.3	18.5	18.2	18.2	18.5	18.3	18.2	18.5	18.3	18.1	18.4	18.2	10	10	20	25	10
10,11	23.4	19.7	20	19.7	19.6	19.9	19.7	19.5	19.8	19.4	19.9	20.2	20	19.7	20	19.6	55	50	35	42	50
11,12	25	21.5	21.8	21.4	21.1	21.4	21	21	21.3	21.1	21.9	22.2	21.9	21.4	21.8	21.5	70	65	45	52	65
12,13	26.9	22.4	22.8	22.4	21.8	22.2	21.9	22.2	22.4	22.1	23	23.3	22.9	22.2	22.6	22.3	85	72	52	60	75
13,14	28.2	23.9	24.3	24	23.2	23.5	23.3	23.6	23.9	23.5	24.4	24.8	24.5	23.6	24	23.7	55	50	45	50	50
14,15	29	24.7	25.1	24.8	23.8	24.1	23.7	24.4	24.7	24.4	25.4	25.8	25.5	24.4	24.7	24.3	25	22	35	30	20
15,16	30.7	25.8	26.2	25.8	24.7	25.1	24.7	25.2	25.5	25.1	26.7	27	26.6	25.4	25.8	25.5	9	6	10	10	8
11/17																					
9,10	21.7	18	18.3	18.1	18.1	18.3	18	18	18.3	18.1	18	18.3	18.1	17.9	18.2	18	12	12	25	30	12
10,11	23.9	19.5	19.8	19.5	19.4	19.7	19.5	19.3	19.6	19.2	19.7	20	19.8	19.5	19.8	19.4	57	50	40	47	53
11,12	25.5	21.3	21.6	21.2	20.9	21.2	20.8	20.8	21.1	20.9	21.7	22	21.7	21.2	21.6	21.3	70	65	45	58	68
12,13	27.4	22.2	22.6	22.2	21.6	22	21.7	22	22.2	21.9	22.8	23.1	22.7	22	22.4	22.1	85	72	52	60	80
13,14	28.7	23.7	24.1	23.8	23	23.3	23.1	23.4	23.7	23.3	24.2	24.6	24.3	23.4	23.8	23.5	55	50	45	53	50
14,15	29.5	24.5	24.9	24.6	23.6	23.9	23.5	24.2	24.5	24.2	25.2	25.6	25.3	24.2	24.5	24.1	25	22	38	30	23
15,16	29	24.8	25.2	24.9	24	24.3	23.9	24.6	24.9	24.7	25.8	26.1	25.9	24.8	25.1	24.8	9	6	10	10	8
11/20																					
8,9	19	16.4	16.7	16.5	16.5	16.7	16.5	16.5	16.7	16.4	16.4	16.7	16.5	16.3	16.6	16.4	10	10	15	20	10
9,10	21.1	17.7	18	17.8	17.8	18	17.7	17.7	18	17.8	17.7	18	17.8	17.6	17.9	17.7	15	15	25	30	15
10,11	23.3	19.2	19.5	19.2	19.1	19.4	19.2	19	19.3	18.9	19.4	19.7	19.5	19.2	19.5	19.1	60	50	40	55	53
13,14	28.1	23.4	23.8	23.5	22.7	23	22.8	23.1	23.4	23	23.9	24.3	24	23.1	23.5	23.2	55	50	47	58	50
14,15	28.9	24.2	24.6	24.3	23.3	23.6	23.2	23.9	24.2	23.9	24.9	25.3	25	23.9	24.2	23.8	25	25	38	35	25
15,16	28.4	24.5	24.9	24.6	23.7	24	23.6	24.3	24.6	24.4	25.5	25.8	25.6	24.5	24.8	24.5	10	10	12	12	10

11/22		M-7			M-8			M-9			M-10			M-11			M-7	M-8	M-9	M-10	M-11
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_t	S_t	S_t	S_t	S_t
8,9	18.5	15.9	16.1	15.8	15.8	16	15.7	15.6	15.9	15.7	15.7	16	15.8	15.7	15.9	15.6	10	10	18	20	10
9,10	20	17.3	17.6	17.4	17.2	17.5	17.3	17.1	17.4	17.2	17.2	17.6	17.3	17.2	17.5	17.3	18	16	30	35	18
10,11	22.2	18.5	18.8	18.6	18.4	18.7	18.3	18.4	18.6	18.3	18.6	18.9	18.7	18.6	18.8	18.5	60	50	45	60	58
11,12	23.9	20.2	20.5	20.3	20.1	20.4	20.1	20	20.3	20.1	20.3	20.6	20.2	20.1	20.4	20	75	70	52	70	70
12,13	26.1	21.9	22.2	22	21.7	22.1	21.8	21.6	21.9	21.5	22	22.3	22.1	21.6	22	21.7	90	77	60	76	90
13,14	27.4	22.8	23.1	22.9	22.7	23	22.8	22.4	22.7	22.3	22.8	23.1	22.8	22.8	23.1	22.9	58	55	50	63	55
14,15	28.2	24.2	24.5	24.1	23.7	24	23.8	23.6	23.9	23.5	24.3	24.6	24.2	24.2	24.5	24.3	28	26	40	40	28
15,16	29.1	24.6	25	24.7	24.3	24.6	24.4	24	24.4	24.1	24.8	25.2	24.9	24.7	25.1	24.8	10	10	12	15	10
11/24																					
8,9	17.5	14.6	14.8	14.5	14.5	14.7	14.4	14.3	14.6	14.4	14.4	14.7	14.5	14.4	14.6	14.3	10	10	18	20	10
9,10	19	16	16.3	16.1	15.9	16.2	16	15.8	16.1	15.9	15.9	16.3	16	15.9	16.2	16	18	16	30	35	18
10,11	21.2	17.2	17.5	17.3	17.1	17.4	17	17.1	17.3	17	17.3	17.6	17.4	17.3	17.5	17.2	60	50	45	60	58
11,12	22.9	18.9	19.2	19	18.8	19.1	18.8	18.7	19	18.8	19	19.3	18.9	18.8	19.1	18.7	75	70	52	70	70
12,13	25.1	20.6	20.9	20.7	20.4	20.8	20.5	20.3	20.6	20.2	20.7	21	20.8	20.3	20.7	20.4	90	77	60	76	90
13,14	26.4	21.5	21.8	21.6	21.4	21.7	21.5	21.1	21.4	21	21.5	21.8	21.5	21.5	21.8	21.6	58	55	50	63	55
14,15	27.2	22.9	23.2	22.8	22.4	22.7	22.5	22.3	22.6	22.2	23	23.3	22.9	22.9	23.2	23	28	26	40	40	28
15,16	28.1	23.3	23.7	23.4	23	23.3	23.1	22.7	23.1	22.8	23.5	23.9	23.6	23.4	23.8	23.5	10	10	12	15	10
11/30																					
8,9	18	15.3	15.5	15.2	15.3	15.5	15.2	15.3	15.6	15.2	15.2	15.5	15.3	15.2	15.5	15.1	10	10	23.5	23.5	10
9,10	19	16.8	17	16.7	16.7	16.9	16.6	16.7	16.9	16.6	16.7	17	16.8	16.4	16.7	16.3	23.5	23.5	40.5	40.5	24
10,11	21.8	17.9	18.2	17.8	17.7	18	17.7	18	18.3	18.1	18	18.3	18.1	17.9	18.2	17.9	60	50	59.25	72	56
11,12	23.6	19.3	19.6	19.4	19	19.4	19.1	19.5	19.9	19.6	19.6	19.9	19.5	19.4	19.8	19.5	77	59.25	64	81	68
12,13	25.2	20.9	21.3	21	20.7	21	20.7	21.2	21.5	21.1	21.4	21.6	21.3	21	21.4	21.1	85	72.25	73	90	80
13,14	26.5	21.7	22	21.8	21.4	21.7	21.3	21.9	22.2	21.8	22	22.3	22.1	21.7	22.1	21.8	66	53	66	94.5	60
14,15	28.1	22.2	22.6	22.3	22	22.3	22.1	22.6	22.9	22.6	22.8	23.2	22.9	22.4	22.6	22.3	28.5	26.9	45	50	28
15,16	28.4	22.6	23	22.7	22.4	22.7	22.3	23	23.3	23.1	23.4	23.6	23.3	22.8	23.1	22.9	10	10	12	20	10
12/5																					
8,9	17.3	14.2	14.4	14.1	14	14.3	14.1	14	14.2	14	14.3	14.5	14.1	14	14.2	14	10	5	32	30	7
9,10	20.1	15.3	15.6	15.2	14.8	15.1	14.8	15.3	15.7	15.4	15.6	15.9	15.6	15.4	15.7	15.5	33	20	40	60	30
10,11	21.9	16.5	16.8	16.4	15.7	16.1	15.8	16.5	16.9	16.6	16.7	17	16.6	16.1	16.4	16.1	55	50	62	78	52
11,12	23.5	17.4	17.1	17	16.5	16.8	16.4	17.3	17.6	17.3	17.5	17.8	17.5	17.7	18.1	17.7	90	66	66	84	85
12,13	24.8	18.1	18.4	18.1	17.5	17.9	17.6	18	18.4	18.1	18.6	19	18.6	18.6	19.1	19.6	95	72	75	84	85
13,14	25.9	19	19.3	19	18.6	19	18.7	19	19.3	19	19.6	20	19.6	19.7	20.2	19.8	65	55	58	94	56
14,15	26.7	19.5	19.8	19.5	18.9	19.2	19	18.7	19.1	18.7	19	19.4	19.1	19.1	19.5	19	27	25	55	55	32
15,16	26.1	19.1	19.3	19	18.2	18.6	18.2	18.1	18.5	18.2	18.3	18.7	18.4	18.3	18.7	18.2	11	7	20	33	6
12/6																					
8,9	16.9	13.7	13.9	13.6	13.5	13.8	13.6	13.5	13.7	13.5	13.8	14	13.6	13.5	13.7	13.5	10	5	32	30	7
9,10	19.7	14.8	15.1	14.7	14.3	14.6	14.3	14.8	15.2	14.9	15.1	15.4	15.1	14.9	15.2	15	33	20	40	60	30
10,11	21.5	16	16.3	15.9	15.2	15.6	15.3	16	16.4	16.1	16.2	16.5	16.1	15.6	15.9	15.6	55	50	62	78	52
11,12	23.1	16.9	16.6	16.5	16	16.3	15.9	16.8	17.1	16.8	17	17.3	17	17.2	17.6	17.2	90	66	66	84	85
12,13	24.4	17.6	17.9	17.6	17	17.4	17.1	17.5	17.9	17.6	18.1	18.5	18.1	18.1	18.6	19.1	95	72	75	84	85
13,14	25.5	18.5	18.8	18.5	18.1	18.5	18.2	18.5	18.8	18.5	19.1	19.5	19.1	19.2	19.7	19.3	65	55	58	94	56
14,15	26.3	19	19.3	19	18.4	18.7	18.5	18.2	18.6	18.2	18.5	18.9	18.6	18.6	19	18.5	27	25	55	55	32
15,16	25.7	18.6	18.8	18.5	17.7	18.1	17.7	17.6	18	17.7	17.8	18.2	17.9	17.8	18.2	17.7	11	7	20	33	6
12/8																					
8,9	17.1	13.7	14	13.8	13.6	13.9	13.7	13.7	14	13.8	13.7	14	13.8	13.6	14	13.7	10	5	32	30	7
9,10	18.8	15	15.3	15.1	14.9	15.2	15	15.1	15.4	15.2	15.3	15.5	15.2	15	15.4	15.1	33	20	40	60	30
10,11	20.2	16.1	16.4	16.1	15.8	16.1	15.8	16.2	16.5	16.3	16.1	16.4	16.2	15.9	16.2	15.8	55	50	62	78	52
11,12	21.9	17.3	17.7	17.4	17	17.3	17.1	17.5	17.8	17.5	17.5	17.8	17.4	17	17.4	17.1	90	66	66	84	85
12,13	23.4	18.8	19	18.7	18.2	18.5	18.3	18.8	19.1	18.9	18.8	19.2	18.9	18.2	18.6	18.3	95	72	75	84	85
13,14	25.1	20.1	20.4	20	19.4	19.7	19.3	20.2	20.5	20.2	20.5	20.8	20.6	19.5	19.8	19.6	65	55	58	94	56
14,15	26.8	20.9	21.2	20.8	19.8	20.2	19.9	21	21.3	21.1	21.6	21.9	21.7	20.2	20.5	20.3	27	25	55	55	32
15,16	26.5	21.1	21.5	21.2	20	20.3	20.1	21.3	21.6	21.2	22	22.3	22.1	20.7	21	20.6	11	7	20	33	6

12/9		M-7			M-8			M-9			M-10			M-11			M-7	M-8	M-9	M-10	M-11
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_1	S_1	S_1	S_1	S_1
8,9	17.8	14.3	14.6	14.4	14.2	14.5	14.3	14.3	14.6	14.4	14.3	14.6	14.4	14.2	14.6	14.3	12	12	32	30	22
9,10	19.5	15.6	15.9	15.7	15.5	15.8	15.6	15.7	16	15.8	15.9	16.1	15.8	15.6	16	15.7	35	30	47	60	55
10,11	20.9	16.7	17	16.7	16.4	16.7	16.4	16.8	17.1	16.9	16.7	17	16.8	16.5	16.8	16.4	55	54	64	78	59
11,12	22.6	17.9	18.3	18	17.6	17.9	17.7	18.1	18.4	18.1	18.1	18.4	18	17.6	18	17.7	89.25	69	69	84	88
12,13	24.1	19.4	19.6	19.3	18.8	19.1	18.9	19.4	19.7	19.5	19.4	19.8	19.5	18.8	19.2	18.9	96	74	76	84	89
13,14	25.8	20.7	21	20.6	20	20.3	19.9	20.8	21.1	20.8	21.1	21.4	21.2	20.1	20.4	20.2	67	59	60	94	60
14,15	27.5	21.5	21.8	21.4	20.4	20.8	20.5	21.6	21.9	21.7	22.2	22.5	22.3	20.8	21.1	20.9	34	30	59	55	40
15,16	27.2	21.7	22.1	21.8	20.6	20.9	20.7	21.9	22.2	21.8	22.6	22.9	22.7	21.3	21.6	21.2	10	12	25	33	11
12/10																					
8,9	19.1	16.2	16.5	16.3	16.1	16.4	16.2	16.2	16.5	16.3	16.2	16.5	16.3	16.1	16.5	16.2	13	13	33	30	23
9,10	20.8	17.5	17.8	17.6	17.4	17.7	17.5	17.6	17.9	17.7	17.8	18	17.7	17.5	17.9	17.6	36	30	48	60	56
10,11	22.2	18.6	18.9	18.6	18.3	18.6	18.3	18.7	19	18.8	18.6	18.9	18.7	18.4	18.7	18.3	56	55	65	78	60
11,12	23.9	19.8	20.2	19.9	19.5	19.8	19.6	20	20.3	20	20	20.3	19.9	19.5	19.9	19.6	90	70	70	84	88
12,13	25.4	21.3	21.5	21.2	20.7	21	20.8	21.3	21.6	21.4	21.3	21.7	21.4	20.7	21.1	20.8	98	75	78	84	89
13,14	26.8	22.6	22.9	22.5	21.9	22.2	21.8	22.7	23	22.7	23	23.3	23.1	22	22.3	22.1	68	60	62	94	60
14,15	27.8	23.4	23.7	23.3	22.3	22.7	22.4	23.5	23.8	23.6	24.1	24.4	24.2	22.7	23	22.8	35	32	61	55	40
15,16	27.3	23	23.3	23.1	21.9	22.3	22	22.9	23.3	23	23.5	23.8	23.6	22.2	22.6	22.3	12	12	25	33	12
12/12																					
8,9	18.5	15.6	15.9	15.7	15.5	15.8	15.6	15.6	15.9	15.7	15.6	15.9	15.7	15.5	15.9	15.6	12	12	32	32	12
9,10	20.2	16.9	17.2	17	16.8	17.1	16.9	17	17.3	17.1	17.2	17.4	17.1	16.9	17.3	17	48	48	58.5	58.5	48
10,11	21.6	18	18.3	18	17.7	18	17.7	18.1	18.4	18.2	18	18.3	18.1	17.8	18.1	17.7	66.5	66.5	72	83.5	66.5
11,12	23.3	19.2	19.6	19.3	18.9	19.2	19	19.4	19.7	19.4	19.4	19.7	19.3	18.9	19.3	19	96	84	76	96	96
12,13	24.8	20.7	20.9	20.6	20.1	20.4	20.2	20.7	21	20.8	20.7	21.1	20.8	20.1	20.5	20.2	103.5	80	80	110	103.5
12/14																					
8,9	16	12.4	12.4	12.4	12.3	12.3	12.3	12.3	12.3	12.3	12.4	12.4	12.4	12.3	12.3	12.3	12	12	32	32	12
9,10	18	13.8	13.8	13.8	13.7	13.7	13.7	13.8	13.8	13.8	13.8	13.8	13.8	13.7	13.7	13.7	48	48	58.5	58.5	48
10,11	19.8	14.5	14.5	14.5	14.4	14.4	14.4	14.4	14.4	14.4	14.5	14.5	14.5	14.4	14.4	14.4	66.5	66.5	72	83.5	66.5
11,12	21	16.4	16.4	16.4	16.2	16.2	16.2	16.6	16.6	16.6	16.8	16.8	16.8	16.7	16.7	16.7	96	84	76	96	96
12,13	22.7	17.9	17.9	17.9	17.5	17.5	17.5	18.3	18.3	18.3	18.6	18.6	18.6	18.2	18.2	18.2	103.5	80	80	110	103.5
13,14	24.1	19.4	19.4	19.4	18.7	18.7	18.7	19.6	19.6	19.6	20.2	20.2	20.2	19.6	19.6	19.6	70	61.5	62.5	110	70
14,15	26	20.9	20.9	20.9	20	20	20	20.8	20.8	20.8	21.9	21.9	21.9	21.1	21.1	21.1	44	44	64	64	44
15,16	25.5	21.3	21.3	21.3	20.6	20.6	20.6	22.3	22.3	22.3	22.5	22.5	22.5	21.5	21.5	21.5	11	11	28	28	11
12/17																					
8,9	14.9	11.7	11.8	11.6	11.5	11.7	11.4	11.6	11.8	11.5	11.3	11.7	11.4	11.5	11.8	11.6	48	42	52	55	44
9,10	16.3	13.2	13.4	13.2	13	13.2	13.1	13	13.4	13.2	13.2	13.3	13.1	13.2	13.4	13.2	62	59	72	83.5	61
10,11	17.8	15.5	15.7	15.5	15.2	15.5	15.2	15.5	15.8	15.6	15.5	15.6	15.4	15.6	15.9	15.6	96	84	76	96	96
11,12	19.8	17	17.4	17.1	16.7	16.9	16.6	16.8	17.2	16.9	17	17.2	17.1	16.9	17.2	16.8	103	80	80	110	103.5
12,13	21.6	18.2	18.7	18.3	17.7	18	17.8	18	18.4	18.1	18.2	18.6	18.3	18	18.3	18.1	56	55	62.5	110	60
13,14	23.6	19.8	20.2	19.9	19	19.4	18.9	19.7	20	19.7	19.8	20.1	19.9	19.8	20.2	19.9	49	48	54	64	49
14,15	24.7	21.2	21.5	21.2	19.8	20.3	20	20.7	21.2	20.8	21.1	21.3	21.2	20.6	21	20.8	20	21	25	30	19
15,16	24	20.7	20.9	20.7	19.2	19.7	19.3	20.2	20.7	20.4	20.6	20.8	20.5	20.2	20.7	20.4					
12/18																					
8,9	14.4	10.3	10.4	10.2	10.1	10.3	10	10.2	10.4	10.1	9.9	10.3	10	10.1	10.4	10.2	14	14	30	32	14
9,10	15.8	11.8	12	11.8	11.6	11.8	11.7	11.6	12	11.8	11.8	11.9	11.7	11.8	12	11.8	50	48	55	58	48
10,11	17.3	14.1	14.3	14.1	13.8	14.1	13.8	14.1	14.4	14.2	14.1	14.2	14	14.2	14.5	14.2	65	60	75	85	62
11,12	19.3	15.6	16	15.7	15.3	15.5	15.2	15.4	15.8	15.5	15.6	15.8	15.7	15.5	15.8	15.4	98	86	78	98	98
12,13	21.1	16.8	17.3	16.9	16.3	16.6	16.4	16.6	17	16.7	16.8	17.2	16.9	16.6	16.9	16.7	105	85	85	112	105
13,14	23.1	18.4	18.8	18.5	17.6	18	17.5	18.3	18.6	18.3	18.4	18.7	18.5	18.4	18.8	18.5	58	56	65	113	60
14,15	24.2	19.8	20.1	19.8	18.4	18.9	18.6	19.3	19.8	19.4	19.7	19.9	19.8	19.2	19.6	19.4	50	48	57	68	49
15,16	23.5	19.3	19.5	19.3	17.8	18.3	17.9	18.8	19.3	19	19.2	19.4	19.1	18.8	19.3	19	20	20	28	32	20

12/19		M-7			M-8			M-9			M-10			M-11			M-7	M-8	M-9	M-10	M-11
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_1	S_1	S_1	S_1	S_1
8,9	14.1	9.5	9.6	9.6	9.5	9.5	9.5	9.5	9.6	9.5	9.5	9.5	9.5	9.4	9.6	9.5	14	14	30	32	14
9,10	15.5	11	11.2	11	10.8	11	10.9	10.8	11.2	11	11	11.1	10.9	11	11.2	11	50	48	55	58	48
10,11	17	13.3	13.5	13.3	13	13.3	13	13.3	13.6	13.4	13.3	13.4	13.2	13.4	13.7	13.4	65	60	75	85	62
11,12	19	14.8	15.2	14.9	14.5	14.7	14.4	14.6	15	14.7	14.8	15	14.9	14.7	15	14.6	98	86	78	98	98
12,13	20.8	16	16.5	16.1	15.5	15.8	15.6	15.8	16.2	15.9	16	16.4	16.1	15.8	16	15.9	105	85	85	112	105
13,14	22.8	17.6	18	17.7	16.8	17.2	16.7	17.5	17.8	17.5	17.6	17.9	17.7	17.6	17.8	17.7	58	56	65	113	60
14,15	23.9	19	19.3	19	17.6	18.1	17.8	18.5	19	18.6	18.9	19.1	19	18.4	18.8	18.6	50	48	57	68	49
15,16	23.2	18.5	18.7	18.5	17	17.5	17.1	18	18.5	18.2	18.4	18.6	18.3	18	18.5	18.2	20	20	28	32	20
12/23																					
8,9	15	11	11.3	11.1	11	11.3	11.1	10.9	11.3	11	11	11.3	11.1	11.1	11.3	11	15	14	35	35	15
9,10	16.2	12.2	12.6	12.3	12.2	12.5	12.3	12.2	12.5	12.2	12.1	12.4	12.2	12.3	12.6	12.2	50	50	60	60	50
10,11	17.8	13.8	14.2	14	13.8	14.1	13.8	13.7	14	13.6	13.7	14	13.6	14	14.2	13.9	70	70	75	85	68
11,12	19.3	15.4	15.7	15.4	15.3	15.7	15.4	15.3	15.6	15.4	15	15.3	15.1	15.4	15.7	15.5	100	88	77	100	100
12,13	21	17.4	17.7	17.3	17.1	17.4	17	17.7	18.1	17.8	17.9	18.2	17.8	17.4	17.6	17.3	105	85	82.5	112	105
13,14	22.7	19.1	19.3	19	18.9	19.2	18.8	19.2	19.5	19.3	19.5	19.8	19.4	18.9	19.2	18.8	75	65	65	112	75
14,15	24.1	20.3	20.5	20.2	20	20.4	20.1	20.6	20.9	20.5	21	21.3	21.1	20.1	20.4	20	48	48	67.5	66	50
15,16	24	20.9	21.2	20.8	20.7	21	20.6	21	21.4	21.1	21.4	21.7	21.4	20.6	21	20.7	20	20	30	30	20
12/25																					
8,9	15.7	11.6	11.9	11.7	11.6	11.9	11.7	11.5	11.9	11.6	11.6	11.9	11.7	11.7	11.9	11.6	14	14	30	32	14
9,10	16.9	12.8	13.2	12.9	12.8	13.1	12.9	12.8	13.1	12.8	12.7	13	12.8	12.9	13.2	12.8	50	48	55	58	48
10,11	18.3	14.4	14.8	14.6	14.4	14.7	14.4	14.3	14.6	14.2	14.3	14.6	14.2	14.6	14.8	14.5	65	60	75	85	62
11,12	19.7	16	16.3	16	15.9	16.3	16	15.9	16.2	16	15.6	15.9	15.7	16	16.3	16.1	98	86	78	98	98
12,13	21.2	18	18.3	17.9	17.7	18	17.6	18.3	18.7	18.4	18.5	18.8	18.4	18	18.2	17.9	105	85	85	112	105
13,14	22.5	19.7	19.9	19.6	19.5	19.8	19.4	19.8	20.1	19.9	20.1	20.4	20	19.5	19.8	19.4	58	56	65	113	60
14,15	23.8	20.9	21.1	20.8	20.6	21	20.7	21.2	21.5	21.1	21.6	21.9	21.7	20.7	21	20.6	50	48	57	68	49
15,16	23	20.5	20.8	20.4	20.3	20.6	20.2	20.6	21	20.7	21	21.3	21	20.2	20.6	20.3	20	20	28	32	20
12/26																					
8,9	16.5	12.7	13	12.8	12.7	13	12.8	12.6	13	12.7	12.7	13	12.8	12.8	13	12.7	14	14	30	32	14
9,10	17.7	13.9	14.3	14	13.9	14.2	14	13.9	14.2	13.9	13.8	14.1	13.9	14	14.3	13.9	50	48	55	58	48
10,11	19.1	15.5	15.9	15.7	15.5	15.8	15.5	15.4	15.7	15.3	15.4	15.7	15.3	15.7	15.9	15.6	65	60	75	85	62
11,12	20.5	17.1	17.4	17.1	17	17.4	17.1	17	17.3	17.1	16.7	17	16.8	17.1	17.4	17.2	98	86	78	98	98
12,13	22	19.1	19.4	19	18.8	19.1	18.7	19.4	19.8	19.5	19.6	19.9	19.5	19.1	19.3	19	105	85	85	112	105
13,14	23.3	20.8	21	20.7	20.6	20.9	20.5	20.9	21.2	21	21.2	21.5	21.1	20.6	20.9	20.5	58	56	65	113	60
14,15	24.6	22	22.2	21.9	21.7	22.1	21.8	22.3	22.6	22.2	22.7	23	22.8	21.8	22.1	21.7	50	48	57	68	49
15,16	23.8	21.6	21.9	21.5	21.4	21.7	21.3	21.7	22.1	21.8	22.1	22.4	22.1	21.3	21.7	21.4	20	20	28	32	20
2004																					
1/3																					
8,9	18.3	14.8	14.9	14.7	14.6	14.8	14.5	14.7	14.9	14.6	14.8	15	14.9	14.6	14.8	14.7	10	10	30	30	10
9,10	20	16.7	16.8	16.6	16.1	16.3	16	16.7	16.8	16.6	16.8	16.9	16.7	16.4	16.6	16.4	35	30	45	60	35
10,11	22.2	19.1	19.2	19	18	18.3	17.9	19.3	19.4	19.2	19.5	19.6	19.4	19.2	19.4	19.2	60	52	64	78	55
11,12	24.9	20.6	20.7	20.5	20.3	20.8	20.5	21.9	22.1	21.8	22.6	22.7	22.5	20.6	20.8	20.6	86	69	69	84	88
12,13	26.5	22.5	22.6	22.4	21.8	22.2	21.9	23.8	24	23.9	24	24.1	23.9	22.6	22.8	22.7	95	74	76	84	89
13,14	28.2	25.2	25.3	25.1	23.8	24.3	23.9	24.6	24.8	24.6	25.1	25.3	25	25.1	25.3	25.1	65	59	60	94	60
14,15	27.2	25.3	25.5	25.1	24.3	24.8	24.5	25.1	25.3	25	25.8	25.9	25.7	25.3	25.5	25.3	30	26	59	55	34
15,16	25.2	24.5	24.8	24.6	23.3	23.6	23.1	24.2	24.4	24.1	24.6	24.8	24.6	24.5	24.8	24.6	10	10	25	30	11
1/5																					
8,9	19	16	16.2	16.1	16	16.2	16	16.1	16.3	16.3	16	16.4	16.2	15.9	16.2	16	10	5	30	30	7
9,10	20.8	17.8	18	17.9	17.7	17.9	17.7	18	18.2	18.2	18	18.3	18.1	17.7	18	17.8	30	20	40	60	30
10,11	22.9	19.5	19.7	19.6	19.3	19.6	19.4	19.8	20	19.9	20.2	20.5	20.3	19.4	19.7	19.5	55	50	62	78	52
11,12	25.5	21.1	21.2	20.9	20.9	21.1	20.8	21.5	21.7	21.5	22.1	22.4	22	20.5	20.7	20.6	90	66	66	84	85
12,13	27.1	22.9	23	22.8	22	22.2	22.1	23.2	23.4	23.3	23.5	23.8	23.4	23	23.2	22.9	95	72	75	84	85
13,14	28.5	24.5	24.6	24.3	23.7	23.8	23.6	24.8	25.2	24.9	25	25.4	24.9	24.5	24.7	24.4	65	55	58	94	56
14,15	27.8	24.7	24.9	24.6	24.4	24.7	24.5	25.7	26	25.8	25.8	26.3	26	25.2	25.6	25.3	27	25	55	55	32
15,16	26.5	24.2	24.5	24.3	23.9	24	23.8	24.6	24.9	24.7	25.2	25.7	25.3	24.6	25	24.7	10	7	20	30	5

1/7		M-7			M-8			M-9			M-10			M-11			M-7	M-8	M-9	M-10	M-11
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_1	S_1	S_1	S_1	S_1
8,9	18.7	15.9	16.1	15.8	15.7	16	15.8	15.7	16.1	15.5	15.9	16.2	15.8	15.8	16	15.7	10	5	30	30	7
9,10	20.2	17.6	18	17.6	17.2	17.5	17.3	17.7	18	17.7	17.8	18.1	17.7	17.3	17.8	17.3	30	20	40	60	30
10,11	21.7	20.1	20.4	20	19.1	19.5	19.1	20.3	20.6	20.2	20.5	20.8	20.5	20.1	20.6	20.2	55	50	62	78	52
11,12	24.4	21.6	21.9	21.5	21.7	22	21.6	23	23.3	22.8	23.6	23.9	23.5	21.5	22	21.6	90	66	66	84	85
12,13	27	23.6	23.8	23.5	23.1	23.4	22.9	24.9	25.2	24.8	24.9	25.3	24.9	23.6	24	23.5	95	72	75	84	85
13,14	28.7	26.1	26.5	26	25.1	25.5	25	25.5	26	25.6	26	26.5	26	25.9	26.5	26	65	55	58	94	56
14,15	27.7	26.4	26.7	26.4	25.6	26	25.4	26	26.5	26	26.5	27.1	26.5	26.2	26.7	26.3	27	25	55	55	32
15,16	25.7	25.7	26	25.6	24.5	24.8	24.4	25.4	25.6	25.3	25.6	26	25.4	25.8	26	25.7	10	5	20	33	5
1/9																					
8,9	19.5	16.1	16.3	16.2	15.5	15.9	15.7	16.2	16.4	16.3	16.5	16.9	17.6	16.1	16.4	16.2	10	5	25	25	5
9,10	21.2	17.8	18	17.9	17	17.2	16.9	17.4	17.7	17.4	18.4	18.8	18.5	18	18.1	17.9	25	15	35	40	25
10,11	23	20	20.2	19.9	18.8	19.1	18.9	18.9	19.3	19	19.2	19.5	19.2	20	20.3	19.9	60	50	60	75	50
11,12	25.5	22.3	22.7	22.4	21.3	21.7	21.4	21.5	21.9	21.7	22.2	22.6	22.3	22.4	22.8	22.4	75	66	62	80	75
12,13	26.5	23.7	24	23.6	23.6	24	23.8	23.5	23.9	23.7	24.6	25	24.6	23.9	24.2	23.9	85	70	70	80	85
13,14	27.2	24.8	25.1	24.7	24.9	25.2	24.8	25.4	25.7	25.4	25.7	26.2	25.7	24.8	25.1	24.9	65	53	55	90	60
14,15	28.1	23.9	24.2	23.9	24.3	24.7	24.3	25	25.2	25	25.2	25.8	25.2	23.9	24.2	24	30	25	50	53	30
15,16	25.2	23.3	23.7	23.4	23.1	23.5	23.1	24	24.3	24.1	24.1	24.7	24.3	23.5	23.8	23.4	8	5	15	20	5
1/12																					
8,9	18.6	15.4	15.6	15.3	15.1	15.3	15	15.6	15.8	15.7	15.9	16.3	16	15.1	15.3	15.1	10	10	20	20	0
9,10	20.3	16.7	16.9	16.6	15.9	16.2	15.9	16.8	17.1	16.8	16.8	17.2	16.9	16	16.3	15.9	20	15	35	35	12
10,11	22.1	18.7	19.1	18.7	17.2	17.5	17.3	18.8	18.7	18.8	18.6	18.9	18.6	17.7	18.1	17.7	57	50	55	70	55
11,12	24.8	20.3	20.5	20.2	18.7	19.1	19.8	20.9	21.3	21.1	20.6	21	20.7	19.3	19.3	19.2	72	65	60	65	70
12,13	26.6	21.5	21.7	21.4	20	20.4	20.2	21.9	22.3	22.1	22	22.4	22	20.5	20.7	20.4	82	68	66	68	80
13,14	28.1	23.1	23.5	23.1	21.3	21.6	21.2	22.8	23.1	22.8	23.1	23.4	23.1	21.1	21.5	21.1	67	50	58	80	65
14,15	30	25.2	25.5	25.1	23.7	23.9	20.7	24.4	24.6	24.3	24.6	25.2	24.6	23.2	23.5	23.1	30	22	52	50	30
15,16	29.1	24.2	24.4	24.1	22.9	23.1	23	23.4	23.7	23.5	23.5	24.1	23.7	22.2	22.4	22.1	6	2	10	10	6
1/16																					
8,9	20.4	17.1	17.4	17.2	16.9	17.3	17	17.5	17.7	17.4	17.5	17.8	17.4	17.1	17.3	17.2	10	10	12	10	8
9,10	22.2	19	19.2	18.9	18.4	18.8	18.5	18.9	19.3	18.8	18.9	19.4	18.8	19	19.1	18.9	18	17	26	30	20
10,11	24.4	21.7	21.9	21.6	20.2	20.6	20.3	21.5	22	21.7	21.5	22.1	21.7	21.7	21.8	21.6	52	42	50	65	52
11,12	26.2	23.5	23.9	23.4	22.3	22.7	22.2	23.3	23.7	23.4	23.6	24.1	23.5	23.5	23.8	23.4	70	51	55	75	68
12,13	27.5	24.9	25.4	25	23.9	24.4	23.9	24.5	24.9	24.6	25.4	26	25.5	24.9	25.3	25	80	62	65	85	78
13,14	28.3	26	26.3	25.9	25.5	26.1	25.5	25.8	26.2	25.7	26.6	27.3	26.7	26.4	26.9	26.3	60	50	60	88	56
14,15	29.2	26.9	27.3	27	26.8	27.3	26.7	27	27.4	27.1	27.9	28.4	28	27.2	27.6	27.5	21	20	40	45	22
15,16	27.6	25.8	26.2	25.9	24.6	25.2	24.7	26.2	26.6	26.1	27	27.4	27.1	26.5	26.7	26.4	7	5	7	7	7
1/19																					
8,9	21.5	17.7	18.1	17.7	17.7	18.1	17.8	18.3	18.5	18.2	18.3	18.6	18.2	17.9	18.1	18	8	8	15	15	10
9,10	23.3	19.3	19.6	19.3	19.2	19.6	19.3	19.7	20.1	19.6	19.7	20.2	19.6	19.8	19.9	19.7	18	17	26	30	20
10,11	25	22.2	22.4	22.2	21	21.4	21.1	22.3	22.8	22.5	22.3	22.9	22.5	22.5	22.6	22.4	52	42	50	65	52
11,12	25.5	23.6	23.9	23.5	23.1	23.5	23	23.7	24.2	23.8	23.4	23.9	23.5	23.3	23.6	23.2	70	51	55	75	68
12,13	26.9	24.7	25.1	24.6	23.9	24.3	24	25.2	25.7	25.3	25.2	25.8	25.3	24.7	25.1	24.8	80	62	65	85	78
13,14	29	26.2	26.8	26.3	25.3	25.9	25.3	26.4	27	26.5	26.4	27.1	26.5	26.2	26.7	26.3	60	50	60	88	56
14,15	30	27.8	28.3	27.7	26.6	27.1	26.5	28	28.5	27.9	28	28.6	28.1	27.8	28.2	27.7	21	20	40	45	22
15,16	29.4	27.3	27.6	27.2	25.7	26.2	25.8	26.8	27.4	26.9	26.8	27.5	26.9	27.3	27.5	27.2	7	8	15	20	7
1/21																					
8,9	22	18.4	18.8	18.4	18.4	18.8	18.5	19	19.2	18.9	19	19.3	18.9	18.6	18.8	18.7	10	10	15	15	10
9,10	23.4	20	20.3	20	19.9	20.3	20	20.4	20.8	21.3	20.4	20.9	21.3	19.5	19.6	19.4	18	17	26	30	20
10,11	24.3	21.9	22.1	21.9	21.7	22.1	21.8	22	22.5	22.2	22	22.6	22.2	21.2	21.3	21.1	55	42	50	65	52
11,12	25.7	23.3	23.6	24.2	22.8	23.2	22.7	23.4	23.9	23.5	23.1	23.6	23.2	22	22.3	21.9	70	51	55	75	68
12,13	27.9	24.4	24.8	24.3	23.6	24	23.7	24.9	25.4	25	23.9	24.5	24	23.4	23.8	23.5	80	62	65	85	78
13,14	29.4	25.9	26.5	26	25	25.6	25	26.1	26.7	26.2	25.1	25.8	25.2	25.9	26.4	26	60	50	60	88	56
14,15	31.4	27.5	28	27.6	26.3	26.8	26.2	27.7	28.2	27.6	26.7	27.3	26.8	27.5	27.9	27.4	21	20	40	45	22
15,16	29.9	27	27.3	26.9	26.4	26.9	26.5	26.5	27.1	26.6	25.9	26.5	26	27	27.2	26.9	14	15	15	20	10

1/23		M-7			M-8			M-9			M-10			M-11			M-7	M-8	M-9	M-10	M-11
TIME	T_s	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_I	S_I	S_I	S_I	S_I
8,9	19.5	16.1	16.3	16.1	16.1	16.3	16.1	16	16.2	15.9	16	16.3	16.1	16	16.2	15.9	10	10	15	15	10
9,10	21	18	18.2	18	18	18.2	18	17.9	18.2	17.8	17.8	18.2	17.9	18	18.3	17.9	16	16	32	37	16
10,11	23.2	19.7	20	19.8	19.8	20.1	20	19.8	20.1	19.7	19.9	20.2	19.8	20	20.3	20.1	58	45	48	66	55
11,12	24.8	20.9	21.2	20.9	20.9	21.2	21	21.1	21.5	21.1	21.4	21.7	21.3	21.2	21.8	21.3	73.5	68	55	80	65
12,13	27	22.7	23.1	22.8	22.8	23.2	22.9	22.9	23.2	22.8	23.2	23.5	23.1	23.2	23.5	23.1	88	75	62	80	88
13,14	27.4	24.3	24.7	24.4	23.6	24.1	23.7	23.8	24.2	23.9	24.6	25	24.7	24	24.3	23.9	55	50	52	70	50
14,15	28	25.3	25.8	25.4	24.4	24.8	24.3	25	25.4	25.1	25.2	25.7	25.3	25.1	25.6	25.2	25.25	24	40	40	25
15,16	28.4	26.7	27.2	26.8	25	25.4	25.1	25.4	25.8	25.3	26.4	26.9	26.6	25.7	26.2	25.8	15	10	15	15	10
1/28																					
8,9	18	15.1	15.2	15.1	14.7	15	14.8	15	15.1	15	15	15.2	15.1	14.9	15	14.9	0	0	10	15	0
9,10	20	16.4	16.5	16.4	16.3	16.6	16.4	16.5	16.7	16.6	16.9	17.1	16.9	16.8	16.9	16.8	10	10	24.5	33.2	10
10,11	23.2	18.8	19	18.8	18	18.3	18.1	18.2	18.4	18.1	19.2	19.4	19.2	18.9	19.1	18.9	52.4	35	42	54	57.4
11,12	24.8	21.4	21.6	21.4	20.7	21	20.7	20.8	21.1	20.8	21.7	22	21.7	21.1	21.3	21.1	60	61	44	66	60
12,13	26.6	21.8	22.1	21.8	21.1	21.4	21.1	21.3	21.6	21.3	22.3	22.6	22.2	21.7	22	21.8	72	66.5	47	70	68
13,14	27	23	23.3	23	22.4	22.8	22.5	22.5	22.9	22.6	23.4	23.8	23.5	22.6	22.9	22.7	66	47.4	48.25	58	55
14,15	28	24.2	24.6	24.2	23.6	24	23.7	23.6	24	23.7	24.6	25	24.7	23.8	24.2	23.9	22.75	20	30	30	16.5
15,16	28.7	24.8	25.2	24.8	24.3	24.7	24.4	24.6	24.9	24.6	25.3	25.7	25.4	24.6	25	24.7	0	0	10	16.5	0
2/4																					
8,9	20.2	16.6	16.7	16.6	16.4	16.6	16.3	16.5	16.7	16.4	16.6	16.8	16.7	16.5	16.7	16.5	0	0	0	0	0
9,10	23	18.5	18.6	18.4	17.9	18.1	17.8	18.5	18.6	18.4	18.6	18.7	18.5	18.4	18.6	18.3	7	7	10	35	7
10,11	24.2	19.9	20.1	19.8	19.7	20.1	19.7	20.1	20.2	20	20.3	20.4	20.2	19.8	20.1	19.7	50	30	30	58	50
11,12	26.4	21.4	21.5	21.3	21.1	21.6	21.3	20.7	20.9	20.6	21.4	21.5	21.3	21.2	21.5	21.2	80	55	49	64	78
12,13	28.2	23.6	23.9	23.5	23.6	24	23.7	22.9	23.3	22.9	22.8	23.1	22.7	23.5	23.9	23.4	85	70	56	64	69
13,14	29.8	25	25.1	24.9	24.6	25.1	24.7	24.4	24.6	24.4	23.9	24.1	23.8	24.9	25.1	24.8	62	55	40	74	50
14,15	32.2	27.1	27.3	26.9	26.1	26.6	26.3	25.9	26.1	25.8	25.6	25.7	25.5	27	27.3	26.9	20	20	39	35	22
15,16	30.8	27.3	27.6	27.4	27.1	27.4	26.9	26.4	26.8	26.3	25.9	26.3	26	27.2	27.6	27.4	0	0	0	0	0
2/6																					
8,9	21.1	17.9	18.2	18	18	18.4	18.2	17.9	18.2	17.9	17.9	18.2	18	17.8	18.2	18	0	0	0	0	0
9,10	24.1	19.9	20.1	19.9	19.5	19.8	19.6	19.1	19.4	19.1	19.7	20	19.6	19.8	20.1	19.9	9	9	10	26	7
10,11	25.7	21.4	21.6	21.4	20.8	21.1	20.8	20.4	20.8	20.5	20.5	20.8	20.5	21.2	21.6	21.4	40	29	18	36	40
11,12	27.1	22.3	22.8	22.4	22.4	22.8	22.5	21.2	21.6	21.3	21.7	22.1	21.8	22.3	22.7	22.4	55	47	31	45	50
12,13	28.7	23.4	23.8	23.5	23.6	23.9	23.5	22.9	23.2	22.9	23	23.4	23.1	23.4	23.8	23.4	64	51	35	52	60
13,14	30.1	24.8	25.1	24.7	24.9	25.3	24.9	24.8	25.2	24.8	24.6	25	24.6	24.8	24.9	24.7	55	45	25	50	45
14,15	31.7	26.1	26.5	26.2	26.2	26.6	26.3	26.5	26.9	26.6	25.9	26.2	25.9	26.1	26.4	26.2	12	12	20	20	9
15,16	31.1	26.7	27.1	26.7	26.8	27.2	26.9	27	27.3	26.9	27.2	27.6	27.3	26.6	27	26.7	0	0	0	0	0
2/9																					
8,9	22.5	17.4	17.7	17.5	17.5	17.9	17.7	17.4	17.7	17.4	17.4	17.7	17.5	17.3	17.7	17.5	0	0	0	0	0
9,10	24.7	19.4	19.6	19.4	19	19.3	19.1	18.6	18.9	18.6	19.2	19.5	19.1	19.3	19.6	19.4	9	8	8	25	5
10,11	25.7	20.9	21.1	20.9	20.3	20.6	20.3	19.9	20.3	20	20	20.3	20	20.7	21.1	20.9	40	26	15	35	36
11,12	26.8	21.8	22.3	21.9	21.9	22.3	22	20.7	21.1	20.8	21.2	21.6	21.3	21.8	22.2	21.9	55	45	30	42	48
12,13	27.9	22.9	23.3	23	23.1	23.4	23	22.4	22.7	22.4	22.5	22.9	22.6	22.9	23.3	22.9	64	50	32	50	56
13,14	28.8	24.3	24.6	24.2	24.4	24.8	24.4	24.3	24.7	24.3	24.1	24.5	24.1	24.3	24.4	24.2	55	42	22	48	47
14,15	30.2	25.6	26	25.7	25.7	26.1	25.8	26	26.4	26.1	25.4	25.7	25.4	25.6	25.9	25.7	12	10	18	17	6
15,16	29.3	26.2	26.6	26.2	26.3	26.7	26.4	26.5	26.8	26.4	26.7	27.1	26.8	26.1	26.5	26.2	0	0	0	0	0
2/10																					
8,9	23.1	19.7	20	19.8	19.8	20.2	20	19.7	20	19.7	19.7	20	19.8	19.6	20	19.8	0	0	0	0	0
9,10	25.3	21.7	21.9	21.7	21.3	21.6	21.4	20.9	21.2	20.9	21.5	21.8	21.4	21.6	21.9	21.7	7	7	10	35	7
10,11	26.3	23.2	23.4	23.2	22.6	22.9	22.6	22.2	22.6	22.3	22.3	22.6	22.3	23	23.4	23.2	50	30	30	58	50
11,12	27.4	24.1	24.6	24.2	24.2	24.6	24.3	23	23.4	23.1	23.5	23.9	23.6	24.1	24.5	24.2	80	55	49	64	78
12,13	28.5	25.2	25.6	25.3	25.4	25.7	25.3	24.7	25	24.7	24.8	25.2	24.9	25.2	25.6	25.2	85	70	56	64	69
13,14	29.4	26.6	26.9	26.5	26.7	27.1	26.7	26.6	27	26.6	26.4	26.8	26.4	26.6	26.7	26.5	62	55	40	74	50
14,15	30.8	27.9	28.3	28	28	28.4	28.1	28.3	28.7	28.4	27.7	28	27.7	27.9	28.2	28	20	20	39	35	22
15,16	29.9	28.5	28.9	28.5	28.6	29	28.7	28.8	29.1	28.7	29	29.4	29.1	28.4	28.8	28.5	0	0	0	0	0

2/11		M-7			M-8			M-9			M-10			M-11			M-7	M-8	M-9	M-10	M-11
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_1	S_1	S_1	S_1	S_1
8,9	22	18.9	19.2	18.9	18.8	19.2	18.9	18.8	19.1	18.7	18.7	19	18.8	18.8	19.2	18.9	0	0	0	0	0
9,10	24.1	20.9	21.2	20.8	20.8	21	20.7	20.8	21.1	20.7	20.9	21.2	21	20.6	21	20.7	9	8	8	25	5
10,11	25.8	21.9	22.3	21.8	21.8	22.1	21.7	21.9	22.2	21.8	22.2	22.5	22.1	21.8	22.1	21.9	40	26	15	35	36
11,12	27.8	23.6	23.9	23.5	23.4	23.7	23.4	23.4	23.8	23.5	23.8	24.2	23.8	23.4	23.8	23.5	55	45	30	42	48
12,13	29.9	25.1	25.5	25.1	25	25.3	24.9	25	25.4	25.1	25.4	25.8	25.4	25.1	25.4	25	64	50	32	50	56
13,14	31.2	26.5	26.9	26.6	26.4	26.8	26.5	26.4	26.8	26.5	27	27.4	27.1	26.5	26.9	26.5	55	42	22	48	47
14,15	32.5	27.8	28.2	27.9	27.6	28	27.7	27.6	27.9	27.7	28.3	28.6	28.3	27.6	28	27.7	12	10	18	17	6
15,16	32	27.3	27.7	27.3	28.4	28.8	28.5	28.6	28.9	28.6	29.1	29.5	29.2	28.6	28.9	28.5	0	0	0	0	0
2/13																					
8,9	20.4	17.1	17.4	17.1	17	17.4	17.1	17	17.3	16.9	16.9	17.2	17	17	17.4	17.1	0	0	0	0	0
9,10	22.5	19.1	19.4	19	19	19.2	18.9	19	19.3	18.9	19.1	19.4	19.2	18.8	19.2	18.9	5.5	5	11	22	8
10,11	24.2	20.9	21.3	21	20	20.3	19.9	20.1	20.4	20	20.4	20.7	20.3	20	20.3	20.1	30.5	22.4	19	30	30
11,12	26.2	22.3	22.6	22.2	21.8	22.2	21.9	21.6	22	21.7	22	22.4	22	21.6	22	21.7	45	30.6	31.5	40	40
12,13	28.3	24	24.3	24	23.2	23.5	23.1	23.2	23.6	23.3	23.6	24	23.6	23.3	23.6	23.2	55.6	40	38	46	45
13,14	29.6	25.7	26.1	25.7	24.6	25	24.7	24.6	25	24.7	25.2	25.6	25.3	24.7	25.1	24.7	45	30	28	40	30
14,15	31.1	27	27.4	27.1	25.8	26.2	25.9	25.8	26.1	25.9	26.5	26.8	26.5	25.8	26.2	25.9	10	8	18	15	7
15,16	30.5	26.5	26.9	26.5	26.6	27	26.7	26.8	27.1	26.8	27.3	27.7	27.4	26.8	27.1	26.7	0	0	0	0	0
2/16																					
8,9	23.3	19.7	20	19.7	19.6	20	19.7	19.6	19.9	19.5	19.5	19.8	19.6	19.6	20	19.7	0	0	0	0	0
9,10	25	21.7	22	21.6	21.6	21.8	21.5	21.6	21.9	21.5	21.7	22	21.8	21.4	21.8	21.5	5.5	5	11	22	8
10,11	26.7	23.5	23.9	23.6	22.6	22.9	22.5	22.7	23	22.6	23	23.3	22.9	22.6	22.9	22.7	30.5	22.4	19	30	30
11,12	28.4	24.9	25.2	24.8	24.4	24.8	24.5	24.2	24.6	24.3	24.6	25	24.6	24.2	24.6	24.3	45	30.6	31.5	40	40
12,13	29	26.6	26.9	26.6	25.8	26.1	25.7	25.8	26.2	25.9	26.2	26.6	26.2	25.9	26.2	25.8	55.6	40	38	46	45
13,14	30.6	28.3	28.7	28.3	27.2	27.6	27.3	27.2	27.6	27.3	27.8	28.2	27.9	27.3	27.7	27.3	45	30	28	40	30
14,15	32.1	29.6	30	29.7	28.4	28.8	28.5	28.4	28.7	28.5	29.1	29.4	29.1	28.4	28.8	28.5	10	8	18	15	7
15,16	31.3	29.1	29.5	29.1	29.2	29.6	29.3	29.4	29.7	29.4	29.9	30.3	30	29.4	29.7	29.3	0	0	0	0	0
2/20																					
8,9	25.3	22.3	22.6	22.4	22.4	22.8	22.6	22.3	22.6	22.4	22.2	22.5	22.4	22.3	22.6	22.3	0	0	0	0	0
9,10	27	23.7	24	23.7	23.4	23.8	23.5	23.1	23.4	23	23.6	23.9	23.7	23.5	23.8	23.5	7	6	5	22	5
10,11	28.7	24.8	25	24.8	24.2	24.6	24.3	23.8	24.2	23.9	24.7	24.9	24.8	24.8	25.2	24.9	38	24	13	32	35
11,12	30.4	25.7	26.2	25.8	25.4	25.7	25.7	25.1	25.5	25.2	25.6	26.1	25.8	25.6	26	25.7	52	44	28	40	46
12,13	31	26.8	27.2	26.9	26.7	27	26.9	25.4	25.8	25.5	26.7	27.1	26.9	26.7	27	26.8	62	48	30	48	55
13,14	32.6	28.2	28.6	28.3	28	28.3	28	27	27.4	27	28.1	28.5	28.3	27.2	27.6	27.2	52	40	20	45	45
14,15	33.9	29.5	29.9	29.6	28.8	29.2	28.8	28.3	28.6	28.4	29.4	29.8	29.6	28.9	29.3	29	10	8	12	15	5
15,16	32	29.2	29.5	29.2	28.2	28.6	28.3	27.6	28	27.7	29.1	29.4	29.2	28.4	28.7	28.3	0	0	0	0	0
2/23																					
8,9	23.1	20.2	20.5	20.3	20.2	20.5	20.2	20.3	20.7	20.5	20.2	20.5	20.3	20.1	20.4	20.3	0	0	0	0	0
9,10	24.6	21.6	21.9	21.6	21.4	21.7	21.4	21.3	21.7	21.4	22	22.3	21.9	21.5	21.8	21.6	5	4	0	15	0
10,11	25.7	22.7	22.9	22.7	22.7	23.1	22.8	22.1	22.5	22.2	22.7	23.1	22.8	22.6	22.8	22.7	36	22	10	32	35
11,12	27	23.6	24.1	23.7	23.5	23.9	23.6	23.3	23.6	23.5	24	24.4	24.1	23.5	24	23.7	52	44	28	40	46
12,13	28.6	24.7	25.1	24.7	24.6	24.9	24.7	24.6	24.9	24.8	24.3	24.7	24.4	24.6	25	24.8	62	48	30	48	55
13,14	30.3	26.1	26.5	26.2	26.1	26.5	26.1	25.9	26.2	25.9	25.9	26.3	25.9	26.1	26.4	26.2	52	40	20	45	45
14,15	31.6	27.4	27.8	27.5	26.8	27.2	26.9	26.7	27.1	26.7	27.2	27.5	27.3	27.3	27.7	27.5	8	5	5	10	0
15,16	33	28.8	29.2	28.8	28.7	29	28.8	28.7	29	28.9	28.4	28.8	28.5	28.7	29.1	28.9	0	0	0	0	0
2/25																					
8,9	27.8	20.5	20.8	20.6	20.5	20.8	20.5	20.6	21	20.8	20.5	20.8	20.6	20.4	20.7	20.6	0	0	0	0	0
9,10	29.4	21.9	22.2	21.9	21.7	22	21.7	21.6	22	21.7	22.3	22.6	22.2	21.8	22.1	21.9	0	0	0	10	0
10,11	31	23	23.2	23	23	23.4	23.1	22.4	22.8	22.5	23	23.4	23.1	22.9	23.1	23	32	22	8	25	25
11,12	32.6	23.9	24.4	24	23.8	24.2	23.9	23.6	23.9	23.8	24.3	24.7	24.4	23.8	24.3	24	42	35	15	30	38
12,13	34.7	25	25.4	25	24.9	25.2	25	24.9	25.2	25.1	24.6	25	24.7	24.9	25.3	25.1	55	40	20	38	45
13,14	35.5	26.4	26.8	26.5	26.4	26.8	26.4	26.2	26.5	26.2	26.2	26.6	26.2	26.4	26.7	26.5	45	25	12	35	35
14,15	33.9	27.7	28.1	27.8	27.1	27.5	27.2	27	27.4	27	27.5	27.8	27.6	27.6	28	27.8	0	0	0	8	0
15,16	32	29.1	29.5	29.1	29	29.3	29.1	29	29.3	29.2	28.7	29.1	28.8	29	29.4	29.2	0	0	0	0	0

3/1		M-7			M-8			M-9			M-10			M-11			M-7	M-8	M-9	M-10	M-11
TIME	T_a	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	T-I	T-II	T-III	S_1	S_1	S_1	S_1	S_1
8,9	23.8	19.9	20	19.8	19.4	19.7	19.5	19.7	19.9	19.5	19.4	19.6	19.4	19.4	19.7	19.5	0	0	0	0	0
9,10	25.6	21.1	21.3	21	21	21.3	21.1	21	21.3	21	20.7	21.1	20.8	20.8	21.1	20.9	0	0	0	3	0
10,11	27	23.4	23.7	23.3	23.1	23.5	23.2	22.1	22.4	22	21.9	22.3	22	22.5	22.8	22.5	28	18	3	12	12
11,12	28.6	24.8	25.1	24.8	23.9	24.2	23.8	22.9	23.2	22.9	22.8	23.2	22.9	24.1	24.5	24.1	40	16	5	18	26
12,13	30.3	25.5	25.8	25.4	24.9	25.3	25	24	24.4	24	24.4	24.8	24.5	25	25.5	25	50	31	12	16	25
13,14	32	26.4	26.7	26.4	26	26.4	26.1	25	25.4	25	25.4	25.7	25.4	26.1	26.6	26.2	32	10	3	20	15
14,15	33.3	27.8	28.2	27.8	27.3	27.6	27.4	26.4	26.8	26.5	27.1	27.5	27.1	27.5	27.8	27.4	0	0	0	3	0
15,16	32.2	27.2	27.6	27.1	26.6	27	26.6	25.8	26.1	25.8	26.5	26.9	26.6	26.4	27.1	26.6	0	0	0	0	0
3/3																					
8,9	23.6	20.2	20.3	20.1	19.7	20.1	19.8	19.9	20.1	19.9	19.9	20.1	19.8	20	20.3	20	0	0	0	0	0
9,10	25.4	21.3	21.6	21.3	21.3	21.5	21.3	21	21.3	21	20.8	21.1	20.7	20.8	21.2	20.9	0	0	0	2.5	0
10,11	27.6	22.7	23.1	22.8	22.6	22.9	22.6	22	22.3	22	22.2	22.6	22.3	22.4	22.8	22.5	21	12	4	10.9	16
11,12	29.5	24.4	24.8	24.4	23.2	23.6	23.3	22.7	23.1	22.8	23.1	23.4	23	23.2	23.5	23.2	35	18	10.5	22	21
12,13	31.9	26	26.3	25.9	24.3	24.6	24.2	24	24.3	23.9	24.3	24.7	24.4	24.7	25.1	24.8	42.5	21	11	22.1	27
13,14	33.6	27.3	27.6	27.2	25.2	25.5	25.2	24.7	25.1	24.8	25.6	25.9	25.6	25.9	26.2	25.8	30	16	8	14.5	11
14,15	34.4	28.8	29.1	28.7	26.4	26.8	26.5	25.2	25.6	25.3	26.1	26.5	26.2	26.2	26.7	26.3	0	0	0	2.5	0
15,16	34	30.5	30.9	30.4	27.9	28.3	27.9	26.9	27.3	26.8	27.6	27.9	27.5	27.1	27.5	27.2	0	0	0	0	0

BIOGRAPHY

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