Flexible Manufacturing System

Comprehensive Exam, 2022-23, Sem I

BITS-Pilani, Hyderabad campus

Total Time: 3 hrs.   Date: 20th December, 2022   Total Marks: 75

1. Objective Questions [2x8 = 16]

    a. Classify the following as automatic control, manual control or discrete control. [2]

        i. A sensor is used to turn on and off the lights of a room.

        ii. A temperature sensor is used to adjust the room temperature and maintain it at a set point.

        iii. A user starts the bottle filling machine, places the bottle on the conveyor belt to fill it with the required liquid.

        iv. The luggage system at the airport.

    b. What are the roles of humans in a factory automation system?   [2]

    c. What is the difference between Sequential error and Timing errors?   [2]

    d. Explain any two diagnostic features?   [2]

    e. What is the nature of the Projective transformation?   [2]

    f. What is the difference between Secret key cryptography and Public key cryptography?   [2]

    g. What is a Histogram?   [2]

    h. Write two limitations of FMS.   [2]

2. 80% of students who do maths work during one study period, will do the maths work at the next study period. 30% of students who do english work during one study period, will do the english work at the next study period. Initially there were 60 students doing maths work and 40 students doing English work. Calculate,
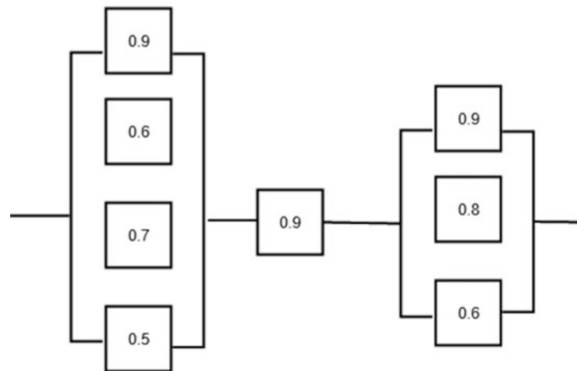
    a. The transition probability matrix   [3]

    b. The number of students who do maths work, english work for the next 2 study periods.   [5]

3. DTMC:

    a. Explain what are transient and recurrent states with examples.   [3+3]

    b. What is Sojourn time?   [1]

c. What is a Poisson process? [2]

4. Find the reliability of the system for the system block diagram. [8]

5. For a Lathe spindle system automation you have to use a PLC. You have to ensure that the oil pump motor starts first and the main motor starts subsequently to provide lubricant for the gear box before the lathe spindle starts. Incorporate four push buttons for switching on and off both the oil pump motor and main motor, and write a ladder logic for the lathe spindle. . [8]

6. Communication:

   a. Explain different modes of Broadband signal communication with examples. [3+3]

   b. Describe two different network topologies with diagrams. [2+2]

7. CMM:

   a. What are the two transducers used in the CMM probe? Why? [2+2]

   b. Explain what a virtual figure is? How can it be measured? [2+2]

8. Quality:

   a. What is the quality of design? [4]

   b. What is Six Sigma quality? [3]

   c. What is the difference between inspection and testing? [1]

[End]