BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI – HYDERABAD CAMPUS
FIRST SEMESTER 2022-23
BIO F212 MICROBIOLOGY – MID SEMESTER EXAM (CLOSED BOOK (10%) + OPEN BOOK (15%))
DATE: 4TH NOV. 2022 **TIME: 1:30 – 3:00 P.M**
WEIGHTAGE: 25% (10% CB + 15% OB) **MARKS : = 75 MARKS (30 CB + 45 OB)**

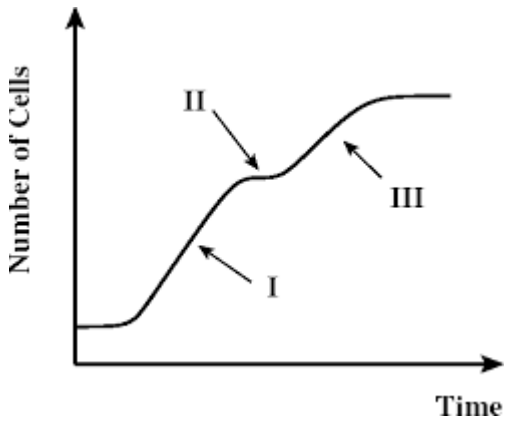
Note: Paper has two parts A (OB) and B (CB) to be answered in separate answer sheets. Once you complete Part A keep your books aside and attempt Part B. No time specified individually for Part A and Part B – you need to plan your time between the two. **Ideal scenario would be 45-60 mins for Part A and 30-45 mins for Part B.**

PART A - OPEN BOOK

1. The bacterium *Erwinia caratovora* is the causative agent of soft rots in carrots. This is a culturable bacteria, and can be reintroduced into carrots to reproduce the disease as it is a phloem inhabiting bacteria. **(15)**
   The following materials are available with you in the Microbiology lab:
   i) Infected carrot with *Erwinia carotovora,*
   ii) Healthy carrots
   iii) Nutrient agar plates
   iv) Razor blade, forceps and inoculating loop
   v) Moist chamber (sterile petri plate lined with moist filter paper)
   vi) Gram staining reagents
   vii) 70% ethanol
   viii) Sterile distil water
   ix) Bunsen burner/spirit lamp in laminar air flow
   x) Glass slides
   Using these materials, design and write down the step by step procedure that you will follow to prove the Koch's postulates for plant pathogenic bacteria.

2. a) 'X' is a genus of pathogenic bacteria that causes tuberculosis and leprosy in humans. To identify this specific genus and to differentiate it from other bacteria, describe a staining method that can be used. Mention the steps of the staining method you suggest and clearly explain the principle which facilitates their distinction. **(10)**

3.



Given in the figure is the growth curve of *E.coli* at 37°C in a medium containing two sugars, glucose and lactose. This growth curve seems to be different from the regular growth curve of bacteria that you have studied. Explain the reason of the variation of growth curve and explain the phases as you see in I, II and III. **(10)**

4. Identify the following Eukaryotic organisms: **(2 X 5 = 10)**
   a) Symbiotic fungi that help roots absorb minerals and nutrients
   b) Asexual fungi – those which have lost the ability for sexual reproduction and produce no sexual spores.
   c) Dinoflagellate that produces neurotoxins and gives ocean the deep red color called red tides.
   d) Definitive host of Plasmodium that harbours the sexually reproducing stage
   e) Combination of a green algae and a fungus in a mutualistic relationship.

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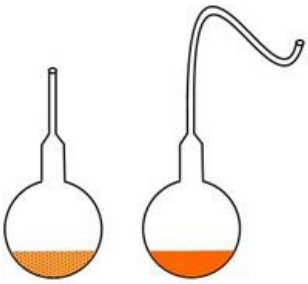
Part B – Closed book

1. 

Explain how the open ended long necks bended into S-shaped curves (swan neck flasks) as shown in the figure were instrumental in disproving the spontaneous generation theory? **(3)**

2. Apart from the regular methods of bacterial identification used in classification of bacteria like morphology, biochemical tests, serology, differential staining etc., how is phage typing as a method helpful in distinguishing bacteria and explain the principle behind the same **(3)**
3. A) Both magnification and resolution in Transmission electron microscope is better than a light microscope. Give specific reason for this possibility based on your understanding of microscopy. B) Can live cells be viewed by electron microscopy? C) Is the concept of staining to improve contrast applicable for electron microscopes and If yes, what is the nature of stains used. **(6)**
4. Penicillin is an antibiotic that interferes with the formation of functional cell wall by preventing the formation of peptide cross bridges of peptidoglycan. What will be the impact of this antibiotic on a) Gram positive bacteria b) Gram negative bacteria and c) Mycoplasma. Explain your answer with proper reasoning. **(6)**
5. What can you comment on the carbohydrate catabolism and energy production in the following microbes in terms of type and ATP production? **(6)**
   a) *Pseudomonas*, an aerobic chemoheterotroph
   b) *Spirulina*, an oxygenic photoautotroph
6. Classify the following methods into either Direct measurement of microbial growth or indirect method of microbial growth? **(6)**
   a) Filtration through membrane filters followed by colony counting
   b) Petroff Hausser cell counter for microscopic count
   c) Measuring turbidity in a spectrophotometer
   d) Measuring metabolic products like Co2 and acid
   e) Pour plate method
   f) Lyophilisation of microbial cultures

**********END OF PART – B**********

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