

# RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

THIRD YEAR

B.A./B.SC. SIXTH SEMESTER (January – June) 2013

Mid-Semester Examination, March 2013

Date : 05/03/2013

**MICROBIOLOGY (Honours)**

Time : 12 noon – 2 pm

Paper : VII

Full Marks : 50

1. a) How can you define therapeutic index? [2]
- b) What do mean by generations of antibiotics? Give one example each from different generation of cephalosporin. [2+2]
- c) How does a bacterium become quinolone resistant? [2]
- d) Which prodrug would you use to treat herpes simplex infection and why? [2]

**Or,**

- a) What do you mean by extended spectrum penicillin? [2]
- b) What do you expect when ampicillin is administered to a bacterium producing  $\beta$ -lactamase? What happens if clavulanic acid is added simultaneously? [2+2]
- c) What may happen to a patient when chloramphenicol is administered for a long-time? [2]
- d) Name one antifungal antibiotic and mention its mode of action. [2]
2. a) What is Holliday junction? [2]
- b) Why is the term 'jumping gene' misnomer? [2]
- c) How can you prove that a staggered cut is made during transposition? [2]
- d) Write the differences between generalized and site-specific recombination. [2]
- e) A fluctuation test was carried out to estimate the mutation rate of an *E. coli* locus conferring resistance to phage T1. If 5 of the 12 small independent cultures contained no phage resistant mutants after growth of the cultures was completed and the average number of bacterial cells per culture was  $5 \times 10^8$ , what is the estimated rate of mutation to T1 resistance? [2]

**Or,**

- a) What is mutation frequency? [1]
- b) What is meant by composite transposon? [2]
- c) In *Neurospora*, a cross between two parents, "+pdxp" and "pdx+" yields asci containing ascospores, in which pdxp: + = 6:2 instead of normal 4:4 ratio. How can you explain this deviation? [3]
- d) Write the roles of Rec BCD complex and RecA during homologous recombination? [2+1]
- e) If a cell contains 2000 genes and if the average mutation rate per gene is  $1 \times 10^{-5}$  per generation, what is the average number of new mutations per cell per generation? [1]
3. a) Give an example of i) RNA virus with fragmented genome, ii) partial ds DNA virus. [2]
- b) Describe the mode of entry of picornavirus in human body. [2]
- c) What are the vaccines available in the market for preventing polio virus. [2]
- d) Why do some adenovirus infection induce apoptosis? [2]
- e) What are the functions of T antigens and how it autoregulate the early gene expressions? [2]

4. Answer **any two** questions from the following :- [2×3]
- High antibody avidity can compensate for low antibody affinity – Justify.
  - Heart burn is frequently observed in patients with *Streptococcus pyogenes* – Justify.
  - Differentiate between Precipitation and Agglutination reactions.
5. Answer **any two** questions from the following :- [2×2]
- What is Passive Agglutination? [2]
  - How can chemiluminescence be helpful in antigen-antibody titration assays? [2]
  - What are incomplete antibodies? Give example. [1+1]
6. a) What are restriction endonuclease? Give an example of any R.E that cuts a DNA molecule producing blunt end and sticky end :- [1+2]
- b) Why phage that survive one cycle of growth upon the restrictive host can subsequently re-infect that host efficiently? [2]
- c) What are isoschizomers? Mention its uses along with an example. [2 1/2]
- d) The restriction enzyme EcoRI cuts the DNA at the sequence GAATTC and restriction enzyme HaeIII cuts DNA at the sequence GGCC. Predict how frequently will each enzyme cut double stranded DNA? [2 1/2]

**Or,**

- What is DNA methylase? Why are they important for cloning experiments? [2]
- Mention two important properties of different types of restriction endonucleases. [2]
- What are the advantages of using adaptor over linker? [2]
- What is star activity? Give an example. [2]
- How is T<sub>4</sub> PNK useful in R.D.T? [2]

