RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

B.A./B.SC. FIRST SEMESTER EXAMINATION, DECEMBER 2013

FIRST YEAR

Date : 14/12/2013 **MICROBIOLOGY (Honours)**

Time : 11 am – 3 pm Paper : I Full Marks : 75

[Use Separate Answer Scripts for each group]

Group - A

1. Answer **any five** from the following questions : [5×2]
   a) State the Koch's postulates in the light of modern molecular biology.
   b) What is auxospore? State its importance.
   c) State the function of SASP.
   d) Name a pathogenic alga and the disease caused by it.
   e) What is meant by triphasic alternation of generation? Give an example.
   f) What is heterocyst? State its function.
   g) What is meant by negative staining? Why is it useful?

2. Answer **any three** from the following questions :

   a) i) State the importance of r-RNA homology in identifying a bacterium. [2]
      ii) What is a signature sequence? [2]
      iii) What is meant by fructification? What are its major types? [1+2]
      iv) State the importance of hymenium and subhymenium. [1·5+1·5]

   b) i) Name the stains ideal for staining : *E. coli*, *Staphylococcus aureus*, Endospore. [3]
      ii) What is a Mordant? [2]
      iii) Describe the method of acid fast staining. [3]
      iv) Name the organism that causes cerebral malaria and African Malaria. [2]

   c) Calculate the mean, median, S.D, variance and co-variance of the following data : [10]

Class Interval	95 – 105	105 – 115	115 – 125	125 – 135	135 – 145
Frequency	19	23	36	70	52

   d) i) What is Teichoic acid? What are its types? State its function. [1+2+2]
      ii) State the importance of Mot protein. [2]
      iii) State the importance of Ti plasmid. [2]
      iv) Name the bacteria having magnetosome. [1]

   e) i) Two bacterial cells A and B have diameter of 0·5µ and 5µ, respectively. Which one will have higher growth rate and why? [1+2]
      ii) What is meant by Erythrocytic cycle? Briefly illustrate the cycle with a word diagram. [1+3]
      iii) Name a bacterium without cell wall. State its adaptation for survivality. [1+2]

   f) i) Why Gram negative bacteria are relatively more virulent than Gram positive bacteria in general? [2]
      ii) What are plasmid and episomes? [2+2]
      iii) Name some histone like proteins in bacterial chromosome. [2]
      iv) What are mitosporic fungi? Give example. [2]

Group – B

3. Answer **any five** of the following :

   a) i) What do you mean by ‘‘buffering capacity’’ of a solution? [2]

ii) Determine the pH of 2(M) of NaOH solution. [2]

iii) How does a buffer solution resist a change in pH when acid or base is added to the solution? [3]

b) i) What is SI unit of viscosity? [2]

ii) State the Newton's law of viscosity with mathematical representation. [2]

iii) What are the uses of viscosity in biological system? [3]

c) i) Mention the different tautomeric forms exhibited by uracil. [2]

ii) What are sugar puckering? [3]

iii) State with proper diagram : A phosphoanhydride bond, A phosphoester bond [1+1]

d) i) Write down the structure of : Thymidine, Adenine [1+1]

ii) The reaction $ATP \rightleftharpoons ADP + P_i$ is exergonic —Justify. [2]

iii) What is Central dogma? [1]

iv) Differentiate between A-DNA and Z-DNA. [2]

e) i) Describe the Watson and Crick's model of double stranded DNA. [3]

ii) What is melting temperature (T_m) of DNA? [2]

iii) Write the structure of A = U base pairing. [2]

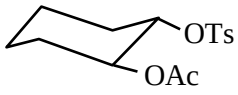
f) i) What happen when glycine is heated? [2]

ii) What are the drawbacks of dansyl chloride method? [2]

iii) How many stereoisomers are possible for L-Leucine? [2]

iv) Draw the structure of Cis-4 tet-butyl cyclohexanol? [1]

g) i) Both cis and trans-isomer of the following compound give the same product on acetolysis. [2]



Give the structure of the product with suitable reason.

ii) What is dihedral angle? [1]

iii) Give an example of non chiral molecule with stereogenic centre. [1]

iv) Both cis and trans-isomers of 2 aminocyclohexanol are separately treated with nitrous acid. Write down the structures of the products in each case. [3]

h) i) How will you prepare Gly-ala-phe from gly-ala? [2]

ii) What happens when you run an amino acid in an electric field through a pH gradients? [1½]

iii) What are the differences between conformation and configuration? [1½]

iv) How many optically active isomers are possible for isoleucine? Explain. [2]

i) i) Comment on optical activity of the product obtained by oxidation of D(–) ribose with nitric acid. [3]

ii) Write short notes on –Ion exchange chromatography. [2]

iii) Write down the structure of Boc-alanine. [1]

iv) What is Sorenson formol titration? [1]

j) i) State the characteristic features of primary, secondary, tertiary and quaternary structures of proteins. [2]

ii) Water soluble proteins fold into compact structures with non polar cores — comment on their structure-function aspect citing appropriate example. [2]

iii) Elaborate the distinguishing features of fibrous proteins and globular proteins. [3]

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