

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. FIRST SEMESTER EXAMINATION, DECEMBER 2016

FIRST YEAR [BATCH 2016-19]

MICROBIOLOGY [Honours]

Date : 12/12/2016

Time : 11 am – 3 pm

Paper : I

Full Marks : 100

[Use a separate Answer Book for each Group]

Group – A

UNIT-I

(Answer any five questions)

[5×10]

1. a) Mention the difference between phenetic and phylogenetic types of classification. [3]
b) Who is said to be the father of soil microbiology? [1]
c) What are Col plasmids? Give an example. [2+1]
d) Write the number and plane of division to produce cubical packet of bacterial cells. [2]
e) Write an importance of fungi citing an example. [1]
2. a) Write the advantages of agar over gelatin as a solidifying agent to prepare culture media. [2]
b) Write the differences between the zygomycota and oomycota. [2]
c) Write down the principle of Acid Fast staining. [4]
d) Name the largest coccus known to you. [2]
3. a) What is T_m value? How does it help in the classification of bacteria? [2+1]
b) Which type of rRNA is used by Carl Woese to classify bacteria phylogenetically and why? [1+1]
c) What are Leuco compounds? [2]
d) How does surface area and volume ratio affect cell size? [3]
4. a) Write the important features of *E.coli* nucleoid. [2]
b) Write the differences between the plasmid and episome. [2]
c) State four differences between bright field microscope and electron microscope. [4]
d) What is periplasmic space? [2]
5. a) What are the limitations of Numerical Taxonomy? [2]
b) Write two important features of slime molds. [2]
c) State the basic principle of dark field microscope. [2]
d) What is porin protein? [2]
e) What is the function of carboxysome? [2]
6. a) Define heterocyst and write its function. [2+1]
b) What is chemotherapy? [1]
c) What do you mean by limit of Resolution of a microscope? [2]
d) Why are membrane lipids amphipathic in nature? [2]
e) Why are archaebacteria resistant to the action of lysozyme? [2]
7. a) Draw a labelled diagram of gram negative bacterial flagella. [4]
b) What is fimbrilin? [2]
c) Name three kinds of mycelia in Basidiomycota and mention their function. [3]

- d) According to five-kingdom system of classification by Whittaker, which kingdom presents maximum number of organism? [1]
8. a) What is the function of 95% alcohol in Gram staining? [2]
 b) Name the different kinds of asexual spores formed in Zygomycota and also mention the conditions when they are formed. [3]
 c) Write the scientific name of fission yeast. [1]
 d) Write the differences between gram positive and gram negative bacterial cell wall. [4]
9. a) What do you mean by eukaryotic algae? [2]
 b) What is a signature sequence in reference to phylogenetic classification of bacteria? [2]
 c) Why G+C ratio is considered instead of A+T for phylogenetic classification? [2]
 d) What do you mean by oogamy? [2]
 e) What is the difference between trichome and filament? [2]
10. a) What is pyrenoid? [2]
 b) Give two differences between Eubacteria and Archaeobacteria. [2]
 c) Name the different stages of life cycle in *Puccinia graminis* and mention the names of the hosts where these stages are completed. [2]
 d) Name the asexual and sexual stages in the life cycle of *Plasmodium vivax*. [2]
 e) What is the function of dipicolinic acid? [2]

UNIT-II

(Answer any one question)

[1×10]

11. a) The mean of 30 values was 150. It was detected on rechecking that the value 165 was wrongly copied as 135 for computation of the mean. Find the corrected mean. [4]
 b) Calculate mean, SD, variance and covariance of the following data: [6]

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

12. a) Define: Frequency density, Pictogram, Histogram, Quartile deviation. [2×4]
 b) Mention the relation among mean, median and mode. [2]

Group – B

(Answer any four questions)

[4×10]

13. a) Deduce the relation between surface tension and surface energy. [3]
 b) Define Henderson-Hasselbalch equation. [3]
 c) Briefly explain the importance of hydrophobic interaction in biological system. [2]
 d) Define the term true acidity. [2]
14. a) What makes peptide bonds planar? [2½]
 b) Water soluble proteins fold into compact structures with non-polar cores – comment on their structure-function aspect citing appropriate examples. [2½]
 c) State the characteristic features of intra-chain hydrogen bonding and inter-chain hydrogen bonding in the secondary structure of proteins. [3½]
 d) State three characteristic differences between collagen and haemoglobin in respect of their structures? [1½]

15. a) Elaborate with examples the distinguishing features of fibrous proteins and globular proteins. [3]
 b) What distinguishes tertiary from quaternary structure in proteins? Do all proteins have quaternary structures? [3]
 c) Ramachandran plots helps understand protein structures – comment. [2]
 d) Which of the following peptides is more likely to take up an α -helical structure and why?
 (i) LKAENDEAARAMSEA (ii) CRAGGFPWDQPGTSN. [2]
16. a) Define the terms:–
 (i) Zwitterions (ii) Isoelectric point [2+2]
 b) What is the principle of formol titration? Why is formaldehyde used in formol titration? [2+2]
 c) Define biologically important peptides. [2]
17. a) What is sugar puckering of nucleotides? What type of sugar puckering is generally found in RNA? [3+1]
 b) Write the structure of the following:–
 (i) Thymine (ii) Uridine [1+1]
 c) Write short notes on:–
 (i) Anti conformation of nucleotides
 (ii) Watson-Crick base pairing [2+2]
18. a) When does B-DNA readily change to A-DNA? [1]
 b) What are the differences between A-DNA and B-DNA? [3]
 c) What is Central Dogma? [2]
 d) What do you mean by DNA denaturation? [2]
 e) Draw the structure of a nucleotide. [2]
19. a) What do you mean by prochirality? Give an example. [2]
 b) Write short note on specific rotation of a nonchiral molecule. [2]
 c) Amino acids can act as a buffer – Justify. [2]
 d) *cis*-2-aminocyclohexanol on treatment with nitrous acid gives single product whereas its *trans* isomer gives mixture of product – justify the statement. [3]
 e) Give an example of non chiral molecule with stereogenic centre. [1]
20. a) How would you synthesize gly-phe-ala chemically? [2]
 b) What is Butane-Gauche interaction? Explain with example. [2]
 c) State the stereochemical relationship between glucose, mannose and galactose. [2]
 d) What are the differences between stereogenicity and chirotopicity? [2]
 e) What are the symmetry elements present in chair conformation of cyclohexane? [2]

————— × —————