RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. SECOND SEMESTER EXAMINATION, JUNE 2022

FIRST YEAR [BATCH 2021-24]

Date : 22/06/2022

MICROBIOLOGY (HONOURS)

Time : 11 am – 1 pm

Paper : IV [CC4]

Full Marks : 50

Answer **any ten** of the following questions: [10×2]

1. a) Write down the function of gap junction.
   b) Write down the significance of RGD sequence.
   c) Write down the difference between procollagen and collagen.
   d) What are lipid rafts?
   e) What is cytoskeleton made up of?
   f) Differentiate between paracrine and endocrine signaling process.
   g) What is permissive effect?
   h) Mention names of any two hormones and their function which are secreted from pancreas.
   i) What are second messengers? Give examples.
   j) Mention the function of Protein Kinase A and Phospholipase C enzymes.
   k) Justify whether the following statement is true or false- 'All newly synthesized proteins on RER have same signal peptide sequence at their N-terminus'.
   l) How many sugars residues are present in the core oligosaccharide that is N linked to the growing polypeptide? Name the sugars.
   m) Choose the correct pathway for targeting a secretory protein:

      i) Rough ER → ER-to-Golgi transport vesicles → Golgi body (cisternae) → TGN (secretory or transport vesicles) → cell surface → exocytosis.

      ii) Rough ER → cell surface (exocytosis) → Golgi body (cisternae) → TGN (secretory or transport vesicles) → ER-to-Golgi transport vesicles

      iii) Rough ER → ER-to-Golgi transport vesicles → Golgi body (cisternae) → cell surface → exocytosis

      iv) TGN (secretory or transport vesicles) → rough ER → ER-to-Golgi transport vesicles → Golgi body (cisternae) → cell surface → exocytosis.

   n) How is a lysosomal protein targeted to lysosome?
   o) Mention the application of t-test.

Answer **any three** of the following questions: [3×10]

2. a) How are integrin molecules activated?
   b) Write down the structure of proteoglycan complex.
   c) How are occluding junctions formed?
   d) What is the difference between desmosome and hemidesmosome? (3+3+2+2)

3. a) Ca2+, IP3 and cAMP have all been described as second messengers. In what ways are their mechanism of action similar? In what ways are they different?
   b) Explain the signaling cascade of JAK-STAT pathway. (4+6)

4. a) Explain how transport vesicles are formed? Why are they coated?
   b) How does glycosylation in the Golgi complex differ from that in the RER?
   c) Write the function(s) of the following in protein targeting:
      i) Signal sequence
      ii) SRP
      iii) SRP receptor
      iv) Translocon
   d) Write down the role of v-SNAREs and t-SNAREs in the process of vesicle docking and membrane fusion. (2+2+4+2)

5. a) Why do *ced* mutant progenies of *Caenorhabditis elegans* exhibit an abnormal body pattern?
   b) State the differences between the pleuripotent and oligopotent stem cells. How can these cells be used in regenerative medicines?
   c) In a plant breeding experiment you have recorded the height of 100 progeny plants. The calculated mean value was 38.8 with standard deviation of 11.4. Do these values describe the variability in the population height? Explain vividly.
   d) Cyclins are said to be the regulator of the cell cycle. Why are they so called? (3+3+2+2)

6. a) A test-crossing experiment was done between the parent organisms with the genotypes Dd and dd (Dd x dd) and eight progenies were obtained (where D is completely dominant to d). What is the probability that out of eight offspring three will be of dd genotype?
   b) State the role of cytochrome *c* in the intrinsic pathway of apoptosis.
   c) What is z-test? What is ANOVA?
   d) Mention the assumption in the analysis of variance (ANOVA). (2+3+2+3)

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