

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. SECOND SEMESTER EXAMINATION, AUGUST 2021

FIRST YEAR [BATCH 2020-23]

MICROBIOLOGY (HONOURS)

Paper : IV [CC4]

Date : 12/08/2021

Time : 11 am – 1 pm

Full Marks : 50

Answer **any five** questions of the following :

[5×10]

1. a) How can you determine the length of the 'S'-phase of cell cycle?
b) Differentiate between the multipotent and pluripotent stem cells. Is it possible to transform multipotent stem cell to pluripotent stem cell? Explain with suitable example.
c) How do the death ligands and death receptors interact to ensure apoptosis?
d) How does cancerous tissue form its own vasculature for maintenance of nutrient supply? [3+3+2+2]
2. a) "cdc" mutants of yeasts are lethal. How was their existence proved then?
b) Why are cyclin-dependent kinases called the "engines" of the cell cycle?
c) "Cytochrome c" is an electron carrier in the mitochondrial electron transport chain. This protein also plays a role in intrinsic pathway of apoptosis. How does it exercise its effect?
d) Can an aged cell be rejuvenated? If the answer is 'yes' then how is it possible? [2+3+3+2]
3. a) In USA the incidence of the recessive metabolic disorder phenylketonuria is about 0.0001(q) so that $p+q=1$. What proportion of population would be the heterozygous carrier?
b) In the wake of Covid-19 pandemic a hospital in the country reported that 80% of the admitted patients got fully cured of this dreadful viral disease and the remaining 20% succumbed to death. What is the probability that among randomly chosen 6 patients 5 will be cured?
c) Write the difference between the standard deviation and standard error. With suitable numerical example show that the variances of two independent variables are additive but not the standard deviations.
d) Differentiate between the acceptance region and critical region of a standard normal distribution curve. [2+2+4+2]
4. a) What determines the location in a cell where a protein is synthesized?
b) What is the role of dolichol phosphate in the synthesis of membrane glycoproteins?
c) How are the SNARE proteins involved in the process of membrane fusion?
d) What are the major steps that occur during phagocytosis?
e) 'Ubiquitin attachment to substrates requires multiple enzymes'---explain. [2+2+2+2+2]
5. a) What is the function of STAT protein?
b) Which are the possible factors which influence signal amplification?
c) Explain the effect of glucose concentration on the cAMP and catabolic activator protein?
d) How cGMP is involved in vasodilation or smooth muscle relaxation? [2+2.5+3+2.5]
6. a) How does nuclear lamina affect the stability of nucleus?
b) Explain the 'Christmas tree model'.

- c) What does histone code hypothesis state?
- d) Write down the structure and function of cristae. [2+2+2+(2+2)]
7. a) How do anchor proteins mediate function of cell adhesion molecules?
- b) How does occluding junction maintain polarity of epithelial cells?
- c) What is lectin?
- d) How is thin filament of muscle organized? [3+3+2+2]
8. a) What is z test ?
- b) What is F test?
- c) What do you mean by sampling?
- d) Body length of fishes of a species was obtained from two ponds. They were measured as follows (in cm):

Pond A	20	24	20	28	22	20	24	32	24	26
Pond B	12	10	8	10	6	4	14	20	10	6

Calculate whether the mean difference in total body length between the two ponds of fish is significant or not. (It $I_{0.05, 18} = 2.10$) [1.5+1.5+1+6]

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