

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. FIRST SEMESTER EXAMINATION, MARCH 2022

FIRST YEAR [BATCH 2021-24]

MICROBIOLOGY (HONOURS)

PAPER : II [CC2]

Date : 10/03/2022

Time : 11 am – 1 pm

Full Marks : 50

Answer **all** the following questions:

[1×10]

1. a) What are capnophiles?
- b) What do you mean by microaerophilic microbes?
- c) What do you mean by the term parfocal microscope?
- d) What is the basic difference between negative staining and simple staining?
- e) What will be the best choice of microscope, if you want to visualize live cell and why?
- f) Define resolving power.
- g) Define 'natural media'. Give example.
- h) Would you expect generation time to be a constant characteristic of a bacterial species? Explain.
- i) What is the shape of *Serratia*?
- j) Name one bacterium having peritrichous flagella.

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

[4×10]

2. a) What are the disadvantages of pour plate technique?
- b) Why are agar slants prepared?
- c) How are anaerobic microbes cultured?
- d) What do you mean by direct microscopic counting of microbes? (2+2+4+2)
3. a) Why blue monochromatic light is more acceptable than that of white light to visualize the microscopic specimen?
- b) Why we use oil for high magnification objective lens?
- c) Over heat fixing is detrimental for Gram's staining. – Justify the statement.
- d) What is leuco compound? State its application in the field of biology.
- e) What is mordant? State the role of mordant in Gram's staining. (2+2+2+2+2)
4. a) Acidic stains works well in acidic pH and basic stain works well in alkaline pH. – Justify the statement.
- b) Why we use acid-alcohol as de-staining solution for acid fast staining?
- c) Differentiate phase contrast microscopy from compound light microscopy.
- d) What do you mean by the term numerical aperture? (3+2+3+2)
5. a) In the lag phase of growth the number of bacteria remains constant. Does this mean the cells are dormant and inert? Explain.
- b) Indicate the various toxic derivatives of oxygen and explain how aerobic organisms might protect themselves against these derivatives.
- c) Classify bacteria on the basis of their temperature requirements. Explain each type with proper example.
- d) Discuss the various adaptation mechanisms of halophiles. (2+3+3+2)

6. a) How can synchronous growth of a bacterial culture be obtained? In what way could a synchronously growing culture be useful for the electron microscopist who is trying to determine the cytological changes associated with bacterial growth?
- b) What are 'photolithoautotrophs' and 'photoorganoheterotrophs'? Explain with example.
- c) Define 'selective media' and 'differential media'. Explain with example. [(2+2)+(2+2)+2]
7. a) How would you induce a bacterium to produce Ca-dipicolinate?
- b) What happens if a bacterial cell is treated with SDS?
- c) What is the difference between teichoic acid and teichuronic acid?
- d) What is Brown's lipoprotein? Write down its function? [1+3+2+(2+2)]
8. a) Do you think that presence of plasmid is essential for the host?
- b) How does nucleoid differ from plasmid?
- c) What is the function of gas vesicle in bacteria? Discuss about its shell. [3+3+(2+2)]

9. a) Find the mean and standard deviation from the following :

VARIABLE	10	11	12	13	14	15	16
FREQUENCY	2	7	11	15	10	4	1

- b) What are primary and secondary data?
- c) What is frequency density?
- d) Mention the relationship between mean, median and mode. (5+2+2+1)
10. a) Calculate the correlation coefficient between "x" and "y":

X	1	2	3	4	5	6	7	8	9
Y	10	11	12	13	14	15	16	17	18

- b) You are given the following data :

Mean of "x" = 36; mean of "y" = 85; $\delta_x = 11$; $\delta_y = 8$; $r_{xy} = 0.66$

Calculate the value of "y" when "x" = 10.

(5+5)

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