

B.Sc. BIOTECHNOLOGY
First Semester
MICROBIOLOGY-I
(BBT – 102)

Duration: 3Hrs.

Full Marks: 70

Part-A (Objective) =20
Part-B (Descriptive) =50

(PART-B: Descriptive)

Duration: 2 hrs. 40 mins.

Marks: 50

Answer any *five* of the following questions:

1. Write about the role of microbiology in agriculture, environment, industry and medical? (10)
2. Write short notes: (any *two*) (5×2=10)
 - a) Bio-fertilizer
 - b) Bio-pesticide
 - c) Bio-fuel
 - d) Bio-remediation
3. Define media. What are the different types of media? Write down the difference between differential and selective media. (2+3+5=10)
4. What is bacterial growth kinetics? What are the major phases of bacterial growth curve? Write the salient features of each of the growth phases. For production of an antibiotic which phase is considered to be the best for harvesting and why? (1+2+4+3=10)
5. Write the differences between: (any *two*) (5×2=10)
 - i) Bright field microscopy Vs. Dark field microscopy.
 - ii) Phase contrast microscopy Vs. Bright-field microscopy.
 - iii) Scanning electron microscopy Vs. Transmission electron microscopy.

6. Describe batch culture and continuous culture. Explain with a neat diagram the process of chemostat. (5+5=10)
7. Define rhizosphere. Describe with a neat diagram the nodule formation in leguminous plant. (2+8=10)
8. Draw and describe the sulphur cycle in bacteria. (10)

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Duration: 20 minutes

Marks – 20

(PART A - Objective Type)

I. Choose the correct answer:

0.5×10=5

1. Prokaryotic DNA is –
a) Circular with protein b) Linear with protein,
c) Circular without protein d) Linear without protein
2. Which term is not associated with a beneficial activity of micro-organisms?
a) Bioremediation b) Pathogenicity
c) Fermentation d) More than one of the above
3. Nodule formation is associated by the presence of–
a) Rhicadhesin b) Nod gene
c) Flavonoids d) Nif gene
4. Binomial Nomenclature was proposed by-
a) Carolus Linnaeus b) Joseph Lister
c) Ernst H. Haeckel d) Carl Woese
5. In peptidoglycan molecules subunits from glycan chains joined by –
a) N-acetylglucosamine, b) N-acetylmuramic acid,
c) Tetrapeptide chain d) Tripeptide chain
6. A centriole is an organelle that is-
a) present in the centre of a cell's cytoplasm.
b) composed of microtubules and important for organizing the spindle fibre.
c) surrounded by a membrane.
d) part of a chromosome.
7. Animalculis is termed by-
a) Louis Pasteur b) Anton Von Leewenhoek
c) Robert Koch d) Edward Jenner

8. Labeled antibody is used in –
 a) Bright field microscopy
 c) Fluorescence microscopy
 b) Phase contrast microscopy
 d) Dark-field microscopy
9. Typhoid disease is caused by-
 a) Mycobacterium tuberculosis
 c) Clostridium botulinum
 b) Salmonella typhi
 d) Escherichia coli
10. Hop is used in the production of-
 a) Wine
 c) Yogurt
 b) Beer
 d) Tempeh

II. Write true or false:

0.5×10=5

1. BOD is always greater than COD.
2. Archaea is more closely related to the Eukaryotes than Eubacteria.
3. Peritrichous flagella is found in Salmonella typhi.
4. In Fed-Batch fermentation limiting substances is continuously or intermittently added until the required density of cell mass or product is obtained.
5. Conversion of Nitrate to nitrite is known as ammonification.
6. The formula for magnification is associated with objective lens×ocular lens.
7. Biochemically fermentation is an energy yielding metabolic breakdown of organic molecules where net oxidation is not zero.
8. In a common microscope greatest resolution is obtained with the longest wave length and greatest Numerical Apparatus.
9. Lipid content is higher in Gram (+)ve bacterial cell wall.
10. The temperature of an auto clave is 110° for 2 hrs.

III. Fill in the blanks:

0.5×10=5

1. The primary source of vitamin B12 is the metabolic activity of _____.
 (microorganisms /plants/higher animals).
2. In alcohol fermentation main product for the fermenting-microbe is _____.
 (ATP/ ethanol /CO₂)
3. For isolation of phosphate solubilizing bacteria the best target site for sampling will be _____.(rhizosphere /gobar gas plant/highly saline soil)

4. Antibiotics are generally produced during _____ (log-phase/stationary phase/decline phase of the microbial growth)
5. Edible forms of bacteria (e.g. spirulina) is an example of _____.
(Single Cell Protein/functional food/fortified food)
6. In bacterial Electron Transport System is located in _____.
(cell membrane/nucleoid region/cytoplasm)
7. Gram staining is _____ (simple staining/differential staining/acid fast staining)
8. Influenza is commonly a _____. (water borne/air borne/soil borne disease)
9. Bacteriostatic _____ (prevents growth of bacteria/kill the bacteria/prevents growth of fungi)
10. Unstained structures within the cells can be visualised with help of _____.
(dark field microscopy/bright field microscopy/phase contrast microscopy)

IV. Match the following:

0.5×10=5

- | | |
|--------------------------|-----------------------------------|
| a) Prokaryote | (a) liquid nitrogen |
| b) 3-D object | (b) Milk |
| c) Sodium Metabisulfite | (c) microscope |
| d) Edward Jenner | (d) small pox vaccine |
| e) Dengue | (e) <i>Aedes aegypti</i> mosquito |
| f) Louis Pasteur | (f) Penicillin |
| g) Antony van Leewenhoek | (g) preservative |
| h) Alexander Fleming | (h) rabies vaccine |
| i) Cryopreservation | (i) nucleoid region |
| j) Lactobacillus | (j) scanning electron microscopy |
