

B.Sc Biotechnology: Choice based Credit System**B. Sc. I – SEMESTER I - W.E.F. 2016-17****BT 101 MICROBIOLOGY AND CELL BIOLOGY****UNIT I****History, Development and Microscopy**

History and development of microbiology: contributions of Louis Pasteur, Robert Koch and Edward Jenner. Microscopy: Compound microscopy: Numerical aperture and its importance, resolving power, oil immersion objectives and their significance, principles and applications of dark field, phase contrast, fluorescent microscopy. Electron microscopy: Principle, ray diagram and applications, TEM and SEM, comparison between optical and electron microscope, limitations of electron microscopy.

Stains and staining procedures: Acidic, basic and neutral stains, Gram staining, Acid fast staining, Flagella staining, Endospore staining.

UNIT II**A. Bacteria:**

Bacterial morphology and subcellular structures, general morphology of bacteria, shapes and sizes, generalized diagram of typical bacterial cell.

Slime layer and capsule, difference between the structure, function and the position of the two structures.

Cell wall of gram +ve and Gram -ve cells.

General account of flagella and fimbriae.

Chromatin material, plasmids; definition and kind of plasmids (conjugative and non-conjugative) F, R, and Col plasmids.

Endospores: Detailed study of endospore structure and its formation, germination, basis of resistance.

B. Viruses: General characteristics of viruses, difference between virus and typical microbial cell, structure, different shapes and symmetries with one example of each type, classification of viruses on the basis of nucleic acids, phage and animal cell viruses, example of each and their importance. Brief idea of lytic cycle and lysogeny.

UNIT III

Nutrition: Basic nutritional requirements: Basic idea of such nutrients as water, carbon, nitrogen, sulfur and vitamins etc., natural and synthetic media, nutritional classification of bacteria. Selective and Differential media, Enriched media, Enrichment media.

UNIT IV: Microbial growth and control:

Growth: Growth rate and generation time, details of growth curve and its various phases.

Concept of synchronous cultures, continuous and batch cultures (chemostat and turbidostat). Measurement of growth.

Physical conditions required for growth: Temperature (classification of microorganisms on the basis of temperature requirements), Ph etc. Pure cultures and cultural characteristics. Maintenance of pure culture.

Microbial Control: Terminologies - Sterilization, disinfection, antiseptic, sanitization, germicide, microbistasis, preservative and antimicrobial agents.

Mechanism of cell injury: Damage to cell wall, cell membrane, denaturation of proteins, inhibition of protein synthesis, transcription, replication, other metabolic reactions and change in supercoiling of DNA.

Physical control: Temperature (moist heat, autoclave, dry heat, hot air oven and incinerators), dessication, surface tension, osmotic pressure, radiation, UV light, electricity, ultrasonic sound waves, filtration.

Chemical control: Antiseptics and disinfectants (halogens, alcohol, gaseous sterilization.

Concept of biological control.

UNIT V Cell Biology

Eukaryotic Cell - Structure and function of the following: nucleus, nuclear membrane, nucleoplasm, nucleolus, golgi complex, endoplasmic reticulum, lysosomes, peroxisomes, glyoxisomes and vacuoles.

Plant cell wall.

Cytoskeleton (actin, microtubules) and cell locomotion.

Mitosis and meiosis. Brief idea of cell cycle..

Cell and its life cycles: Mitosis and meiosis

B.Sc. I SEMESTER I
PRACTICALS
BIOTECHNOLOGY
102 Microbiology & Cell Biology

1. Demonstration, use and care of microbiological equipments.
2. Preparation of media, sterilization and isolation of bacteria.
3. Isolation of Bacteriophage from sewage / other sources.
4. Demonstration of motility of Bacteria.
5. Simple staining of bacteria
6. Gram staining of Bacteria
7. Acid fast staining of Bacteria
8. Endospore staining.
9. Demonstration of starch hydrolysis by bacterial cultures
10. Growth of fecal coliforms on selective media.
11. Isolation of pure culture by pour plate method
12. Isolation of pure culture by streak plate method.
13. Anaerobic cultivation of microorganisms.
14. Cultivation of yeast and moulds.
15. Antibiotic sensitivity assay.
16. Oligodynamic action of metals.
17. To study germicidal effect of UV light on bacterial growth.
18. Stages of mitosis.
19. Stages of meiosis.

Note: - Mandatory to perform at least ten practical.

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B.Sc I year Biotechnology
Semester I - 2016-17

Model question paper

Course code : BT 101

Cell Biology

Time: 3h

Section A

Answer any five of the following

Marks 75

5 x 3 = 15 M

- ① Limitations of electron microscopy
- ② Lytogeny
- ③ Gram staining
- ④ Basis of resistance
- ⑤ Differential medium.
- ⑥ Synchronous culture
- ⑦ Denaturation of protein
- ⑧ Lysosomes

Section B

Answer all the questions

5 x 12 = 60 M

- Q a) what are the different stains employed in identification of microorganisms
or
- G) Explain the principle, construction and applications of electron microscopy

PTO

10) a) Explain in detail about structure and formation of endospores

or

b) How to classify viruses based on the content of nucleic acids.

11) a) What are the various media employed in cultivation of microorganisms.

or

b) Explain the basic nutritional requirements employed in media preparation.

12) a) What are the ^{physical} factors influence the growth of microorganisms.

or

b) What is sterilization and what are the physical and chemical methods employed for it.

13) a) Draw the structure of eukaryotic cell and explain the different organelles.

or

b) Explain the differences between mitosis and meiosis.

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