SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF MEDICAL ELECTRONICS

QUESTION BANK

VII SEMESTER –

Agriculture &CSE

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MICROBIOLOGY

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UNIT I – INTRODUCTION TO MICROBIOLOGY			
Classification and nomenclature of microorganisms, microscopic examination of microorganisms: Light, Fluorescent, Dark field, Phase contrast, and Electron microscopy.			
PART – A			
Q. No	**Questions**	**BT Level**	**Competence**
1	Define the microorganism classification groups Protozoa & Slime moulds.	BTL1	Remembering
2	Identify the significance of Algae & Bacteria classification biological groups.	BTL1	Remembering
3	List the different sources for microorganism names.	BTL1	Remembering
4	Differentiate between classification and nomenclature.	BTL4	Analyzing
5	Relate the various biological groups used for microorganism classification.	BTL3	Applying
6	Show the various taxonomic ranks used for classification.	BTL3	Applying
7	Enlist some cellular microorganisms based on clinical purpose.	BTL1	Remembering
8	When to use initials during naming the microorganisms?	BTL1	Remembering
9	Enumerate various rules used in nomenclature.	BTL1	Remembering
10	Name the steps used to name subspecies and serovars.	BTL1	Remembering
11	Examine the nomenclature used during the naming of microorganism using binary names.	BTL4	Analyzing
12	Employ the significance of classification of microorganism in clinical practice.	BTL3	Applying
13	Articulate the principal types of viruses causing human disease.	BTL3	Applying
14	Sequence the various direct methods used for identification of bacteria.	BTL1	Remembering
15	Categorize various indirect methods used for identification of bacteria.	BTL4	Analyzing
16	Explain the importance of microscopy identification method.	BTL4	Understanding
17	Indicate the significance of the cultural characteristics method.	BTL2	Understanding
18	Review the kind of information you think that can be provided by microscopic observations of microorganisms.	BTL2	Understanding
19	How did Pasteur and Tyndall finally settle the spontaneous generation controversy?	BTL2	Understanding
20	Extend the set of information that you think can be provided by isolating microorganisms from their natural environment and culturing them in the laboratory.	BTL2	Understanding
21	Why was the belief in spontaneous generation an obstacle to the development	BTL2	Understanding

	of microbiology as a scientific discipline?		
22	Recognize the various steps involved in scientific method used to conduct experimental research.	BTL2	Understanding
23	Illustrate the scientific method used in experimental science. How does a theory differ from a hypothesis? Why is it important to have a control group?	BTL3	Applying
24	Criticize Koch's postulates. What is a pure culture? Why are pure cultures important to Koch's postulates?	BTL4	Analyzing
	PART – B		
1	(i) Explain the various stages involved in designing and conducting experimental research (9) (ii) Describe the role of Koch's postulates to demonstrate that mycobacterium tuberculosis is the causative agent of tuberculosis. (4)	BTL2	Understanding
2	Classify the five most important research areas to pursue in microbiology? Give reasons for your choices (13)	BTL2	Understanding
3	Indicate the various aspects of resolution, numerical aperture, working distance, and fluorochrome. (13)	BTL2	Understanding
4	Describe the various rules of nomenclature used during naming of microorganism. (13)	BTL1	Remembering
5	Enlist the parts of a light microscope and describe their functions. (13)	BTL1	Remembering
6	Illustrate the following (i) refraction and refractive index. (5) (ii) focal point. (4) (iii) focal length. (4)	BTL3	Applying
7	Explain the importance of microscope resolution and numerical aperture with appropriate schematic diagram. (13)	BTL3	Applying
8	Interpret a method to convert light microscope to a dark field microscope (13)	BTL3	Applying
9	Illustrate the following concept in detail (i) The formation of a micrograph of the protozoan Amoeba proteus using DIC microscope. (6) (ii) The condenser lens system in dark field microscope (7)	BTL3	Applying
10	State in detail the principle of production of contrast in a phase-contrast microscopy. (13)	BTL1	Remembering
11	Model a microscope with the following details (i) If a specimen is viewed using a 5X objective in a microscope with a 15X eye piece (7) (ii) Why don't most light microscopes use 30X ocular lenses for greater magnification? (6)	BTL4	Analyzing
12	Describe in detail the function of immersion oil. (13)	BTL2	Understanding
13	Define and identify various steps and stages involved in staining of microorganisms (13)	BTL2	Understanding

14	Enumerate the characteristics of light and transmission electron microscopes in a tabular column. (13)	BTL1	Remembering
15	List the limits of microscopic resolution. (13)	BTL1	Remembering
16	Examine an overview of TEM operation and compare it with the operation of light microscope. (13)	BTL4	Analyzing
17	Identify the significance of lenses and bending of light and tabulate the common units of measurement used in microscopy. (13)	BTL1	Remembering
	PART – C		
1	Identify the working of fluorescence microscope system with a neat diagram. (15)	BTL4	Analyzing
2	Infer the specimen shadowing and transmission electron micrograph from the transmission electron microscope system. (15)	BTL2	Understanding
3	Under what circumstances would it be desirable to prepare specimens for the TEM by use of negative staining? Shadowing? Freeze-etching? (15)	BTL3	Applying
4	How does the scanning electron microscope operate and in what way does its function differ from that of the TEM? The SEM is used to study which aspects of morphology? (15)	BTL3	Applying
5	Explain the following: (i) Fixation, dye and chromophore. (5) (ii) Basic dye, acidic dye and simple staining. (5) (iii) Differential staining, negative staining, and acid-fast staining. (5)	BTL2	Understanding

UNIT II – MICROBES- STRUCTURE AND REPRODUCTION			
Structural organization and multiplication of bacteria, Viruses (TMV, Hepatitis B), Algae(cyanophyta, rhodophyta) and Fungi (Neurospora), Life history of actinomycetes (Streptomyces), Yeast (Saccharomyces), Mycoplasma (M. pneumoniae) and Bacteriophages (T4 phage, lphage)			
	PART – A		
Q. No	**Questions**	**BT Level**	**Competence**
1	What characteristic shapes can bacteria assume? Describe the ways in which bacterial cells cluster together.	BTL1	Remembering
2	Label and draw a bacterial cell and label all important structures.	BTL1	Remembering
3	List the functions of the procaryotic plasma membrane	BTL1	Remembering
4	Prepare a diagram to represent the schematic of bacterial plasma membrane.	BTL3	Applying
5	Relate the structure of a gas vacuole to its function.	BTL3	Applying
6	Illustrate how cell wall structure and sugar content are used to classify the actinomycetes	BTL3	Applying
7	Interpret seven steps are involved in the infection process and pathogenesis of bacterial diseases?	BTL1	Remembering
8	Mention the significance of nucleocapsid, capsid, icosahedral capsid, helical capsid.	BTL1	Remembering
9	Enumerate the major properties of the genus Streptomyces.	BTL1	Remembering
10	Explain the importance gapped DNA in hepadnavirus.	BTL2	Understanding
11	Seperate three ways in which Streptomyces is of ecological importance.	BTL4	Analyzing

12	Articulate the reproductive technique in Cyanophyta & Rhodophyta.	BTL2	Understanding
13	Identify the `general properties of actinomycetes.	BTL2	Understanding
14	Indicate with appropriate label and draw the helical model of TMV.	BTL2	Understanding
15	Recognize the process involved in reproduction of the virus.	BTL2	Understanding
16	Categorize the yeast and mold based on their differences.	BTL4	Analyzing
17	Describe the various types of reproduction fungi.	BTL2	Understanding
18	Review the various stages in lifecycle of Saccharomyces cerevisiae	BTL2	Understanding
19	Prepare a table with various cellular organelles in a yeast cell.	BTL3	Applying
20	Interpret different characteristics of neurospora genus of ascomycete fungi.	BTL3	Applying
21	Point out the morphological structure of yeast with a diagram	BTL4	Analyzing
22	Outline the lifecycle of a bacteriophage	BTL4	Analyzing
23	Label and draw various stages involved in the assembly of T4 Bacteriophage.	BTL1	Remembering
24	Draw the morphological structure of T4 Bacteriophage.	BTL1	Remembering
	PART-B		
1	(i) Describe a bacterial cell and label all important structures. (7) (ii) Indicate the various functions of prokaryotic structures found in bacteria (6)	BTL2	Understanding
2	(i) Compare the following terms: nucleocapsid, capsid, icosahedral capsid, helical capsid, complex virus, binal symmetry, protomer, capsomer, pentamer or penton, and hexamer or hexon. (8) (ii) How do pentamers and hexamers associate to form a complete icosahedron; what determines helical capsid length and diameter? (3) (iii) Illustrate the TMV structure with a neat diagram (2)	BTL4	Analyzing
3	Explain the importance of the Australian antigen and dane particle in discovery of morphological structure of Hepatitis B (13)	BTL2	Understanding
4	Relate the organization and reproduction of cyanoaphyta. (13)	BTL1	Remembering
5	Predict the cell wall structure and sugar content are used to classify the actinomycetes. Include a brief description of the four major wall types (13)	BTL3	Applying
6	Illustrate the following with a neat diagram (i) The Fluid Mosaic Model of Membrane Structure (5) (ii) The Structure of a Polar Membrane Lipid. (4) (iii) Bacterial membranes (4)	BTL3	Applying
7	Show three ways in which Streptomyces is of ecological importance. Why do you think Streptomyces spp. produce antibiotics? (13)	BTL3	Applying
8	Name the various the major properties of the genus Streptomyces. (13)	BTL1	Remembering
9	Interpret the morphological significance of suborder streptomycineae (13)	BTL3	Applying
10	Explain in detail the various stages in binary fission reproduction method with neat diagram (13)	BTL1	Remembering
11	Describe the various types of bacteriophages. (13)	BTL1	Remembering

12	Enumerate the significance of different stages in cell cycle of E coli (13)	BTL2	Understanding
13	Describe the cell reproduction cycle of mycoplasma (13)	BTL1	Remembering
14	State the relationship between Mycoplasma genome size and growth requirements (13)	BTL1	Remembering
15	Categorize the various stages involved in the life cycle of the yeast Saccharomyces. (13)	BTL4	Analyzing
16	Review the Asexual reproduction in the fungi and some representative spores with diagrammatic illustrations. (13)	BTL2	Understanding
17	Recognize the morphology of t4 phage with a neat diagram. (13)	BTL2	Understanding
	PART – C		
1	Analyze the various stages in the life cycle of the Bacteriophage. Describe briefly the lytic and lysogenic cycle. (15)	BTL4	Analyzing
2	Describe the endocytic pathway and the three routes that deliver materials to lysosomes for digestion.Which type of endocytosis does not deliver ingested material to lysosomes? (15)	BTL2	Understanding
3	Describe the significance of the following (iii) Rough & smooth EPR (5) (ii) Golgi apparatus (5) (iii) Mitochondria (5)	BTL2	Understanding
4	Illustrate the structure of the nucleus. What are euchromatin and heterochromatin? What is the role of the pores in the nuclear envelope? (15)	BTL3	Applying
5	What is meiosis, how does it take place, and what is its role in the microbial life cycle? (15)	BTL3	Applying

UNIT III - MICROBIAL NUTRITION, GROWTH AND METABOLISM			
Nutritional classification of microorganisms based on carbon, Energy and electron sources . Definition of growth, Balanced and unbalanced growth, Growth curve and different methods to quantify bacterial growth:(counting chamber, viable count method, counting without equipment),Different media used for bacterial culture (defined, complex, selective, differential, enriched),The mathematics of growth-generation time, Specific growth rate.			
	PART - A		
Q. No	**Questions**	**BT Level**	**Competence**
1	Define heterotroph and autotroph.	BTL1	Remembering

2	What are nutrients? On what basis are they divided into macroelements and trace element	BTL1	Remembering
3	What are the six most important macroelements? How do cells use them?	BTL1	Remembering
4	What are growth factors? What are vitamins?	BTL3	Applying
5	How can humans put to use a microbe with a specific growth factor Requirement?	BTL3	Applying
6	Illustrate the growth factors that microorganisms produce industrially.	BTL3	Applying
7	Why do you think amino acids, purines, and pyrimidines are often growth factors, whereas glucose is not?	BTL1	Remembering
8	Mention the two pathways function during the procaryotic cell cycle.	BTL1	Remembering
9	How does the procaryotic cell cycle compare with the eucaryotic cell cycle?	BTL1	Remembering
10	Tabulate the sources of carbon, energy, and electrons.	BTL4	Analyzing
11	Categorize two trace elements. How do cells use them?	BTL4	Analyzing
12	Review the four phases of the growth curve in a closed system.	BTL2	Understanding
13	Define the principle of turbidity and microbial mass measurement.	BTL1	Remembering
14	Report the role of ATP in metabolism.	BTL1	Remembering
15	Analyze the equations for the endergonic or exergonic reactions.	BTL4	Analyzing
16	Do living cells increase entropy within themselves? Do they increase entropy in the environment?	BTL4	Analyzing
17	What are cardinal temperatures?	BTL2	Understanding
18	Infer the significance between the dilution rate and maintenance energy	BTL2	Understanding
19	Mention the importance of growth rate rise with increasing temperature and then fall again at higher temperatures.	BTL2	Understanding
20	Indicate the significance of growth in living organisms.	BTL2	Understanding
21	Estimate the generation or doubling time and the mean growth rate constant.	BTL2	Understanding
22	Explain the phenomenon of entropy and enthalpy.	BTL2	Understanding
23	Employ a generalized method to write equation for a redox reaction.	BTL3	Applying
24	Show the significance of energy cycle and ATP's role in it.	BTL3	Applying
	PART – B		
1	Review the ways in which microorganisms are classified based on their requirements for energy, carbon, and electrons (13)	BTL2	Understanding
2	Indicate the nutritional requirements of the major nutritional groups and give some microbial examples of each. (13)	BTL2	Understanding
3	Explain facilitated diffusion, active transport, and group translocation in terms of their distinctive characteristics and mechanisms (13)	BTL2	Understanding
4	Describe the significance of measurement of cell numbers (13)	BTL1	Remembering
5	Distinguish between turbidity and microbial mass measurement (13)	BTL2	Understanding

6	Illustrate the concept of membrane filtration procedure (13)	BTL3	Applying
7	Interpret the concept of specific growth rate and apply it to a real-time scenario. (13)	BTL3	Applying
8	Predict functional importance between chemostat and turbidostat continuous culture system. (13)	BTL3	Applying
9	Analyze the influence of solutes and water activity on growth (13)	BTL4	Analyzing
10	State in detail the effect of pH on microbial growth (13)	BTL1	Remembering
11	List the different phases of microbial growth curve in a closed system (13)	BTL1	Remembering
12	Explain the overall schema of metabolism (13)	BTL2	Understanding
13	Describe the flow of carbon and energy in an ecosystem (13)	BTL1	Remembering
14	State the laws of thermodynamics with appropriate interpretations (13)	BTL1	Remembering
15	Recognize the importance of loss of viability caused in a irreparable cell (13)	BTL1	Remembering
16	Break down the process of counting and identifying microorganisms in natural Environments. (13)	BTL4	Analyzing
17	Apply the principle the cell-cell communication within microbial populations. (13)	BTL3	Applying
	PART – C		
1	Model the growth rates in microorganisms by fitting exponential and linear curves. Use appropriate test data to simulate the results. From the simulated data use conservative approach to Compute generation time of the microorganisms. (15)	BTL4	Analyzing
2	Explain the structure and classification aspects of enzymes with emphasis on lock and key model of enzyme function. (15)	BTL2	Understanding
3	Apply the following environmental factors on the growth rate (i) Temperature (5) (ii) Oxygen Concentration (5) (iii) Pressure (5)	BTL3	Applying
4	Illustrate different approaches and methods used to quantify bacterial growth (15)	BTL3	Applying
5	Review different media used for bacterial culture (15)	BTL2	Understanding

UNIT - IV CONTROL OF MICROORGANISMS

Physical and chemical control of microorganisms, Definition of sterilization, Dry and moist heat, Pasteurization, Tyndalization, Radiation, Ultrasonication, Filtration. Disinfections anitization, Antiseptics sterilants and fumigation. Mode of action and resistance to antibiotics, Clinically important microorganisms.

PART – A

Q. No	Questions	BT Level	Competence
1	Mention the significance of sterilization and sterilant.	BTL1	Remembering
2	Define disinfection and disinfectant.	BTL1	Remembering
3	Describe the principles of sanitization, antisepsis and antiseptic.	BTL1	Remembering
4	How one decides whether microorganisms are actually dead?	BTL3	Applying
5	Employ graphically the pattern of microbial death.	BTL3	Applying
6	Illustrate the significance of population size and composition.	BTL3	Applying
7	Recognize the concepts of chemotherapy, germicide, bactericide and bacteriostatic.	BTL1	Remembering
8	State the significance of heat in controlling microbial growth.	BTL1	Remembering
9	Outline the phenomenon of thermal death time.	BTL1	Remembering
10	Categorize the approximate conditions for moist heat killing.	BTL4	Analyzing
11	Point out the importance of dry heat sterilization	BTL4	Analyzing
12	Examine the importance of filtration in controlling microbial growth.	BTL4	Analyzing
13	Why the chemical agents are used in control of microbial growth?	BTL1	Remembering
14	Indicate the importance of depth filters and membrane filters	BTL2	Understanding
15	Enlist the advantages and disadvantages of ultraviolet light and ionizing Radiation.	BTL1	Remembering
16	Analyze the significance of pasteurization in the past for death of infants.	BTL4	Analyzing
17	Briefly describe the phenol coefficient test.	BTL2	Understanding
18	How can low temperatures be used to control microorganisms?	BTL2	Understanding
19	Why is boiling milk over prolonged periods not a desirable method for controlling spoilage and spread of milk-borne pathogens?	BTL2	Understanding
20	What three things one must do when operating an autoclave to help ensure success?	BTL2	Understanding
21	Infer the Dans Z values for some food-borne pathogens.	BTL2	Understanding
22	Express the longitudinal cross section of a typical autoclave showing some of its parts and the pathway of steam in a schematic representation.	BTL2	Understanding
23	Interpret the activity levels of selected germicides	BTL3	Applying
24	Prepare a schematic design of an EtO sterilizer.	BTL3	Applying

PART – B			
1	Explain the various microbial control methods in an hierarchical tree structure (13)	BTL2	Understanding
2	Complete the pattern of microbial death and fit the assessment with an exponential curve. (13)	BTL3	Applying
3	Review the various aspects of use of heat as physical methods in control of microbial growth (13)	BTL2	Understanding
4	Examine the significance of a membrane filters in sterilization process (13)	BTL1	Remembering
5	Indicate the sterilization process used in automatically controlled autoclave system (13)	BTL2	Understanding
6	Illustrate the following conditions influencing the effectiveness of antimicrobial agents (i) Concentration (5) (ii) Duration of exposure (4) (iii) Local environment (4)	BTL3	Applying
7	Review the working principle of UV treatment system for disinfection of water (13)	BTL2	Understanding
8	Interpret the use of following physical methods in control of microbial growth (i) Radiation (7) (ii) Low temperatures (6)	BTL3	Applying
9	Apply the working principle of sterilization system during the onset of ionization radiation (13)	BTL3	Applying
10	State in detail the various universal precautions for microbiology laboratories (13)	BTL1	Remembering
11	Recognize the functioning of an ethylene oxide sterilizer (13)	BTL1	Remembering
12	Describe the operation of a biological safety cabinet (13)	BTL2	Understanding
13	Name the use of phenolics and alcohols in control of microbial growth (13)	BTL1	Remembering
14	Categorize the various tests involved to check the effectiveness of antimicrobial agent. (13)	BTL3	Analyzing
15	Enumerate the working principle of dry heat incineration. (13)	BTL1	Remembering
16	Arrange different steps in the mechanism of antimicrobial resistance to antibiotics (13)	BTL1	Remembering
17	Analyze the use of heavy metals and sterilizing gases in control of microbial growth (13)	BTL4	Analyzing

PART –C			
1.	Explain various different systems that use heat as a physical method to control microbial growth. (15)	BTL2	Understanding
2.	Describe the structures of some frequently used disinfectants and antiseptics and explain their significance. (15)	BTL2	Understanding
3.	Illustrate the use of following chemical agents in microbial control (i) Sterilizing gases. (10) (ii) Chemotherapeutic agents. (5)	BTL3	Applying
4.	Integrate various different systems that use filtration and radiation as a physical method to control microbial growth. (15)	BTL4	Analyzing
5.	Suppose hospital custodians have been assigned the task of cleaning all showerheads in patient rooms in order to prevent the spread of infectious disease. What two factors would have the greatest impact on the effectiveness of the disinfectant the custodians use? Explain what that impact would be. Also briefly describe about other conditions. (15)	BTL3	Applying

UNIT V - INDUSTRIAL MICROBIOLOGY

Microbes involved in preservation (Lactobacillus, bacteriocins), Spoilage of food and food borne pathogens (E.coli, S.aureus, Bacillus, Clostridium). Industrial use of microbes (production of penicillin, alcohol, vitamin B-12); Biogas; Bioremediation (oil spillage leaching of ores by microorganisms, pollution control); Biofertilizers, Biopesticides. Biosensors. Quality assurance — Quality control — Practice of cGMP — Schedule M — USFDA.

PART – A

Q. No	Questions	BT Level	Competence
1	What steps are usually taken to purify drinking water?	BTL1	Remembering
2	Why is chlorination, although beneficial in terms of bacterial pathogen control, of environmental concern?	BTL1	Remembering
3	Which important waterborne pathogens are not controlled reliably by chlorination?	BTL1	Remembering
4	Interpret the significance of coagulation.	BTL3	Applying
5	Show the various steps involved in water purification process.	BTL3	Applying
6	Illustrate the various criteria required for “ideal” indicator organism.	BTL3	Applying
7	Define coliform. How does this definition relate to presumptive, confirmed, and completed tests?	BTL1	Remembering
8	In what type of environment is it better to use fecal enterococci rather than fecal coliforms as an indicator organism? Why?	BTL1	Remembering
9	Why has the defined substrate test with ONPG and MUG been accepted as a test of drinking water quality?	BTL1	Remembering

10	Differentiate the various metrics used to assess water quality.	BTL4	Analyzing
11	Differentiate between coliforms and fecal coliforms in the laboratory.	BTL4	Analyzing
12	Outline the advantages and disadvantages of membrane filters for microbiological examinations of water.	BTL2	Understanding
13	Enumerate the components that should limit the reactions in a BOD test.	BTL1	Remembering
14	Identify the components in excess and limiting at the end of incubation period	BTL2	Understanding
15	Enumerate the factors that can lead to a nitrogen oxygen demand (NOD) in water.	BTL1	Remembering
16	Analyze the parameters that can be monitored in a modern, large-scale industrial fermentation.	BTL4	Analyzing
17	Select the minerals can contribute to eutrophication	BTL2	Understanding
18	Review the critical limiting factors are used in the penicillin and streptomycin fermentations.	BTL2	Understanding
19	Describe the major uses for biopolymers and biosurfactants.	BTL2	Understanding
20	Use alternative definitions for the term biodegradation.	BTL3	Applying
21	Indicate the components that should not limit reaction rates in a BOD test.	BTL2	Understanding
22	What are biosensors and how do they detect substances?	BTL2	Understanding
23	Illustrate the significance of GMP Schedule M.	BTL3	Applying
24	Categorize the five main components of good manufacturing practice.	BTL4	Analyzing
	PART – B		
1	Indicate the various steps involved in water purification steps with a neat diagram (13)	BTL2	Understanding
2	Enlist different stages involved in the multiple-tube fermentation test. (13)	BTL1	Remembering
3	Enumerate the different metrics used to evaluate the quality of water (13)	BTL1	Remembering
4	State the significance of major steps in primary, secondary, and tertiary treatment of wastes (13)	BTL1	Remembering
5	Analyze the steps of organic matter processing that occur in anaerobic Digestion. Mention the significance acetogenesis step. (13)	BTL4	Analyzing
6	Illustrate the following with a neat diagrams (i) Constructed Wetland for Wastewater Treatment. (7) (ii) The Conventional Septic Tank Home Treatment System (6)	BTL3	Applying
7	Recognize the working principle of industrial stirred fermenters (13)	BTL2	Understanding
8	Infer the following products of industrial microbiology (i) Antibiotics (7) (ii) Amino acids (6)	BTL2	Understanding
9	Analyze the alternate methods for mass culture (13)	BTL4	Analyzing

10	Recognize the phenomenon of stimulating biodegradation (13)	BTL1	Remembering
11	Explain in detail the following (i) Metal Bioleaching (4) (ii) Biopesticides (4) (iii) Bio augmentation (5)	BTL2	Understanding
12	Describe in detail the significance of a subsurface engineered bioremediation System (13)	BTL2	Understanding
13	List the components used to design a biosensor used in industrial microbiology (13)	BTL1	Remembering
14	Describe the phenomenon of phytoremediation with a neat diagram (13)	BTL1	Remembering
15	Show the major organic acids produced by microbial processes. (13)	BTL3	Applying
16	Interpret the major microbial products and processes of Interest in Industrial Microbiology. (13)	BTL3	Applying
17	Practice and use the growth of microorganisms in an industrial setting. (13)	BTL3	Applying
	PART – C		
1	Integrate different sectors in a waste water treatment process to build a aerobic secondary sewage treatment. (15)	BTL4	Analyzing
2	Employ appropriate principle used for recombinant vaccine production. (15)	BTL3	Applying
3	Explain the Streptavidin-Biotin binding systems and enumerate the various application of such systems. (15)	BTL2	Understanding
4	Interpret the mode of action of the Bacillus thuringiensis toxin. (15)	BTL3	Applying
5	Describe the use of microorganisms in the fields of industrial microbiology and Biotechnology. (15)	BTL2	Understanding