S–3271	Sub. Code
	23MBT1C1

M.Sc. DEGREE EXAMINATION, APRIL 2024

First Semester

Biotechnology

BIOCHEMISTRY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. What is acid and base?
2. Define Phosphate buffer system.
3. Explain about glycol lipids.
4. What is sphingolipids?
5. Write a short note on Bioenergetics.
6. What is photosynthesis?
7. Discuss the primary structure of proteins.
8. Explain the term “isoelectric point” (pI).
9. Differentiate nucleosides and nucleotides.
10. What is the role of nucleic acids?

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Explain Nomenclature, classification and structure of Carbohydrates.

Or

(b) Explain Pentose phosphate pathway.

12. (a) What are the chemical and physical properties of fatty acids?

Or

(b) Differentiate between triglycerides and phospholipids in terms of structure and function.

13. (a) Explain the steps involved in the metabolism of carbohydrates.

Or

(b) Write the short note on oxidation of fatty acids.

14. (a) Explain the concept of quaternary structure in proteins and provide an example of a protein that exhibits quaternary structure.

Or

(b) Explain about biosynthesis of amino acids.

15. (a) Write about the structure and classification of purines and pyrimidines.

Or

(b) Describe the catabolisms of purine and pyrimidine bases.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Elaborate Glycogenesis.

17. Elaborate on cholesterol biosynthesis, its regulation, and the physiological roles of cholesterol in the body.

18. Briefly describe the key steps involved in the process of glycolysis.

19. How do inborn errors of metabolism related to amino acids affect the overall health and development of affected individuals?

20. Differentiate between the de novo synthesis and salvage pathways for purine and pyrimidine bases.

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S–3272

Sub. Code
23MBT1C2

M.Sc. DEGREE EXAMINATION, APRIL 2024

First Semester

Biotechnology

MOLECULAR GENETICS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. Differentiate between introns and exons.
2. Define microsatellite.
3. Define point mutation and provide an example of a genetic disorder caused by such a mutation.
4. Explain the process of recombination.
5. What is insertional inactivation?
6. Define transposons.
7. What is genotype frequency, and how is it calculated in population genetics?
8. Explain the Hardy-Weinberg principle.
9. Define Ti-replication.
10. Discuss the significance of the Human Genome Project (HGP).

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Explain the significance of various DNA markers in genetics.

Or

(b) Describe the codons with suitable examples.

12. (a) Define radiation-induced mutation and its genetic consequences.

Or

(b) Brief notes about Chromosomal abnormalities.

13. (a) Describe DNA repair mechanisms and give examples.

Or

(b) Discuss McClintock's genetic experiments and contributions.

14. (a) Define karyotyping and its genetic diagnostic applications.

Or

(b) Compare sex-based allele frequency differences.

15. (a) Brief notes about Ti-replication.

Or

(b) Explain the artificial plasmid transfer and their methods.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Elaborate on the concept of eukaryotic genome complexity, considering various factors and elements.

17. Provide a comprehensive overview of the regulation of gene expression in both prokaryotic and eukaryotic organisms.

18. Discuss transposons, their characteristics, and their role in the genome.

19. Explain allele frequency and genotype frequency and the methods for their calculation.

20. Explore the biology of plasmids, focusing on their structure, functions, and significance.

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S–3273

Sub. Code
23MBT1C3

M.Sc. DEGREE EXAMINATION, APRIL 2024

First Semester

Biotechnology

MOLECULAR CELL BIOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. Explain the Endosymbiotic theory.

2. Discuss the significance of the Extracellular Matrix (ECM).

3. How does the Endoplasmic Reticulum (ER) participate in post-translational modification?

4. Define protein glycosylation.

5. Enumerate various types of Histone proteins.

6. Differentiate chromatin and chromatid.

7. Elaborate on the key aspects of cell cycle checkpoints.

8. Describe the concept of apoptosis.

9. What is p 53?

10. Clarify the importance of tumour suppressor genes.

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Explain the significance of the endosymbiotic theory in the context of cellular evolution.

Or

(b) Discuss the molecular basis of cell adhesion.

12. (a) Elaborate on the structure and function of ribosomes in protein synthesis.

Or

(b) Explain the structure of Nucleic acids with clear diagram.

13. (a) Explain the functions of histone proteins in chromatin structure.

Or

(b) Explain the chromatin and the process of supercoiling.

14. (a) Clarify the concept of cell signalling and its significance.

Or

(b) Describe the programmed cell death.

15. (a) Differentiate: Proto-oncogenes and oncogenes with clear diagrams.

Or

(b) Outline the role of tumour suppressor genes in preventing cancer development.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Distinguish between active and passive transport mechanisms and provide relevant examples for each.

17. Discuss Post-Translational Modifications (PTMS) of proteins, including their significance in cellular processes.

18. Explain the process of DNA folding and its role in the formation of chromosomes.

19. Detail the cell cycle process, highlighting key checkpoints and their importance.

20. Outline the stages of the cancer development.

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S–3274	Sub. Code
	23MBT1E1

M.Sc. DEGREE EXAMINATION, APRIL 2024

First Semester

Biotechnology

Elective – BIOINSTRUMENTATION

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. What is a stereo Microscope?

2. What are the applications of FRET?

3. What is sedimentation co-efficient?

4. List out the applications of HPLC.

5. Expand ELISA.

6. Define Electro blotting.

7. Write about Spectroscopic Techniques.

8. Write any two applications of Raman spectroscopy.

9. Define Radiation Dosimetry.

10. What is the Liquid scintillation counter used for?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Discuss Atomic Force Microscope.

Or

(b) Write about the principles and applications of Flow cytometry.

12. (a) Explain briefly about pH meter.

Or

(b) Write a detailed note on Gel filtration chromatography.

13. (a) Discuss 2D-gel Electrophoresis.

Or

(b) Elaborate on PCR and RT-PCR.

14. (a) Write about Fluorescence spectroscopy.

Or

(b) Explain ELISA and RIA.

15. (a) What is Radioactive Decay? Explain its types.

Or

(b) Explain in detail about the Health Effects of Radiations.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Give a detailed account of Atomic Force Microscopy.

17. Discuss in detail about Principles and applications of Paper Chromatography.

18. Explain High-resolution Electrophoretic Technique.

19. Write a detailed note on Laser Spectroscopic techniques.

20. Explain in detail about Application of GM Counter.

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S–3275	Sub. Code
	23MBT1E2

M.Sc. DEGREE EXAMINATION, APRIL 2024

First Semester

Biotechnology

Elective — BIOSTATISTICS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A ($10 \times 2 = 20$)

Answer **all** the questions.

1. Write any two uses of random numbers.

2. Define Kurtosis.

3. What is regression?

4. Write about Markov chains applications.

5. What is line graphs?

6. What is Null hypothesis?

7. What is Fisher's exact test?

8. What is correlation coefficient?

9. Name two popular statistical analysis software packages.

10. What is the primary purpose of graphics software in a presentation package?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Describe various types of classification of Statistics.

Or

(b) Situation A : A study of 300 households in a small southern town revealed that 20 percent had at least one school-age child present.

Situation B : A study of 250 patients admitted to a hospital during the past year revealed that, on the average, the patients lived 15 miles from the hospital.

Consider the two situations given. For Situation A describe how you would use a stratified random sample to collect the data. For Situation B describe how you would use systematic sampling of patient records to collect the data.

12. (a) Calculate Karl pearson's correlation co-efficient for the following data.

X	6	2	10	4	8
Y	9	11	5	8	7

Or

(b) Explain binomial distribution with an example.

13. (a) List out the characteristics of the Normal distribution.

Or

(b) Describe the basics of Statistical Inference.

14. (a) Explain chi-square test of goodness of fit and give its characteristics.

Or

(b) Write about 2*2 contingency table.

15. (a) Explain one way ANOVA and its assumptions.

Or

(b) Describe about mathematical function and statistical function.

Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. Explain the measures of central tendency. Calculate the mean and standard deviation for the given data on the mid-arm circumstance (cm) of 16 children – 14, 12, 13, 10, 11, 13, 14, 12, 12, 11, 10, 13, 12, 11, 10, 14.

17. From the following data, obtain two regression equations:

X	6	2	10	4	8
Y	9	11	5	8	7

18. The consumption of number of guava and orange on a particular week by a family are given below.

No. of Guavas	3	5	6	4	3	5	4
No. of Oranges	1	3	7	9	2	6	2

Using coefficient of variations, find out which fruit is consistently consumed by the family?

19. How can you distinguish between small and large samples? Describe the major steps involved in one sample t-test. A sample of 20 items has mean 42 units and standard deviation 5 units. Test the hypothesis that it is a random sample from a normal population with mean 45 units. Given: t (19) (0.05) = 2.093 (Test at 5% level of significance).

20. Define CRD and RBD. Explain the advantage and disadvantage of control chart of attributes.

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S–3276	Sub. Code 23MBT1E3

M.Sc. DEGREE EXAMINATION, APRIL 2024

First Semester

Biotechnology

Elective – ENZYMOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. Write about the effects of pH on enzymes.
2. What is centrifugation?
3. Write about Bisubstrate reactions.
4. Define the Hanes wolf equation.
5. Write about the Enzyme catalysis.
6. Define base catalysis.
7. What is carboxypeptidase used for?
8. What is the fatty acid synthetase complex?
9. Write about Enzyme regulation.
10. List any two clinical applications of enzymes.

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Explain how to name the enzymes.

Or

(b) Discuss about effects of temperature on enzymes.

12. (a) How do you define the Kinetics of catalyzed reaction in detail?

Or

(b) Write about the Line weaver Burk Plot.

13. (a) Explain the Stereospecificity of enzymes.

Or

(b) What are nucleophilic and electrophilic attacks in catalysis?

14. (a) Write a brief note on the mechanism of action of lysozyme.

Or

(b) Discuss about Multienzymes system.

15. (a) Write about the reversible covalent modification of enzymes.

Or

(b) Explain Enzyme engineering in detail.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Explain in detail about Extraction isolation and purification of enzymes by chromatography method.

17. Discuss the limitations of Michaelis-Menten kinetics in detail.

18. Give a detailed note on the Mechanism of catalysis.

19. Explain about Mechanism of action and regulation of fatty acid synthetase complex.

20. Write about Symmetric and sequential modes for action of allosteric enzymes.

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S–3277	Sub. Code
	23MBT2C1

M.Sc. DEGREE EXAMINATION, APRIL 2024.

Second Semester

Biotechnology

MICROBIOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define prions.

2. What are the major discoveries of Edward Jenner in the field of microbiology?

3. What is the Synchronous Growth?

4. Differentiate between disinfectant and antiseptic.

5. Mention the infections transmitted by droplets.

6. What is an endemic disease? Explain.

7. What are the causative agents of candidiasis?

8. Write a note on the laboratory diagnosis of yellow fever.

9. How is nitrate reduced to nitrite by the bacteria? Explain.

10. What are the examples of phosphorus mobilizing bacteria?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain microbial growth curve.

Or

(b) Give an account on the contributions of Robert Koch in the field of microbiology.

12. (a) Brief a note on 165 rRNA Gene Sequencing.

Or

(b) Outline the sterilization methods with a flowchart. Give examples for each.

13. (a) Brief about the human microbiome of skin.

Or

(b) Explain the transmission modes of epidemic diseases.

14. (a) Write a detailed account on the pathogenesis of leprosy.

Or

(b) Give a note on the laboratory diagnosis of Zika virus.

15. (a) Illustrate the carbon cycle with a neat diagram.

Or

(b) Mention a note on symbiotic and free-living microbes with examples.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Explain in detail about the microbial metabolism.

17. Elucidate an account on principle and types of staining methods.

18. Discuss a note on host microbe interaction and epidemiology of human lungs.

19. Give the general characteristics, pathogenesis, laboratory diagnosis and control measures of fungal diseases.

20. Enumerate an account on the biological nitrogen fixation. Explain the mechanism of N_2 fixation.

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S–3278

Sub. Code
23MBT2C2

M.Sc. DEGREE EXAMINATION, APRIL 2024.

Second Semester

Biotechnology

PLANT AND ANIMAL BIOTECHNOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Draw the structure of anthocyanin.

2. How does heterosis differ from hybrid vigour?

3. Define Biolistics.

4. QTL

5. How are monoclonal antibodies produced?

6. What is the difference between primary and established cell line culture?

7. Cryopreservation

8. Necrosis assay

9. What is metabolic profiling in animal cell culture?

10. Why the study of stem cells is considered controversial?

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Brief about synthetic seed production.

Or

(b) Comment on therapeutic applications of alkaloids.

12. (a) Write an account on Ti plasmid vector.

Or

(b) Explain RAPD Markers.

13. (a) Comment on monoclonal antibodies.

Or

(b) Brief about DNA vaccines in animal diseases.

14. (a) Write a note on somatic cell cloning.

Or

(b) Discuss about the cytotoxicity assays.

15. (a) Comment a note on NMR Methods for monitoring cell metabolism.

Or

(b) Transgenic animals as a model for human diseases– Explain.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Discuss in detail about protoplasm isolation and fusion with a diagram.

17. Explain RAPD Markers.

18. Enumerate an account on Animal health disease diagnosis.

19. Elaborate a detailed note on karyotyping.

20. Comment on properties, types and therapies of stem cells.

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S–3279

Sub. Code
23MBT2C3

M.Sc. DEGREE EXAMINATION, APRIL 2024

Second Semester

Biotechnology

GENETIC ENGINEERING

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Section A $(10 \times 2 = 20)$

Answer **all** questions.

1. Discuss the features of an active promoter.
2. Describe dot blot assay.
3. List out the salient features of λ EMBL3 vector.
4. Comment on RSF1010.
5. What is the T_y element of yeast?
6. Define post transcriptional modifications.
7. Explain the use of minisatellites in eukaryotic DNA.
8. Discuss Pyrosequencing.
9. What are the benefits of GM foods?
10. List out the steps in microarray.

Section B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Explain the various markers used for construction of a recombinant Vector for prokaryotic cells.

Or

(b) How the foreign DNA is adapted in a new host? Explain.

12. (a) Explain the uses of single stranded phage vectors with suitable examples.

Or

(b) Describe the construction process of an artificial plasmid pBR322.

13. (a) Differentiate YEP and YIP.

Or

(b) How do you synthesis specific RNA molecule in vitro? Explain.

14. (a) Elaborate Sanger Dideoxy sequencing.

Or

(b) How do you design a prime for gene specific polymerase chain reaction?

15. (a) Devise a method to prepare knockout mice.

Or

(b) Explain the strategy involved in herbicide resistant crop production.

Section C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Demonstrate the tools used for manipulation of a gene.

17. What is in vitro packaging? How it used for recombinant DNA technology.

18. Explain the use of promoters and selection markers for yeast cell cloning.

19. What is second generation gene sequencing? Explain with merits and demerits.

20. Elaborate the Process and applications of gene therapy.

S–3280	Sub. Code
	23MBT2E1

M.Sc. DEGREE EXAMINATION, APRIL 2024

Second Semester

Biotechnology

Elective – REGULATORY AFFAIRS AND INDUSTRIAL STANDARDS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. List the labotory safety equipment.

2. What are flammables?

3. Give examples for chemical additives.

4. Define water activity.

5. Give examples for biodegradable packing materials.

6. What is active packing?

7. What are thermophiles?

8. Define: pure culture.

9. What are FSO?

10. Define: Sanitation.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Write about the requirements for food microbiology lab.

Or

(b) Explain about the general laboratory hazards and their disposal methods.

12. (a) Describe the principle behind pasteurization and its application.

Or

(b) Write the principle behind oscillating magnetic field in food preservation.

13. (a) List the factors responsible for the selection of packing material.

Or

(b) Write about various packaging materials used in dairy products.

14. (a) Write about sources of microbes in food chain.

Or

(b) Describe about methods for microbiological examination of foods.

15. (a) Write about food safety management and risk analysis.

Or

(b) Explain about product recall procedure.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Explain in detail on various requirements to get ISO/IEC 17025:2017 accreditation.

17. Write an essay on various thermal and non-thermal food preservation techniques with examples.

18. Describe about optimum design and properties for packing materials used in fresh produce.

19. Elaborate about thermal destruction of microorganisms and its applications in food industry.

20. Write an essay on HACCP principles and limitations.

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S–3281

Sub. Code
23MBT2E2

M.Sc. DEGREE EXAMINATION, APRIL 2024

Second Semester

Biotechnology

Elective – PHARMACEUTICAL BIOTECHNOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define Ethnopharmacology.
2. Comment of dot blot assay.
3. Trace the pharmacological applications of Peroxidase.
4. Define Interferon's.
5. Discuss the use of vitamin B_{12}.
6. What is Xeno transplantation.
7. Give the uses of caffeine.
8. What is ADME?
9. Comment on routes of drug action.
10. List out any two antidotes.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) How biosensors work? Explain the applications of biosensors in pharmaceutical industries.

Or

(b) Explain the pharmacological importance of systems, receptors and ligands.

12. (a) How is recombinant DNA technology applied in vaccine development?

Or

(b) Explain enzyme immobilization and its applications.

13. (a) Describe the microbial bio transformation process in drug discovery.

Or

(b) Demonstrate the Bio safety aspects in pharmaceutical industry.

14. (a) Derive the pharmacological and clinical applications of vincristine and vinblastine.

Or

(b) Analyze the role of plant-derived compounds in modern pharmacology.

15. (a) Describe the various routes of drug administration and give their advantages and disadvantages.

Or

(b) Elaborate drug poisoning.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Explore the global impact of pharmaceutical biotechnology on public health and healthcare systems.

17. Explain the process of protein engineering and its applications in the development of therapeutic proteins.

18. Explain the design considerations for large-scale production in fermenters.

19. Compare the pharmacological properties of natural plant constituents with their synthetic substitutes, assessing their efficacy, safety, and therapeutic applications.

20. Discuss the classification of drugs based on their therapeutic uses, pharmacological properties. and chemical structures.

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S–3282

Sub. Code
23MBT2E3

M.Sc. DEGREE EXAMINATION, APRIL 2024

Second Semester

Biotechnology

Elective – ENVIRONMENTAL BIOTECHNOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Radionuclides
2. Sources of soil pollutants
3. Role of biofilm in wastewater treatment
4. Sloughing
5. Expand and Comment on COD
6. Trickling filter
7. Characteristics of bacteria used in biomining.
8. Sub-acute toxicity
9. Types of surfactants.
10. Name any four xenobiotic compounds.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Write a note on mission and objectives of IUCN.

Or

(b) Describe the prevention and control of air pollution.

12. (a) Explain the continuous-flow stirred tank reactor (CFSTR).

Or

(b) Simplify the working mechanism of reactors in series.

13. (a) List out the various sources of wastewater.

Or

(b) Simplify the activated sludge process and its advantages.

14. (a) Discuss the application of bioassay in toxicology.

Or

(b) Write a note on the biological magnification of DDT.

15. (a) Discuss the bioremediation of contaminated sites on land.

Or

(b) Explain the process of methane production by anaerobic digestion of solid wastes.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Elaborate the types, sources and control measures of water pollution.

17. Discuss in detail about the soluble microbial products and its implications.

18. Give an account on the various treatment processes of wastewater with neat diagrams.

19. Describe the various methods used in acute toxicity tests.

20. Write a detailed account on in-situ and ex-situ bioremediation techniques.

S–3283

Sub. Code
23MBT2S1

M.Sc. DEGREE EXAMINATION, APRIL 2024

Second Semester

Biotechnology

TISSUE ENGINEERING

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Give examples for engineered tissues.
2. List the types of tissues.
3. What are Organs?
4. List the bioreactors used in the tissue engineering.
5. What are nanocomposites.
6. Give examples for extracellular matrix.
7. What are PFCs?
8. List the types of dialysis.
9. What are multipotent stem cells?
10. What is ECM mimicking?

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Describe the process of morphogenesis.

Or

(b) Write about tissue differentiation.

12. (a) Write about the procedural difference between *in vitro* synthesis of tissues and organs.

Or

(b) What are the types of engineered tissues?

13. (a) Write about scaffolds in tissue engineering.

Or

(b) List the polymers used in tissue engineering with specific applications.

14. (a) Describe the principle behind artificial pancrease.

Or

(b) Explain the working procedure of renal replacement devices.

15. (a) Write the bone regeneration methods.

Or

(b) Explain about brain implants and their applications.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Write an essay on tissue engineering principles.

17. Describe about the tissue engineering bioreactors with applications.

18. Write an essay on various biomaterials used in tissue engineering.

19. Explain the principle behind the functioning of artificial womb.

20. Write all essay on periodontal applications of tissue engineering.

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