Exam. Code : 107404
Subject Code : 2301

B.Sc. (Bio Technology) 4th Semester

BT-I : PHYSICAL CHEMISTRY—B

Time Allowed—Three Hours] [Maximum Marks—40

Note :—The question paper consists of **THREE** sections. Section A contains **8** very short answer type questions (Q. Nos. **1** to **8**), each carrying **1** mark. Section B contains **8** short answer type questions (Q. Nos. **9** to **16**), each carrying **4** marks. Section C contains **4** essay type questions (Q. Nos. **17** to **20**), each carrying **6** marks. Attempt all the questions from Section A, any **5** questions from Section B and any **2** questions from Section C.

SECTION—A

Each question carries **1** mark.

1. Give the significance of EMF.
2. Write down the electrode reaction for Quinhydrone electrode.
3. Define activity coefficient. Name a method used to determine activity coefficient.

4. Define rate constant and give its units for third order reaction.
5. Define threshold energy.
6. What is turn over number ?
7. What do you understand from buffer index ?
8. What is cell constant ? Give its units.

SECTION—B

Each question carries **4** marks.

9. Calculate the liquid junction potential at 25°C between two solutions of HCl having mean ionic activities of 0.01 and 0.001, respectively. The transference number of H^+ ion in HCl may be taken as 0.83.
10. Discuss the effect of concentration of electrolyte on electrode potential.
11. (a) Differentiate between order and molecularity of a reaction.
    (b) Enlist and discuss briefly the factors influencing the rate of reaction.
12. Derive the integrated rate expression for the first order reaction $A \rightarrow P$.
13. What are chain reactions ? Elaborate the chain reaction between $H_{2(g)}$ and $Br_{2(g)}$.

14. Explain the Kohlraush law. Discuss its application for calculation of molar conductance of weak electrolytes at infinite dilution.
15. A moving boundary experiment was carried out with 0.01 M solution of KCl (κ = 1.29 S m^{-1}), using $CdCl_2$ as the indicator electrolyte. A current of 521 mA was passed through the tube of 0.230 cm^2 cross-sectional area. It was observed that the boundary moved through 4.16 cm in one hour. Calculate the mobility of the K^+.
16. Write a note on experimental determination of transference number using Hittorf's method.

SECTION—C

Each question carries **6** marks.

17. Write a brief note on (a) concentration cells; and (b) standard hydrogen electrode.
18. What is steady-state approximation ? Using it, derive Michaelis-Menton equation for enzyme catalysis.
19. Explain the Debye Huckel theory of activity coefficients.
20. (a) Calculate the pH of 1×10^{-7} M solution of HCl at 25°C. Take $K_w = 10^{-14}$ mol^2 dm^{-6}.
    (b) Write a short note on heterogeneous catalysis.

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B.Sc. (Bio Technology) 4th Semester

BIOCHEMISTRY-IV

Paper–BT-3

Time Allowed—3 Hours] [Maximum Marks—40

SECTION–A

Note :— Attempt **all** questions. Each question carries 1 mark.

1. Where in the cell synthesis and degradation of Fatty acid takes place ?
2. What is the fate of glycerol in degradation of Triacylglycerol ?
3. What is the role of Carnitine in Fatty acid oxidation ?
4. What are ketone bodies ?
5. Explain briefly what are ketogenic amino acids
6. Draw the structure of any one aromatic amino acid.
7. Draw the structure of pyrimidine ring and identify the sources which provide the different atoms of pyrimidine.
8. Differentiate between Adenine and Adenosine.

SECTION–B

Note :— Attempt any **five** questions, each question carries **4** marks.

1. Explain Urea Cycle and indicate the reactions occuring in cytosol and mitochondria.
2. What are Transamination reaction ? Explain its importance in amino acid degradation.
3. Describe Salvage Pathway of nucleotides.
4. Explain the regulation of biosynthesis of Purine and Pyrimidine bases.
5. Draw a well labelled diagram and write reactions how fatty acids are transported to mitochondria from cytosol for oxidation.
6. Write a note on regulation of Lipid metabolism.
7. Explain the role of lipoproteins in regulating Cholesterol levels in the body.
8. Explain the degradation of Triacylglycerol.

SECTION–C

Note :—Attempt any **two** questions, each question carries **6** marks.

1. Write a note on biosynthesis of essential amino acids. Briefly explain its regulation.

2. Discuss the biosynthesis of Purine and Pyrimidine bases.
3. Explain different steps in degradation of saturated Fatty acids. How is it different from degradation of unsaturated fatty acid ?
4. Explain biosynthesis of Cholesterol.

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BT-4 : CELL BIOLOGY—B

Time Allowed—3 Hours] [Maximum Marks—40

SECTION—A

Note :— Attempt **ALL** the questions. Answer to any question should not exceed **1/3** of a page.

1. Define actin filaments.
2. What are dictyosomes ?
3. Define nucleolus.
4. Give the functions of peroxysomes.
5. What do you understand by amitosis ?
6. Define cilia.
7. Define a pleuripotent cell.
8. What do you understand by necrosis ? 8×1=8

SECTION—B

Note :— Attempt any ***five*** questions. Answer to any question should not exceed **2** pages.

1. Write a short note on rough endoplasmic reticulum.
2. Describe the structure and functions of ribosomes.
3. What are the characteristic structural features of mitochondria that aid in their identification ?

4. What are the functions of chloroplasts ?
5. Define mitosis. Give the significance of mitosis.
6. Write a note on flagellar locomotion.
7. Briefly describe artificial creation of 'cells'.
8. Describe apoptosis and its significance. 5×4=20

SECTION—C

Note :— Attempt any *two* questions. Answer to any question should not exceed **5** pages.

1. With the help of a labelled diagram, describe the ultrastructure of cell membrane. Discuss its important functions.
2. Describe in detail the ultrastructure of nucleus. Discuss its significance.
3. Describe in detail the process of meiosis with the help of diagrams. What is the significance of this process ?
4. Describe cell differentiation in plants and animals. 2×6=12

Exam. Code : 107404
Subject Code : 2305

B.Sc. (Bio Technology) 4th Semester

BT-5 IMMUNOTECHNOLOGY

Time Allowed—3 Hours] [Maximum Marks—40

Note :— Section A (1×8 marks) is compulsory. Section B (5×4 marks). Attempt any **5** questions. The answer should not exceed **two** pages. Section C (6×2 marks). Attempt any **2** questions. The answer should not exceed **five** pages.

SECTION—A

(Compulsory)

Write a brief account of the following :

1. Properties of T independent antigens
2. Markers on T cells attained in the thymus
3. Principle of Radial immunodiffusion
4. Direct agglutination test of bacteria
5. How body responds to extracellular bacteria ?
6. Immune invasion
7. Freunds complete adjuvant composition
8. Attenuation

SECTION—B

1. Describe the differentiating markers on mature T helper cells and their functions.
2. Give the structure of TCR.
3. Write down the procedure of rocket immunoelectrophoresis.
4. How to perform Haemagglutination inhibition reaction and its significance ?
5. How body responds to viruses ?
6. What do you understand by immune invasion ?
7. What are the merits and demerits of passive immunization ?
8. Which methods are adopted to prepare whole organism vaccines ?

SECTION—C

1. How T cells recognize exogenous and endogenous antigens ?
2. Write down the procedure for sandwich ELISA.
3. Give an account of immunopathological consequences of parasitic infections like malaria and babesia.
4. How to make purified macromolecules vaccines ?

Exam. Code : 107404
Subject Code : 2306

B.Sc. (Bio-Technology) 4th Semester

MOLECULAR BIOLOGY

Paper—BT-6

Time Allowed—3 Hours] [Maximum Marks—40

Note :– Attempt **all** the questions of Section A, **five** questions from Section B and **two** questions from Section C.

SECTION—A

Explain the following briefly :

1. Selfish DNA
2. Replicon
3. RNA primers
4. Conservative model of DNA replication
5. Major groove of DNA
6. Z form of DNA
7. C form of DNA
8. Episome. 1×8=8

SECTION—B

1. Give various steps of the translation initiation in prokaryotes.

2. Draw well labelled structure of the transcription bubble.
3. Give an experimental setup to demonstrate semiconservative mode of DNA replication.
4. Explain methylation and acetylation of histones.
5. Explain trp operon for control of tryptophan biosynthesis.
6. Explain Rolling-circle replication.
7. Describe eukaryotic transcription initiation mechanism.
8. Describe mechanism of translation termination in prokaryotes. 5×4=20

SECTION—C

1. Explain mechanism of chain elongation during protein synthesis.
2. Give mechanism of rho-dependent and rho-independent transcription termination in prokaryotes.
3. What are nucleosomes ? Describe its various components in detail.
4. Explain various insertion elements. What are uses of transposons ? 2×6=12

Exam. Code : 107404

Subject Code : 2307

B.Sc. (Bio-Technology) 4th Semester

AGRO AND INDUSTRIAL APPLICATIONS OF MICROBES-B

Paper-BT-7

Time Allowed—3 Hours] [Maximum Marks—40

Note :– Attempt **five** questions from Section–B and **two** questions from Section-C. Section-A is compulsory.

SECTION—A

1. Describe briefly :

   (i) Biopesticides

   (ii) Vermiculture

   (iii) Mycotoxins

   (iv) Biofertilizers

   (v) Mycorrhizal fungi

   (vi) Mycoherbicides

   (vii) Biochips

   (viii) Red Vs. white wine. 1×8=8

25/5/18 MoR

SECTION—B

2. How vermicomposting is different from traditional composting? Explain.

3. What is a surfactant? Describe the production of surfactants.

4. What are single cell proteins ? Describe the production of fungal SCP.

5. Describe the fermentative production of vitamin B12.

6. What is BT gene ? Describe the incorporation of BT gene in BT cotton.

7. Describe the plant and microbe interactions in biological nitrogen fixation.

8. Describe briefly the production technology of beer.

9. Describe the production of penicillin. 5×4=20

SECTION—C

10. Describe the microbes involved in the production of antibiotics and pharmaceutical drugs.

11. Discuss the fermentative production of organic acids.

12. Describe the large scale production of *Spirulina* as single cell proteins.

13. What are secondary metabolites ? Describe the production of a secondary metabolite by tissue culture techniuqe. 2×6=12

Exam. Code : 107404
Subject Code : 2309

B.Sc. (Biotechnology) 4th Semester

ENVIRONMENTAL STUDIES—II

Paper—ESL–222

Time Allowed—3 Hours] [Maximum Marks—50

Note :— Section A (15 Marks) : It consists of **FIVE** short answer type questions. Candidates are required to attempt any **THREE** questions, each question carrying **5** marks. Answer to any of the questions should not exceed **2** pages.

Section B (20 Marks) : It consists of **FOUR** essay type questions. Candidates are required to attempt **TWO** questions, each question carrying **10** marks. Answer to any of the questions should not exceed **4** pages.

Section C (15 Marks) : It consists of **TWO** questions. Candidates are required to attempt **ONE** question only which carries **15** marks. Answer to the question should not exceed **5** pages.

SECTION—A

1. Write about aesthetic and ethical values of biodiversity.
2. What is habitat loss ? How it can be stopped ?
3. How can the electronic waste be managed ?

4. What do you understand by term 'thermal pollution' ?

5. What are the control measures of urban and industrial solid waste ?

SECTION—B

6. What are nuclear hazards ? Mention a case study related to it.

7. Write a note on different measures adopted at national levels to conserve biodiversity.

8. Give a detailed account on Soil Pollution.

9. Write a note on relationship between environment and human health.

SECTION—C

10. Give a detailed account of various threats to biodiversity.

11. What is disaster management ? What is the role of an individual during any disaster ?