Exam. Code : 107404
Subject Code : 2241

B.Sc. Bio-Technology Semester—IV

PHYSICAL CHEMISTRY–B

Paper–BT–1

Time Allowed—3 Hours] [Maximum Marks—40

Note : This 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. Define standard electrode potential.
2. What is liquid junction potential ?
3. Define threshold and activation energy.
4. For a first order reaction A $\rightarrow$ Products, $t_{½}$ is 100 s. Calculate the rate constant for the reaction.
5. What is the effect of pressure on reaction rate of a unimolecular surface reaction ? Show it diagrammatically.
6. What is cell constant ? How it is determined ?

7. Define buffer index and buffer capacity.

8. What is indicator constant ? Discuss its significance.

SECTION—B

Each question carries 4 marks.

9. Discuss how activity and activity coefficients are determined from EMF measurements.

10. A zinc rod is placed in 0.1 M solution of $ZnSO_4$ at 298.15 K. Assuming that the salt is dissociated to the extent of 95 percent at this dilution, calculate the potential of electrode at this temperature. $E^0_{(Zn^{2+}, Zn)} = -0.76$ V.

11. What is enzyme catalysis ? Enlist different factors which affect the enzyme catalysis and discuss the effect of temperature on enzyme calalysis in detail.

12. Write a short note on heterogeneous catalysis.

13. Derive integrated rate expression for first the first order reaction $A \rightarrow P$ and show that concentration of a reactant in such reaction decreases exponentially with time.

14. Discuss Debye-Huckel theory of activity coefficients.

15. What do you mean by ionic product of water ? How it is determined ?

16. Define hydrolysis constant. Derive the necessary equation for hydrolysis of the salt of weak acid and strong base.

SECTION—C

Each question carries 6 marks.

17. (a) Derive Nernst equation for EMF of a cell.

    (b) What are Electrolyte-concentration cells ? Give one example each of concentration cell with and without transference.

18. (a) Discuss the Transition State theory of bimolecular process and derive Eyring equation.

    (b) Name four methods used for determining the order of reaction. Discuss differential rate expression for determination of order of a reaction.

19. (a) Calculate the pH of 1×10^{-7} M solution of HCl at 25°C. Take kW = 10^{-14} mol^2 dm^{-6}.

    (b) What is transference number ? How is it determined using moving boundary method ?

20. (a) The molar conductance of sodium acetate, hydrochloric acid and sodium chloride at infinite dilution are 91.0×10^{-4} 426.16×10^{-4} and 126.45×10^{-4} S m^2 mol^{-1}, respectively, at 25°C. Calculate the molar conductance for acetic acid at infinite dilution.

    (b) Write a short note on surface reactions with special reference to unimolecular surface reactions.

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B.Sc. Bio-Technology Semester—IV

BOTANY–C

Paper–BT-2

Time Allowed—3 Hours] [Maximum Marks—40

Note : Attempt **ALL** the Sections.

SECTION—A

Note : Attempt **ALL** the parts. Answer to any part should not exceed 1/3 of a page.

1. What are the physiological adaptations found during cold stress ?
2. Define transpiration.
3. Name the causal agent and control measures of TMV of potato ?
4. Define Crop rotation.
5. Write down the role of late embryogenesis abundant proteins.
6. What are phytoalexins ?
7. Name the secondary host of *Puccinia graminis tritici.*
8. Define heat shock proteins. 8×1=8

SECTION—B

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

1. Give a brief account of osmosis.
2. Describe briefly the dehydrins.
3. Explain briefly the causal agent and disease cycle of loose smut of wheat.
4. Briefly describe the disease resistance host pathogen interaction.
5. Describe heat shock proteins.
6. Briefly explain the mode of transmission of plant diseases.
7. Write down the various physiological adaptations made by plants in respect of heat stress.
8. Explain briefly the disease cycle of Bunchy top banana.

5×4=20

SECTION—C

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

1. Write short notes on :
   (a) Transpiration and its role in plants
   (b) Water potential.
2. Write a detailed note on Black stem rust of wheat with respect of its causal agents, symptoms, disease cycle and their control measures.
3. What are the control methods used to exclude the pathogens from the host ?
4. Describe in detail the role of heat shock proteins in stress physiology.

2×6=12

Exam. Code : 107404
Subject Code : 2243

B.Sc. Bio-Technology Semester—IV

BIOCHEMISTRY–IV

Paper–BT-3

Time Allowed—3 Hours] [Maximum Marks—40

Note :— (1) Attempt **ALL** parts from Section-A. Each question carries **1** mark.

(2) Attempt any **FIVE** questions from Section-B. Each question carries **4** marks.

(3) Attempt any **TWO** questions from Section-C. Each question carries **6** marks.

SECTION—A

1. (i) Fatty acids
   (ii) Sphingolipids
   (iii) Steroids
   (iv) Phosphoglycerides
   (v) Glycine
   (vi) Transamination
   (vii) Nucleoside
   (viii) Purines and Pyrimidine.

SECTION—B

2. Degradation of triacylglycerol.

3. Lipid metabolism.

4. What is difference between triacylglycerol and Phosphoglycerides ?

5. Cholesterol.

6. What is the difference between essential and basic amino acids ?

7. Comment on degradation of essential amino acids.

8. Biosynthesis of Purines and Pyrimidines.

9. Salvage pathway.

SECTION—C

10. What is the difference between α-oxidation and β-oxidation of fatty acids ? Discuss in detail.

11. Discuss the biosynthesis of cholesterol.

12. Write a note on regulation of amino acids biosynthesis.

13. Discuss the biosynthesis of nucleotides and its regulation.

19-5-14

Exam. Code : 107404
Subject Code : 2244

B.Sc. Bio-Technology Semester—IV

CELL BIOLOGY–B

Paper–BT-4

Time Allowed—3 Hours] [Maximum Marks—40

Note : Attempt **ALL** the Sections.

SECTION—A

Note : Attempt **ALL** the parts. Answer to any part should not exceed **1/3** of a page.

Define :

1. Heterochromatin
2. S phase
3. Cell differentiation
4. Cisternae
5. Pleuripotent cell
6. Endoplasmic reticulum
7. Plasmalemma
8. Pachytene. 8×1=8

SECTION—B

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

1. Write a detailed note on cell-cell interaction.
2. Write a short on cell locomotion.
3. Explain briefly cytoskeletal structures present in the cell.
4. Describe the structure of lysosomes and why are they called suicidal bags ?
5. Describe briefly cell differentiation in plants and animals.
6. Give a brief account of Golgi bodies and their functions.
7. What do you mean by apoptosis ?
8. Differentiate between heterochromatin and euchromatin.

5×4=20

SECTION—C

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

1. Explain the ultra structure of plasma membrane.
2. Describe in detail the structure and function of two semi-autonomous organelles and explain why they are called semi-autonomous.
3. Discuss the following :
   (a) Totipotent, multipotent and pleuripotent cells
   (b) Artificial creation of "cells".
4. Write in detail the differences between mitosis and meiosis of plant and animal cells. 2×6=12

Exam. Code : 107404
Subject Code : 2246

B.Sc. Bio-Technology Semester—IV

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. A form of DNA
2. Okazaki fragments
3. Rec A protein
4. Helicase
5. Consensus sequence
6. Non-template strand
7. Ribozyme
8. Splicing. 1×8=8

SECTION—B

1. What are Chargaff's rules ? Explain Briefly.
2. Discuss briefly the semiconservative nature of DNA replication.
3. Define transposons. Explain briefly.

4. Explain briefly recombinational DNA repair.
5. Define operon. Explain 'lac' operon.
6. Differentiate between prokaryotic and eukaryotic transcription.
7. Define briefly DNA supercoiling.
8. What are histones ? Discuss briefly. 4×5=20

SECTION—C

1. Discuss the various enzymes and protein factors involved in DNA replication.
2. Enlist and discuss different types of genetic recombinations.
3. Detail the events taking place in RNA polymerase II dependent transcription in eukaryotes.
4. Discuss post translational regulation of gene expression. 6×2=12

Exam. Code : 107404
Subject Code : 2249

B.Sc. Bio-Technology 4th Semester

ENVIRONMENTAL STUDIES—II

Paper : ESL-222

Time Allowed—Three 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 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 any **TWO** questions, each 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 which carries **15** marks. Answer to the question should not exceed **5** pages.

SECTION—A

1. What do you understand by value of Biodiversity ?
2. What are the various sources of Water Pollution ?

3. How can biodegradable waste be managed ?
4. What are Human Rights ?
5. How can financial institutions play role towards Entrepreneurship ?

SECTION—B

6. Describe the Aesthetic, Ethical and Scientific importance of Biodiversity.
7. What do you understand by Natural Disasters ? Briefly describe its types.
8. What is the importance of Family Welfare Programme ?
9. What is meant by First Aid ? What First Aid can be given to Road Accident Victim ?

SECTION—C

10. Discuss Aims and Objectives of Civil Defense along with its importance.
11. What are the effects of Air-pollution ? Also discuss the major sources of specifically Indoor Air pollution.

Exam. Code : 107404
Subject Code : 2245

B.Sc. (Bio-Technology) Semester—IV

IMMUNOTECHNOLOGY

Paper : BT–5

Time Allowed—3 Hours] [Maximum Marks—40

Note :– **Section A** is compulsory. Section B attempt any **FIVE** questions. The answer should not exceed **2** pages. Section C attempt any **TWO** questions. The answer should not exceed **5** pages.

SECTION–A

(Compulsory)

Give a brief account of the following :

1. Markers on the T helper cells.
2. T independent antigens and response to them.
3. ELISA principle for detecting antigens.
4. Haemagglutination inhibition test principle.
5. Immunity against Tuberculosis causing microorganism.
6. By Oral Polio Vaccine which type of immunity develops.
7. How attenuation is carried out ?
8. Merits of Passive immunization. 8×1=8

SECTION–B

1. How cell mediated immune response occurs to T dependent antigens ?
2. What is the role of MHC in antigen presentation to T cells ?
3. Describe the principle and methodology of Rock immunoelectrophoresis.
4. Describe the methodology, principle and significance of Immunoblotting.
5. How body protects against AIDS virus ?
6. How immune response is evaded by parasites ?
7. Describe the properties of a good active immunization vaccine.
8. Contrast and compare the active and passive immunization.

5×4=20

SECTION–C

1. Describe the structure and functions of various molecules on the surface of T cells in antigen reception.
2. Write the various haemagglutination techniques and their significance.
3. What are the immunopathological consequences of parasitic infections ?
4. Write an account on the vaccines prepared from purified macromolecules.

6×2=12