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Exam. Code : 107403
Subject Code : 2260

B.Sc. Biotechnology 3rd Semester

PHYSICAL CHEMISTRY–A

Paper–BT-1

Time Allowed—3 Hours] [Maximum Marks—40

Note :– Do all the questions of Section-A, **5** questions from Section-B and **2** questions from Section-C. Log tables may be provided.

SECTION–A

1. Define intensive properties by citing examples.
2. Differentiate dependent and independent variables.
3. What is Nernst heat theorem ?
4. State the law of chemical equilibrium.
5. What is an ideal solution ? Cite one example.
6. Determine the osmotic pressure of an aqueous solution containing 1 gm each of glucose and sucrose per litre at 25°C.
7. What are cooling curves ?
8. Find the number of degrees of freedom in the following system :

$$Fe_{(s)} + H_2O_{(g)} \rightleftharpoons FeO_{(s)} + H_{2(g)}$$ 8×1=8

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SECTION–B

9. One mole of $H_{2(g)}$ contained in a cylinder at 25°C, is allowed to expand isothermally against external pressure of 6 atmospheres from a volume of 1.0 dm^3 to a volume of 2.8 dm^3. If the gas behaves ideally, determine the values of q, w, ΔE and ΔH.

10. State and explain the bond energy. Discuss the various applications of bond energies.

11. Explain how the absolute entropy of a gas at 25°C is determined with the help of the 3rd law of thermodynamics.

12. Discuss the entropy changes in reversible and irreversible processes. Give reasons why the entropy of the universe is increasing day by day.

13. State and explain the Raoult's law for vapour pressure of binary solutions of volatile liquids.

14. Explain the conditions under which abnormal molar masses of solutes are obtained from the measurement of colligative properties of their solutions. What is van't Hoff factor ?

15. Give the derivation of Gibbs phase rule. Explain the various terms (e.g., phase, component, degrees of freedom, etc.) involved in phase rule.

16. Explain the Pb-Ag phase diagram for two-component systems. 5×4=20

SECTION–C

17. (a) State and explain Hess's law of heat summation. What are its applications ?

    (b) Derive an expression for the work done in reversible isothermal expansion and reversible isothermal compression of an ideal gas. What is meant by maximum work ?

18. (a) Derive Gibbs-Helmholtz equation for a process at constant pressure and at constant volume.

    (b) A carnot engine converts one-fourth of heat input into work. If the temperature of sink is reduced by 50°C, its efficiency is doubled. Find the temperature of source and sink.

19. (a) Derive Gibbs-Duhem-Margules equation for ideal and non-ideal mixtures.

    (b) A solution of A and B with 30 mole percent of A is in equilibrium with its vapour containing 60 mole percent of A. Assuming ideality, calculate the ratio of vapour pressure of pure A to that of pure B.

20. Draw and discuss the phase diagram of water system. Also discuss the importance of Clapeyron-Clausius equation for various equilibria in this system. 2×6=12

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Exam. Code : 107403
Subject Code : 2261

B.Sc. Biotechnology 3rd Semester

BT–2 : ZOOLOGY–C

Time Allowed—3 Hours] [Maximum Marks—40

Note : Attempt **ALL** questions from Section-A, **FIVE** questions from Section-B and **TWO** questions from Section-C.

SECTION–A

1. Write short notes on the following :
   (i) Commensalism
   (ii) Intermediate host
   (iii) Promastigotes
   (iv) Vector
   (v) Drug Resistance
   (vi) Prophylaxis
   (vii) Pathogen
   (viii) Disease caused by *Trichomonas*. 1×8

SECTION–B

2. Describe life history of *Leishmania*.
3. Explain histopathological changes in liver cirrhosis.

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4. Write a note on distribution and control of Dengue.
5. What is drug resistance ? Explain.
6. Write a note on vector of plague and give its control measures.
7. What is Cancer ? Describe its types.
8. Write a note on eradication programmes for Cholera.
9. Describe mode of infection and prophylaxis of *Entamoeba*.

5×4

SECTION–C

10. Explain mode of infection and pathogenicity of *Trypanosoma*.
11. What is nephrosis ? Explain histopathological changes in this disease.
12. Discuss the distribution and control of the vector of Filariasis.
13. Give an account of disease Typhoid. Describe its occurrence and eradication programme.

2×6

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Exam. Code : 107403
Subject Code : 2262

B.Sc. Biotechnology 3rd Semester

BIOCHEMISTRY—III

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) Catabolism and anabolism.
   (ii) Biological oxidation.
   (iii) Gluconeogenesis.
   (iv) Total ATP synthesis in glycolysis.
   (v) Adenosine triphosphate.
   (vi) Pyruvate dehydrogenase.
   (vii) ATP synthase.
   (viii) Chemiosmotic hypothesis.

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SECTION—B

2. Biological oxidation and reduction reaction.
3. Principles of bioenergetics.
4. Glycolysis.
5. Regulation of carbohydrate catabolism.
6. Amphibolic nature of Kreb's cycle.
7. Glyoxylate pathway.
8. Oxidative Phosphorylation.
9. Regulation of ATP synthesis.

SECTION—C

10. Mention the basic principle of metabolism and its relevance in living organism.
11. Write down the biosynthesis and degradation of Carbohydrates.
12. Explain Kreb's cycle and its regulation.
13. Discuss electron transport chain and its significance.

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Exam. Code : 107403

Subject Code : 2263

B.Sc. Biotechnology 3rd Semester

CELL BIOLOGY—A

Paper—BT-4

Time Allowed—3 Hours] [Maximum Marks—40

SECTION—A

Note :– Section—A is compulsory. Attempt **ALL** questions.

1. Define :

   (i) Cell Theory

   (ii) PPLO

   (iii) Ecology

   (iv) Hot spring

   (v) Cell interaction

   (vi) Cell matrix

   (vii) Membranes

   (viii) Liposomes. 1×8=8

SECTION—B

(Attempt any **five** questions)

2. Discuss the genetically similar cells.

3. Discuss the different types of cells.

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4. Discuss the ecological amplitudes of cells in sediments.
5. Discuss the ecological amplitudes of hot spring.
6. Discuss the extra cellular matrix.
7. Discuss the molecular mediated cell adhesion.
8. Discuss the architecture of membrane.
9. Discuss the lipids in membranes. 4×5=20

SECTION—C

(Attempt any **two** questions)

10. Discuss the solute transport across the membrane.
11. Discuss the regulation of receptors expression in cells.
12. Discuss the different types of cell-cell interactions. 6×2=12

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Exam. Code : 107403
Subject Code : 2264

B.Sc. Biotechnology 3rd Semester

BASIC CONCEPTS IN IMMUNOLOGY

Paper—BT-5

Time Allowed—3 Hours] [Maximum Marks—40

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

SECTION—A

Give a brief account of the following :—

1. Hapten.
2. Epitope.
3. Null cells.
4. Eosinophils.
5. Complement system activators of alternate pathway.
6. High affinity antibodies.
7. Nomenclature of the MHC class I and II antigens.
8. Give the role of Class I MHC molecules.

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SECTION—B

1. How adaptive immune response occurs ?
2. What is specificity and cross reactivity of immune reaction ?
3. Give the structure of Thymus.
4. Describe the heterogeneity of Lymphoid cells.
5. What are complement fixing antibodies ?
6. What do you understand by affinity and avidity of antibodies ?
7. Describe the structure of MHC class I molecules.
8. Give a detailed structure of T cell antigen receptor.

SECTION—C

1. Describe the approaches to study immune response.
2. Define secondary lymphoid organs and explain in detail lymph node and spleen.
3. Classify immunglobulins and give in detail their functions.
4. Give a detailed structure of Class II MHC molecules.

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Exam. Code : 107403
Subject Code : 2265

B.Sc. (Biotechnology) 3rd Semester

GENETICS

Paper—BT-6

Time Allowed—3 Hours] [Maximum Marks—40

Note :—Section A is compulsory. Each question carries **1** mark. Attempt **FIVE** questions from Section B. Each question carries **4** marks. Attempt **TWO** questions from Section C. Each question carries **6** marks.

SECTION—A

1. Define principle of segregation and independent assortment.
2. Differentiate between prokaryotic and eukaryotic chromosome.
3. What is heterochromatin ?
4. What do you understand by epistasis ?
5. What is the significance of Linkage ?
6. Mention different types of crossing over.
7. Differentiate between transduction and transformation.
8. Name physical and chemical mutagens.

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SECTION—B

1. Explain special chromosomes polytene and Lampbrush chromosomes with their significance.
2. Draw and describe centromere and telomere structure.
3. Discuss monohybrid, dihybrid and trihybrid crosses.
4. What is the importance of F2 ratio for interaction of genes ?
5. Explain mechanism of meiotic crossing over.
6. Describe chromosomal theory of linkage.
7. Highlight practical applications of mutation.
8. Write a note on Conjugation.

SECTION—C

1. Write an essay on satellite DNA and supercoiling of DNA.
2. Discuss in detail the Multiple allelism.
3. Describe factors affecting crossing over and coupling and repulsive hypothesis in Linkage.
4. Explain the molecular basis of mutations and significance of mutation.

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Exam. Code : 107403

Subject Code : 2266

B.Sc. Bio-Technology 3rd Semester

AGRO & INDUSTRIAL APPLICATIONS OF MICROBES–A

Paper—BT–7

Time Allowed—3 Hours] [Maximum Marks—40

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

SECTION—A

(Compulsory)

1. Write a brief account of the following

   (a) Which kind of industries fall under agro industry ?

   (b) What kind of products can be made in dairy industry ?

   (c) Give the role of temperature in preservation of culture.

   (d) Why is subculture necessary in maintenance of a microbe ?

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(e) Name two biopesticidal microbes.

(f) What are organic foods ?

(g) Which enzymes are used for clarification of the juices ?

(h) Enlist the contents of medium for a bacteria to grow.

SECTION—B

(Attempt **5** questions)

2. What are the basic requirements for a microbial quality control lab in the food industry ?

3. Describe the methodology to screen an industrially important microorganism by taking any example.

4. How can an important microbe be preserved ?

5. Describe the major classes of products of industrial importance from fungi.

6. What kind of selection pressure effects the maintenance of hyperproducing microbes ?

7. Write a note on the mutational programme of the pencillin producing microorganisms.

8. How can Rhizobium be applied as a biofertilizer ?

9. What is the importance of Azobacter in Agro industry ?

SECTION—C

(Attempt **2** questions)

10. Comment on food processing being viable as an industry and its present scenario in Punjab.

11. Describe the potential of genetic engineering of microbes for industrial purposes.

12. What do you understand by process optimization of industrial by important bacteria ?

13. Write notes on the importance of Anabaena and Agrobacterium in industry.

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Exam. Code : 107403
Subject Code : 2267

B.Sc. Bio-Technology 3rd Semester

Paper—ESL-221 : ENVIRONMENTAL STUDIES—I

Time Allowed—3 Hours] [Maximum Marks—50

Note :— (1) Attempt any ***three*** questions from Section-A and restrict your answers to ***two*** pages.

(2) Attempt any ***two*** questions from Section-B, restricting your answers to a maximum of ***four*** pages.

(3) Attempt any ***one*** question from Section-C, restricting your answer to a maximum of ***five*** pages.

SECTION—A

3×5=15

1. Describe in brief the causes of floods.
2. Write in brief about need for environmental awareness.
3. Write a brief note on food chain.
4. Write in brief about impacts of acid rain.
5. Write briefly about aims and objectives of NSS.

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SECTION—B

$2 \times 10 = 20$

6. Discuss the importance and scope of environmental studies in environmental protection.

7. Describe the various options of alternative energy resources to meet demand for energy.

8. Give a detailed account of structure of a pond ecosystem.

9. Consumerism has degraded environment. Justify.

SECTION—C

$1 \times 15 = 15$

10. What is an ecosystem ? Discuss various characteristic features, structure and function of a Grassland ecosystem.

11. Write in detail the philosophy, aims and objectives along with the organizational structure of NSS.