

Total No. of Questions :5]

SEAT No. :

P288

[Total No. of Pages : 2

[5524]-1

F.Y. B.Sc.

BIOTECHNOLOGY

CHEMISTRY

**Bb-101: Fundamental of Chemistry
(2013 Pattern)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *All questions carry equal marks.*
- 3) *Figures to the right indicate full marks.*
- 4) *Neat diagrams must be drawn wherever necessary.*
- 5) *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*

Q1) Answer the following:

[8×2=16]

- a) Distinguish between order and Molecularity.
- b) Define and explain the depression in freezing point.
- c) Explain oxidation and reduction reaction with examples.
- d) Define triple point and eutectic point.
- e) The kinetic energy of nitrogen gas at 300K is 20.041 kJ. Calculate the number of moles of a gas. [R=8.314 J/K/mole.]
- f) State and explain formation of covalent bond with suitable examples.
- g) What are amines? How are they classified?
- h) Define the terms:
 - i) Molality
 - ii) Mole fraction

Q2) Answer the following (Any four) :

[4×4=16]

- a) State and explain briefly the Markownikoff's rule as well as anti Markownikoff's rule.
- b) Give the difference between Sigma and Pi bond.
- c) Describe with the help of neat diagram, Landsberger Method for determination of Molecular weight of solute.
- d) The conductance in moles, at infinite dilution of NaCl, HCl and CH₃COONa are 126.45, 426.16, 91.0 respectively. What will be the conductance of CH₃COOH, at infinite dilution?

P.T.O.

- e) Explain paramagnetic nature of oxygen and di-magnetic nature of nitrogen with the help of molecular orbital energy level diagram.
- f) Draw schematically the phase diagram for sulphur system and apply Gibb's phase rule.

Q3) Answer the following (Any four) : **[4×4=16]**

- a) State the rules to determine the oxidation number.
- b) Explain the different types of molecular velocities and derive the relation between them.
- c) Define first order reaction. Derive the equation for rate constant.
- d) State the postulates of Heitler-London theory and Pauling-Slater theory.
- e) Give the types of substitution reaction and explain each type briefly. (SN¹ and SN²)
- f) For a certain reaction the rate constant 'R' is $2.86 \times 10^{-8} \text{ sec}^{-1}$ at 298 K and $4.65 \times 10^{-8} \text{ sec}^{-1}$ at 308 K. Calculate the energy of activation of the reaction. Given R= 1.987 cal/deg/mole.

Q4) Answer the following (Any two) : **[2×8=16]**

- a) Derive the expression for E.M.F. of the following cells,
 - i) Chemical cell with transference.
 - ii) Concentration cell without transference.
- b) What is hydrogen bonding? Explain the types of hydrogen bonding and its effect on physical as well as chemical properties.
- c) State the Faraday's laws of electrolysis and write a note on conductometric titration.

Q5) Attempt the following (Any One) : **[1×16=16]**

- a) What does it mean by isomerism? Give the classification of isomerism and explain each class briefly.
- b) What is activation energy? Derive the activation energy equation by graphical method and differential method. Derive the units for activation energy.



Total No. of Questions : 6]

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[5524]-101

S.Y. B.Sc.

BIOTECHNOLOGY

Bb-211 : Genetics and Immunology

(Semester - I) (2013 Pattern)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Draw neat and labelled diagrams wherever necessary.*

Q1) Answer the following.

[10×2=20]

- a) What is incomplete dominance. Give an example.
- b) Enlist the genes and products of arabinose operon.
- c) What are insertion sequences.
- d) What is pleiotropy.
- e) State the causes and symptoms of klinefelter syndrome.
- f) What is the difference between F⁺ and F⁻ strain.
- g) What are transition and transversion mutations.
- h) Define plasmids. Give any 2 examples.
- i) What are lethal genes.
- j) Define penetrance and expressivity.

Q2) Answer the following.

[5×2=10]

- a) Define artificial passive immunity with an example.
- b) State the difference between immunogen and antigen.
- c) Define epitope and paratope.
- d) Enlist any four functions of antibodies.
- e) Enlist the cells involved in adaptive immune response.

P.T.O.

Q3) Attempt any Three of the following. **[3×5=15]**

- a) Describe in detail the process of transformation in streptococcus.
- b) Discuss different types of mutagens with examples.
- c) Explain dominant epistasis with an example.
- d) Define chromosomal abberation. Add a note on aneuploidy.

Q4) Attempt any Three of the following. **[3×5=15]**

- a) Write a short note on Multiple alleles.
- b) Describe the transposons in yeast systems.
- c) Elaborate the concept of gene frequency and allelic frequency.
- d) Explain sex linked inheritance with an example.

Q5) Answer Any One of the following. **[10]**

- a) Compare and contrast complete and incomplete linkage with suitable examples.
- b) Describe in details the working of tryptophan operon.

Q6) Attempt Any Two of the following. **[2×5=10]**

- a) Discuss in details the various factors affecting immunogenicity.
- b) Describe ELISA and its applications.
- c) Define hypersensitivity. Explain any one type.
- d) Elaborate the role of bone marrow and thymus in immune function.



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

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[5524]-102

S.Y. B.Sc.

BIOTECHNOLOGY

Bb-212: Cell Biology

(2013 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Draw neat labelled diagrams wherever necessary.*

Q1) Answer in brief:

[10×2=20]

- a) What is MPF?
- b) Give the functions of cholesterol in plasma membrane.
- c) What are intermediate filaments?
- d) Define Osmosis.
- e) Explain facilitated diffusion.
- f) What is Neoplasia?
- g) Write the significance of 'G₁' phase.
- h) Define phagocytosis.
- i) Differentiate between open and closed mitosis.
- j) Explain Hyperpolarisation.

Q2) Short Notes (any three):

[3×5=15]

- a) Tight Junction.
- b) Ion channel receptor.
- c) Nuclear Pore Complex (NPC)
- d) Lysosomes.

P.T.O.

Q3) Attempt any three:

[3×5=15]

- a) Explain the mechanism synaptic transmission.
- b) Write the basic framework of Extra Cellular Matrix (ECM).
- c) Comment on the functions of vacuoles in plant cell.
- d) Write a note on various phospholipids present in plasma membrane.

Q4) a) Describe in detail structure and functions of mitochondria. [7]

b) Explain cyclic and Non cyclic photophosphorylation in chloroplast. [8]

OR

a) Describe in detail various steps involved in meiosis. [7]

b) Write a detailed notes on cell surface receptors. [8]

Q5) a) Explain in detail check points regulating cell cycle. [7]

b) Elaborate protein targetting to nucleus with suitable diagrams. [8]

OR

a) Describe extrinsic pathway of Apoptosis. [7]

b) Write a detailed Note on molecular mechanism of cancer. [8]

EEE

Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

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[5524]-103

S.Y. B.Sc.

BIOTECHNOLOGY

Bb-213: Environmental Biology and Biotechnology

(2013 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Draw neat labelled diagrams wherever necessary.*

Q1) Answer the following in short.:

[10×2=20]

- a) Define ecological succession.
- b) Short note on Inosphere.
- c) Enlist the factors responsible for entrophication.
- d) Define biogeochemical cycle.
- e) Compare Autogenic & Allogenic succession.
- f) Explain food web.
- g) What is EIA.
- h) Give applications of remote sensing in climate monitoring.
- i) Explain Environmental Audit.
- j) Define phytoremediation.

Q2) Write a note on (Any three):

[3×5=15]

- a) Biogeochemica cycle.
- b) GIS in environmental monitoring.
- c) Microbial Biodegradation of pesticides.
- d) Wild life protection act 1972.

P.T.O.

- Q3)** a) What is bio-remediation? Explain different types of bioremediation & give it's significance. [8]
b) Define phytogeography. Describe in detail the major terrestrial communities. [7]

OR

- a) Elaborate different methods of conservation of biodiversity. Give applications of biotechnology in conservation of biodiversity. [8]
b) What are the natural factors affecting the ecosystem. [7]

- Q4)** a) Describe in detail causes & effect of soil pollution. [8]
b) What is hazardous waste? Describe in detail any two methods of it's disposal. [7]

OR

- a) Describe different types of ecological succession what do you meant by pioneer species in ecological succession. [8]
b) With the help of diagram, describe cycling of carbon in biosphere. [7]

Q5) Write short notes on (any three): [15]

- a) Integrated waste management.
b) Ecosystem evolution.
c) Remote sensing.
d) Toxins in environment.

EEE

Total No. of Questions :5]

SEAT No. :

P289

[5524]-2

[Total No. of Pages : 3

F.Y. B.Sc. BIOTECHNOLOGY
Bb-102: Fundamentals of Physics
(2013 Pattern)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of calculator is allowed.*
- 4) *Neat and labelled diagrams must be drawn wherever necessary.*

Q1) Attempt all of the questions.

[8×2=16]

- a) What is a system of unit? List different systems.
- b) Define : (i) elasticity and (ii) elastic limit.
- c) Explain (i) reflection and (ii) refraction of light.
- d) State the uses of ultrasonic waves.
- e) What do you mean by charge of substance? Explain the conservation of charge.
- f) Define: (i) streamline and (ii) turbulent flow of a liquid.
- g) What is magnetosphere?
- h) Define: (i) specific heat and (ii) latent heat of a substance

Q2) Attempt ANY FOUR of the following :

[4×4=16]

- a) Briefly discuss the inter-relationship between physics and life sciences.
- b) Explain the construction and working of a mercury barometer. Write the appropriate formula.
- c) Define : (i) Stress and strain (ii) young's modulus (iii) Bulk modulus and (iv) modulus of rigidity.
- d) Define fundamental and derived quantities. List the seven important fundamental quantities along with appropriate units and symbols.
- e) State Doppler's effect. Derive an expression for apparent frequency when the source is moving towards and away from a stationary observer.

P.T.O.

- f) Define (i) angle of contact, (ii) capillarity and (iii) surface tension of a liquid. Write the appropriate formula to determine the surface tension of a liquid using angle of contact.

Q3) Attempt ANY FOUR of the following : **[4×4=16]**

- a) Write a note on thermal equilibrium. Hence state the zeroth law of thermodynamics.
- b) Define (i) critical pressure, (ii) critical volume, (iii) critical temperature and (iv) critical coefficients of Van der waal's gas.
- c) State and explain Gauss's Law in magnetism.
- d) What are the conditions of a good refrigerant.
- e) Distinguish between conductors and insulators.
- f) Write down the conditions for sustained interference.

Q4) Attempt ANY TWO of the following : **[2×8=16]**

- a) What is biomagnetism? Discuss biomagnetism in animals, birds and humans.
- b) Explain Coulomb's law of electrostatic force. Express Coulomb's law in vector form. The radius of any standard nucleus is 10^{-15} m. What would be the electrostatic force between two protons situated at the edge of the nucleus along its diameter?

(Given: Charge of proton = 1.6×10^{-19} C, $\frac{1}{4\pi\epsilon_0} = 9 \times 10^9$ Nm²/C²)

- c) State and derive Poiseuille's law for the flow of liquid through a capillary tube. Give the physical significance of Poiseuille's equation.
- d) State the first law of thermodynamics. Discuss its applications for i) isochoric process and ii) Cyclic process.

At normal temperature (0°C) and normal pressure (1.013×10^5 pa) when 1 gm of water freezes, its volume increases by 0.091 cm³. Calculate the change in internal energy. (Given : Latent heat of ice L = 80 cal/gm)

Q5) Answer ANY ONE :

[1×16=16]

a) Define:

- i) Spontaneous emission
- ii) Stimulated emission
- iii) Optical pumping
- iv) Population inversion

Give any four applications of LASER light.

b) Define:

- i) Plane polarized light
- ii) Unpolarized light
- iii) Partially polarized light
- iv) Plane of polarization

Explain polarization by reflection. State and prove Brewster's law of polarization.

OR

a) Define magnetization (\overline{M}) and magnetic susceptibility (χ_m).

Distinguish diamagnetic, paramagnetic, and ferromagnetic substances.

b) Define thermal efficiency (η) and coefficient of performance (β) of a refrigerator. Obtain the relationship between them.

A refrigerator works under reversible cycle between temperatures 177°C and 327°C . Calculate (i) Thermal efficiency and (ii) Coefficient of performance.



Total No. of Questions :6]

SEAT No. :

P300

[5524]-202

[Total No. of Pages : 2

S.Y. B.Sc.

BIOTECHNOLOGY

**Bb - 222 : Plant and Animal Development
(2013 Pattern) (Semester - II)**

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Answers to the two sections should be written on separate answer sheets.*
- 3) *Draw neat diagrams wherever necessary.*
- 4) *Figures to the right indicate full marks.*

SECTION - I

(Plant Development)

Q1) Answer in 2-3 sentences.

[5×2=10]

- a) What is differentiation?
- b) Write role of tapetum.
- c) What is commitment in plant?
- d) Enlist types of ovules.
- e) Write a note on double fertilization.

Q2) Answer any four of the following :

[4×5=20]

- a) Explain role of environmental Inductive stimuli in flowering.
- b) Write a note on ageing and senescence.
- c) Describe principles involved in plant development.
- d) Elaborate factors involved in in-vitro organogenesis.
- e) Discuss vegetative patterning in plant development.

Q3) Attempt any one :

[1×10=10]

- a) Explain in detail molecular regulation on development in 'Arabidopsis'.
- b) Describe embryogenesis in monocot with labelled diagram.

P.T.O.

SECTION - II

(Animal Development)

Q4) Answer the following : **[5×2=10]**

- a) Explain the fast block mechanism to avoid polyspermy.
- b) Write any two types of blastula.
- c) Define the term vitellogenesis.
- d) What is primary induction?
- e) Define the term teratogenesis.

Q5) Attempt the following (Any 4) : **[4×5=20]**

- a) Explain in detail about the process of oogenesis.
- b) What is holoblastic cleavage? Describe different types of holoblastic cleavage with suitable examples.
- c) Define the term apoptosis. Explain extrinsic pathway.
- d) Describe different types of regeneration in animal with suitable examples.
- e) Explain the term cell lineage with example.
- f) Explain the role of Gap genes & pair rule genes in Drosophila patterning.

Q6) Attempt any one of the following : **[1×10=10]**

- a) Describe the process of gastrulation in chick embryo.
- b) What are stem cells? Describe types of stem cells with characteristic features and suitable examples.



Total No. of Questions : 3]

SEAT No. :

[Total No. of Pages : 1

P301

[5524]-203

S.Y. B.Sc.

BIOTECHNOLOGY

Bb-223: Scientific Writing and Communication

(2013 Pattern) (Semester - II)

Time : 2 Hours]

[Max. Marks :40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*

Q1) Answer in brief:

[5×2=10]

- a) Define prepositions with examples.
- b) Give the meaning of the terms - accent and pronunciation.
- c) What is an Abstract?
- d) What are antonyms?
- e) What is prefix and suffix?

Q2) Write short notes on (any 4):

[4×5=20]

- a) Statistical Data Analysis?
- b) Deductive and Inductive reasoning.
- c) Guidelines for Authors.
- d) Literature survey.
- e) Material and methods in a Research Article.
- f) Hypothesis and Law.

Q3) Attempt any one of the following:

[1×10=10]

Describe the sequence in which the contents should be organized in a Research Article.

OR

Write a detailed note on planning and organization of an oral presentation.



Total No. of Questions : 3]

SEAT No. :

[Total No. of Pages : 2

P302

[5524]-204

S.Y. B.Sc.

BIOTECHNOLOGY

Bb-224 : Metabolic Pathways

(2013 Pattern) (Semester-II)

Time : 2 Hours]

[Max. Marks :40

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*

Q1) Answer in 2-3 sentences

[5×2=10]

- a) Give the significance of oxidative phase of HMP shunt.
- b) Name the different complexes involved in ETC.
- c) Define: Enzyme activity, Turnover number.
- d) Write the reaction catalysed by Rubisco.
- e) What are Ketogenic amino acids. Give two examples.

Q2) Attempt any FOUR

[4×5=20]

- a) Define K_m . Calculate V_o when substrate concentration is $2 K_m$.
- b) What are ketone bodies. How are they synthesized.
- c) Gluconeogenesis is not the exact reversal of glycolysis. Justify.

P.T.O.

- d) Differentiate between cyclic and noncyclic photophosphorylation.
- e) Write the reaction catalysed by glutamate amino transferase and alanine amino transferase.
- f) Write the significance of NADPH in biological system.

Q3) Attempt any ONE

[1×10=10]

- a) Explain in detail activation, transport and β oxidation of stearic acid. Give its energetics.
- b) Discuss in detail reaction in TCA cycle. TCA is central pathway in metabolism. Justify.



Total No. of Questions : 8]

SEAT No. :

P290

[5524]-3

[Total No. of Pages : 2

F.Y. B.Sc. BIOTECHNOLOGY

**Bb. - 103 : Basics of Plant and Animal Sciences
(2013 Pattern)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *Answer to the two sections should be written in separate answer books.*
- 2) *All questions are compulsory.*
- 3) *Neat labelled diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

SECTION - I

(Plant Science)

Q1) Answer the following questions.

[4×2=8]

- a) Define suckers and give two examples.
- b) Enlist any two unique features of plant cell.
- c) Define endosmosis.
- d) What is inflorescence?

Q2) Write short notes on (Any two) :

[2×4=8]

- a) Important characters of angiosperms.
- b) Modifications of root
- c) Fungi

Q3) Attempt the following (Any two):

[2×4=8]

- a) What is diffusion? Give its significance.
- b) Discuss essential nutrients for growth and development of plant.
- c) Give distinguishing characters of algae.

Q4) Answer in detail (Any two)

[2×8=16]

- a) Explain in brief photo-morphogenesis
- b) Discuss in detail respiration.
- c) Explain in detail photophosphorelation.

P.T.O.

SECTION - II
(Zoology)

Q5) Answer the following questions: **[4×2=8]**

- a) Give any two examples of phylum echinodermata.
- b) What is a myelinated nerve fibre?
- c) Mention any two characteristic features of mollusca.
- d) What are trophic hormones?

Q6) Write short note on (Any Two) : **[2×4=8]**

- a) Excretory system of Frog.
- b) Hormones of Adrenal Medulla.
- c) Structure and functions of smooth muscle.

Q7) Attempt the following (Any Two) : **[2×4=8]**

- a) Explain the effect of pH on oxygen-dissociation curve.
- b) Give an account on products obtained from Apiculture.
- c) Explain the characteristic features of Aves.

Q8) Answer the following (Any Two) : **[2×8=16]**

- a) Give a detailed account on sericulture.
- b) Describe the life cycle and parasitic adaptations of liver fluke
- c) Write a note on structure and function of spiral cord.



Total No. of Questions : 5]

SEAT No. :

P303

[Total No. of Pages : 2

[5524]-301

T.Y. B.Sc.

BIOTECHNOLOGY

Bb-331 : Microbial Biotechnology

(2013 Pattern) (Semester - III)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Draw neat labelled diagrams wherever necessary.*
- 3) *Figures to the right indicate full mark.*

Q1) Answer all of the following in 2-4 lines.

[20]

- a) Give significance of normal flora in human health.
- b) Define field coefficient?
- c) What is TDP?
- d) What is Saurkraut?
- e) Enlist various sources of contamination of milk.
- f) Write applications of Eijkman test.
- g) What is MEOR?
- h) Enlist different microbes used as biofertilizer and biopesticide.
- i) What are growth linked products? Give examples.
- j) What is false presumptive test?

Q2) Attempt the following questions (Any Three)

[15]

- a) Describe Monod's equation in detail.
- b) Enlist different added preservations used in food preservation. Explain mode of action of any two.
- c) Explain different methods used to remove turbidity in drinking water purification.
- d) Describe Biotransformation with suitable example.

P.T.O.

Q3) Write short notes on (Any Three)

[15]

- a) Spoilage of fruit and vegetable.
- b) Microbial Sweetners.
- c) Colour defects in milk.
- d) H A C C P.

Q4) a) Explain any two secondary methods of sewage treatment.

[8]

OR

Describe food infection and food intoxication with suitable example.

- b) Describe any two methods of immobilization of enzyme/cell and write its applications. **[7]**

OR

Classify organisms based on salt requirement for growth add note on adaptations in halophiles.

Q5) Attempt any one of the following.

[15]

- a) Describe various methods used for grading of milk and add a note on preservation of milk.
- b) Describe disease Polio with respect to
 - i) Causitive agent.
 - ii) Symptoms.
 - iii) Pathogenesis.
 - iv) Diagnosis.
 - v) Treatment.



Total No. of Questions : 6]

SEAT No. :

P304

[Total No. of Pages : 3

[5524]-302

T.Y. B.Sc.

BIOTECHNOLOGY

Bb-332 : Plant & Animal Tissue Culture

(Semester - III) (2013 Pattern)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Draw neat labelled diagrams wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Answer to each section should be written in separate answer books.*

SECTION - I

Plant Tissue Culture

Q1) Answer in brief.

[5×2=10]

- a) Explain the term dedifferentiation.
- b) Enlist two applications of pollen culture.
- c) Explain somatic embryo.
- d) Draw neat labelled diagram of Horizontal Laminar Air Flow.
- e) Define an explant.

Q2) Answer any four.

[4×5=20]

- a) Write a note on embryo culture & Give its applications.
- b) Explain surface sterilization technique w.r.t. explant.
- c) Write role of various phytohormones used in tissue culture media.
- d) What are protoplasts. Describe methods of its isolation.
- e) Explain in detail, endosperm culture.
- f) Give the applications of suspension culture.

P.T.O.

Q3) Answer any One

[1×10=10]

- a) Differentiate between direct & indirect organogenesis. Describe the various factors affecting organogenesis. Add a note on the application of organogenesis in plant tissue culture.

OR

- a) What is totipotency? Explain its role in tissue culture & give detail applications of plant tissue culture.

SECTION - II

Animal Tissue Culture (ATC)

Q4) Answer the following in 3-4 lines.

[5×2=10]

- a) Give role of phenol red in ATC media.
- b) Define monolayer culture.
- c) Organic material should not be kept in laminar air flow cabinet when U.V. is switched on. State true or false & Justify.
- d) Define cell line.
- e) Give applications of cell repositories.

Q5) Answer the following. (Any Four)

[4×5=20]

- a) Define vital stain. Add a note on its applications in ATC.
- b) What is organ culture. Explain advantages & disadvantages of organ culture.
- c) Write characteristics of transformed cell lines.

- d) Explain aseptic culture conditions in ATC.
- e) Give advantages & disadvantages of serum in ATC medium.
- f) Give comparative account of finite vs infinite cell lines.

Q6) Explain different methods of cell disaggregation in detail. **[10]**

OR

Write a note on cryopreservation. Explain it's need in ATC and also comment on role of cryoprotectants during cell preservation. **[10]**



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

P305

[5524]-303

T.Y. B.Sc.

BIOTECHNOLOGY

Bb-333: Biodiversity and Systematics

(2013 Pattern) (Semester - III)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Draw neat and labelled diagrams.*

Q1) Answer the following in short (2-3 sentences):

[10×2=20]

- a) Define Biodiversity hotspots.
- b) Enlist importance of systematics.
- c) Explain alpha diversity.
- d) What is carrying capacity of an ecosystem.
- e) Define habit and habitat.
- f) Define population richness.
- g) Define mutualism.
- h) Enlist applications of biodiversity data bases.
- i) Explain allopatric speciation.
- j) Define Endangered species.

Q2) Write short notes on (any 3):

[3×5=15]

- a) Importance of biodiversity for food., fodder and fibre.
- b) Age class distribution of a population.
- c) Outcomes of Rio conference.
- d) Livestock diversity of India.

P.T.O.

Q3) Answer the following (any 3):

[3×5=15]

- a) What is Biome? Elaborate on Aquatic biomes with suitable examples.
- b) Explain the reasons responsible for population fluctuations.
- c) Importance of molecular tools in biosystematics - Explain.
- d) Explain any two behaviour patterns of animals.

Q4) a) Write a note on methods used in in-situ conservation & justify its significance over ex-situ conservation. **[8]**

b) Explain the mathematical model of competition. **[7]**

OR

a) Explain current methods applied in the analysis of biodiversity and supplement it with a note on indices used in biodiversity analysis. **[8]**

b) What is Prey-predator dynamics? Explain with the help of model. **[7]**

Q5) Write short note on (any 3):

[3×5=15]

- a) Chemotaxonomy.
- b) Domesticated plants.
- c) IUCN categories.
- d) Sancturaries.

EEE

Total No. of Questions :5]

SEAT No. :

P307

[5524]-402

[Total No. of Pages : 2

T.Y. B.Sc.

BIOTECHNOLOGY

Bb-342 : Biochemical and Biophysical Techniques

(2013 Pattern) (Semester - IV)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Draw neat labelled diagrams wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer the following in 2-4 lines :

[10×2=20]

- a) What are strong and weak acids?
- b) What do you mean by chromophores?
- c) Define Molar Extinction Coefficient.
- d) What is retardation factor?
- e) Define Wavelength.
- f) Give the use of SDS in PAGE.
- g) What is numerical aperture of microscope?
- h) What is intrinsic fluorescence?
- i) Define sedimentation coefficient.
- j) What is bright field microscopy?

Q2) Attempt the following questions. (any three)

[3×5=15]

- a) Explain hypochromic and hyperchromic shift.
- b) Describe analytical and instrumental errors in experimentation.
- c) The molecular weight of sucrose is 342. Calculate the amount of sucrose that will be used to prepare :
 - i) 300 ml of 7% solution
 - ii) 100 ml of 0.5 M solution
- d) The molecular weight of NaOH is 40. How will you prepare 250 ml of 2.5 N solution. What will be the volume of above solution used to prepare 300 ml of 1 N solution.

P.T.O.

Q3) Write short notes on any three:

[3×5=15]

- a) SDS - PAGE
- b) gel filtration
- c) Inverted microscopy
- d) Biological hazards in laboratory.

Q4) a) What is affinity chromatography? Explain different types and give its applications. **[8]**

b) Give principle and applications of pulse field gel electrophoresis **[7]**

OR

a) Explain the principle and applications of confocal microscope. **[8]**

b) What are buffers? Explain their importance in biological systems with suitable examples. **[7]**

Q5) Attempt any one :

[1×15=15]

a) What is spectroscopy? Give the principle, instrumentation and working of UV-visible spectrophotometer. Add a note on its applications.

b) Discuss centrifugation with respect to :

- i) Types of centrifugation
- ii) Angular velocity and R.C.F.
- iii) Density gradient centrifugation
- iv) Types of rotors
- v) Applications of centrifugation in biology



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

P308

[5524]-403

T.Y. B.Sc.

BIOTECHNOLOGY

Bb-343: Recombinant DNA Technology

(2013 Pattern) (Semester - IV)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Draw neat labelled diagrams wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer the following in 2-3 lines:

[20]

- a) Plasmid.
- b) Annealing, Temperature.
- c) Electroporation.
- d) Palindromic sequences.
- e) Multiple cloning site.
- f) Transfection.
- g) How will you determine purity of DNA.
- h) Expression vector.
- i) Origin of replication.
- j) Milestones in genetic engineering.

Q2) Attempt the following (any 3):

[15]

- a) Explain Maxam Gilbert method for DNA sequencing.
- b) Write a note on DNA fingerprinting.
- c) Discuss λ phage as a gene cloning vector.
- d) Applications of genetic engineering in Agriculture and Pharmaceutical industry.

P.T.O.

Q3) Answer the following questions (any 3): **[15]**

- a) Explain the method of site directed mutagenesis for gene manipulation.
- b) Discuss the biosafety guidelines for the use of genetically modified organisms.
- c) How does the alkaline lysis solution I, II and III helps in isolation of plasmid DNA and not the genomic DNA.
- d) Explain the importance of genome mapping in genomic studies.

Q4) a) With the representative example explain how Bacterial Artificial chromosome is used for sequencing projects. **[8]**

- b) Discuss the recipe for carrying the polymerase chain reaction with their appropriate roles. **[7]**

OR

a) Explain the automation and uses of sanger's method of sequencing in sequencing projects. **[8]**

- b) Enlist the methods used for transformation in animals. Discuss any one in detail. **[7]**

Q5) Strategically explain the construction of cDNA library w.r.t. **[15]**

- Method
- Primers
- Vector - lost pair
- Screening of recombinants
- applications

OR

a) Discuss the molecular tools used in genetic manipulations. **[8]**

- b) How will you transfer your gene of interest (GoI) in plant cells. **[7]**

EEE

Total No. of Questions :5]

SEAT No. :

P292

[Total No. of Pages : 2

[5524]-5

F.Y. B.Sc.

BIOTECHNOLOGY

**Bb - 105 : Fundamentals of Biological Chemistry
(2013 Pattern)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Draw neat labelled diagram wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Attempt all the following questions.

[8×2=16]

- a) Define dissociation constant.
- b) Name a fatty acid with four double bonds. Also indicate position of double bonds.
- c) Define glycosidic bond.
- d) Give two features of peptide bond.
- e) What are storage polysaccharides? Give two examples.
- f) What are essential fatty acids? Give two examples.
- g) Give any one chemical reaction used for detection of amino acids.
- h) What are allosteric enzymes?

Q2) Attempt any four of the following :

[4×4=16]

- a) Define buffer. Write its main constituents and principles of Buffer action.
- b) What are steroids? Write its various functions.
- c) What is the difference in structure of amylase and amylopectin? Explain.
- d) Define phosphodiester bond. Show Hydrogen bonding between Adenine and Thymine.
- e) Briefly explain quaternary structure of protein with an example.
- f) Describe the difference between lock and key model and Induced fit hypothesis of enzyme activity.

P.T.O.

Q3) Attempt any four of the following : **[4×4=16]**

- a) Phospholipids are amphipathic in nature. Justify.
- b) Write structures of Uracil, phosphatidylcholine, fructose and reducing sugar.
- c) Explain the role of water in biological systems.
- d) What are structural polysaccharides? Give one example with structure.
- e) Describe Transition state hypothesis.
- f) Glucose exhibits the phenomenon of mutarotation. Explain.

Q4) Attempt any two of the following : **[2×8=16]**

- a) Explain α -helix and β -pleated structure of proteins.
- b) Give structure and biochemical role of thiamine pyrophosphate and FMN as co-enzymes.
- c) Explain salient features of Watson-Crick Model of DNA with suitable diagram.

Q5) Attempt any one of the following **[1×16=16]**

- a) Explain classification of amino acids based on R group.
- b)
 - i) Give a detailed account of enzyme classification.
 - ii) With neat labelled diagram, explain structure of peptidoglycan and give its significance.



Total No. of Questions : 5]

SEAT No. :

P293

[Total No. of Pages : 2

[5524]-6

F.Y. B.Sc.

BIOTECHNOLOGY

Bb-106: Biophysics and Instrumentation

(2013 Pattern)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Draw neat of labelled diagrams wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of scientific calculator is allowed.*

Q1) Attempt all of the following.

[8×2=16]

- a) Define Rydberg's constant.
- b) What are Infra-red waves? Give its application.
- c) Define Isobars.
- d) What is Action Potential?
- e) What are homeothermic animals.
- f) Give applications of Mass Spectroscopy.
- g) What is refraction of light?
- h) What is chromatic aberration?

Q2) Attempt Any Four of the following.

[4×4=16]

- a) Describe Sommerfield's relativistic atom model.
- b) Give principle, construction and working of flurometer.
- c) What are Gamma (γ) rays. Give their properties.
- d) With neat labelled diagram explain Fluid Mosaic Model.

P.T.O.

- e) Explain bimetallic Thermometer. Give its application.
- f) Explain dark field microscope.

Q3) Attempt Any Four of the following. [4×4=16]

- a) 1 gram of radium is reduced by 2.1 milligram in 5 years by α -decay. Calculate the half life period of radium.
- b) Discuss electromagnetic wave spectra.
- c) Write a Note on ECG.
- d) Describe Hertz experiment to demonstrate electromagnetic wave.
- e) Describe RIA (radio immuno assay). Give its application.
- f) Give principle, construction and working of pH meter.

Q4) Attempt Any Two of the following. [2×8=16]

- a) Describe scanning electron Microscope.
- b) Explain Energy level diagram of Hydrogen atom.
- c) Explain Emission spectra of sodium atom.
- d) Explain G.M. counter.

Q5) Attempt any one of the following. [1×16=16]

- a) Give principle, working and applications of scintillation counter.
- b) Describe in detail liquid drop and shell model of Nucleus.



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

P294

[5524]-7
F.Y. B.Sc.
BIOTECHNOLOGY
Bb-107 : Microbiology
(2013 Pattern)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Draw neat labelled diagrams wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Answer the following.

[8×2=16]

- a) Enlist four distinguishing characters of fungi.
- b) What is role of fixative and accentuator in staining?
- c) Give mode of action of chlorine on microorganism?
- d) What is breeds count?
- e) Define mixed culture. Give 2 examples.
- f) Enlist any two human diseases caused by bacteria and viruses each and its respective causitive agent.
- g) State Koch's postulate.
- h) What is commensalism? Give one example.

Q2) Attempt Any Four of the following.

[4×4=16]

- a) Discuss role of Louis Pasteur in development of Microbiology.
- b) Explain any one method to obtain pure culture.
- c) What are biosafety measures? State its importance in handling microorganisms.

P.T.O.

- d) What is Selective Media? Write role of selective agent in Selective Media with example.
- e) Describe construction, working and use of Autoclave.
- f) Write distinguishing characters of cyanobacteria. Add its economic importance.

Q3) Write self explanatory note on any four of the following. **[4×4=16]**

- a) Archaeobacteria.
- b) Lysogeny.
- c) Radiation as a sterilizing agent.
- d) Biogenesis vs Abiogenesis
- e) Theories of staining.
- f) Ultrastructure of Endospore.

Q4) Attempt Any Two of the following. **[2×8=16]**

- a) What is differential staining? Describe principle, procedure and application of blood staining.
- b) Discuss different classes of bacteria on the basis of nutritional requirement.
- c) Explain Plant-Microbe interaction with any one example.

Q5) Describe in detail structure of Gram negative bacterial cell wall. Add note on principle of Gram staining. **[16]**

OR

With neat labeled diagram explain different phases of bacterial growth curve. Add a note on any one method for cell enumeration.



Total No. of Questions : 5]

SEAT No. :

P295

[Total No. of Pages : 2

[5524]-8
F.Y. B.Sc.
BIOTECHNOLOGY
Bb-108 : Computers and Applications
(2013 Pattern)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Draw neat and labelled diagrams whenever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Attempt all of the following.

[8×2=16]

- a) What is the role of an operating system?
- b) Differentiate between MAN and LAN.
- c) Which Linux commands are used for directory manipulation?
- d) What is a bridge? Give its use.
- e) List different types of computer viruses.
- f) Give use of RAM and ROM.
- g) What is an attribute? List different types of attributes.
- h) What are the differences between high level programming languages and low level programming languages?

Q2) Attempt Any Four of the following.

[4×4=16]

- a) What is a network topology? Explain any one in detail.
- b) Write advantages of DBMs over file system.
- c) Discuss in short working of Laser Printer.
- d) Explain various ways in which a virus can attack a computer system.
- e) Write a short note on relational data model.

P.T.O.

Q3) Attempt Any Four of the following.

[4×4=16]

- a) What is an abstraction? Discuss three levels of abstraction.
- b) What are input devices? Explain any one in detail.
- c) List various types of cables used in computer networking. Explain any one in detail.
- d) What is an algorithm? Explain its characteristics.
- e) What are different storage devices used in computer? Explain any one in detail.

Q4) Attempt Any Two of the following.

[2×8=16]

- a) Explain different generations of computers in detail.
- b) Write a short note on Medline.
- c) What are different types of graphs used in Ms-Excel? Give steps of creation of any one graph.

Q5) Attempt all of the following.

[2×8=16]

- a) Write an algorithm and draw a flowchart to display fibonacci series upto n terms.

OR

Write an algorithm and draw a flowchart to find maximum of 3 numbers.

- b) Explain ISO-OSI model in detail.

OR

Write an algorithm and flow chart to find the reverse of a given number.

