

Total No. of Questions : 5]

SEAT No. :

P531

[Total No. of Pages : 3

[5424]-1

F.Y. B.Sc. (Biotechnology)

CHEMISTRY

Bb-101: Fundamentals of Chemistry  
(2013 Pattern)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) Neat diagram must be drawn wherever necessary.
- 2) Figures to the right indicate full marks.
- 3) All questions carry equal marks.
- 4) Use of logarithmic table and calculator is allowed.
- 5) All questions are compulsory.

Q1) Answer the following :

[8 × 2 = 16]

- a) What is isomerism? How are they classified?
- b) Define triple point and eutectic point.
- c) Determine the number of phases, component and degree of freedom for the following system in closed vessel.  $\text{CaCO}_{3(s)} \rightleftharpoons \text{CaO}_{(s)} + \text{CO}_{2(g)}$
- d) Define the order of reaction and find out the order of reaction, if it obey the rate expression. Rate = k [A]<sup>1</sup> [B]<sup>2</sup>.
- e) What are amines? How are they classified?
- f) State and explain the formation of metallic bond with example.
- g) Define most probable velocity and root mean square velocity.
- h) Write IUPAC name and structure of Glycerol and C<sub>4</sub>H<sub>10</sub>O.

P.T.O.

**Q2)** Answer the following (Any four) : **[4 × 4 = 16]**

- a) Draw different conformations of propane and comment on the stability and energy with the help of energy profile diagram.
- b) Explain the Avogadro's law and Boyle's law as well as deduce these laws from kinetic gas equation.
- c) What are alcohols? Give their classification and explain each one of them.
- d) What is the first order reaction? Derive the rate constant for first order reaction.
- e) Comment on changes in B.P, M.P, solubility and volatility of substances.
- f) Describe with the help of neat diagram, Landsberger's method for determination of molecular weight of solute.

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

- a) Define energy of activation. How is it determine by graphical method.
- b) For a certain reaction the rate constant  $k$  is  $6.08 \times 10^{-4} \text{ sec}^{-1}$  at 300k and  $8.75 \times 10^{-2} \text{ sec}^{-1}$  at 325k. Calculate the energy of activation of the reaction. ( $R = 8.314 \text{ J/k/mole}$ ).
- c) State the rules to determine the oxidation number.
- d) Give the types of substitution reaction and explain each type briefly. ( $\text{SN}^1$  and  $\text{SN}^2$ ).
- e) What is a single electrode potential? Derive the Nernst equation for the following reaction.  $a\text{A} + b\text{B} \rightleftharpoons c\text{C} + d\text{D}$
- f) Write a note on cell constant and explain the variation of equivalent conductance with concentration.

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

- a) What is second order reaction? Derive the expression for rate constant and derive the units and half life for it.
- b) What is hydrogen bonding? Explain the types of hydrogen bonding and its effect on physical & chemical properties.

- c) Draw the neat phase diagram of Sulphur system. Explain the areas, curves and triple point with reference to phase rule.
- d) How would you determine dissociation constant of weak acid? Explain the determination of dissociation for strong electrolyte cannot follow same manner.

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

- a) What are phenols? Explain the physical and chemical properties of phenols. Describe different methods of preparation.
- b) Give and explain the postulates of kinetic theory of gases and derive the

equation,  $PV = \frac{1}{3}nmv^2$ .



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SEAT No. :

**P539**

[Total No. of Pages : 2

**[5424]-101**

**S.Y. B.Sc.**

**BIOTECHNOLOGY**

**Bb-211: Genetics & Immunology  
(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 and labelled diagrams wherever necessary.*

**Q1)** Answer the following :

**[10 × 2 = 20]**

- a) Define incomplete dominance with example.
- b) What is meant by complementary gene action?
- c) What are different symbols used in pedigree analysis?
- d) What is nullisomy?
- e) What is tautomerism?
- f) What is plasmid incompatibility?
- g) Define the terms inducer and repressor.
- h) Give two points of differentiation between generalized transduction and specialized transduction.
- i) What are lethal genes?
- j) State Hardy-Weinberg principle.

**Q2)** Answer the following :

**[5 × 2 = 10]**

- a) Enlist any two T-cell subtypes with their function.
- b) What is epitope?
- c) What is CDR?
- d) Enlist any two characteristics of antigen-antibody reaction.
- e) Enlist any two mechanisms of innate immunity.

**P.T.O.**

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

- a) Explain dominant epistasis with suitable example.
- b) 'Gene linkage influences Mendelian ratio'. Justify with example.
- c) Give an account of bacterial transformation.
- d) What are chromosomal aberrations? Explain duplication in detail.

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

- a) Write a note on unordered tetrad analysis.
- b) What are base analogues? Explain mechanism of mutation with example.
- c) Justify - Human blood group is the example of co-dominance, multiple allele and complete dominance.
- d) Explain inversion and its types.

**Q5)** Attempt any One of the following : **[10]**

- a) With the help of neat, labelled diagram, explain 'trp' operon.
- b) What is structure of transposable elements in prokaryotes? Explain their mechanisms of transposition. Comment on its significance.

**Q6)** Attempt any Two of the following : **[2 × 5 = 10]**

- a) Explain with neat and labelled diagram, structure and function of lymph node.
- b) Comment on radioimmunoassay.
- c) Differentiate between active and passive immunity.
- d) Give an account of delayed hypersensitivity reaction.



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SEAT No. :

**P540**

[Total No. of Pages : 2

**[5424]-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) Enlist the differences between plant & animal cells.
- b) What is cytokinesis.
- c) Explain role of Cdks.
- d) Comment on role of cholesterol in lipid bilayer.
- e) Explain - Facilitated diffusion.
- f) Define - Synapse.
- g) Give a role of signal sequences.
- h) What are plasmodesmata?
- i) Define neoplasia.
- j) What are anti-oncogenes?

**Q2)** Short notes (Any three) :

**[3 × 5 = 15]**

- a) Vacuoles.
- b) Secondary cell wall in plants.
- c) Coat proteins in vesicle based transport.
- d) Extrinsic pathway of apoptosis.

**P.T.O.**

**Q3)** Attempt any three : **[3 × 5 = 15]**

- a) Describe the process of sorting of lysosomal hydrolases.
- b) Write a short note on membrane repolarization & depolarization.
- c) Differentiate between pinocytosis & phagocytosis. Add a note on phagocytosis.
- d) Draw neat labelled diagram of ATP synthase..

**Q4)** a) Explain the structure & function of calcium ATPase. Add a note on role of calcium ion channels in cytosolic calcium ion concentration. **[7]**

b) Differentiate between cyclic & non-cyclic photophosphorylation. **[8]**

OR

a) Explain the mechanism of nuclear import. **[7]**

b) Give an account on events in meiosis - I **[8]**

**Q5)** a) Describe Calvin cycle of carbon fixation. **[7]**

b) Give an account on proteins in plasma membrane. **[8]**

OR

a) Explain in detail structure & function of endoplasmic reticulum. **[7]**

b) Describe the organization of cytoskeleton in non-dividing cells. **[8]**



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SEAT No. :

**P541**

[Total No. of Pages : 2

**[5424]-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 :

**[20]**

- a) Define mesarch.
- b) What is leachate?
- c) Define biomagnification.
- d) What is Polyclimax theory?
- e) Define cybernetics.
- f) Enlist types of ecosystem.
- g) Define stratopause.
- h) What is radiation pollution?
- i) Define entropy.
- j) What are threatened species?

**Q2)** Attempt any three of the following :

**[15]**

- a) What is GIS? Give applications of GIS.
- b) Give significance of biosensors in environmental monitoring.
- c) Write note on energy budget.
- d) Write in brief about Ozone layer.

**P.T.O.**



- Q3)** a) What is heavy metal pollution? Explain causes and effects of heavy metal pollution. [8]  
b) Enumerate 'Y' shaped energy flow model. [7]

OR

- a) Discuss the biotic and abiotic factors of terrestrial ecosystem. [8]  
b) What are bioindicators? Enlist and explain various bioindicators. [7]

- Q4)** a) Define in-situ conservation. Discuss methods of in-situ conservation with its significance and limitations. [8]  
b) What is EIA? Explain EIA with case study. [7]

OR

- a) Give detailed account of biological waste water treatment. [8]  
b) Explain the sources of air pollution. Add note on Acid rain. [7]

- Q5)** Write short notes on (Any three) : [15]  
a) Ecological succession.  
b) Nitrogen cycle.  
c) 'Agenda 21'.  
d) Natural factors affecting ecosystem.



Total No. of Questions : 5]

SEAT No. :

P532

[Total No. of Pages : 3

[5424]-2

F.Y. B.Sc. (Biotechnology)

PHYSICS

**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 calculators is allowed.*
- 4) *Draw suitable diagrams wherever necessary.*

**Q1)** Attempt each of the following :

**[8 × 2 = 16]**

- a) State Zeroth law of thermodynamics.
- b) Define surface tension. Give its S.I. units.
- c) Distinguish between p type and n type semiconductors.
- d) Define elastic limit. State Hooke's law.
- e) Explain Fraunhofer diffraction.
- f) Define coefficient of viscosity. State its dimensions.
- g) Define magnetic susceptibility.
- h) Define beat.

A tuning fork of unknown frequency has a beat frequency of 3Hz with another tuning fork of frequency 581 Hz. Find the frequency of first fork.

**P.T.O.**

**Q2)** Answer any four of the following: **[4 × 4 = 16]**

- a) Define Kelvin. State the relationship between Celsius and Fahrenheit scale of temperature. Express boiling point of water on Kelvin, Celsius and Fahrenheit scale.
- b) What is strain? Define longitudinal, volume and tensile strain with mathematical expressions.
- c) With the help of a suitable diagram, explain the construction and working of open-tube manometer.
- d) State Bernoulli's theorem. Water flowing in a horizontal pipe has a speed 20 cm/sec at one end point and 15cm/sec at another point. Determine the pressure drop between two points.
- e) A big drop of water of radius  $R$  is formed by combining 1000 small droplets of water of radius  $r$  each. What will be the change in surface energy.
- f) State Doppler's effect. Derive an expression for apparent frequency when the observer is moving towards and away from a stationary source.

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

- a) Write a note on thermal equilibrium.
- b) Using first law of thermodynamics, show that  $C_p - C_v = R$ .
- c) A Carnot engine whose heat sink is at  $10^\circ\text{C}$ , has an efficiency of 50%. It is desired to increase the efficiency to 70%, by how many degrees should the temperature of heat source be increased.
- d) Distinguish between un-polarized and plane polarized light.
- e) Define the following terms.
  - i) Electric Intensity
  - ii) Electric Potential
  - iii) Electric Flux
  - iv) Electric lines of force.
- f) Write a short note on nuclear magnetism.

**Q4)** Answer any two of the following :

[2 × 8 = 16]

- a) Define
- Young's Modulus
  - Modulus of rigidity
  - Bulk Modulus
  - Poisson's ratio
- Obtain a relation between  $Y$ ,  $K$  and  $\eta$ .
- b) State and derive Poiseuille's law for the flow of liquid through a capillary tube. Give the physical significance of Poiseuille's equation.
- c) State the first law of thermodynamics. Discuss its applications for
- isobaric process
  - isothermal process
  - adiabatic process
  - isochoric process
- d) Distinguish between diamagnetic, paramagnetic and ferromagnetic materials.

A current of 10nA is established in a circular loop of radius 5 cm. Find the magnetic dipole moment of current loop.

**Q5)** Answer any one of the following :

[1 × 16 = 16]

- a) i) Show that change in entropy during a reversible cyclic process is zero.  
Find the change in entropy when 40 gm of ice at 0°C is converted into water at the same temperature. The latent heat of fusion of ice is 80 cal/gm.
- ii) What do you understand by spontaneous and stimulated emission? State properties of laser. State four applications of laser.
- b) i) With the help of a suitable diagram, explain the principle, construction and working of a Venturi meter. Derive the necessary formula.
- ii) State Coulomb's law of electrostatic force between two electrical charges. Give its Vector form.  
Four point charges  $10\mu\text{c}$ ,  $15\mu\text{c}$ ,  $10\mu\text{c}$  and  $-20\mu\text{c}$  are placed on the four corners of a square of side 4m. Calculate the total force on a charge of  $15\mu\text{c}$  due to other three charges.



Total No. of Questions : 5]

SEAT No. :

**P542**

[Total No. of Pages : 2

**[5424]-201**

**S.Y. B.Sc.**

**BIOTECHNOLOGY**

**Bb-221: Molecular Biology  
(2013 Pattern) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 80*

*Instructions to the candidates:*

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

**Q1)** Answer in 2-3 sentences :

**[10 × 2 = 20]**

- a) What is A-Form of DNA?
- b) Write the outcomes of Meselson-Stahl experiment.
- c) Define : Central Dogma
- d) What is telomere?
- e) What is transition?
- f) Role of topoisomerases.
- g) Role of Single Strand Binding proteins (SSBs).
- h) What are interons?
- i) Role of DNA Pol. I.
- j) What are Novel genetic codes?

**Q2)** Write short notes on (Any three) :

**[3 × 5 = 15]**

- a) Clover leaf Model of *t*-RNA.
- b) Watson-Crick Model of double helix DNA.
- c) Mechanism of Mis-Match repair.
- d) Mitochondrial genome structure.

**P.T.O.**

**Q3)** Answer the following (Any three) : **[3 × 5 = 15]**

- a) Write in brief about Post-translational transport.
- b) Initiation process of DNA replication in Prokaryotes.
- c) Explain Tryptophan operon as a repressible system.
- d) Explain the concept of open reading frame (ORF).

**Q4)** Answer the following : **[1 × 15 = 15]**

- a) Explain in detail the process of transcription in eukaryotes.

OR

- b) What is splicing? Describe the process of splicing mediated by “Spliceosomal Machinery”.

**Q5)** a) Write a note on Nucleosomal Model of chromosome structure and level of packaging. **[8]**

- b) Write a note on inhibitors of transcription and translation process in prokaryotes. **[7]**

OR

- a) Describe in detail the mechanism of DNA repair in prokaryotes. **[8]**

- b) Why did nature choose DNA as genetic material. Justify your answer. **[7]**



Total No. of Questions : 6]

SEAT No. :

**P543**

[Total No. of Pages : 2

**[5424]-202**

**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 programmed cell death?
- b) Define de-differentiation.
- c) Differentiate between determinate & indeterminate growth.
- d) Enlist plant growth regulators.
- e) Give significance of in vitro culture in plant development.

**Q2)** Answer any four of the following : **[4 × 5 = 20]**

- a) Explain development of monocot embryo.
- b) Describe structural organization of root apical meristem.
- c) Elaborate role of various genes involved in floral patterning.
- d) Describe types of ovules.
- e) Write note on male gametogenesis in plants.

***P.T.O.***

**Q3)** Attempt any one : **[1 × 10 = 10]**

- a) What is double fertilization & triple fusion? With neat labelled diagram explain the process of double fertilization & triple fusion.
- b) Arabidopsis thaliana is used as model plant to study plant development. Justify.

### **SECTION - II**

#### **Animal Development**

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

- a) Explain telomerase theory of ageing.
- b) Differentiate between spiral & rotational cleavage.
- c) Define the term Delamination.
- d) Draw neat labelled diagram of Human sperm.
- e) What is teratogen? Enlist any 2 teratogens.

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

- a) How maternal genes help in pattern formation.
- b) Describe the term cell lineage.
- c) Explain the process of neurulation in frog.
- d) Differentiate between spermatogenesis & oogenesis.
- e) Describe different patterns of animal regeneration with suitable examples.
- f) What is apoptosis. Explain its role in developing embryo.

**Q6)** Explain in detail, the process of fertilization in human & its significance. **[1 × 10 = 10]**

OR

Describe process of gastrulation in Amphioxus upto the formation of three germ layers. **[1 × 10 = 10]**





Total No. of Questions : 3]

SEAT No. :

**P544**

[Total No. of Pages : 1

**[5424]-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) What are scientific acronyms? Give 2 examples.
- b) What is a preposition?
- c) Give two examples of words with 'anti-' as prefix.
- d) State the importance of proof-reading of a manuscript.
- e) Differentiate between - Theory and Law.

**Q2)** Write short notes on (any 4) :

**[4 × 5 = 20]**

- a) Research article.
- b) Sources of references.
- c) Inductive reasoning.
- d) Pronunciation and accent.
- e) Probability.
- f) Likely sources of errors in results.

**Q3)** Attempt any one of the following :

**[1 × 10 = 10]**

Describe in detail the different types of scientific presentation.

OR

Write a detailed account on literature citation systems.



Total No. of Questions : 3]

SEAT No. :

**P545**

[Total No. of Pages : 2

**[5424]-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) Draw neat diagrams wherever necessary.*

**Q1)** Answer in 2-3 sentences :

**[5 × 2 = 10]**

- a) What is the difference between Apoenzyme and Holoenzyme?
- b) What is the difference between NAD<sup>+</sup> and FAD?
- c) Write the significance of glyoxylate cycle and mention its key enzymes.
- d) What is the significance of Kranz anatomy?
- e) Define Ketogenic amino acids. Give 2 examples.

**Q2)** Attempt any Four :

**[4 × 5 = 20]**

- a) What are Ketone bodies? Give the pathway for their synthesis.
- b) Explain in brief the regulation of enzymes by covalent modification.
- c) Give only the regulatory points in the urea cycle. Add a note on its connection with TCA cycle.
- d) Compare and contrast cyclic and non cyclic phosphorylation.
- e) What is the significance of non oxidative reactions of HMP pathway?
- f) What is transamination and deamination? Explain in brief.

***P.T.O.***

**Q3)** Attempt any one :

**[1 × 10 = 10]**

- a) Explain in detail all reactions of gluconeogenesis with structures. Write a note on its regulation and energetics.
- b) Explain in details the  $\beta$  oxidation of fatty acid containing 18 carbon atoms. Add a note on its energetics.



Total No. of Questions : 8]

SEAT No. :

P533

[Total No. of Pages : 2

**[5424]-3**  
**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 books.*
- 2) All questions are compulsory.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Figures to the right indicate full marks.*

**SECTION - I**

**Q1)** Answer the following questions : **[8]**

- a) What are epiphytic roots?
- b) Define Permeability.
- c) Give two characters of Bryophytes.
- d) What is Marginal placentation?

**Q2)** Write short notes on (Any two) : **[8]**

- a) Passive absorption of water.
- b) Cyclic photophosphorylation.
- c) Internal structure of Megasporangium.

**Q3)** Attempt the following (any two) : **[8]**

- a) Describe the internal structure of Dicot root.
- b) What are plant movements? Describe any two types.
- c) Define diffusion and give its significance.
- d) Give salient features of pteridophytes.

**P.T.O.**

**Q4)** Answer in detail (Any two) : **[2 × 8 = 16]**

- a) What are essential elements? Describe any two major & two minor elements with respect to physiological role and deficiency symptoms.
- b) Define phytohormes? Enlist different types of cytokinins and give its physiological role in plants.
- c) Describe the structure of plant cell with suitable diagram.

## **SECTION - II**

### **Zoology**

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

- a) Enlist any two characteristics of Phylum Porifera.
- b) Draw a neat labelled diagram of a Neuron.
- c) Give 1 function each of - epinephrine and nonepinephrine.
- d) Enlist any two protozoan parasites.

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

- a) Central Nervous System.
- b) Products obtained from Sericulture.
- c) Connective tissue.

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

- a) Describe the characteristic features of Amphibians.
- b) Write a note on transport of CO<sub>2</sub> in blood.
- c) Describe the mouth parts of honey bee.

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

- a) Give a detailed account of culture of Apis mellifera. Draw a neat labelled diagram of Honey extractor.
- b) Explain the stages in the life cycle of Taenia sps.
- c) Describe the urinogenital system of frog.



Total No. of Questions : 5]

SEAT No. :

**P546**

[Total No. of Pages : 2

**[5424]-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 marks.*

**Q1)** Answer all the following in 2-4 lines :

**[20]**

- a) Define TDT and D value.
- b) Name two micro organisms responsible for gassiness of milk.
- c) State two uses of the lepromin test.
- d) Define fluorescent antibody technic with reference to syphilis laboratory diagnosis.
- e) Define coliforms.
- f) State two characteristics of ideal indicator bacteria.
- g) State two benefits of microbial consortia for effluent treatment.
- h) State four principles of HACCP.
- i) Define secondary metabolite of bacteria with suitable example.
- j) E.coli was grown in a production medium containing 18 g/L of glucose as substrate. After 24 hours 4g/L of glucose was left in the broth and 5g/L lysine was produced. Calculate Y<sub>p/s</sub>.

**Q2)** Attempt the following questions (any three) :

**[3 × 5 = 15]**

- a) Describe beer fermentation and also draw a flow chart.
- b) Describe the use of chemostat for continuous culture of bacteria.

**P.T.O.**

- c) Describe in brief the molecular adaptations of psychrophiles.
- d) Describe encapsulation and adsorption as methods of enzyme immobilization.

**Q3)** Write short notes on (any three) : **[3 × 5 = 15]**

- a) Biotransformation.
- b) Kefir
- c) Microbial plant growth promoters.
- d) Role of GMOs in medicine.

**Q4)** a) Describe the role of trickling filter in secondary treatment of waste water with neat labelled diagram. **[8]**

OR

With the help of a well labelled diagram describe the principle and working of activated sludge treatment of waste water. **[8]**

b) Describe the routine bacteriological analysis of water potability. **[7]**

OR

State the relevance of BOD and COD determination in analysis of waste water. **[7]**

**Q5)** Attempt any one of the following : **[15]**

- a) Discuss the disease Leprosy with respect to
  - i) Causative agent
  - ii) Types of Leprosy
  - iii) Pathogenesis
  - iv) Treatment
- b) Define food intoxication and food infection and describe the terms with suitable examples with respect to :
  - i) Causative agent
  - ii) Symptoms
  - iii) Pathogenesis
  - iv) Treatment



Total No. of Questions : 6]

SEAT No. :

**P547**

[Total No. of Pages : 3

**[5424]-302**

**T.Y. B.Sc.**

**BIOTECHNOLOGY**

**Bb -332: Plant and Animal Tissue Culture  
(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 marks.*
- 4) Answer to each section should be written in separate answer book.*

**SECTION - I**

**Plant Tissue Culture**

**Q1)** Answer in brief :

**[5 × 2 = 10]**

- a) Give two precautions to maintain aseptic conditions in plant tissue culture.
- b) Explain organogenesis.
- c) Enlist two applications of leaf culture in PTC.
- d) Give principle of pollen culture.
- e) What are somatic hybrid?

**Q2)** Answer any four :

**[4 × 5 = 20]**

- a) Write short notes on Land marks in plant tissue culture.
- b) Give principle & working of laminar air flow with suitable diagram.
- c) Write short notes on somatic embryogenesis.

***P.T.O.***



- d) What is protoplast fusion? Describe any two methods of it.
- e) Describe various parameters to assess growth and development in-vitro.
- f) Write a note on surface sterilization.

**Q3)** Attempt any one : **[1 × 10 = 10]**

- a) What are plant growth regulators? Describe various role of Auxins & cytokinin in plant tissue culture.

OR

- b) Give an applications of plant tissue culture in detail with suitable examples.

## **SECTION - II**

### **Animal Tissue Culture**

**Q4)** Answer the following in 3-4 lines : **[5 × 2 = 10]**

- a) Enlist various components of extracellular matrix, and mention their application in ATC.
- b) Mention the method of sterilization of serum with appropriate justification.
- c) Give the working principle of vertical laminar air flow hood.
- d) How is yeast contamination detected?
- e) Justify - After first subculture primary culture does not become a cell line immediately.

**Q5)** Answer the following (any 4) : **[4 × 5 = 20]**

- a) Write a note on characteristics of cells growing in culture.
- b) Mention the components of serum and their use.
- c) Describe different methods of tissue disaggregation other than trypsinization.
- d) Discuss different factors that affect the success of cryopreservation and revival of cells.

- e) Draw a neat labeled diagram of Neubauer's chamber. Explain how it can be used for viable cell counting.
- f) What is balanced salt solution? Give its composition and role in ATC.

**Q6)** Explain in detail advantages and disadvantages of monolayer culture over organ culture.

[1 × 10 = 10]

OR

What is cryptic contamination? Give examples and elaborate different methods to detect these contaminants.

[1 × 10 = 10]



Total No. of Questions : 5]

SEAT No. :

**P548**

[Total No. of Pages : 2

**[5424]-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 labelled diagrams wherever necessary.*

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

**[10 × 2 = 20]**

- a) Define genetic diversity with example.
- b) Enlist any four biomes of the world.
- c) Define: Endangered species.
- d) What is cladogram?
- e) Define speciation.
- f) What is taxonomy.
- g) What is agnostic behavior?
- h) Define species abundance.
- i) Give names of any two centers of origin.
- j) Define Fecundity.

**Q2)** Write notes on (any three) :

**[3 × 5 = 15]**

- a) 'Agenda 21'.
- b) Biodiversity Hotspots.
- c) Carrying capacity.
- d) Natality and Mortality.

**P.T.O.**

**Q3)** Answer the following (Any three) : **[3 × 5 = 15]**

- a) Describe the concept of Biodiversity.
- b) What is biome? Explain any two terrestrial biomes.
- c) Elucidate habitat with example.
- d) Explain five kingdom system of classification.

**Q4)** a) What is in situ conservation? Describe any two methods of Biodiversity conservation. **[8]**

b) Enlist the techniques used in biological systematics. Explain any two techniques. **[7]**

OR

a) Explain population interactions with examples. **[8]**

b) Describe the methods used to measure plant and animal biodiversity. **[7]**

**Q5)** Write notes on (any three) : **[3 × 5 = 15]**

- a) Importance of Biodiversity Databases.
- b) Communication behaviour..
- c) The Wild Life Protection Act 1972.
- d) Socio-economic importance of Biodiversity.



Total No. of Questions : 6 ]

SEAT No. :

P534

[Total No. of Pages : 4

[5424]-4

F.Y. B.Sc. (Biotechnology)

MATHEMATICS AND STATISTICS

**Bb-104: Mathematics and Statistical Methods for Biologists  
(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 non-programmable scientific calculator is allowed.*
- 4) *Solve each section on separate answer paper.*

**SECTION - I**

(Mathematics)

**Q1)** Attempt each of the following :

**[4 × 2 = 8]**

a) Define monotonically decreasing sequence. Give one example.

b) Let  $A = \begin{bmatrix} 1 & 2 \\ 3 & -1 \\ 0 & 5 \end{bmatrix}$ ,  $B = \begin{bmatrix} 4 & 1 & 5 \\ -2 & 0 & 1 \end{bmatrix}$ .

Find determinant of (BA)

c) If  $u = \tan(xy)$ , then find  $u_x$  and  $u_y$ .

d) Examine the convergence of the series  $\sum_{n=1}^{\infty} \left( \frac{n+4}{3n+2} \right)$

**P.T.O.**

**Q2)** Attempt any four of the following : **[4 × 4 = 16]**

- a) Find polar form of  $(1 + i)$ . Hence find real and imaginary parts of  $(1 + i)^5$ .  
b) Find rank of the following matrix.

$$\begin{bmatrix} 2 & 4 & 2 & 3 \\ -2 & 2 & -2 & -2 \\ 1 & -1 & 1 & 1 \end{bmatrix}$$

- c) Solve :  $e^x \cos y \, dy = x \, dx$ .  
d) Test the convergence of the series  $\sum_{n=1}^{\infty} \frac{4^n}{(n+1)!}$ .  
e) Check whether the vectors  $\{(1, 0, 1), (0, 1, 4), (-1, 0, 1)\}$  are linearly dependent.  
f) Using  $\epsilon$  definition, prove that  $\lim_{n \rightarrow \infty} \frac{1}{n^2 + 1} = 0$ .

**Q3)** Attempt any two of the following : **[2 × 8 = 16]**

- a) Solve the following system of linear equations by Gauss-Elimination method.

$$x + 2y - 3z + 2w = 2$$

$$2x + 5y - 8z + 6w = 5$$

$$3x + 4y - 5z + 2w = 4$$

- b) Check whether the following matrix A is diagonalizable. If so, find matrix P, that diagonalizes A. Also write  $P^{-1}AP$ .

$$A = \begin{bmatrix} 1 & 2 \\ 4 & 3 \end{bmatrix}$$

- c) Define exact differential equation. Check for exactness and hence solve the following differential equation.

$$(2y^2 - 4x + 5) \, dx + (4 - 2y + 4xy) \, dy = 0.$$

- d) Find the stationary points and examine for minimum and maximum value for the function.

$$f(x, y) = x^3 + y^3 - 12x - 3y + 5.$$

## SECTION - II

**Q4)** Attempt each of the following : **[4 × 2 = 8]**

- a) Define the following terms :
  - i) Population
  - ii) Sample
- b) Define the term : Quartile.
- c) The monthly salaries of 10 employees of a firm are Rs. 2500, 2780, 2820, 2850, 2680, 2750, 2575, 3000, 2725, 2790. Find the average salary of the workers.
- d) Explain the term : Multiple Correlation.

**Q5)** Attempt any four of the following : **[4 × 4 = 16]**

- a) An insurance agent knows from the past experience that the probability that person he visits is 0.75. What is the probability that at least one of the seven persons he visits will insure?
- b) Define Normal distribution. State its mean and variance.
- c) Compute Standard deviation for data given below :

7, 5, 3, 6, 9, 8
- d) Define the terms :
  - i) Parameter
  - ii) Statistic
  - iii) Standard error
  - iv) Critical region
- e) A box containing 42 viable and 8 non-viable seeds. What is the probability that a seed selected at random is not viable.
- f) Describe the Chi-square test of goodness of fit.

**Q6)** Attempt any two of the following :

**[2 × 8 = 16]**

a) Compute median and mode for the following frequency distribution.

Class	0-10	10-20	20-30	30-40	40-50
Frequency	5	15	25	18	17

b) Calculate coefficient of correlation by using given data :

$$n=7, \sum x = 349, \sum y = 366, \sum xy = 20,343, \sum x^2 = 19,753, \sum y^2 = 21,100.$$

c) What is one way ANOVA technique? Explain this method and state its assumptions.

d) Explain “Paired  $t$ -test”. in brief.





Total No. of Questions : 5]

SEAT No. :

**P549**

[Total No. of Pages : 2

**[5424]-401**

**T.Y. B.Sc.**

**BIOTECHNOLOGY**

**Bb-341: Large Scale Manufacturing Processes  
(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 questions in 2-4 lines :

**[10 × 2 = 20]**

- a) Define : Bioprocess Engineering.
- b) What is 'O' ring seal? State its use.
- c) Enlist any four carbon sources used in industrial fermentation media.
- d) What is D value?
- e) What are fixed and variable cost?
- f) What is salk and sabin vaccine?
- g) State importance of scale up.
- h) Give role of inducer in industrial fermentation media.
- i) Enlist different chemical methods used for cell disruption.
- j) State principle of LAL Test.

**Q2)** Attempt the following (any 3) :

**[3 × 5 = 15]**

- a) With neat labelled diagram describe multichamber centrifuge.
- b) Explain concept of Good Manufacturing Practices (GMP) used in large scale industries.
- c) Explain any two temperature sensing devices used in bioprocess.
- d) Discuss steroid biotransformation in brief.

**P.T.O.**

**Q3)** Write short note on (Any 3) : **[3 × 5 = 15]**

- a) Bubble column reactor.
- b) Antifoam agents.
- c) Pyrogen Test.
- d) Scale down.

**Q4)** a) Explain principle and use of liquid-liquid extraction in downstream processing of fermentation product. **[8]**

OR

Describe methods for determination and control of pH in industrial fermentation process.

- b) With neat labelled diagram explain use of Recombinant DNA technology for strain improvement. **[7]**

OR

Describe different types of agitator used in industrial fermenter.

**Q5)** Describe in detail principle and application of Ion exchange chromatography and gel filtration chromatography used in purification of fermentation product. **[15]**

OR

- a) Explain Large scale production of Penicillin. **[8]**
- b) Describe use of computers in Bioprocess. **[7]**



Total No. of Questions : 5]

SEAT No. :

P550

[Total No. of Pages : 2

[5424]-402

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 questions in 2-3 lines : **[10 × 2 = 20]**

- a) How will you prepare 100 ml of 0.5 M  $C_6H_{12}O_6$ . (M.W. = 180)
- b) Define stokes shift?
- c) What are auxochromes?
- d) What is hypsochromic shift.
- e) What are fixed angle rotors.
- f) Define Retention time?
- g) Give role of SDS in PAGE.
- h) What is the role of immersion lenses in microscopy?
- i) What is combination electrode?
- j) What are cation exchangers? Give examples.

**Q2)** Answer the following (any 3) : **[3 × 5 = 15]**

- a) Explain health hazards in laboratory.
- b) Discuss the working of ultracentrifuge.
- c) Explain the basis of separation in thin layer chromatography.
- d) Elaborate on continuous and discontinuous buffers in gel electrophoresis.

**P.T.O.**

**Q3)** Answer the following (any 3) : **[3 × 5 = 15]**

- a) Comment on the choice of matrices used in gel filtration.
- b) Explain the Beers-Lamberts law. What is the difference between optical density and absorbance.
- c) Discuss the working of inverted microscope.
- d) Differentiate between SDS and native polyacrylamide gel electrophoresis.

**Q4)** Answer the following :

- a) Explain differential centrifugation for cellular fractionation. **[8]**

OR

Enlist the types of microscope with methods used for specimen preparation.

- b) Explain the regions of electromagnetic spectrum with properties of electromagnetic radiations. **[7]**

OR

Discuss the dissociation behaviour of polyprotic acids.

**Q5)** Answer any one : **[15]**

- a) Discuss the principle for purification of enzyme using affinity chromatography. Add a note on matrix and ligands used.

OR

Write short notes on :

- i) Pulse field gel electrophoresis.
- ii) Fluorescence microscopy.
- iii) Isopycnic centrifugation.



Total No. of Questions : 5]

SEAT No. :

**P551**

[Total No. of Pages : 2

**[5424]-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 2-4 lines :

**[10 × 2 = 20]**

- a) Explain role of phenol and isoamyl alcohol in DNA isolation.
- b) Give application of polynucleotide kinase in genetic engineering.
- c) Give the guidelines for release of genetically modified organisms.
- d) What are shuttle vectors?
- e) What are adapters?
- f) Write the contribution of Watson & Crick in RDT.
- g) Mention any two applications of genetic engineering in human health.
- h) What are dideoxy nucleotides?
- i) Explain any one method to determine yield of isolated DNA.
- j) Write any two applications of RAPD marker.

**Q2)** Attempt the following questions (Any three) :

**[3 × 5 = 15]**

- a) Comment on Agrobacterial vectors.
- b) Describe any one strategy for isolation of plasmid DNA.
- c) Discuss role of DNA ligases in RDT.
- d) Write a note on restriction mapping.

**P.T.O.**

**Q3)** Write short notes on (Any three) : **[3 × 5 = 15]**

- a) Blue white selection.
- b) Techniques of introducing foreign DNA into bacterial cells.
- c)  $\lambda$  insertional vectors.
- d) Automated DNA sequencing.

**Q4)** a) Explain northern blotting technique. **[8]**

b) Give a brief account on construction of cDNA library. **[7]**

OR

a) Explain any one method of site directed mutagenesis. Add a note on its applications. **[8]**

b) Describe RNA isolation & purification in detail. **[7]**

**Q5)** Describe in detail the DNA sequencing by Maxam-Gilbert method. Also comment on limitations of this method. **[15]**

OR

Give a detailed account of 'Polymerase chain reaction'. Add a note on variants of PCR & their applications. **[15]**



Total No. of Questions : 5]

SEAT No. :

P535

[Total No. of Pages : 2

**[5424]-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 of the followings :

**[8 × 2 = 16]**

- a) What do you mean by phosphodies for linkage?
- b) What is the concentration of H<sup>+</sup> ions in 0.001M NaOH?
- c) State Second law of thermodynamics.
- d) Define Anomers.
- e) What is Acid numbers?
- f) Amino acids are amphoteric in nature. Comment.
- g) Define activation energy of a chemical reaction.
- h) Name two coenzymes that catalyse oxidation reduction reactions.

**Q2)** Attempt any four of the followings :

**[4 × 4 = 16]**

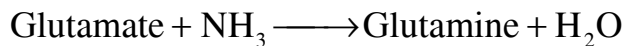
- a) Describe salient features of Watson & Crick model of DNA with suitable diagram.
- b) What are the coenzyme form of vitamin B<sub>7</sub> and vitamin B<sub>6</sub>? Mention the reaction catalysed by them.
- c) Describe how the pH of blood is regulated.
- d) Give the significance of I<sup>st</sup>, II<sup>nd</sup>, III<sup>rd</sup> and IV<sup>th</sup> digit of E.C. No. given by commission system of Enzyme classification with suitable example.

**P.T.O.**

- e) Discuss quaternary structure of protein with an example.
- f) What are waxes? Give their significance.

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

- a) Explain in brief Sanger's method for protein sequencing.
- b) Define rancidity and saponification number. What is their significance.
- c) Maltose is a reducing sugar where as sucrose is non-reducing sugar. Explain.
- d) Discuss briefly the role of water in biological system.
- e) Describe the forces stabilizing nucleic acid structure.
- f) Define free energy change of a reaction. Calculate the Gibbs free energy change ( $\Delta G$ ) for the following chemical reaction.



Given  $\Delta H = 4103 \text{ cal}$

$$\Delta S = 2.4 \text{ cal/k}$$

$$T = 293 \text{ k}$$

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

- a) Discuss in detail types of Enzyme inhibition.
- b) Draw hydrogen bonding between :
  - i) Adenylate and thymidylate
  - ii) Guanylate and cytidylate
- c) Discuss in detail complex lipids.
- d) Discuss in detail enzyme classes oxidoreductase, ligases and lyases.

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

- a) Discuss in detail structures and importance of storage and structural polysacchrides.
- b) Write the properties of peptide bond. Explain the classification of amino acids based on 'R' group.





Total No. of Questions : 5]

SEAT No. :

**P536**

[Total No. of Pages : 2

**[5424]-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 labelled diagram wherever necessary.*
- 3) Figures to the right indicate full marks.*

**Q1)** Attempt all of the following :

**[8 × 2 = 16]**

- a) State Bohr's third postulate.
- b) State applications of radiowaves and microwaves
- c) State Beer-Lambert's law.
- d) State Pauli's exclusion principle.
- e) Enlist various types of electrodes used in pH meter.
- f) Give relation between pH and pOH.
- g) Write two concepts of vector atom model.
- h) Define: Action Potential.

**Q2)** Answer any four of the following :

**[4 × 4 = 16]**

- a) Derive Rydberg's constant using Bohr's third postulate.
- b) Write a note on bimetallic thermometer.
- c) Draw Na-spectrum.
- d) Derive energy value of rotational spectra for non-rigid molecule.
- e) Write principle, construction and working of scintillation counter.
- f) Find the number of an electron when  $n = 3$  using Pauli's exclusion principle.

**P.T.O.**

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

- a) Explain the properties of nucleus.
- b) What is half life of radioactive element? The disintegration constant  $\lambda$  - of a radioactive element is 0.0023 per day. Calculate its half life.
- c) Write a note on thermocouple thermometer.
- d) Explain properties of electromagnetic waves.
- e) Calculate the radius of the helium atom.  
[ $h = 6.624 \times 10^{-34}$  J-S,  $\epsilon_0 = 8.85 \times 10^{-12}$  c<sup>2</sup>/N-m<sup>2</sup>  
 $m = 9.1 \times 10^{-31}$  kg,  $e = 1.6 \times 10^{-19}$ c.]
- f) Write a note on thermistor thermometer.

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

- a) Explain principle, working of centrifuge and also explain RCF concept.
- b) Explain Sommerfeld model in details.
- c) Explain principle, construction and working of pH meter.
- d) Explain principle, construction and working of G.M. counter.

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

- a) Explain nuclear models.

OR

- b) What is resolving power? Explain chromatic and achromatic aberrations.



Total No. of Questions : 5]

SEAT No. :

P537

[Total No. of Pages : 2

**[5424]-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 diagram wherever necessary.*
- 3) *Figures to the right indicate full marks.*

**Q1)** Answer the following :

**[8 × 2 = 16]**

- a) Write two distinguishing characters of archaebacteria.
- b) Mention the principle of heat fixation in staining process.
- c) Define: Nutrient media, and state its use.
- d) What is germ theory of disease?
- e) Why do we require acidic as well as basic stains?
- f) Write mode of action of detergents on microorganisms.
- g) What is Prophage?
- h) What is Commensalism?

**Q2)** Attempt any 4 of the following :

**[4 × 4 = 16]**

- a) Why Chlorine is used in water disinfection?
- b) Justify: Aga-agar is used as solidifying agent and not gelatin.
- c) What is sterilization? Mention method of sterilization used to sterilize/ disinfect following material with reason.
  - i) Scissors, forceps, syringes, operation blades etc.
  - ii) Serum, solution containing vitamins, amino acids.
  - iii) Aprons, clothes, gloves etc.

**P.T.O.**

- d) With neat labelled diagram explain pure culture technique.
- e) Explain any one example of Animal-microbe interaction. State its importance.
- f) Write composition and functions of capsule and endospore.

**Q3)** Write self explanatory note (any 4) : **[4 × 4 = 16]**

- a) Bergy's manual of determinative bacteriology.
- b) Differential media.
- c) Cyanobacteria.
- d) Bacterial growth curve.
- e) Biosafety measures in microbiology laboratory.
- f) Acid fast staining.

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

- a) Discuss pathbreaking discoveries in development of microbiology.
- b) Describe structure of Gram negative cell wall.
- c) Explain any two methods of preservation of microorganism. State its importance.
- d) Write distinguishing characters of fungi and discuss different groups of fungi.

**Q5)** Enlist methods of cell enumeration. Explain one each from Direct microscopic count and Total viable count. **[16]**

OR

What are different types of bacteriophages? How do virulent phages reproduce? Explain with diagram.



Total No. of Questions : 5]

SEAT No. :

**P538**

[Total No. of Pages : 2

**[5424]-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) Figures to right indicate full marks.*
- 3) Use of color pencils restricted to diagrams.*

**Q1)** Attempt all of the following :

**[8 × 2 = 16]**

- a) What is computer virus?
- b) State True/False. Justify.  
“Unix is a single tasking operating system.”
- c) Explain the role of server?
- d) Give examples of scanning devices?
- e) What is the meaning of protocol?
- f) Explain the need of Database?
- g) What is Hub? Give its use?
- h) Define the term : Internet

**Q2)** Attempt any four of the following :

**[4 × 4 = 16]**

- a) Explain structure of Twisted pair cable?
- b) What are secondary storage devices? Explain any one in detail.
- c) What is Firewall? Why you need a Firewall?
- d) Explain various Topologies used for computer networks.
- e) What are the output devices? Explain working of Inkjet printer?

**P.T.O.**

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

- a) What is an attribute? Explain its types with example.
- b) State any four features of MS-Excel.
- c) What are the advantages of DBMS over file system.
- d) Explain text based searching with suitable example.
- e) Write a short note on Multiprocessing system.

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

- a) What is Networking? How Internet & Networking is related to each other? Which are the components used in Network?
- b) Explain MS-Power Point with its uses.
- c) Explain Google Search Engine & Yahoo Search Engine in detail.

**Q5)** Attempt all of the following : **[2 × 8 = 16]**

- a) Write an algorithm & draw a flow chart to check given number is prime or not.

OR

Write a note on toolbar of MS-Word.

- b) Write an algorithm and draw a flow chart to find out the addition of 1 to  $n$  numbers.

OR

What is an operating system? Explain various functions of an operating system.

