Total No. of Questions : 8] **[Total No. of Pages : 4**

P201

[3619]-4

F.Y. B.Sc.

BIOTECHNOLOGY (New)

Bb – 104 : Mathematics and Statistical Methods For Biologists

Time : 3 Hours] ***[Max. Marks : 80***

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***Use separate answer book for each section.***
3) ***Use of scientific calculator and statistical table is allowed.***
4) ***Figures to the right indicate full marks.***

SECTION - I

Q1) Attempt the following: **[5 x 2 = 10]**

a) Find modulus and argument of a complex number $1 - i$.

b) Find rank of a matrix $A = \begin{bmatrix} 1 & 2 & 5 \\ 3 & 5 & 2 \\ 2 & 4 & 10 \end{bmatrix}$.

c) Test for exactness the differential equation $2xy\,dx + (x^2 + 1)\,dy = 0$.

d) Determine whether the vectors $u_1 = (0, 0)$, $u_2 = (2, 3)$ in a vector space $V = R^2$ are linearly independent.

e) Discuss the convergence of the series $\sum_{n=1}^{\infty} \frac{1}{n^{3/5}}$.

Q2) Attempt any four of the following: **[4 x 2½ = 10]**

a) Prove that if two complex numbers are conjugate of each other then their sum and product are real.

b) Solve the following system of linear equations

$$x + y + z = 9,\ 2x + 5y + 7z = 52,\ 2x + y - z = 0.$$

P.T.O.

c) Solve the differential equation $\frac{dy}{dx}=\frac{x^2+1}{2-y}$.

d) Discuss the convergence of the series $\sum_{n=0}^{\infty}\frac{x^n}{n!}$

e) If $u=x\log(xy)$, find $\frac{\partial^3 u}{\partial^2 x\partial y}$.

f) Let $V = R^3$ be a vector space with usual addition and scalar multiplication of ordered triplets. If $W = \{(x, y, z) \in R^3/2x + 3y + 4z = 0\}$, show that W is a subspace of V.

Q3) Attempt any two of the following: **[2 x 5 = 10]**

a) If $u = f(x - y, y - z, z - x)$, find $\frac{\partial u}{\partial x}+\frac{\partial u}{\partial y}+\frac{\partial u}{\partial z}$.

b) Assuming validity of expansion, show that $\sec x=1+\frac{x^2}{2!}+\frac{5x^4}{4!}+...$

c) Using De Moivre's theorem, prove that $(-1 + i)^7 = -8 (1 + i)$.

Q4) Attempt any one of the following: **[1 x 10 = 10]**

a) Determine whether matrix A is diagonalizable, where

$$A=\begin{bmatrix}5 & 1 & 1\\ 1 & 5 & -1\\ 1 & -1 & 5\end{bmatrix}$$

b) The rate of population increase is proportional to the population at a instant. If the population of a city increases from 10 lakhs to 15 lakhs in 20 years what will be population in the next 10 years.

SECTION - II

Q5) Attempt the following: **[5 x 2 = 10]**

a) Define the terms Population and Sample.

b) Compute median for the following series.

7, 5, 12, 9, 8, 21, 14, 16, 25

c) State the classical definition of probability.

d) The average monthly wage of all workers in the factory is Rs. 444. If the average wages paid to male and female workers are Rs. 480/- and Rs. 360/- respectively. Find the percentage of male and female workers.

e) Define the term regression.

Q6) Attempt any four of the following: **[4 x 2½ = 10]**

a) Represent the following data by a subdivided bar diagram

No. of Students

College	Arts	Science	Commerce	Agriculture	Total
A	1200	800	600	400	3000
B	750	500	300	450	2000

b) Following are the marks obtained by 250 students in statistics. Find arithmetic mean.

Marks :	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90
No. of Students :	2	3	7	13	13	9	2	1

c) Define correlation, Positive correlation and Negative correlation.

d) Number of articles supplied by a small scale industry on 10 days are as follows.

98, 75, 80, 94, 96, 108, 102, 100, 270, 95

Calculate variance

e) A town has two doctors X and Y operating independently. If the probability that doctor X is available is 0.9 and that of Y is 0.8. What is the probability that at least one doctor is available when needed.

Q7) Attempt any two of the following: **[2 x 5 = 10]**

a) From the following information obtain the equation of line of regression of X on Y and Y on X.

$n = 5$, $\Sigma x = 30$, $\Sigma x^2 = 220$, $\Sigma y = 40$, $\Sigma y^2 = 340$, $\Sigma xy = 214$

b) If mortality rate for certain disease is 0.10. Find the probability that out of 10 people with this disease exactly four will survive.

c) Explain the term coefficient of variation. State importance of it.

Q8) Attempt any one of the following: **[1 x 10 = 10]**

a) i) Genetic theory states that children having one parent of blood type M and the other of blood type N will always be of one of three types M, MN, N and that the proportions of these types will be on an average as 1:2:1. The report states that out of 300 children having one M parent and one N parent 30% were found to be of type M, 45% of type MN and remainder type N. Test the hypothesis by χ^2 test.

ii) Explain the following terms.

1) Parameter
2) Statistic
3) Hypothesis
4) Null hypothesis
5) Level of Significance

b) A special type of fertilizer was used in four agricultural fields A, B, C and D. Each field was divided into four beds and the fertilizer was applied over them. The respective yields are given below. Find whether the difference in the mean yields is significant or not.

Plot Yield			
A	B	C	D
8	9	3	3
12	4	8	7
1	7	2	8
9	1	5	2

Total No. of Questions : 5] **[Total No. of Pages : 2**

P202

[3619]-5
F.Y. B.Sc.
BIOTECHNOLOGY
Bb-105 : Fundamentals of Biological Chemistry
(Old & New)

Time : 3 Hours] ***[Max. Marks : 80***

Instructions to the candidates :

1) ***All questions are compulsory.***
2) ***All questions carry equal marks.***

Q1) Attempt the following: **[16]**

a) What are essential and nonessential aminoacids?

b) Define Isoelectric pH. What is the pI of Glycine?

c) What are the coenzymes of Thiamin and Pyridoxine?

d) Draw the structure of Maltose and Isomaltose.

e) Define pH and pKa.

f) Write MM equation and Line Weaver Burk equation.

g) Define Saponification number and Iodine number.

h) Name the linkage seen in Proteins and Nucleic acid polymerisation.

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

a) List out the biological functions of proteins.

b) Draw the structure of a tripeptide. List out the features of a peptide bond.

c) Differentiate between monosaccharides and polysaccharides with example.

d) Write short note on lipoproteins.

e) What are the forces that stabilise nucleic acid structure.

f) Give the features of active site of an enzyme.

P.T.O.

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

a) Differentiate between prokaryotes and eukaryotes with a simple diagram and list out their distinctive features.

b) Draw the structure of α-D-Glucose, Serine, Palmitic acid and Lactose.

c) Write short note on rancidity of lipids.

d) What are the salient features of Ramachandran Plot that helps in predicting the protein structure?

e) How does induced fit hypothesis and lock and key hypothesis explain the Enzyme - Substrate binding to form ES complex?

f) What is a prosthetic group? Give its significance with suitable examples.

Q4) Attempt any two: **[16]**

a) Classify enzymes with examples.

b) Explain Nucleophilic substitution reaction with an example.

c) Explain the principle, procedure and applications of Affinity Chromatography.

Q5) Attempt any two: **[16]**

a) Explain the steps involved in determination of primary structure of proteins.

b) Discuss the features of Watson and Crick model of DNA with a suitable diagram.

c) Elaborate on two different transport across the cell membrane with an illustrative diagram.

Total No. of Questions : 7] **[Total No. of Pages : 2**

P663

[3619] - 301
T.Y. B.Sc.
BIOTECHNOLOGY
Bb - 331 : Microbial Biotechnology
(Old & New Course) (Sem. - III)

Time : 3 Hours] ***[Max. Marks :80***

Instructions to the candidates:

1) ***Question No. 1 is compulsory.***
2) ***Attempt any 4 questions out of the remaining.***
3) ***Figures to the right indicate full marks.***

Q1) Attempt the following **[10 × 2 = 20]**

a) The discoveries of Robert Koch contributed to the establishment of Microbial Biotechnology. Justify.

b) Mention the significance of gradient plate technique in strain improvement.

c) Define YxIS. State its role in microbial fermentation.

d) Saccharomyces cerevisiae is not the sole microorganism for alcohol production. Justify.

e) Name any 2 diseases of the eyes and their causative agents.

f) What is bitty cream?

g) Mention the methods of sludge disposal.

h) Exemplify the use of GMOs in health.

i) Enlist the extrinsic factors affecting the food spoilage.

j) How is the faecal pollution of water detected.

Q2) a) Enlist the methods of strain improvement. Explain with an example the use of analogue resistant mutants in strain improvement. **[7]**

b) Glycolysis in bacteria is carried out by different pathways. Explain. **[8]**

Q3) a) Explain repression and derepression in lactose operon. **[10]**

b) Gene - mapping can be carried out by genetic recombination. Comment. **[5]**

P.T.O.

Q4) a) Enlist the various microbial diseases of the digestive system and explain food poisoning caused by clostridium botulinum and salmonellosis. **[10]**

b) Compare and contrast batch - fed culture and continuous culture. **[5]**

Q5) a) Explain the food preservation by low temperature. **[7]**

b) Discuss the spoilage of meat and meat products. **[8]**

Q6) a) Explain the activated sludge process used in effluent treatment. **[7]**

b) Briefly mention the action of antiviral drugs and the various strategies employed in their use. **[8]**

Q7) Write short notes (any three): **[15]**

a) Influenza - Pandemic disease.

b) Fermentation Vs Respiration.

c) Use of chemicals preservatives in food preservation.

d) SCP.

e) Chemolitho trophy.

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Total No. of Questions : 5] **[Total No. of Pages : 3**

P198

[3619]- 1
F.Y. B.Sc.
BIOTECHNOLOGY
Bb - 101 : Fundamentals of Chemistry
(New)

Time : 3 Hours] ***[Max. Marks : 80***

Instructions to the candidates:

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

Q1) Answer the following : **[16]**

a) Calculate the average kinetic energy of the molecule in 8.0gms of Methane at 27^oC. [$R = 8.314\ JK^{-1}$].

b) What is half life period? Calculate half life period of second order reaction?

c) Define Osmosis and Osmotic pressure.

d) State 'Phase Rule'.

e) How is the solubility of sparingly soluble salt determined with the help of conductance measurement?

f) What is liquid-liquid junction potential? How it can be eliminated.

g) Define the terms :

i) Dihedral angle and
ii) Strain.

h) Distinguish between SN^1 and SN^2 reactions.

Q2) Attempt <u>any four</u> of the following : **[16]**

a) What are the assumptions of kinetic theory of gases?

b) Show that half life period of first order reaction is independent of the initial concentration of the reactant.

c) What is elevation of boiling point? Explain Landsbergers method of determining the molecular weight of given solute.

P.T.O.

d) Define eutectic point. Explain the phase diagram of Pb-Ag system.

e) What are buffer solutions? Derive Henderson's equation for acidic buffer.

f) Balance the following equation by ion electron method :

$Zn + NO_3^- + OH^- \rightarrow ZnO_2^{2-} + NH_3$

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

a) Derive the expression

$\Pi = CRT$

b) Describe KI - H_2O system on the basis of phase rule.

c) What are chemical cells? Derive an expression for emf of chemical cell without transference.

d) If 15% of a substance decomposes in first ten minutes in a first order reaction, calculate how much of it would remain undecomposed after one hour?

e) Calculate the boiling point of 2.5% solution of glucose [MW = 180]. Kb for 100gms of water is 5.2.

f) Determine the number of phases, components and degrees of freedom for the following systems.

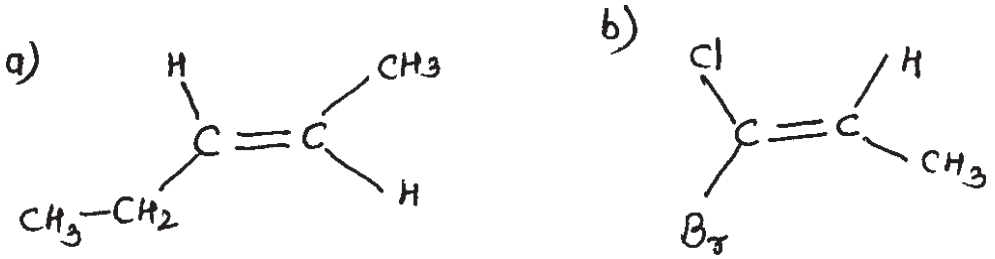
i) $H_2O\ (s) \rightleftharpoons H_2O\ (l) \rightleftharpoons H_2O\ (g)$

ii) $CaCO_3\ (s) \rightleftharpoons CaO(s) + CO_2\ (g)$ [In closed vessel]

Q4) a) Attempt <u>any two</u> of the following : **[8]**

i) What is conformational isomerism? Explain the isomers of butane with energy profile diagram.

ii) What is geometrical isomerism? Give necessary conditions for the existance of geometrical isomerism. Assign E or Z configuration for the following :



iii) What is addition reaction? Discuss addition of HBr to propene. What is major product?

b) Attempt any two of the following : **[8]**

i) Define paramagnetism. Explain its characteristics.

ii) Calculate the equivalent conductance of AgBr at infinite dilution from the given values of equivalent conductance at infinite dilution for $Ag\ NO_3$, KBr and KNO_3 as 131.3, 137.4 and 121.3 $ohm^{-1}\ Cm^2\ eqt^{-1}$.

iii) The standard electrode potential for reduction reaction of Zn/Zn^{++} (a = 1) electrode is - 0.7618 V at 25°C. Calculate single electrode potential of same electrode when activity of Zn^{++} ion is 0.1 at the same temperature.

Q5) Attempt any two of the following : **[16]**

a) Discuss Debye - Huckel theory for strong electrolyte. Write the Onsagar equation.

b) What are different types of electrodes? Explain any one electrode with reference to :

i) formation of electrode.
ii) electrode reaction.
iii) expression for electrode potential.

c) How is the potentiometric titration method superior to the conventional one? Give brief account of potentiometric titration with respect to redox titration.

Total No. of Questions : 5] **[Total No. of Pages : 3**

P199

[3619]- 2
F.Y. B.Sc. (Biotechnology)
PHYSICS
Bb - 102 : Fundamentals of Physics
(New)

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.***

Q1) Answer the following questions : **[16]**

a) Define standard unit for temperature.

b) Differentiate between streamline and turbulent flows.

c) Define surface tension in terms of surface energy. Give its S.I. unit.

d) State characteristics of transverse waves.

e) Define calorie. Give relations among various heat units.

f) State first law of thermodynamics.

g) Refractive index of water is 1.33. Calculate the angle of polarization for light reflected from the surface of a lake.

h) Define dielectric constant of a medium.

Q2) Attempt any four : **[16]**

a) What do you mean by fundamental and derived units. Classify the following units into fundamental and derived units.

Kilogram, ampere, newton, candela, kelvin, joule, volt, ohm, coulomb, watt, hertz, mole, weber, sec.

b) Two wires of the same material are subjected to the same tension. Compare the extensions produced if the length of first wire is double that of the other, while its radius is half that of other.

c) State Pascal's principle and show that the work done on the input piston by the applied force is equal to the work done by the output piston in lifting the load placed on it.

P.T.O.

d) State and prove Bernoulli's theorem.

e) With the help of suitable diagram explain the vapour compression refrigeration cycle.

f) Find the change in entropy when 40gm of ice at $0^{o}C$ is converted into water at the same temperature. The latent heat of fusion of ice is 80 cal/gm.

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

a) Define pressure. State different units used for the measurement of pressure. With the help of suitable diagram explain how open tube manometer is used to measure the gauge pressure of the gas in the tank.

b) Describe Quinke's method to determine surface tension of mercury when angle of contact is not known.

c) A train is travelling at a speed of 90km/h. The frequency of note produced by the whistle of train is 520Hz. Find the frequency of sound heard by a stationary observer when the train approaches him. (Velocity of sound = 340 m/s).

d) Derive Vander Waal's equation of state for real gases.

e) A refrigerator works under reversible cycle between the temperatures $177^{o}C$ and $327^{o}C$ Calculate

i) Thermal efficiency.

ii) Coefficient of performance.

f) What is biomagnetism? How it is useful in health care? Discuss with example.

Q4) Attempt <u>any two</u> : **[16]**

a) Derive Poiseulle's equation for determination of rate of flow of liquid flowing through a capillary.

b) Describe capillary rise method to determine surface tension of a liquid in terms of hight of liquid column, radius of capillary and angle of contact.

c) State different musical instruments that work on vibration of air particals. Show that only odd hormonics are present in vibrations of column in closed organ pipe.

Q5) a) What is carnot's cycle? Show that efficiency of Carnot's engine is $\eta = 1 - \frac{T_2}{T_1}$ where T_1 and T_2 are temperatures of source and sink respectively.

b) Describe the laser action. State and explain the properties of laser.

OR

a) State coulombs law of electrostatic force between two electrical charges. Explain vector form of coulomb's law. What do you mean by principle of conservation of charge?

b) Explain in brief causes of earths magnetic field. A proton is projected with a speed of 3×10^6 m/s horizontally from east to west. A uniform magnetic field of strength 2×10^3 T exists in vertically upward direction. Find the force on the proton just after it projected. **[16]**

Total No. of Questions : 8] **[Total No. of Pages : 2**

P200

[3619]-3
F.Y. B.Sc.
BIOTECHNOLOGY
Bb-103 : Basic Biosciences (New)

Time : 3 Hours] ***[Max. Marks : 80***

Instructions to the candidates:

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

SECTION - I

(Botany)

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

a) State any two vegetative plant organs.

b) Define photoperiodism.

c) What is a corm?

d) State two biotechnologically important fungi.

e) Give two key characters of Bryophytes.

f) Enlist two internal pecularities and monocol-leaf.

g) Name any two growth inhibiting plant hormones.

h) What is in vitro Morphogenesis?

Q2) Write short notes on Any Three of the following : **[12]**

a) Dicot leaf

b) Key characters of Gymnosperms

c) Economic importance of fungi

d) Gibberellins

Q3) Attempt Any Two of the following : **[10]**

a) Explain mechanism of vernalization.

b) Discuss key characters of fungi.

c) Explain the process of seed germination.

P.T.O.

Q4) Describe key characters of Angiosperms with suitable examples. **[10]**

OR

What are Cytokinins? Give their practical applications.

SECTION - II

(Zoology)

Q5) Answer the following : **[8]**

a) Give examples of Phylum Arthropoda.

b) Define - Aquaculture.

c) Write any two characteristics of Phylum Echinodermata.

d) Define - Parasitism.

e) Name any one Ectoparasite and its host.

f) Enlist any two useful Arthropods.

g) Define - Protozoa.

h) What is Smoker?

Q6) Write short notes on (any three) **[12]**

a) What are the types of parasites?

b) Describe Mariculture.

c) Salient features of Phylum Platyhelminthes.

d) Write economical importance of honey bees.

e) Bamboo Mountage.

Q7) Attempt the following (Any two) **[10]**

a) Describe types of host.

b) Sketch and label digestive system of Earthworm.

c) Explain symptoms and control measure of any one protozoan parasite.

Q8) Attempt the following : **[10]**

Describe colony organization of Apis dorsata.

OR

Describe fresh water aquaculture.

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Total No. of Questions : 5] **[Total No. of Pages : 2**

P203

[3619]-6
F.Y. B.Sc.
BIOTECHNOLOGY
Bb-106 : Biophysics and Instrumentation (New)

Time : 3 Hours] ***[Max. Marks : 80***

Instructions to the candidates:

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

Q1) Answer the following : **[16]**

a) State failures of Bohr's theory.

b) State characteristics of electromagnetic waves.

c) Define
   i) Radioactivity
   ii) Radioactive decay

d) What is difference between enthalpy and entropy?

e) What is thermiston? Draw symbol and state its types.

f) Define aberrations. State it's types.

g) State limitations of first law of thermodynamics.

h) What is lipids? State its types.

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

a) Prove that the radius of the n^{th} Bohr's orbit of an atom is directly proportional to n^2 where n is principle quantum number.

b) Give characteristics of Beta rays.

c) Write note on chemical potential.

d) Discuss fluid-Mosaic model of plasma membrance with help of neat diagram.

e) What is thermocouple thermometer? Give principle and construction.

f) Write short note on Atomic Absorption Spectroscopy.

P.T.O.

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

a) Calculate kinetic energy and potential energy of first orbit of hydrogen atom. Given $e = 1.6 \times 10^{-19}c$ and $r = 0.53 \times 10^{-10}m$.

b) Define half life. Derive an expression for half life period.

c) Explain physical significance of Entropy.

d) Write note on passive electrical properties of cell.

e) Explain construction and working of clinical thermometer.

f) Explain Dissecting microscope with neat diagram.

Q4) Answer any two of the following : **[16]**

a) Discuss vibrational spectra of diatomic molecules.

b) Describe construction and working of G.M. counter.

c) What do you meant by active transport? Explain Na^+, K^+, ATPase systems and Ca^{++}, H^+ K^+ ATPase systems.

Q5) a) Explain the construction and working of Bainbridge mass spectrometer.

b) Explain transmission electron microscope with schematic diagram of TEM.

[16]

OR

a) Explain in detail properties of Nucleus.

b) What do you meant by fluorescent spectroscopy? Explain working of fluorescent spectrometer with help of schematic diagram.

Total No. of Questions : 5] **[Total No. of Pages : 2**

P204

[3619]-7
F.Y. B.Sc.
BIOTECHNOLOGY
Bb-107 : Microbiology (New)

Time : 3 Hours] ***[Max. Marks : 80***

Instructions to the candidates:

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

Q1) Answer the following : **[16]**

a) Define synergism with suitable example.

b) What is meant by basic dye? Give an example.

c) State two characteristics of chlorophycophyta.

d) Enlist four viral plant pathogens.

e) Define photoheterotrophs with suitable example.

f) State Lamberts law.

g) Enlist four characteristics used in taxonomy of bacteria.

h) State two differences in the nuclear area of prokaryotes and eukaryotes.

Q2) Attempt any four : **[16]**

a) Describe the structure and use of inoculating needle.

b) Write a note on development of agricultural microbiology.

c) State Koch's postulates for germ theory of diseases.

d) Justify: Viruses do contain few enzymes.

e) What is antagonism? Give suitable examples.

f) Justify: Though the flagella of bacteria have very less diameter, they can still be observed by compound microscope.

P.T.O.

Q3) Attempt any four : **[16]**

a) Justify: Biofilm is a novel colony formation pattern.

b) Describe the structure of Bacteriophage T_4.

c) How is lyophilization used for maintenance of cultures.

d) Describe the constituents and role of peptone in media preparation.

e) State the salient features of Bergey's manual.

f) Describe in brief an indirect method for enumeration of bacterial cells.

Q4) Attempt any two : **[16]**

a) Give an account of contributions of Louis Pasteur in microbiology.

b) Explain in detail endomycorrhizae.

c) Give an account of outline classification of Fungi.

Q5) Attempt any one : **[16]**

a) Describe in detail the various stages in lytic cycle of bacteriophage.

b) Give a detailed account of a Laminar air flow with respect to
   i) Principle
   ii) Diagram
   iii) Working
   iv) Uses.

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Total No. of Questions : 5] **[Total No. of Pages : 2**

P205

[3619]-8
F.Y. B.Sc.
BIOTECHNOLOGY
Bb-108 : Use of Computers (New)

Time : 3 Hours] ***[Max. Marks : 80***

Instructions to the candidates:

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

Q1) Attempt all of the following : **[16]**

a) What is computer?

b) Write note on floppy disk.

c) What is MICR?

d) Explain in short workstations.

e) What does the MS-Excel windows contain?

f) Explain in short working of search engines.

g) What is a virus?

h) Describe the properties of an algorithm.

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

a) Explain block diagram of a computer.

b) Distinguish between microcomputer and other computers.

c) Write note on parallel processing system.

d) What are the main services provided by operating system?

e) Summarize the features of MS-Word.

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

a) Explain the difference between Virus, Worm and Trojan Horse.

b) What is firewall? Why you need a firewall?

c) How search engines search the databases?

d) What is flowchart? Explain the symbols used in flowchart.

e) List the biomatrics resources. Explain any one of them.

P.T.O.

Q4) Attempt any two of the following : **[16]**

a) Write note on file system verses DBMS.

b) Explain the different attribute types with respect to E-R diagrams.

c) Explain generation of computers.

Q5) Attempt the following : **[16]**

a) Write an algorithm and draw flowchart to check whether given number is perfect or not.

OR

What is an algorithm? Explain the characteristics of algorithm.

b) Write an algorithm and draw flowchart to find first *n* prime numbers.

OR

Write an algorithm and draw flowchart to generate fibonacci series of first 10 terms.

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Total No. of Questions : 5] **[Total No. of Pages : 3**

P207

[3619]- 51
F.Y. B.Sc. (Biotechnology)
CHEMISTRY
Bb : 101 : Fundamentals of Chemistry
(Old Course)

Time : 3 Hours] ***[Max. Marks : 80***

Instructions to the candidates:

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

Q1) Answer the following : **[16]**

a) Distinguish between ideal gas and non-ideal gas.

b) What is necessity of reference electrode?

c) Vapour pressure of solution is less than vapour pressure of pure solvent. Explain.

d) Define rate of reaction. What is effect of catalyst on the rate of reaction?

e) Define the terms : Conformer and chirality.

f) What is paramagnetism? Explain with suitable example.

g) Calculate $[H^+]$ of lime juice whose pH is 4.4.

h) Define the terms system and component.

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

a) What is osmotic pressure of a solution? How it is measured by Berkley and Hartley's method?

b) Mention all the four triple points in the sulphur system. Explain with the help of phase diagram all the phases present at each triple point.

c) Derive an expression for the kinetic theory of gasses.

d) Balance the following equation by ion electron method :
$Fe^{++} + MnO_4^- \rightarrow Fe^{3+} + Mn^{2+}$ (acidic-medium).

e) What are pseudomolecular reactions? Explain giving reasons behind pseudo behaviour.

f) What are buffer solutions? Derive Henderson's equation for basic buffer.

P.T.O.

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

a) Draw phase diagram of two component system in which the two components forms a eutectic mixture.

b) What are concentration cells? Explain the electrode concentration cell without transference.

c) What do you mean by lowering of vapour pressure? Explain relative lowering of vapour pressure of solvent with the help of Raoult's law.

d) A 0.1M solution of KNO_3 shows an osmotic pressure of 4.5 atms at 300k while calculated one is 2.5 atms. Calculate Van't Hoff factor i and degree of dissociation α of KNO_3.

e) In general the rate of a chemical reaction doubles with every 10^oC rise in temperature. If the reaction is carried out in the vicinity of 27^oC, what will be the activation energy of the reaction? [R = 8.314 J/k]

f) Determine the number of phases, components and degrees of freedom for the following systems.

i) $NH_4Cl_{(s)} \rightleftharpoons NH_{3(g)} + HCl_{(g)}$ when $P_{NH_3} \neq P_{HCl}$

ii) $N_2O_{4\,(g)} \rightleftharpoons 2NO_{2(g)}$

Q4) a) Attempt any two of the following : **[8]**

i) Write necessary conditions for a organic molecule to show geometrical isomerism. Illustrate with general example.

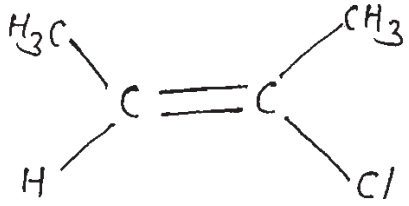
ii) What is redox reaction? Find the oxidant and reductant from the following reactions :

1) $HBr + HBrO^-_3 \rightarrow Br_2$

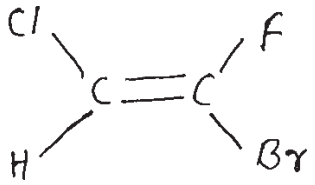
2) $Na_2S_2O_3 + I_2 \rightarrow NaI + Na_2S_4O_6$.

iii) Assign E and Z designation to the following molecules :

1)



2)



b) Attempt any two of the following : **[8]**

i) What is hydrogen bond? What are characteristics of hydrogen bonding.

ii) Calculate ΔH and ΔS for the following reaction at 25°C.
$HgCl_{2(s)} + H_{2\ (1\ atms)} \rightarrow 2Hg_{(l)} + 2H^{+}_{\ (a=1)}$, the emf of cell at 25°C is 0.2676 volts and $\left[\frac{dE}{dT}\right]_p = -31.9 \times 10^{-4}$ volts – deg^{-1}.

iii) At 25°C the transport number of H^+ ion in HCl and CH_3COO^- ion in CH_3COONa are 0.81 and 0.47 respectively. The equivalent conductance at infinite dilution of HCl and CH_3COONa are 426 and 91.0 $Ohm^{-1}Cm^2$ $eqvt^{-1}$ respectively. Calculate the equivalent conductance of acetic acid at infinite dilution.

Q5) Answer any two of the following : **[16]**

a) What do you mean by single electrode potential? Describe the construction and working of quinhydrone electrode. How it is used in measurement of pH of solution.

b) Give brief account of potentiometric titrations. Explain neutralization titration. What are the advantages of potentiometric titrations?

c) What is transport number? Describe Hittorofs method for determination of transport number of ions.

Total No. of Questions : 5] **[Total No. of Pages : 2**

P208

[3619] - 52
F.Y. B.Sc.
BIOTECHNOLOGY
Bb - 102 : Fundamentals of Physics (Old)

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.***

Q1) Answer the following : **[16]**

a) Which is more elastic iron or rubber? Why?

b) State characteristics of transverse waves.

c) The resistance of platinum wire at ice point (0^oC) is 5.0Ω and that at the steam point is 6.0Ω. When the platinum wire is heated in a bath, its resistance is found to be 5.8Ω. Calculate the unknown temperature.

d) State second law of thermodynamics.

e) State Brewster's law of polarization.

f) Calculate the input power of solar cell using efficiency of cell = 12%
V_{oc} = 450 mV.
I_{sc} = 30 mA.
Fil factor = 0.7

g) Give properties of nuclear forces.

h) Convert binary number 10011 into decimal and BCD system.

Q2) Attempt any four : **[16]**

a) Find the maximum load which may be applied to a steel wire of diameter 1.0×10^{-3} m if the permitted strain must not exceed 1/1000 and Young's modulus for steel is 2.0×10^{11} Nm^{-2}.

b) Derive Poiseulle's equation for determination of rate of flow of liquid through the capilary.

c) Discuss the applications of surface tension.

d) The pressure inside soap bubble of radius 2cm balances a 1.5mm column of oil having 0.8gm/cm^3. Find the surface tension of soap solution.

P.T.O.

e) State and prove De Morgan's second theorem. Give interpretation of it.

f) Explain the principle, construction and working of nuclear magnetic resonance spectrometer.

Q3) Attempt any four : **[16]**

a) Two pipes of diameters 3cm and 6cm are connected together. In the first pipe speed of water is 4m/s. Calculate speed of water in second pipe.

b) Distinguish between step up and step down transformer.

c) What is Zener diode? How it is used as voltage stabilizer?

d) Explain the working of n-p-n transistor.

e) The wavelength of first member of Lyman series is 1216 A^o. Calculate the wavelength of second member of Balmer series.

f) What is chromatographic techniques? Discuss three methods used for chromatography.

Q4) Attempt any two : **[16]**

a) Explain construction, principle and working of venturimeter. Derive necessary formula.

b) Explain Quincke's method to determine S.T. of mercury when angle of contact is known.

c) What is beat. Show that the frequency of beats is equal to difference between the frequencies of two sound waves producing it.

Q5) a) Define three critical constants of the gas. Obtain the critical constants in terms of Van der waal's constants.

b) Discuss following in brief :

i) Population inversion and pumping methods.

ii) Condition for laser action.

iii) Properties of laser.

[16]

OR

a) Draw the phase diagram for series LCR ac circuit. Hence obtain total impedence, phase angle and condition for resonance. Find the resonance frequency of series LCR circuit if C = 0.4 μF, L = 0.4H, R = 10Ω.

b) Describe principle, construction and working of thero-couple thermometer. Give advantages and limitations of it.

Total No. of Questions : 8] **[Total No. of Pages : 2**

P209

[3619] - 53
F.Y. B.Sc.
BIOTECHNOLOGY
Bb - 103 : Basic Biosciences
(Old Course)

Time : 3 Hours] ***[Max. Marks : 80***

Instructions to the candidates:-

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

SECTION - I
(BOTANY)

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

a) What is binomial nomenclature?

b) Define photoperiodism.

c) Enlist general characters of plant kingdom.

d) State two examples of fungi.

e) Give two diagnostic characters of Bryophytes.

f) Enlist two internal characters of monocot leaf.

g) State methods of breaking seed dormancy.

h) Give two characters of short day plants.

Q2) Write short notes on <u>any three</u> of the following : **[12]**

a) Dicot leaf.

b) Distinguishing characters of pteridophytes.

c) Applications of fungi.

d) Long day plants.

Q3) Attempt <u>any two</u> of the following : **[10]**

a) Explain the mechanism of vernalization.

b) Discuss diagnostic characters of gymnosperms.

c) Distinguish between primary and secondary growth.

P.T.O.

Q4) Classify Angiosperms and discuss their diagnostic characters in brief. **[10]**

OR

Give an account of classification of Algae and enlist their distinguishing characters.

SECTION - II
(ZOOLOGY)

Q5) Answer the following: **[8]**

a) Give examples of Phylum coelenterata.
b) Define -Ectoparasite.
c) Write any two characteristics of phylum porifera.
d) Define Arthropoda.
e) Name any one Nematode parasite with their habitat.
f) Enlist any two useful protozoans.
g) Define-Hemichordata.
h) What is Royal Jelly?

Q6) Write short notes on (any three) : **[12]**

a) Salient features of phylum Mollusca.
b) Adaptations in Amphibia.
c) Describe-structural host specificity.
d) Write Economic importance of Honey bees.
e) Artificial pearl formation.

Q7) Attempt the following (any two) : **[10]**

a) Differentiate between Reptilia and Mammalia.
b) Sketch and label life cycle of silk moth.
c) Describe the types of parasites.

Q8) Attempt the following : **[10]**

Describe the digestive system of earthworm.

OR

Describe different bee keeping equipments.

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Total No. of Questions : 8] **[Total No. of Pages : 4**

P210

[3619]- 54
F.Y. B.Sc.
BIOTECHNOLOGY
Bb : 104 : Mathematics and Statistical Methods for Biologists
(Old Course)

Time : 3 Hours] ***[Max. Marks : 80***

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Use separate answer books for each section.***
3) ***Use of scientific calculator and statistical table is allowed.***
4) ***Figures to the right indicate full marks.***

SECTION - I

Q1) Attempt each of the following : **[5 × 2 = 10]**

a) State true or false. Justify your answer.
If A = {3, 3^2, 3^3, ..., 3^n, ...} and B = {3, 6, 9, 12, ..., 3n, ...} then B $\subseteq$ A.

b) Find real and imaginary part of a complex number $(3 + 4i)(1 - 2i)$.

c) Find values of x and y from the matrix equation :

$$\begin{bmatrix} 2x+1 & -1 & 1 \\ 3 & 4y & 4 \end{bmatrix} + \begin{bmatrix} -1 & 6 & 4 \\ 3 & 0 & 3 \end{bmatrix} = \begin{bmatrix} 4 & 5 & 5 \\ 6 & 12 & 7 \end{bmatrix}.$$

d) Determine the order and degree of the differential equation

$$\frac{dy}{dx} = \left(1 + 4\frac{d^2y}{dx^2}\right)^{\frac{1}{2}}.$$

e) Determine whether the vectors $u_1 = (0,0)$, $u_2 = (2, 3)$ in a vector space R^2 are linearly independent.

Q2) Attempt any four of the following : **[4 × 2½ = 10]**

a) Prove that if two non zero complex numbers are conjugate of each other then their sum and product are real.

b) Solve the following system of linear equations

$x + y + z = 9$
$2x + 5y + 7z = 52$
$2x + y - z = 0.$

P.T.O.

c) Solve the differential equation

$$\frac{dy}{dx} = \frac{x^2 + 1}{2 - y}.$$

d) Discuss the convergence of the series $\sum_{r=0}^{\infty} \left(\frac{3}{5}\right)^n$.

e) If $u = 3x^2 + 5xy - 7y^2$, find $\frac{\partial u}{\partial x}$ and $\frac{\partial u}{\partial y}$ at (1, 2).

f) Let $V = R^2$ be a vector space with usual addition and scalar multiplication of order pairs. If $W = \{(x, y) \in R^2 / 2x + 3y = 0\}$, show that W is a subspace of V.

Q3) Attempt any two of the following : **[2 × 5 = 10]**

a) If $u = \log (x^3 + y^3 - x^2y - xy^2)$, find $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$.

b) Assuming validity of expansion show that $\sec x = 1 + \frac{x^2}{2!} + \frac{5x^4}{4!} + ...$

c) Using De Moivre's theorem, prove that $(-1 + i)^7 = -8(1 + i)$.

Q4) Attempt any one of the following : **[1 × 10 = 10]**

a) Find a matrix P, if it exists that diagonalizes the matrix A, where

$$A = \begin{bmatrix} 5 & 1 & 1 \\ 1 & 5 & -1 \\ 1 & -1 & 5 \end{bmatrix}.$$

b) The rate of population increase is proportional to the population at a instant. If the population of a city increases from 10 lakhs to 15 lakhs in 20 years what will be population in the next 10 years.

SECTION - II

Q5) Attempt the following : **[5 × 2 = 10]**

a) With suitable example explain inclusive and exclusive class intervals.

b) Calculate Arithmetic mean and median weight of the group of students with weights (in kg) given below :

51, 52, 53, 51, 53, 54, 54, 50, 55, 53.

c) State classical defination of probability.

d) The mean weight of 150 students in a class is 60kg. The mean weight of boys in a class is 70kg. and that of girls is 55kg. Find the number of boys and girls in the class.

e) Define population and sample with illustration.

Q6) Attempt any four of the following : **[4 × 2½ = 10]**

a) Age distribution of following 180 persons is given below. Find an appropriate measure of central tendency.

Age	No. of persons
Below 40	25
40-50	35
50-60	52
60-70	40
70 & above	28

b) There are 300 patients in a certain hospital of which 15 are typhoid patients, 13 are malaria patients while 3 are suffering from both. Find the probability that person. Selected has either typhoid or malaria or both.

c) Calculate variance and standard deviation and C.V. for the following series :

18, 20, 22, 27, 21, 29, 27, 29, 28, 29.

d) Find Karl Pearson's coefficient of correlation for the data given below :

n = 20, $\sum x = 80$, $\sum y = 40$ $\sum x^2 = 1680$ $\sum y^2 = 320$ $\sum xy = 480$.

e) The mean diastolic blood pressure for a group of 81 adults was found to be 79.2mm. Test the hypothesis that the mean diastolic blood pressure is 75mm. population standard deviation is known to be 9mm.

Q7) Attempt any two of the following : **[2 × 5 = 10]**

a) Among 64 offsprings of a certain cross between guinea pigs 34 were red, 10 were black, and 20 were white. According to a genetic model these numbers should be in the ratio 9:3:4 are the data consistent with the model at 5% level.

b) The probability that a patient recovers from a delicate heart operation is 0.9. What is the probability that exactly four of next 7 patients having this operation survive?

c) Find mode for the following frequency distribute.

Size of farm	No. of farms
0-20	12
20-40	28
40-60	16
60-80	5
80-100	3
100-120	1

Q8) Attempt any one of the following : **[1 × 10 = 10]**

a) The height and weight of ten males are given below. Calculate coefficient of correlation between them.

Height :	65	68	62	70	65	72	67	66	68	70
Wt (Pounds) :	128	140	120	152	138	160	135	130	125	165

b) i) Define Binomial distribution state it's mean and variance.

ii) A hospital switchboard receives an average of 4 emergency calls in a 10-minute interval. What is the probability that

1) There are exactly 2 emergency calls in a 10minute interval.
2) There are atleast 1 emergency call in a 10minute interval.

Total No. of Questions : 5] **[Total No. of Pages : 2**

P211

[3619]- 56
F.Y. B.Sc.
BIOTECHNOLOGY
Bb - 106 : Biophysics and Instrumentation
(Old Course)

Time : 3 Hours] ***[Max. Marks : 80***

Instructions to the candidates:

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

Q1) Answer the following : **[16]**

a) Define :

i) Entropy.
ii) Enthalpy.

b) A solution of vitamin D_2 shows 80% transmittance of wavelength 264nm. Explain the measurement in terms of absorbance units.

c) Define absorbed dose (D). Give it's unit.

d) Write some important functions of different plasma membrane.

e) What is the principle of electron microscope?

f) What is membranes potential, in typical animal cell?

g) Explain the term : Adsorption.

h) Define co-efficient of performance of refrigerator.

Q2) Answer any four of following : **[16]**

a) State and explain physical significance of entropy.

b) Give any four applications of IR spectra to biomolecules.

c) Explain physical and biological half life of radioactive substance.

d) State some essential features that are common to most biological membranes.

e) Write note on passive transport.

f) What is thermistors. Draw it's symbol and state types of thermistors.

P.T.O.

Q3) Attempt any four of following : **[16]**

a) What is thermocouples give it's principle and construction with neat diagram.

b) Explain any four electrical properties of membranes.

c) Give any four characteristics of free energy change ΔG.

d) State and explain any four applications of rotational spectra.

e) What is half life period? Give an expression for calculation of decay constant and from that derive an expression for half life period.

f) What is Carnot cycle? Write steps when Carnot cycle acting as heat engine.

Q4) Attempt any two : **[16]**

a) Explain principle, construction and working of scanning electron microscope with neat and labeled diagram.

b) Explain rotational spectra of diatomic molecule on basis of rigid rotor model for rotating diatomic molecule.

c) Write note on :

i) Negative β decay.
ii) Positron decay.
iii) Emission of γ-Ray's (Gama ray's)
iv) Alpha decay.

Q5) a) Explain characteristics of lipid bilayer.

b) What is proteins? Explain carrier protein with neat labeled diagram. **[16]**

OR

a) What is pH? Explain principle, construction and working of pH meter.

b) Write note on :

i) Redox-couple.
ii) Nernst equation to calculate E from E^o.

Total No. of Questions : 5] **[Total No. of Pages : 2**

P212

[3619]- 57
F.Y. B.Sc.
BIOTECHNOLOGY
Bb - 107 : Microbiology
(Old Course)

Time : 3 Hours] ***[Max. Marks : 80***

Instructions to the candidates:

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

Q1) Answer the following : **[16]**

a) Give any four examples of gram negative bacteria.

b) What are pH indicator dyes? Give two examples.

c) Write any two distinguishing characters of actinomycetes.

d) What is a selective medium? Give one example.

e) Define pasteurization.

f) Write the composition of nutrient broth.

g) Give two examples of capsulated bacteria.

h) Define mordant. Write two examples.

Q2) Answer the following (any four) : **[16]**

a) Describe the phases of bacterial growth curve.

b) Determine the TVC of sewage sample in terms of CFU/ml using the following data :

i) Dilution plated = 10^{-6}

ii) Number of colonies = 70

iii) Amount plated = 0.1ml.

c) Why 16s rRNA analysis is significant in classifying organisms.

d) Describe the use of animal tissue culture in viral cultivation.

e) Describe the principle and working of an autoclave.

f) Explain symbiosis between two microbes.

P.T.O.

Q3) Answer the following (any four) : **[16]**

a) Explain the role of microorganisms in biotechnology.

b) Give the use of Koch's postulates in deciding the causative agent of a disease.

c) How will you enumerate lytic phages from a given lysate.

d) Write a short note on locomotion of protozoa.

e) Compare mitosis and meiosis.

f) Describe the cell wall of gram positive bacteria.

Q4) Attempt any two : **[16]**

a) Describe the various morphological and physiological characteristics used in bacterial taxonomy.

b) Give the significant events of the 'Golden Era' of microbiology.

c) Describe the characteristics of fungi. Give a general account of classification of fungi.

Q5) Attempt any one : **[16]**

a) Diagramatically explain the lytic and lysogenic cycle of bacteriophage.

b) Describe the nutritional classification of bacteria with suitable examples.

Total No. of Questions : 5] **[Total No. of Pages : 2**

P213

[3619]- 58
F.Y. B.Sc.
BIOTECHNOLOGY
Bb : 108 : Use of Computers
(Old Course)

Time : 3 Hours] ***[Max. Marks : 80***

Instructions to the candidates:

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

Q1) Attempt all of the following : **[16]**

a) What do you mean by computer memory?

b) Explain the star topology.

c) List various tools in the paint tool box.

d) What is the purpose of windows explorer?

e) State true or false :

i) An autoexec.bat executes automatically.

ii) CD-ROM is allowed to write data more than once.

f) Write note on menubar.

g) Define the following terms :

i) RAM.

ii) Extended memory.

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

a) How the operating system supports to interact application software?

b) Write short note on input devices.

c) Explain in short bioinformatics.

d) Explain the concept of directory with help of example. Also explain subdirectory.

e) Write the applications of internet.

P.T.O.

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

a) Explain the concept of network software.

b) What is the purpose of network adapter card.

c) Explain different uses of computer biology.

d) State the process of mail-merge in MS-Word.

e) Explain ISO-OSI model.

Q4) Attempt any two of the following : **[16]**

a) What is disk operating system? Explain any four external commands of DOS.

b) Write note on spread sheet of MS-Excel.

c) Differentiate between low level and high level programming languages.

Q5) Attempt the following : **[16]**

a) What is flowchart? How flowchart is differ from algorithm? Explain the symbols used in flowchart.

OR

Write an algorithm and draw flowchart to accept 5 numbers and find sum of their reverse.

b) Write an algorithm and draw flowchart to accept n numbers from user, find maximum and minimum of these numbers.

OR

Write an algorithm and draw flowchart to generate fibonacci series of first 10 terms.

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Total No. of Questions : 5] **[Total No. of Pages : 2**

P214

[3619] - 201
S.Y. B.Sc.
BIOTECHNOLOGY
Bb - 221 : Molecular Biology
(Sem. - II)

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.***
4) ***Use of colour pensils restricted to diagrams.***

Q1) Attempt the following in 2-3 sentences : **[10 × 2 = 20]**

a) Write distinguishing properties of e-RNA polymerases.

b) Give diagramatic representation of Harshy-Chase expt.

c) What is meant by non-histone proteins, mention their significance.

d) How does DNA, RNA & plasmid DNA reacts with NaOH? What will be the outcome of the reaction?

e) Viruses are classified on the basis of their genomes. Justify.

f) Enlist the name of enzymes involved in replication in E.coli.

g) With example, write about transition & transversion mutation.

h) What is base pair excision repair?

i) Lipidation of membrane proteins is essential for cell survival give reason.

j) Define gene.

Q2) Give justification for the following (<u>any five</u>) : **[5 × 3 = 15]**

a) Third end of tRNA chain ends in CCA base sequence.

b) Repressor needs for lytic infection.

c) Histone acetylation has an important role in nucleosome assembly.

d) Gyrases are DNA Topoisomerases enzymes.

e) Most DNA lesions in E.coli are repaired prior to replication.

f) HSP 70 and HSP 60 families are important in protein folding.

g) In eukaryotic translation, elongation factor is complexed with GTP.

P.T.O.

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

a) B form & Z form of DNA.

b) Suppressor mutation.

c) Interpretation of the result of Meselson & Stahl's experiment.

d) Significance of exon shuffling.

e) 3 poly adenylation.

Q4) a) Illustrate role of DNA glycosylases in Base excision repair. **[7]**

OR

What is genetic code? Explain ambiguity & cracking of genetic code.

b) With neat diagram describe polytene & lamp brush chromosomes. **[8]**

OR

Write in detail the elongation of translation in eukaryotes.

Q5) Give reasons for the following : **[15]**

a) The presence of repressor is necessary for its own synthesis.

b) Eukaryotic genomes contain large amounts of repetitive DNA sequences.

c) Basic proteins substitute the histones in prokaryotic cells.

OR

With neat labelled diagram explain elongation of eukaryotic transcription, add a note on processing of pre mRNAs.

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Total No. of Questions : 6] **[Total No. of Pages : 2**

P215

[3619]- 202
S.Y. B.Sc.
BIOTECHNOLOGY - II
Bb : 222 : Plant and Animal Tissue Culture
(Sem. - II)

Time : 3 Hours] ***[Max. Marks : 80***

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Answer to both the sections should be written on separate answer sheets.***
3) ***Figures to the right indicate full marks.***

SECTION -I

Q1) Answer any six in brief : **[12]**

a) Write important contribution of Guha and Maheshwari to PTC.

b) What are the basic infrastructural requirements for a PTC lab?

c) What are chelating agents? Give examples?

d) Differentiate between batch and continuous culture.

e) How synchronization can be obtained in cell culture?

f) What are PEDC and IEDC?

g) How virus free plants can be obtained through in vitro techniques?

h) Describe the term cellular totipotency.

Q2) Attempt any three of the following : **[12]**

a) Write protocol for callus culture and add notes on its significance.

b) Explain in detail any two pathways of micropropagation.

c) Describe the production of haploids through pollen culture technique.

d) Write a note on plant growth regulators.

e) How yield of secondary metabolites can be increased under in vitro conditions?

P.T.O.

Q3) a) Explain in detail the Agrobacterium mediated genetic transformation in plants. **[8]**

OR

Write in detail initiation and establishment of protoplast culture.

b) What are the different steps involved in cryopreservation? **[8]**

SECTION -II

Q4) Answer any six : **[12]**

a) Differentiate between cell proliferation and differentiation.

b) What is cell counter? Give its importance.

c) Write application of animal tissue culture.

d) Give the role of serum in media.

e) Explain layout of a ATC laboratory where 2-3 people can work.

f) What is enzymatic disaggregation of tissue?

g) Methyl red is added in the media. Why?

h) What are class III biosafety cabinets?

Q5) Answer any three : **[12]**

a) Give the principle, working and application of laminar air flow.

b) What are the characteristics of transformed cell lines.

c) Explain the concept of tissue engineering.

d) Define cell repository and give it's importance.

e) Give the importance of insect cell line.

Q6) a) What is organ culture? Discuss various ways and importance of organ culture. **[8]**

OR

Explain in detail biochemical and genetic characterisation of cell lines.

b) Explain the principle and importance of animal cell culture technique. **[8]**

Total No. of Questions : 5] **[Total No. of Pages : 3**

P216

[3619]- 203
S.Y. B.Sc.
BIOTECHNOLOGY
Bb - 223 : English
(Sem. - II)

Time : 3 Hours] ***[Max. Marks : 80***

Instructions to the candidates:

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

Q1) a) In front of the enormous Shibuya train station in Tokyo, there is a life-size bronze statue of a dog. Even though the statue is very small when compared to the huge neon signs flashing, it isn't difficult to find. It has been used as a meeting point since 1934 and today you will find hundreds of people waiting there for their friends to arrive. Hachiko, an Akita dog, was born in 1923 and brought to Tokyo in 1924. His owner, Professor Eisaburo Uyeno and he were inseparable friends right from the start. Each day Hachiko would accompany his owner, a professor at the Imperial University, to Shibuya train station when he left for work. When he came back, the professor would always find the dog patiently waiting for him. Sadly, the professor died suddenly at work in 1925 before he could return home. Although Hachiko was still a young dog, the bond between him and his owner was very strong and he continued to wait at the station every day. Sometimes, he would stay there for days at a time, though some believe that he kept returning because of the food he was given by street vendors. He became a familiar sight to commuters over time. In 1934, a statue of him was put outside the station. In 1935, Hachiko died at the place he last saw his friend alive.

i) Where is the life-size bronze statue of the dog located? **[1]**
ii) Who was the owner of Hachiko? **[2]**
iii) How did the dog develop the habit of coming to the railway station? **[2]**
iv) Why did the dog keep waiting at the station? **[2]**
v) What is the meaning of the word 'commuters' in this passage? **[1]**

P.T.O.

b) Expand the following ideas : **[8]**

i) United we stand, divided we fall.

ii) Variety is the spice of life.

Q2) a) Fill in the blanks and complete the following table (any four) : **[4]**

Noun	**Verb**	**Adjective**	**Adverb**
Emotion	----------	----------	----------
----------	----------	----------	Optionally
----------	----------	Creative	----------
----------	Vary	----------	----------
Excellence	----------	----------	----------

b) Use the correct tense form of the verbs given in the brackets to complete the following sentences. (any four) : **[4]**

i) Shweta didn't come to the college today. She (meet) with an accident yesterday.

ii) The doctor will come at eight. He never (miss) an appointment.

iii) She (wait) since yesterday.

iv) The boys are on the terrace (fly) kites.

v) We (listen) to the speaker for the last two hours.

c) Explain the meaning of the following pairs with suitable examples. (any four) : **[8]**

i) Picture and pitcher.

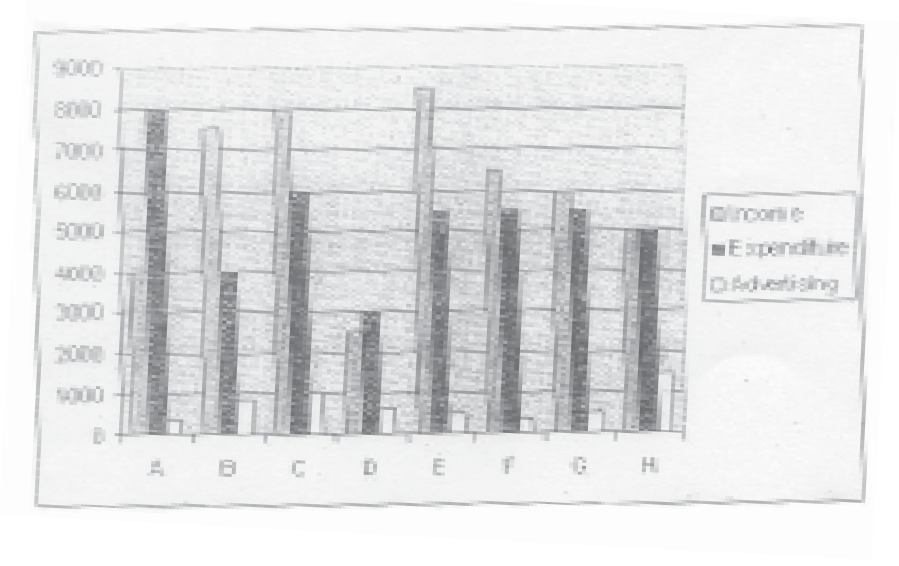
ii) Maid and made.

iii) Seen and scene.

iv) Price and prize.

v) Fierce and fears.

Q3) a) Illustrate the following chart showing a firm's income, total expenditure and advertising costs over an eight-month period. **[8]**



b) Write the experimental records of isolation of chromosomal bacterial DNA. **[8]**

Q4) a) Make a note of the following passage : **[6]**

Leading investors have joined the growing chorus of concern about governments and companies rushing into producing biofuels as a solution for global warming, saying that many involved in the sector could be jeopardising future profits if they do not consider the long-term impact of what they are doing carefully. It is essential to build sustainability criteria into the supply chain of any green fuel project in order to ensure that there is no adverse effect on the surrounding environment and social structures. The report produced by the investors expresses concern that many companies may not be fully aware of the potential pitfalls in the biofuel sector. Production of corn and soyabeans has increased dramatically in the last years as an eco-friendly alternative to fossil fuels but environmental and human rights campaigners are worried that this will lead to destruction of rain forests. Food prices could also go up as there is increased competition for crops as both foodstuffs and sources of fuel. Last week, the UN warned that biofuels could have dangerous side effects and said that steps need to be taken to make sure that land converted to grow biofuels does not damage the environment or cause civil unrest. There is already great concern about palm oil, which is used in many foods in addition to being an important biofuel, as rain forests are being cleared in some countries and people driven from their homes to create palm oil plantations. An analyst and author of the investors' report says that biofuels are not a cure for climate change but they can paly their part as long as governments and companies manage the social and environmental impacts thoroughly. There should also be greater measure taken to increase efficiency and to reduce demand.

b) Write a report on your study tour to a vineyard. **[10]**

OR

Write a note on the importance of editing.

Q5) a) Write an application for the post of a Medical Representative in a reputed pharmaceutical company. **[8]**

b) Form new words with the following prefixes and suffixes. **[8]**

Prefix	Suffix
i) Pre ———	——— ion
ii) Con ———	——— ly
iii) Be ———	——— ive
iv) En ———	——— acy.

Total No. of Questions : 7] **[Total No. of Pages : 2**

P217

[3619]-401
T.Y. B.Sc.
BIOTECHNOLOGY
Bb-341 : Large Scale Manufacturing Processes
(Old & New Course) (Semester - II)

Time : 3 Hours] ***[Max. Marks : 80***

Instructions to the candidates:

1) ***Q.1 is compulsory. Attempt any four out of the remaining questions.***
2) ***Draw well labelled diagrams wherever necessary.***
3) ***Answers to the sub questions are to be written together.***
4) ***Figures to the right indicate full marks.***

Q1) Answer all the following in 2-4 lines. **[20]**

a) Define Bioprocess Engineering.

b) State the levels in scale-up of a bioprocess.

c) Mention the specifications of stainless-steel used in bioreactor design.

d) Enlist the mechanisms of capture of particles by air filters.

e) Mention the use of hydrocarbons as media constituent with examples.

f) State the use of mass spectrometers in bioprocess monitoring.

g) What is OUR? How is it related to $K_L a$?

h) State the principle of LAL test used in quality assurance of fermentation products.

i) Mention the applications of nucleases.

j) Enlist any four measures taken in economising a bioprocess.

Q2) a) Explain the various methods used to measure $K_L a$. **[10]**

b) Elaborate on the properties of immobilized enzymes. **[5]**

Q3) a) What is Del factor? Explain with an example its use in design of a batch sterilization process. **[10]**

b) Explain with a diagram the principle and applications of cross-flow filtration. **[5]**

P.T.O.

Q4) a) Explain with the help of a flowsheet the fermentative production of glutamic acid. **[10]**

b) Explain the various measures considered in pricing of a product. **[5]**

Q5) a) Explain the use of Plackett-Burmann design in media optimization with an example. **[10]**

b) Diagrammatically represent a bubble column fermenter and explain its working and use. **[5]**

Q6) a) What is biotransformation? Mention its applications. **[5]**

b) Explain the production of New Castle disease vaccine. **[5]**

c) Draw a neat labelled diagram of multichamber centrifuge. **[5]**

Q7) Write short note : **[15]**

a) GMP.

b) Spirulina as SCP.

c) Yield Co-efficient.

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Total No. of Questions : 8] **[Total No. of Pages : 2**

P218

[3619]-402
T.Y. B.Sc. (Semester - IV)
BIOTECHNOLOGY
Bb-342 : Applications of Biotechnology in Agriculture & Health
(Old & New Course)

Time : 3 Hours] ***[Max. Marks : 80***

Instructions to the candidates:

1) ***Q.1 & Q.5 are compulsory.***
2) ***Out of the remaining attempt any two questions from each section.***
3) ***Answers to each section should be written on separate answer books.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat & labelled diagrams if necessary.***

SECTION - I

(Agriculture)

Q1) Explain the terms : **[10]**

a) Cybrid.

b) Trade Mark.

c) AFLP.

d) GM Crops.

e) Cryopreservation.

Q2) a) Describe with suitable example the ethical & social aspects involved in introducing a GM Food. **[8]**

b) Explain the method of slow growth preservation & add note on DNA banking. **[7]**

Q3) a) Describe different techniques of gene manipulation. Give its application with respect to agricultural biotechnology. **[8]**

b) Name the IPR's related Agricultural biotechnology. Explain any one in detail. **[7]**

P.T.O.

Q4) Write short notes : **[15]**

a) QTL analysis.

b) Shuttle vectors.

c) Micropropagation.

SECTION - II

(Health)

Q5) Attempt the following : **[10]**

a) Enlist the applications of animal organ culture.

b) What are recombinant vaccines.

c) Define tissue engineering.

d) What are the limitations of animal cell culture.

e) Enlist any four disadvantages of serum in culture media.

Q6) a) What is RFLP? Write the steps involved in preparation of RFLP maps. **[8]**

b) What are DNA vaccines? Write the principle and advantages of these vaccines. **[7]**

Q7) a) What are biosensors? Enlist the types of biosensor and write its applications. **[8]**

b) What are monoclonal antibodies? Explain how they are produced by hybridoma technology. **[7]**

Q8) Write short notes on : **[15]**

a) Recombinant products for human health.

b) Role of epidemeological studies in disease management.

c) Distinguish between Serum Containing Medium and Serum Free Medium.

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Total No. of Questions : 8] **[Total No. of Pages : 2**

P219

[3619]-403
T.Y. B.Sc.
BIOTECHNOLOGY
Bb-343 : Animal and Plant Development
(Old & New Course) (Semester - IV)

Time : 3 Hours] ***[Max. Marks : 80***

Instructions to the candidates:

1) ***Q.1 & Q.5 are compulsory.***
2) ***Out of the remaining attempt any two questions from each section.***
3) ***Answers to each section should be written on separate answer books.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat and labelled diagrams if necessary.***

SECTION - I

(Animal Development)

Q1) Explain the terms : **[10]**

a) Morphogen.

b) Dedifferentiation.

c) Pleuripotency.

d) Commitment.

e) Apoptosis.

Q2) a) Describe the process of oögenesis. **[8]**

b) Mention different types of cleavages and explain how yolk governs the cleavage pattern. **[7]**

Q3) a) Describe the role of pattern forming genes in development with the help of Drosophila system. **[8]**

b) Compare and contrast the development of Congenic and Transgenic animals. **[7]**

P.T.O.

Q4) a) Write an account of Gastrulation in Frog and add a note on fate of three germ layers. **[7]**

b) Describe somatic cell hybridization and its applications. **[8]**

SECTION - II

(Plant Development)

Q5) Explain the following terms with reference to plant development. **[10]**

a) Promeristem.

b) Determination.

c) Abnormal development.

d) Phyto hormone.

e) Somatic embryo.

Q6) a) Why, Arabidopsis is used as plant development model system? Explain Floral patterning in Arabidopsis. **[8]**

b) Describe strategy for the development of transgenic plant. **[7]**

Q7) a) What is Auxin? Explain its role during plant development. **[7]**

b) Describe the structure & activity of root & shoot apical meristems. **[8]**

Q8) Write notes on : **[15]**

a) Embryogenesis in monocotyledons.

b) Plasticity in plants.

c) Embryo Suspenor.

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Total No. of Questions : 3] **[Total No. of Pages : 2**

P220

[3619-A]-201
B.Sc. (Applied)
BIOTECHNOLOGY
M-21 : Microbial Technology - II

Time : 1½ Hours] ***[Max. Marks : 30***

Instructions to the candidates:

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

Q1) Select the correct option : **[5]**

a) Excretion of glutamic acid from microbial cells depend on the concentration of
   i) Biotin
   ii) Nitrogen source
   iii) Acetyl CoA
   iv) Glucose

b) Transfer of oxygen from air to the cell during a fermentation process occur in the following step.
   i) Transfer of oxygen from air bubble to solutions.
   ii) Transfer of dissolved oxygen through medium to the microbial cell.
   iii) Uptake of dissolved oxygen by the cell.
   iv) All of the above.

c) Resistance against rust for steel bioreactors is achieved by incorporation of _____ in the steel.
   i) Aluminium
   ii) Chromium
   iii) Carbon
   iv) Iron

d) Which of the following method is not used for sterilization.
   i) V Radiation
   ii) Autoclaving
   iii) Ultrasonication
   iv) Filtration

P.T.O.

e) Fatty acids and oils are used as a source of
   i) Trace elements
   ii) Carbon and Nitrogen
   iii) Carbon & Phosphorous
   iv) Carbon, energy & antifoam.

Q2) Answer any five of the following : **[10]**

a) Give the difference between cyclic fed batch and continuous fermentation.

b) Define del factor. Give its significance in bioprocess.

c) How serum free media can reduce the cost of the fermentation process.

d) Describe the cross linking method of enzyme immobilisation.

e) Which are the factors of concern in scale up of a bioprocess?

f) What is the significance of mass and energy balances in a fermentation process?

g) Give an account of different mechanisms of filtration.

Q3) Answer any three of the following : **[15]**

a) Explain the Plackett-Burman design for the media optimization.

b) Draw a labelled diagram of a bioreactor. Add a note on the function of each of the part of bioreactor.

c) Explain in detail the use of solvent-solvent extraction in the downstream processing.

d) Explain the large scale production of L-Lysine.

e) What is batch sterilization? Explain the designing of batch sterilization.

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Total No. of Questions : 3] **[Total No. of Pages : 2**

P221

[3619-A]-202
B.Sc. (Applied)
BIOTECHNOLOGY (Semester - II)
M-22/P-22 : Ecology, Waste Management & Biodiversity

Time : 1½ Hours] ***[Max. Marks : 30***

Instructions to the candidates:

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

Q1) Choose correct option : **[5]**

a) In natural ecosystem nature maximizes for gross production, whereas in an artificial ecosystem man maximizes for _____ production.
   i) Net
   ii) Secondary
   iii) Tertiary
   iv) All the above

b) It is estimated that there exists _____ million species of living form on the planet earth.
   i) 5 to 10
   ii) 5 to 20
   iii) 5 to 30
   iv) 5 to 40

c) Ex-situ Conservation of Habitats is achieved by _____
   i) Seed banks
   ii) Gene Banks
   iii) Artificial insemination
   iv) All the above

d) Full form of UASB is _____
   i) Upflow anaerobic screening blanket.
   ii) Upflow aerobic sludge blanket.
   iii) Upflow anaerobic sludge blanket.
   iv) Upflow aerobic screening blanket

P.T.O.

e) The air (prevention and control of pollution) Act passed in _____
   i) 1971
   ii) 1981
   iii) 1976
   iv) 1986

Q2) Attempt <u>any five</u> of the following : **[10]**

a) Differentiate between Natural ecosystem and Artificial ecosystem.

b) What are the applications of ecological tools and techniques?

c) Enlist prezygotic mechanisms responsible for speciation.

d) What are the different physical properties used in water quality monitoring?

e) Write various sources of NO_X.

f) Explain the concept - Trickling filter.

g) Describe species diversity with respect to grassland ecosystem.

Q3) Attempt <u>any three</u> of the following : **[15]**

a) Describe major air pollutants, their sources and effects.

b) Describe any one nonconventional energy sources in detail.

c) Explain mechanism and consequences of ozone layer depletion.

d) Explain importance and applications of Biodiversity indices.

e) Define ecosystem. Describe structure and functions of ecosystem with suitable example.

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Total No. of Questions : 3] **[Total No. of Pages : 2**

P222

[3619-A]-205
B.Sc. (Applied) (Semester - II)
BIOTECHNOLOGY
M-25 : Plant and Animal Tissue Culture.

Time : 1½ Hours] ***[Max. Marks : 30***

Instructions to the candidates:

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

Q1) Select the correct option and fill in the blanks : **[5]**

a) The regression of mature cell to meristematic state is termed as _____ .
   i) Differentiation
   ii) Redifferentiation
   iii) Dedifferentiation
   iv) Totipotency

b) In animal cell culture L glutamine is supplied as a major source of ____ .
   i) Oxygen
   ii) Phosphorus
   iii) Nitrogen
   iv) Carbon

c) The pore size of HEPA filters is _____
   i) 2.0 μm
   ii) 0.22 μm
   iii) 0.45 μm
   iv) 0.3 μm

d) In human leucocyte culture, cells are arrested at metaphase by addition of _____
   i) Colchicine
   ii) Potassium chloride
   iii) Acetic acid
   iv) Trypsin

e) Cell suspension should be subcultured before it enters in ____ phase.
   i) Log
   ii) Exponential
   iii) Dividing
   iv) Stationary

P.T.O.

Q2) Answer in short (any 5) : **[10]**

a) Callus is heterogenous mass of proliferative cells. Justify.

b) Enlist the equipments used in animal tissue culture laboratory.

c) Why the single cell culture requires presence of nurse callus?

d) What is Karyotyping? Give its applications.

e) Define Cytodifferentiation and mention its types.

f) What is primary culture?

g) What is somatic embryogenesis? What are its types.

Q3) Attempt any three in brief : **[15]**

a) Enlist the sources of contamination in the plant tissue culture and discuss the aseptic techniques employed for glassware, media & explant sterilisation.

b) Give an account of growth curve of animal cell culture.

c) Why the cultured cells loose regenerative potential.

d) What are the advantages and disadvantages of animal tissue culture.

e) What are the ingredients of a PTC medium.

Total No. of Questions : 3] **[Total No. of Pages : 2**

P223

[3619-A]-206
B.Sc. (Applied)
BIOTECHNOLOGY
P-26 : Use of Computers in Biology

Time : 1½ Hours] ***[Max. Marks : 30***

Instructions to the candidates:

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

Q1) Choose correct option : **[5]**

a) DVD is
   i) Digital vision disk
   ii) Digital versatile disk
   iii) Data versatile disk
   iv) None of the above

b) Which is NOT type of Micro Computer.
   i) Desktop Computer
   ii) Servers
   iii) Laptop Computers
   iv) Super Computer

c) Most common protocol is
   i) Ethernet
   ii) Internet
   iii) Apparent
   iv) All of the above

d) RAM stands for
   i) Random access memory
   ii) Rare access memory
   iii) Real access memory
   iv) Repeat access memory

e) _____ is name of super computer.
   i) Serum
   ii) PARAM
   iii) KARAM
   iv) None of the above

P.T.O.

Q2) Attempt any five of the following : **[10]**

a) Advantages of the linux as operating system.

b) Differentiate between floppy disk and hard disk.

c) What is RAM and ROM.

d) What is super computer? Give its advantages and disadvantages.

e) What are different types of viruses.

f) What are basic components of the network.

g) Which are the different symbols used in E-R model.

Q3) Attempt any three of the following : **[15]**

a) Distinguish between algorithm, flow chart and programme.

b) What are different types of topologies? Explain them with diagram.

c) What are characteristics of Biological data.

d) Write a note on generation of computer with respect to characteristics of computers, advantages and disadvantages.

e) What are advantages of databases.

Total No. of Questions : 3] **[Total No. of Pages : 2**

P224

[3619-A] - 207
B.Sc. (Applied)
BIOTECHNOLOGY
M - 27 : Bioinformatics

Time : 1½ Hours] ***[Max. Marks :30***

Instructions to the candidates:-

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

Q1) Select the correct option : **[5]**

a) _____ is/are methods for molecular modeling.

i) Ab intio method. ii) Fold recognition.

iii) Homology modeling. iv) All of the above.

b) BLOSUM 90 stands for _____.

i) 90% identity ii) 90% similarity

iii) 10% identity iv) 10% similarity

c) PAM is _____

i) Percent Accepted Mutation.

ii) Percentile Accepted Mutation.

iii) Point Accepted Mutation.

iv) Power Accepted Mutation.

d) _____ is secondary database.

i) NCBI ii) EMBL

iii) PIR iv) BLOCKS

e) Progressive sequence alignment is used in _____.

i) Clustal W ii) Pileup

iii) Both 'i' and 'ii' iv) None of these

P.T.O.

Q2) Attempt any five of the following : **[10]**

a) What are two different types of alignment?

b) What do you mean by dihydral angle? Give example.

c) What are different divisions in the Gene Bank entry?

d) What is difference between homology and similarity?

e) What is difference between cladogram and phylogram?

f) What are difficulties while predicting eukaryotic gene prediction?

g) What are different classes of the proteins?

Q3) Attempt any three of the following : **[15]**

a) Differentiate between PAM and BLOSUM.

b) Write a short note on Ramchandran plot with its diagram. Explain its significance.

c) Explain typical entry of Gene Bank format.

d) What is progressive sequence alignment? Explain with example of clustal W.

e) What do you mean by molecular phylogeny? Explain and label typical phylogenetic tree. What are different approaches to construct phylogenetic tree?

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Total No. of Questions : 3] **[Total No. of Pages : 2**

P225

[3619-A]-208
B.Sc. (Applied) (Semester - II)
BIOTECHNOLOGY
P-21 : Plant Tissue Culture - II

Time : 1½ Hours] ***[Max. Marks : 30***

Instructions to the candidates:

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

Q1) Select the correct option & fill in the blank : **[5]**

a) Embryo culture technique was demonstrated by _____ .
   i) Laibach
   ii) White
   iii) Hanning
   iv) Movel

b) Microspores are cultured at _____ stage for haploid plant production.
   i) Uninucleate
   ii) Binucleate
   iii) Late binucleate
   iv) All of these

c) The cell wall of Pollen Mother cell is made up of _____ .
   i) Cellulose
   ii) Pectin
   iii) Chitin
   iv) Callose

d) _____ has a natural ability to transform plant cells.
   i) Azatobactor
   ii) Agrobacterium
   iii) Rhizobium
   iv) Azospirillum

e) _____ was the first invitro produced chemical to be commercialized.
   i) Vinblastin
   ii) Taxol
   iii) Ajmalicine
   iv) Shikonin

P.T.O.

Q2) Answer in short (any five) : **[10]**

a) What is a cryoprotectant? Give two examples.

b) Define hyperhydration and mention its characteristics.

c) What are the phases of protoplast fussion?

d) Mention the types of T_i plasmid based vectors & give one example each.

e) What is plasmolyticum? Mention their types with one example each.

f) What do you mean by precocious germination? How is it prohibited?

g) What are the advantages of pollen culture?

Q3) Attempt any three in brief : **[15]**

a) Discuss the methods of selection for somoclonal variations with suitable examples.

b) Comment on the factors affecting embryo culture.

c) What are the factors affecting on yield and viability of protoplasts?

d) Discuss the methods of direct gene transfer.

e) Comment on the Ontogeny of androgenic haploids.

Total No. of Questions : 3] **[Total No. of Pages : 2**

P226

[3619-A]-209
B.Sc. (Applied)
BIOTECHNOLOGY
P-25 : Techniques in Microbiology

Time : 1½ Hours] ***[Max. Marks : 30***

Instructions to the candidates:

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

Q1) Select the correct answers : **[5]**

a) Sedimentation co-efficient of bacterial ribosome is
   i) 50s
   ii) 60s
   iii) 70s
   iv) 80s

b) Which of the following is a eukaryote?
   i) Bacteria
   ii) Fungi
   iii) Chlamydia
   iv) Mycoplasma

c) Which virus has ds RNA genome?
   i) Adino
   ii) Rhabdo
   iii) Influenza
   iv) Herpes

d) In Gram staining, iodine acts as
   i) Counter stain
   ii) Decolourising agent
   iii) Primary stain
   iv) Mordant

e) The symbiotic association between plant and fungi is found in
   i) Lichen
   ii) Leguminous plants
   iii) Mycorrhizae
   iv) Rhizobium.

P.T.O.

Q2) Attempt any Five questions : **[10]**

a) What is the importance of an Autoclave?

b) Why do bacteria form endospores?

c) How stains are classified? Give the major groups of stains.

d) What are different associations in microbial ecosystem?

e) Define and differentiate simple & differential staining.

f) Enlist various phases of bacterial growth.

g) Describe four major components used for preparation of bacteriological media.

Q3) Attempt any Three questions : **[15]**

a) Describe the unique features of Archaebacteria.

b) What is Gram staining? Explain the role of different compounds used in Gram staining.

c) Give the mechanism of nodule formation by Rhizobium species.

d) Describe enumeration techniques of microorganisms.

e) Explain Viral replication.

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Total No. of Questions : 3] **[Total No. of Pages : 2**

P606

[3619 - A]- 101
B.Sc. (Applied)
BIOTECHNOLOGY
M - 11 : Microbial Biotechnology - I
(Sem.- I)

Time : 1½ Hours] ***[Max. Marks : 30***

Instructions to the candidates:

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

Q1) Select the correct option : **[5]**

a) Occurance of fungi in the roots of the plant is a ——— relationship.

i) Commensalism
ii) Symbiotic
iii) Neutral
iv) Parasitic

b) ——— method will give count of live bacterial cells.

i) Plating
ii) Measurement of OD
iii) Direct counting
iv) Both (b) and (c)

c) ——— is an example of fastidious bacterium

i) Pseudomonas fluorescence
ii) Aspergillus oryzae
iii) Lactobacillus delbruckii
iv) Escherichia coli

d) ——— is used for attachment to the substrate by the bacteria

i) Pili
ii) Flagella
iii) Exospores
iv) Both (a) and (b)

P.T.O.

e) Secondary metabolites are produced in ——— phase of growth

i) Death
ii) Stationary
iii) Lag
iv) Exponential

Q2) Attempt any five of the following : **[10]**

a) What is the principle of LAL test?

b) Describe the vegetative structure of fungi.

c) Which are the industrially important actinomycetes?

d) What are the basic identidification criteria for fungi?

e) How are anaerobic bacteria cultivated?

f) Name the bacteria producing industrially important enzymes.

g) How are viruses important for production of industrial products.

Q3) Attempt any three of the following : **[15]**

a) Elaborate on the biotechnology industrial growth in India.

b) Describe the method for isolating industrially potential organism from soil.

c) Discuss the various negative interactions among organisms in an ecosystem.

d) Describe a detailed structure of bacterial flagella.

e) What are the techniques used for quantification of amino acids and organic acids.

Total No. of Questions : 3] **[Total No. of Pages : 2**

P607

[3619 - A]- 103

B.Sc. (Applied)

BIOTECHNOLOGY

M - 13 : Microbial Genetics and Immunology

(Sem.- I)

Time : 1½ Hours] ***[Max. Marks : 30***

Instructions to the candidates:

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

Q1) Select the correct option : **[5]**

a) Which of the following antibodies are present insecretions?

i) IgD
ii) IgE
iii) IgA
iv) IgM

b) The offsprings of two parents that are heterogygous for a given trait have a ——— percent chance of being homozygous for that trait.

i) 0
ii) 50
iii) 25
iv) 100

c) If a piece of DNA breaks off a chromosome and attaches itself to a non-homologous chromosome at another location. What type of change has occured?

i) Translocation
ii) Duplication
iii) Deletion
iv) Inversion

d) In the dermis of the skin ——— conditions help to inhibit the microorganisms.

i) Acidic
ii) Alkaline
iii) Reducing
iv) Anaerobic

P.T.O.

e) ——— is a live attenuated vaccine.

i) Rabies
ii) Sabin
iii) Salk
iv) Rubella

Q2) Attempt <u>any five</u> of the following : **[10]**

a) What is co-dominance?

b) Explain with example aneuploidy.

c) What is avidity and affinity?

d) What are the uses of monoclonal antibodies?

e) Explain pleiotropic genes.

f) What are complementarity determining genes?

g) What are the different types of T cells?

Q3) Attempt <u>any three</u> of the following : **[15]**

a) Differentiate between active and passive immunization.

b) Define operon. Describe lac operon in detail.

c) Explain Mendelian inheritance pattern with examples.

d) How are bacteriophages the mediators of gene transfer?

e) Describe in detail radioimmuno assay (RIA). What are its applications?

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Total No. of Questions : 3] **[Total No. of Pages : 1**

P608

[3619 - A]- 104
B.Sc. (Applied)
BIOTECHNOLOGY
M - 14 : Recombinant DNA Technology
(Sem.- I)

Time : 1½ Hours] ***[Max. Marks : 30***

Instructions to the candidates:

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

Q1) Define the following : **[5]**

a) Restriction endonucleases.
b) Ligation.
c) Vector.
d) Alkaline phosphatase.
e) Point mutation.

Q2) Attempt any five of the following : **[10]**

a) Give the characteristics of ideal vector.
b) Write any four applications of cDNA library.
c) Write the regulatory aspects for the release of GM crops.
d) Write the characteristic features of bacteriophage.
e) Write the role of following r-DNA technology.
   i) Ligases
   ii) Polymerases
f) Write the characteristics of ideal host.
g) Write any two characteristics of cloning and expression vector.

Q3) Attempt any three of the following : **[15]**

a) Write the applications of genetic engineering in agriculture.
b) Explain the steps involved in PCR reaction.
c) Distinguish between RAPD and RFLP.
d) Explain the principle of DNA sequencing with applications.
e) Explain the process of cDNA synthesis from MRNA.

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Total No. of Questions : 3] **[Total No. of Pages : 2**

P609

[3619 - A]- 105

B.Sc. (Applied)

BIOTECHNOLOGY

M - 15 / P - 15 : Fundamentals of Biological Chemistry

(Sem.- I)

Time : 1½ Hours] ***[Max. Marks : 30***

Instructions to the candidates:

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

Q1) Select the correct option : **[5]**

a) Fat soluble vitamins involved in bone formation and blood clotting are

i) Vit D and Vit K
ii) Vit B and Vit K
iii) Vit D and Vit B
iv) Vit A and Vit K

b) Waxes are ——— of long chain saturated and unsaturated fatty acids.

i) Esters
ii) Alcohols
iii) Ethers
iv) Ketones

c) ——— DNA exists as left handed structure having 12 basepairs per turn.

i) B
ii) D
iii) Z
iv) C

d) When an acid is half neutralized, pH of the solution is equal to ———.

i) Isoelectric pH
ii) p^K
iii) p^I
iv) Zero

P.T.O.

e) ——— method involves reaction of amino terminal group with phenylisothiocyanate for protein sequencing.

i) Sanger's
ii) Edman's
iii) Dansylchloride
iv) None

Q2) Attempt <u>any five</u> of the following : **[10]**

a) Explain epimers with suitable example.

b) What is the role of pyridoxal phosphate in the cell?

c) What is handerson-Masselbalch equation?

d) What is the significance of Ramchandran plot?

e) Explain with example nucleophilic addition reaction.

f) What is "Lock and Key" hypothesis of enzymes?

g) What is isoprene? Name one of the lipid derived from isoprene.

Q3) Attempt <u>any three</u> of the following : **[15]**

a) Explain the use of ion exchange chromatography in protein purification.

b) Describe Watson and Crick's DNA structure.

c) How are cell membrane lipids classified?

d) With suitable examples explain storage polysaccharides.

e) Discuss competitive and non competitive inhibition of enzymes.

Total No. of Questions : 3] **[Total No. of Pages : 2**

P610

[3619 - A]- 106
B.Sc. (Applied)
BIOTECHNOLOGY
M - 16 : Metabolic Pathways
(Sem.- I)

Time : 1½ Hours] ***[Max. Marks : 30***

Instructions to the candidates:

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

Q1) Select the correct option and rewrite the statement : **[5]**

a) Glycolysis in eukaryotes yields ——— ATP molecules.

i) 24
ii) 30
iii) 34
iv) 38

b) The most important enzyme which can be used for mitochondrial biochemical assay is

i) Hexo Kinase
ii) Succinate Dehydrogenase
iii) Pyruvate Kinase
iv) None of these

c) C_4 pathway was invented by

i) Calvin
ii) Kreb
iii) Hatch, slack and kortshack
iv) Hill

d) Connecting link between glycolysis and kreb's cycle is

i) Succinic acid
ii) Oxalo acetic Acid
iii) Acetyl Co A
iv) Pyruvic acid

P.T.O.

e) During nucleic acid biosynthesis, nucleotides got linked by

i) Hydrogen band
ii) Glycocidic bond
iii) Phosphodiester bond
iv) Disulphide bond

Q2) Write in short (any five) : **[10]**

a) Differentiate entropy and enthalpy.

b) Enlist the different factors affecting enzyme activity.

c) What is gluconeogenesis? Where it occurs?

d) Differentiate C_3 and CAM pathway. (any two)

e) What are coenzymes? Give examples.

f) Draw a structure of ATP.

g) Explain in brief β - Oxidation.

Q3) Write in detail (any three) : **[15]**

a) Describe in detail EMS Pathway.

b) Write a note on biosynthesis of Nucleic Acids.

c) Explain C_4 pathway and comment on its importance.

d) Give role of enzymes involved in Fatty acid biosynthesis.

e) State and explain the laws of thermodynamics.

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Total No. of Questions : 3] **[Total No. of Pages : 2**

P611

[3619 - A]- 107
B.Sc. (Applied)
BIOTECHNOLOGY
M-17/P-16 : Biophysics and Instrumentation
(Sem.- I)

Time : 1½ Hours] ***[Max. Marks : 30***

Instructions to the candidates:

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

Q1) Select the correct option : **[5]**

a) During resonance fluroscence emitted light frequency is ——— that of frequency of absorbed light.

i) Equal to
ii) Less than
iii) Greater than
iv) None of these

b) ——— thermometer is used as standard thermometer for callibration of any thermometer.

i) Platinum wire
ii) H_2 gas
iii) Thermoelectric
iv) Thermocouple

c) The atoms of the elements with same atomic number but different atomic mass numbers are called as ———.

i) Isobars
ii) Isotones
iii) Isotopes
iv) Isomers

d) After interaction with the sample, ——— electrons are utilized to obtain SEM image.

i) Transmitted
ii) Elastically scattered
iii) Inelastically scattered
iv) Secondary.

P.T.O.

e) Which of the following is not the transport Atpase?

i) P - type
ii) N - type
iii) V - type
iv) D - type

Q2) Attempt <u>any five</u> of the following : **[10]**

a) What is the importance of refrigerator in biotechnology?

b) Write down the regions of electromagnetic spectrum with increasing order of wavelength.

c) Distinguish between simple and facilitated diffusion.

d) Generally plant leaves appear green. Comment.

e) What is resolving power of microscope? Give physical significance of numerical aperature.

f) Write the principle of digital pH meter.

g) Mention the types of proteins in cell membrane.

Q3) Attempt <u>any three</u> of the following : **[15]**

a) What is Na^+ K^+ pump? Explain in details.

b) Rotation constant 'B' is the characteristic of the molecule. Explain.

c) With the help of block diagram explain principle, construction and working of colorimeter.

d) Give any five applications of electron spectroscopy to biomolecules.

e) With the help of neutron to proton ratio explain the stability of the nucleus.

Total No. of Questions : 3] **[Total No. of Pages : 2**

P612

[3619 - A]- 109
B.Sc. (Applied)
BIOTECHNOLOGY
P - 11 : Plant Tissue Culture - I
(Sem.- I)

Time : 1½ Hours] ***[Max. Marks : 30***

Instructions to the candidates:

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

Q1) Select the correct answer and rewrite the statement : **[5]**

a) ——— is known as father of plant tissue culture.

i) G.Haberlandt
ii) A.Hilderbrandt
iii) G.Morel
iv) P.R.White

b) A mineral required in quantity ——— is called micronutrient.

i) < 0.05 mM l^{-1}
ii) > 0.05 mM l^{-1}
iii) < 0.5 mM l^{-1}
iv) > 0.5 mM l^{-1}

c) The regeneration of shoot bud from in vitro cultured callus is called as ———.

i) Differentiation
ii) Caulogenesis
iii) Rhizogenesis
iv) Organogenesis

d) The suspension culture is subcultured at ——— phase of growth.

i) Lag
ii) Early exponential
iii) Late exponential.
iv) Stationary.

P.T.O.

e) ——— is a commonly used auxin for callus formation

i) IAA
ii) BAP
iii) 2, 4, 5 – T
iv) 2, 4 – D

Q2) Answer in short (any five) : **[10]**

a) What is an explant? Enlist different explants used in plant tissue culture.
b) What do you mean by dedifferentiation and redifferentiation?
c) Enlist the growth regulator used in plant tissue culture.
d) Mention the principle of laminar airflow cabinet.
e) What is batch culture? Give its importance.
f) Discuss the internal structure of callus.
g) Enlist the technique used for single cell culture.

Q3) Answer in details (any three) : **[15]**

a) Describe the continuous culture technique.
b) What are the essential ingradients of a plant tissue culture media.
c) Why callus culture exhibits genetic variation?
d) Describe the organisation and requirements of a tissue culture laboratory.
e) Explain the different factors affecting cytodifferentiation.

Total No. of Questions : 3] **[Total No. of Pages : 2**

P613

[3619 - A]- 111
B.Sc. (Applied)
BIOTECHNOLOGY
P - 13 : Micropropagation Techniques
(Sem.- I)

Time : 1½ Hours] ***[Max. Marks : 30***

Instructions to the candidates:

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

Q1) Select the correct option : **[5]**

a) In diseased plants generally ——— is free of pathogens.

i) Shoot tip
ii) Meristem
iii) Shoot apex
iv) Axillary bud

b) Presence of ——— in culture medium inhibits embryo development.

i) Auxin
ii) Cytokinin
iii) Gibberellin
iv) Abscisic acid

c) ——— light promotes caulogenesis, whereas ——— light promotes rhizogenesis

i) Blue, Green
ii) Red, Green
iii) Blue, Red
iv) Red, Blue

d) Micropropagation was first reported in ——— .

i) Citrus
ii) Cymbidium
iii) Banana
iv) Orchard grass

P.T.O.

e) The scattered clusters of meristematic cells in the callus are called _____

i) Meristemoids
ii) Organoids
iii) Embryoids
iv) Rhizoids

Q2) Answer in short (any five) : **[10]**

a) How the plant growth hormones regulate the invitro morphogenesis?

b) 'Invitro raised plants require transplantation'. Justify.

c) Enlist various methods of virus indexing.

d) Write a note on effect of electric current on somatic embryogenesis.

e) What are the various types of greenhouse based on shape?

f) 'Meristem is the explant of choice for virus free plant production'. Justify the statement.

g) What are the various stages of somatic embryogenesis?

Q3) Answer in details (any three) : **[15]**

a) Write a note on organogenesis.

b) What are artificial seeds? Discuss the methods of artificial seeds production.

c) Comment on the invitro acclimatization of platlets.

d) What is hyperhydration? Describe its symptoms, possible causes and remedies

e) What is thermotherapy? Discuss its application.

Total No. of Questions : 5] **[Total No. of Pages : 2**

P661

[3619]-103
S.Y. B.Sc.
BIOTECHNOLOGY
Bb - 213 : Metabolic Pathways
(Old) (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) Attempt the following in 2-3 sentences (any eight) : **[8 × 2 = 16]**

a) What is calorific value of ATP, ADP and AMP?

b) Enlist the enzymes participating in 'Cori Cycle'.

c) Draw the structure of guanosine - 5' - monophosphate.

d) How metabolic pathways can be regulated by compartmentation?

e) Name the inhibitors of electron transport chain.

f) Give an example of nucleophillic substitution reaction.

g) Distinguish between anabolic and catabolic reactions.

h) Write two reactions of anapleuratic pathway.

i) Where & how in the cells the sphingolipids are synthesized?

j) What is role of aspartate transcarbamylase?

Q2) Give the regulations of following pathways (any 4) : **[4 × 4 = 16]**

a) Hexose monophosphate shunt.

b) Glycolysis.

c) Glycogenolysis.

d) Purines synthesis.

e) Pyrimidines synthesis.

f) Fatty acid synthesis.

P.T.O.

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

a) Distinguish between transaldolase & transketolase.

b) Explain TCA cycle is amphipathic pathway.

c) How is glycogen synthesis regulated?

d) What do you understand by Ketone bodies? How are they produced in cell?

e) Acetyl CoA carboxylase is a key enzyme in fattyacid synthesis? Justify.

f) Write denovo pathway of pyrimidine biosynthesis.

Q4) a) What is enzyme inhibition? How cell uses it for regulation of various pathways. **[8]**

b) Write a note on β-oxidation of 16 : 0, also add a note on its energetics. **[8]**

Q5) a) How are enzyme classified? Explain each class with suitable example. **[8]**

b) What do you understand by Homolactic acid & Hetero lactic acid fermentation? **[8]**

OR

b) Elaborate on Alcoholic fermentation as taking place in yeast. **[8]**

Total No. of Questions : 5] **[Total No. of Pages : 2**

P662

[3619]- 104
S.Y. B.Sc.
BIOTECHNOLOGY
Bb : 214 : Fundamentals of Ecology and Environment
(Old Course) (Sem.-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) Attempt the following (any eight) : **[8 × 2 = 16]**

a) Define succession.

b) Define ecosystem.

c) Define food energy.

d) What is eutrophication.

e) Explain green house effect.

f) Explain stratosphere.

g) Define autotroph.

h) What is solar energy.

i) Enlist radiation pollutants.

j) Enlist two Nitrogen Fixing Bacteria.

Q2) Attempt the following (any two) : **[2 × 8 = 16]**

a) Explain the term habitat, with characteristics of lotic habitat.

b) With example, explain phosphate solubilization in the biosphere.

c) What is biotransformation? Explain with one example.

d) Explain significance of environmental clean up with reference to pollution control.

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

a) Explain marine ecosystem.

b) Explain forest biome with adaptation.

P.T.O.

c) What are bioindicators? How are they used for monitoring environmental pollution.

d) Write short note on soil formation.

e) In brief, explain scope of ecology.

f) What is food spoilage? Explain with reference to dairy products.

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

a) What are natural resources? Explain the means of their conservation.

b) Describe atmosphere as an abiotic factor.

c) Diagrammatically explain the carbon cycle in nature.

d) With example describe heterotrophs.

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

a) Describe harmful effects of hazardous wastes.

b) Explain in brief bio-transformation of aromatic compounds.

c) Write a short note on 'space ecology'.

d) Explain in brief the energy budget present in an ecosystem.

e) Write short note on 'Denitrification'.

f) Write short note on 'non-symbiotic N_2-fixation'.

Total No. of Questions : 6] **[Total No. of Pages : 2**

P664

[3619] - 302
T.Y. B.Sc.
BIOTECHNOLOGY
Bb - 332 : Recombinant DNA Technology
(Old/New)

Time : 3 Hours] ***[Max. Marks :80***

Instructions to the candidates:-

1) ***Question <u>one</u> is compulsory.***
2) ***Attempt any <u>four</u> from the remaining questions.***
3) ***Figures to the right indicate full marks.***

Q1) Answer the following : **[20]**

a) Write the properties of Good host.

b) Define the tems :

i) Physical map.

ii) Genetic map.

c) Write the role of ligases in r-DNA technology.

d) Define the term insertional inactivation.

e) Write the role of phenol and isopropanol in DNA extraction.

f) Enlist the methods of purification of DNA.

g) Write the full forms of the following

i) VNTR

ii) AFLP.

h) Define the terms :

i) Cloning vector.

ii) Expression vector.

i) Give the examples of radioactive probes and non radioactive probes.

j) What are phagemids.

P.T.O.

Q2) Answer the following :

a) Describe the Sanger's method of DNA sequencing. **[8]**

b) Define Genomic library. Describe how the genomic library is constructed. **[7]**

Q3) Answer the following :

a) Write principle of PCR. Describe the steps involved in this reaction and enlist the applications of PCR. **[8]**

b) What is cDNA? Describe the process of cDNA synthesis. **[7]**

Q4) Answer the following :

a) Describe the process of colony hybridization. **[8]**

b) Write the applications of genetic engineering. **[7]**

Q5) Write short notes on : **[15]**

a) Shuttle vector.

b) Site Directed mutagenesis.

c) Restriction endonucleases.

Q6) Answer the following :

a) Distinguish between RAPD and RFLP. **[8]**

b) Describe the procedure for isolation and purification of plasmid DNA. **[7]**

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Total No. of Questions : 6] **[Total No. of Pages : 2**

P665

[3619] - 303
T.Y. B.Sc.
BIOTECHNOLOGY
Bb - 333 : Biodiversity & Systematics
(Old & New Course) (Sem. - III)

Time : 3 Hours] ***[Max. Marks :80***

Instructions to the candidates:-

1) ***Question 1 is compulsory.***
2) ***Answer any 4 out of the remaining questions.***
3) ***Figures to the right indicate full marks.***

Q1) Attempt the following : **[20]**

a) Define the term 'Biosphere'.

b) What is biodiversity?

c) What is meant by IUCN Red data book?

d) Define the term 'Ecotone'.

e) Distinguish autoecology and synecology.

f) Define the term 'edge effect'.

g) What is meant by population density?

h) Define Allee's Principle".

i) What is ecological niche?

j) Define population dispersal.

Q2) Answer any two of the following: **[15]**

a) What is pattern? Enlist the patterns in communities & explain any two of them.

b) What is taxonomy? Explain advantages of molecular taxonomy of plants, with suitable examples.

c) "Need of conservation of law to maintain ecological balance and environmental stability "justify.

P.T.O.

Q3) a) What is chemotaxonomy? Explain the role of chemotaxonomy in classification. **[15]**

b) Define biome. Enlist the major biomes of world & describe any two of them.

Q4) a) Explain "biological rhylms is maintained in animals and plants". **[15]**

b) Describe taxonomic heirarchy with example & give its advantages.

Q5) a) Morphological & molecular data are complimentary for taxonomy. Comment. **[15]**

b) What is Bioprospecting? Explain modern bioprospecting with examples.

Q6) Write short notes (any three) : **[15]**

a) Ecological dominance.

b) Significance of anatomical characters in taxonomy.

c) Techniques used for measuring population density.

d) Criteria for classification of microbes.

e) Cytotaxonomy.

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Total No. of Questions : 5] **[Total No. of Pages : 2**

P658

[3619]-11

S.Y. B.Sc. (Sem. - I)

BIOTECHNOLOGY

Bb-211 : Genetics & Immunology

(Old and New Course)

Time : 3 Hours] ***[Max. Marks : 80***

Instructions :

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

Q1) Attempt the following (Any Eight): **[8 × 2 = 16]**

a) Define – Allele.

b) Define – Dihybrid Cross.

c) Define – Plasmid.

d) Define – Mutation.

e) What is promoter gene?

f) Describe function of IgA.

g) With example define agglutination in antigen and antibodies.

h) What is innate immunity? Give example.

i) What is Forsmann antigen?

j) What is Bombay blood group?

Q2) Attempt the following (Any Two): **[2 × 8 = 16]**

a) What is gene linkage? Explain with example how it influences Mendelian ratios.

b) Justify : Substitution mutations are always leaky where as frameshift mutations are never leaky.

c) What are lethal genes? Explain their significance with examples.

d) Explain in brief changes occurring in the recipient cells when they acquire competence in transformation process.

P.T.O.

Q3) Attempt the following (Any Four): **[4 × 4 = 16]**

a) Describe IgE and its significance.

b) Complement fixation test and its applications – explain.

c) Steps in inflammation process – explain.

d) Process of phagocytosis & its significance – explain.

e) Describe different types of antigens.

f) Describe Widal test and its applications.

Q4) Attempt the following (Any Four): **[4 × 4 = 16]**

a) Justify : Effect of U.V. mutations depends upon an outcome of a race between replicating and repair enzymes.

b) Describe various properties of plasmids.

c) What is an incomplete dominance? How it influences Mendelian ratios?

d) With example explain specialized transduction.

e) Explain with example chromosomal alterations.

f) In brief comment on reasons for Mendel's success.

Q5) Attempt the following (Any Two): **[2 × 8 = 16]**

a) Differentiate between humoral and cell mediated immunity. Write the role of MHC molecules in an adaptive immunity.

b) Describe with a neat diagram the production of recombinant vector vaccines.

c) Describe the structure of an immunoglobulin. How are they classified on the basis of their fine structure?

d) What is Kahn test? Describe the test and its applications.

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Total No. of Questions : 5] **[Total No. of Pages : 2**

P659

[3619]-12

S.Y. B.Sc. (Sem. - I)

BIOTECHNOLOGY

Bb-212 : Cell Biology

(Old and New Course)

Time : 3 Hours] ***[Max. Marks : 80***

Instructions :

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 (Any Eight): **[8 × 2 = 16]**

a) Viruses are not considered as cell. Why?

b) Enlist types of connective tissues with example.

c) Discuss in brief types of proteins present in cell membrane.

d) What do you mean by staining? Write role of stain in cell biology.

e) Write role of microtubules in cell division.

f) Give significance of scanning electron microscope.

g) What is passive transport of membranes?

h) Write functions of thylakoids.

i) Give important contribution of Robert Brown.

j) Write factors affecting cell size.

Q2) Write short notes on any four : **[4 × 4 = 16]**

a) Type and functions of Endoplasmic reticulum.

b) With labelled diagram explain fluid mosaic model of cell membrane.

c) Oxidative phosphorylation.

d) Plant tissues.

e) Inner membrane of mitochondria.

f) Golgi bodies.

P.T.O.

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

a) Explain cyclic & non cyclic photophosphorylation.

b) How regulation of cell cycle takes place?

c) Write structure & significance of cytoskeleton.

d) Differentiate between necrosis & apoptosis.

e) State importance of extra cellular matrix.

f) Write short notes on Active transport of membrane.

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

a) Write in detail the mechanism of receptor tyrosine kinase mediated signaling.

b) What are oncogenes? Explain their role in cancer development.

c) Explain in detail Bulk transport by plasma membrane.

d) Explain types of animal tissue with examples.

Q5) Attempt any two : **[2 × 8 = 16]**

a) Discuss in detail extrinsic & intrinsic cell death.

b) With neat & labelled diagram write process of mitosis.

c) What is cell differentiation? Explain with one example.

d) Discuss structure & function of mitochondria in detail.

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Total No. of Questions : 5] **[Total No. of Pages : 2**

P660

[3619]-13

S.Y. B.Sc. (Sem. - I)

BIOTECHNOLOGY

Bb-231 : Molecular Biology

Time : 3 Hours] ***[Max. Marks : 80***

Instructions :

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

Q1) Attempt the following in 2-3 sentences (Any Eight): **[8 × 2 = 16]**

a) Give Mischner's contribution to Molecular Biology.

b) Tabulate different σ (sigma) factors found in E.coli.

c) Justify, deacetylation of histone proteins for nucleosome formation.

d) Enlist name and roles of prokaryotic translation factors participating in protein synthesis.

e) Write two distinguishing features of DNA gyrase & Topoisomerases.

f) State the mechanism of alkylating agents in mutations.

g) Why is centromeric DNA called as satellite DNA?

h) In differential density gradient centrifugation, what will be the approximate density of DNA?

i) Eukaryotic cells have three RNA polymerases, justify.

j) Draw the structure of 70s and 80s ribosomes, illustrating its major components.

Q2) Write short notes on – (Any Four) **[4 × 4 = 16]**

a) Antitermination.

b) Polycistronic genes.

c) Clover leaf model of tRNA.

d) Strong promoters of prokaryotic cells.

e) Attenuation.

f) SOS repair.

P.T.O.

Q3) Give justifications for following sentences : (Any Four) **[4 × 4 = 16]**

a) Nitrous acid causes transition mutations.

b) Protein glycosylation occurs in ER lumen.

c) Base analogs cause transversion mutations.

d) Frame shift mutations change the reading frame.

e) Replication is semiconservative, conservative & dispersive.

f) β damp adds to processivity of DNA polymerase.

Q4) a) Explain in detail, the 'Initiation of transcription by eRNA pol II'. **[8]**

b) With a neat labelled diagram explain – Elongation step in translation. **[8]**

OR

a) Write notes on – **[8]**

i) Mismatch repair system.

ii) Excizsion repair system.

b) Explain in detail transcription termination. **[8]**

Q5) a) With neat labelled diagram, explain DNA replication in prokaryotes. **[16]**

OR

b) Elaborate in detail – **[16]**

i) Post transcriptional modifications.

ii) Post translational modifications.

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