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

P357

[4019] - 105
S.Y. B.Sc.
BIOTECHNOLOGY
Bb - 214 - Fundamentals of Ecology and Environment
(2004 Pattern) (Sem. - I) (24051)

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 a neat labeled diagram wherever necessary.***
4) ***Use of color pencils restricted to diagrams.***

Q1) Define the following : **[20]**

a) Troposphere.

b) Limnology and ecohydrology.

c) Subducted lithosphere.

d) Mantle xenoliths.

e) Oceanic lithosphere.

f) Stratosphere.

g) Homeostatic Imbalance.

h) Risk homeostasis.

i) Stress homeostasis.

j) Reactive homeostasis.

Q2) Sketch the diagrammatic representation of <u>any three</u> of the following Biogeochemical cycles : **[15]**

a) Carbon.

b) Water

c) Nitrogen.

d) Phosphorous.

P.T.O.

Q3) Write self explanatory notes on <u>any three</u> of the following : **[15]**

a) Detection of Environmental pollutant.

b) Biotransformation.

c) Noise pollution in our oceans and seas.

d) Eutophication.

Q4) What are food chains and food webs? Explain in detail the basic strata of grassland ecosystem? **[15]**

OR

Define Bioremediation; what are some of the ways to increase the rate of bioremediation? How must underground contaminants in soil sometimes be remediated?

Q5) Justify the following statements : **[15]**

a) Recycling is well known waste-disposal method that is becoming increasingly popular around the globe.

b) Air pollution may trigger many diseases in children and adults.

c) Carbon emissions causing huge ocean acidification.

d) Water purification - The best water pollution solution.

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

P358

[4019] - 205
S.Y. B.Sc.
BIOTECHNOLOGY
Bb - 213 - Molecular Biology
(2004 Pattern) (Sem. - II) (24062)

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

Instructions to the candidates:

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

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

a) State the significance of non-histone proteins.

b) What are kinetochores?

c) Define semi-conservative replication.

d) What are DNA methylases?

e) Write the meaning of chaperones.

f) State the mechanism of glycosylation.

g) Enlist any two inhibitors of transcription, giving their mode of inhibition.

h) What do you understand by z-form of DNA?

i) State the role of Topoisomerase enzyme in replication.

j) Write the role of giant chromosomes.

Q2) Write short notes on (any 3) : **[3 × 5 = 15]**

a) Harshey-chase experiment.

b) SOS response.

c) 'Centromere' as a heart of all chromosomal movements.

d) Organelle genome.

P.T.O.

Q3) Give diagrammatic representation of (any 3) : **[3 × 5 = 15]**

a) Photo reactivation.

b) DNA dependent RNA polymerase.

c) RNA splicing.

d) "Histone acetylation has an important role in nucleosome assembly".

Q4) a) Discuss the role of SMC proteins and topoisomerase enzyme in nuclear scaffold organization. **[8]**

OR

Discuss the steps involved in termination of prokaryotic transcription.

b) Explain in detail trip operon. **[7]**

OR

Discuss the steps involved in elongation of prokaryotic translation.

Q5) Explain with labelled diagram the initiation, elongation and termination of prokaryotic DNA replication. **[15]**

OR

Answer the following :

a) Explain the role of mutagens in DNA damage. **[8]**

b) Discuss the formation of splicosomes. **[7]**

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

P359

[4019] - 207
S.Y. B.Sc.
BIOTECHNOLOGY
Plant and Animal Tissue Culture
(2004 Pattern) (Sem. - II) (24082)

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

Instructions to the candidates:

1) ***Answer each section on a separate answer book.***
2) ***All questions are compulsory.***
3) ***Figures to the right indicate full marks.***
4) ***Draw a neat labeled diagram wherever necessary.***
5) ***Use of color pencils restricted to diagrams.***

SECTION - I

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

a) Heteroploid and Heterokaryon.

b) Nurse culture.

c) Organ culture.

d) Type I callus and Type II callus.

Q2) a) Explain, the procedure involved in Clonal propagation. **[8]**

b) Describe the detailed protocol of carried out in embryo culture and suspension culture. **[8]**

Q3) Write self explanatory notes on the following : **[16]**

a) Somaclonal variation.

b) Shoot tip (apex) culture.

c) Filter sterilization.

d) Chemically Defined Medium.

P.T.O.

SECTION - II

Q4) Attempt the following questions : **[8]**

a) Colony forming efficiency.

b) Crisis.

c) Cumulative population doublings.

d) Feeder layer.

Q5) a) Explain, Primary cultures : Advantages and limitations. **[8]**

b) Describe the terms, Population density and Population doubling time. **[8]**

Q6) Write self explanatory notes on the following : **[16]**

a) Trypan blue exclusion.

b) Finite cell culture and b Immortal cell culture.

c) Detection of Mycoplasma contamination.

d) Cryopreservation.

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

P327

[4019]-1

F.Y. B.Sc.

BIOTECHNOLOGY

Bb - 101 : Fundamentals of Chemistry

(2008 Pattern) (44010)

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 0.5 moles of Carbon dioxide at 27ºC. [R = 8.314 JK^{-1} $mole^{-}$].

b) What is rate of reaction? Why do most of chemical reaction rates increases rapidly as the temperature rises?

c) Why the vapour pressure of 0.1 M $BaCl_2$ solution is lower than 0.1 M glucose solution?

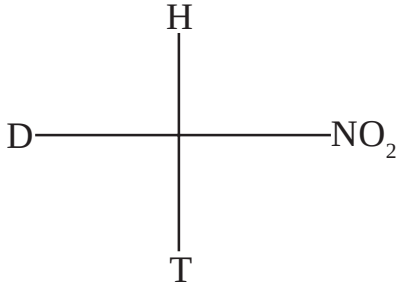
d) Define the terms:

i) Degree of freedom. ii) Metastable equilibrium.

e) Define transport number. How is the transport number related to the speed of ions?

f) Explain 'Chlorine gas electrode'.

g) Assign R and S configuration to the following compound.



h) What is Octet rule? How does it lead to the formation of bond?

P.T.O.

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

a) State and explain Graham's law of diffusion.

b) Derive rate coefficient for Second order reaction when initial concentrations are equal.

c) What is meant by Cryoscopic constant? Explain how the depression of freezing point of a solvent may be used to determine the molecular weight of the dissolved substance.

d) Describe eutectic diagram for Bi - Cd system.

e) Define specific conductance. Describe the method to determine the specific conductance.

f) What are the different types overlap between S and P orbitals? Explain with one example of each.

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

a) Explain relative lowering of vapour pressure with the help of Raoult's law.

b) What is hydrogen bond? What are different types of hydrogen bond?

c) Derive the expression giving relations between emf of cell and the thermodynamic functions ΔH, G and S for the cell reaction.

d) 50% of a first order reaction is complete in 23 minutes. Calculate the time required to complete 90% of the reaction.

e) 2.5 gms of a substance dissolved in 125ml of water gave an Osmotic pressure to 1172 mm of Hg at 20°C. Calculate the molecular weight of the substance. [R = 0.082 lit. atms].

f) Define the term 'Component'. Find the number of components for the following system.

i) $CaCO_{3(s)} \rightleftharpoons CaO_{(s)} + CO_{2(g)}$

ii) $NH_4Cl_{(s)} \rightleftharpoons NH_{3(g)} + HCl_{(g)}$

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

a) Discuss the conformation isomerism in ethane using energy profile diagram. Comment on stability of conformation.

b) What is optical activity? Give the necessary conditions for a molecule to be optically active. Illustrate with suitable example.

c) What is Hansch analysis? How it is useful in QSAR?

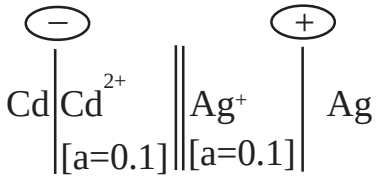
d) Find the oxidation half reaction and reduction half reaction from the following equations.

i) $2KI + Cl_2 \quad I_2 + KCl$

ii) $Fe^{3+} + I^- \quad Fe^{2+} + I_2$.

e) Find the equivalent conductance and specific conductance of NaCl of strength 0.005N, if the cell having cell constant 0.68 Cm^{-1} is placed in it gave the resistance of 1130 Ohm.

f) Write the cell reaction and calculate the e.m.f. of the following cell at 25°C.



Given : Standard Oxidation potential

$E^o_{Ag} = -0.799$ V, $E^o_{cd} = 0.403$ V.

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

a) Discuss the different types of electrodes giving one example of each with reference to →

i) formulation of electrode.

ii) electrode reaction.

iii) expression for electrode potential.

b) What are concentration cells? Explain the electrode concentration cell without transference with the help of any two examples.

c) Write a notes on:

i) Conductometric titrations.

ii) Buffer solutions.

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

P328

[4019]-2

F.Y. B.Sc. (Biotechnology)

PHYSICS

Bb - 102 : Fundamentals of Physics

(2008 Pattern) (44020)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Answers should be specific and to the point.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***

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

a) Define standard unit for luminous intensity.
b) Define breaking stress.
c) Why hydrostatic pressure is a scalar quantity?
d) State the equation of continuity.
e) Define triple point water.
f) What is plane polarized light?
g) Find the efficiency of Carnot's engine working between the temperatures 300ºK & 600ºK.
h) State second law of thermodynamics.

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

a) Distinguish between fundamental and derived units. Classify the following units into fundamental and derived units.
meter, watt, second, joule, ampere, newton.
b) Define life sciences. Which fields are included in life sciences? Give significance of them.
c) With the help of suitable diagram explain the construction and working of open - tube manometer.
d) A wire is 1 m long and 1 mm in diameter. When it is stretched by a weight of 4 kg, its length increases by 0.25 mm. Find the value of stress and strain produced in the wire and Young's modulus of the material of the wire.

P.T.O.

e) Define pressure in a fluid. Obtain an expression for pressure energy.

f) Water flowing in a horizontal pipe has a speed 20 cm/s at one end point and 15 cm/s at another point. Determine the pressure drop between two points.

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

a) State and prove Vander Waal's equation of state for real gases.

b) Carnot's engine with the sink temperature at 17ºC has 50% efficiency. By how much should its source temperature be changed to increase its efficiency to 60%.

c) Explain the steps involved in the vapour Compression refrigeration cycle.

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

e) State and explain Gauss's law in magnetism.

f) Give applications of laser.

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

a) With the help of suitable diagram explain the principle, construction and working of a rotating cylinder method for determination of viscosity of liquid. $\in$

b) Obtain the relationship between surface tension, excess pressure and radii of curvature of a thin film.

c) Show that an open organ pipe produces both even and odd hormonics. What is the frequency of fundamental tone without end correction and with end correction?

Q5) a) Define beats. **[16]**

Two sound waves having equal amplitude and frequencies are sounded together. Show that frequency of beat is $(n_1 - n_2)$.

b) State coulombs law of electrostatics. Express it in vector form.

Calculate the force between two balls each having a charge of 12 μC and are 8 cm apart.

(Given : $_o = 8.854 \times 10^{-12}$ C^2/Nm^2

OR

a) Show that change in entropy during a reversible cyclic process is zero. Find the change in entropy when 40 gm of ice at 0°C is converted into water at the same temperature. The latent heat of fusion of ice is 80 cal/gm.

b) Show that interference of two waves of same frequency travelling in the same direction gives maximum intensity when phase difference between them is 0, 2 , 4 , ---- etc.

Hence show that $I_{max} = (a_1 + a_2)^2$.

Where I is resultant intensity a_1 & a_2 are amplitudes of waves.

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

P329

[4019]-3

F.Y. B.Sc.

BIOTECHNOLOGY

Bb - 103 : Basic Biosciences

(2008 Pattern) (44040)

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

Instructions to the candidates:

1) ***All questions are compulsory***
2) ***Draw neat & labelled diagram 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) What is etaerio of berries?
b) State unique features of plant cells.
c) State different types of thickening in xylem Vessels.
d) Give any two types of underground modification of stem with example.
e) State methods of breaking of seed dormancy.
f) Give classification of fungi upto class.
g) What is tuber?
h) Define insectivorous plants.

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

a) Nitrogen Metabolism.
b) Photoperiodism.
c) Gibberellins.
d) Reproduction in Fungi.

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

a) Draw & describe the primary structure of Dicot Root.
b) Describe different parts of Androecium flower with suitable diagram & its cohesion of stamen.

P.T.O.

c) Define in vivo Morphogenesis & Describe development of shoot & Root.
d) Explain the role of Pigments in plant growth & development.

Q4) a) Give salient features of Bryophytes & explain life - cycle of Bryophytes with suitable example. **[10]**

OR

b) Give structure of seed & its different types. Explain how seeds are formed.

SECTION - II
(Zoology)

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

a) Define Pisciculture.
b) What is Vector?
c) Give use of silk & its composition.
d) Define protozoa.
e) Name any two fresh water fishes used in aquaculture.
f) Enlist two characteristics of phylum Hemichordata.
g) Name any one Ectoparasite & its host.
h) Define smoker.

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

a) Mariculture.
b) Digestive system in Phylum Echinodermis.
c) Explain symptoms & control measure of Rice Weevil.
d) Host parasite relationship.

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

a) Compare Brain of frog with Brain of Mammals.
b) Enlist diagnostic characteristics of class Aves with examples.
c) Give the applications of animal classification in day to day lives of human being.

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

a) Describe in detail life pattern of protozoan parasite.

OR

b) Define Apiculture. Describe colony organization in Honey bee & give application of bee products.

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

P330

[4019]-4

F.Y. B.Sc.

BIOTECHNOLOGY

Bb - 104 : Mathematics and Statistical Methods for Biologists

(2008 Pattern) (44050)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Use of non-programmable scientific calculator is allowed.***
4) ***Solve each section on separate answer paper.***

SECTION - I

(Mathematics)

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

a) If $A = \begin{bmatrix} 4 & 5 \\ 3 & 7 \end{bmatrix}$, then find a matrix X such that

$A - 2X = \begin{bmatrix} 2 & 3 \\ 7 & 5 \end{bmatrix}$.

b) Find modulus and principal argument of $\frac{(1+i)^3}{(1-i)^2}$.

c) Evaluate $\lim_{n\to\infty} \left[n^{-n-1} (1+n)^n \right]$

d) If $z = \log(\sin 2xy)$ then find z_x and z_y.

e) Examine the convergence of the series $\sum_{n=1}^{\infty} \frac{2n+1}{3n+8}$.

P.T.O.

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

a) If $Z_1, Z_2 \in \mathbb{C}$ such that $|Z_1 - Z_2| = |Z_1 + Z_2|$ then show that is real, where $Z_2 \neq 0$.

b) Show that the sequence $\langle a_n \rangle$ where $a_1 =$ and $a_{n+1} = \sqrt{7+a_n}$ for $n \geq 1$, is convergent.

c) Find the stationary points for $f(x, y) = 2x^2 - x^4 + y^4 - 2y^2$.

d) Solve : $\sec^2 x . \tan y \, dx + \sec^2 y . \tan x \, dy = 0$.

e) Solve :
$$2x_1 + x_2 - 2x_3 = 8$$
$$3x_1 - 2x_2 - 4x_3 = 15$$
$$5x_1 + 4x_2 - x_3 = 1.$$

f) Find eigen values of the matrix $A = \begin{bmatrix} 4 & 1 & -1 \\ 6 & 3 & -4 \\ 6 & 2 & -3 \end{bmatrix}$.

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

a) Solve :
$$x - y + 2z - w = -1$$
$$2x + y - 2z - 2w = -2$$
$$-x + 2y - 4z + w = 1.$$

b) Solve : $\frac{dy}{dx} = \frac{x-y+3}{2x-2y+5}$.

c) Find five 5^{th} roots of unity.

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

a) If $u = \log(e^x + e^y)$ then show that $u^2_{xy} = u_{xx} . u_{yy}$.

b) When the room temperature is 20ºC, the temperature of a body drops from 70ºC to 60ºC in 10 minutes. What will be the temperature of the body after lapse of another 10 minutes?

SECTION - II

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

a) Number of insects observed per leaf of a plant, in a random sample of 200 leaves were as follows:

Insects/leaf	0	1	2	3	4	5	6	7	8	9	10
No.of leaves	10	15	30	18	38	57	22	5	3	2	0

Compute the median number insect / leaf.

b) Define quartiles of a data.

c) State two properties of correlation coefficient.

d) Define probability of an event.

e) The mean of a set of observations is 50 and its median is 65. Find the mode.

Q6) Attempt any Four: **[4 × 2½ = 10]**

a) Calculate the mean of following data:

Age (in yrs)	15-19	20-24	25-29	30-34	35-39	40-44
No.of Persons	4	20	38	24	10	4

b) The number of patients reporting/hr. in OPD of a hospital has a Poisson distribution with mean 8. Calculate the probability that on a particular day in a randomly selected hour at least one patient is reported in OPD.

c) What is skewness? What are its types?

d) Define binomial distribution. State its mean and variance.

e) State two properties of variance.

Q7) Attempt any <u>two</u>: **[2 × 5 = 10]**

a) The length of bluegill sunfish is normally distributed with mean 150 mm and S.D. 20 mm. What is the probability that a randomly selected bluegill sunfish will have length between 145 mm and 155 mm?

b) Explain how to test the significance of population mean on the basis of a random sample of size less than 30.

c) Calculate the value of correlation coefficient by using the following data:

$n = 7$, $\Sigma x = 349$, $y = 366$, $x^2 = 19753$, $y^2 = 21100$, $xy = 20343$.

Comment on your result.

Q8) Attempt any <u>one</u>: **[1 × 10 = 10]**

a) Describe the technique of one-way ANOVA.

b) In an pea breeding experiment, out of 1600 seeds, 908 were round and green, 311 were wrinkled and green, 292 were round and yellow and 89 were wrinkled and yellow. Mandel's ratio for these seeds is 9:3:3:1. Test whether the experiment fits the theory? Use 5% l.o.s.

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

P331

[4019]-5

F.Y. B.Sc.

BIOTECHNOLOGY

Bb - 105 : Fundamentals of Biological Chemistry

(2008 Pattern) (44060)

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:

a) What is a prosthetic group? Give example.
b) Define pH and pK. Give the relation between them.
c) What are amphoteric electrolytes? Give example.
d) Write the structure of Sanger's reagent and give its significance.
e) Which type of reactions need PLP and FAD as coenzymes.
f) Name one fatty acid with four double bonds and give its structure.
g) Give four important functions of proteins.
h) Why sucrose does not answer Benedict's test?

Q2) Answer any four of the following:

a) Give short account of phospholipids.
b) How is prokaryotic ribosome different from Eukaryotic ribosome?
c) Differentiate between "Lock and Key" hypothesis and "induced fit hypothesis" of ES complex formation.
d) What are Nucleosides and Nucleotides? Give the structure of Purine nucleosides and nucleotides.
e) Write note on tertiary structure of proteins.

P.T.O.

Q3) Answer any four of the following:

a) Write note on nucleophilic substitution reaction with suitable example.

b) Write note on rancidity of lipids.

c) What are lipoproteins? Give their significance.

d) Differentiate between dialysis and reverse dialysis.

e) Draw a neat diagram of a bacterial cell and give the significance of each part of the cell.

Q4) Attempt any two of the following:

a) Classify Carbohydrates with suitable examples.

b) Describe Watson and Crick model of DNA.

c) Differentiate between competitive and non competitive enzyme inhibition.

Q5) Attempt any two of the following:

a) Explain the principle, procedure and applications of Gel filtration Chromatography.

b) How are Amino acids classified based an R group and polarity.

c) Explain the steps involved to determine primary structure of proteins.

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

P332

[4019]-6

F.Y. B.Sc.

BIOTECHNOLOGY

Bb - 106 : Biophysics and Instrumentation

(2008 Pattern) (44070)

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) On what lines do Sommerfield's theory differs from Bohr's theory for an atom?

b) What is X-Rays? State its application.

c) State application of Fluorescence spectroscopy.

d) Give advantages and disadvantages of GM Counter.

e) State and explain law of Radioactive decay.

f) Define redox couple.

g) Define Gibbs free energy (G) at constant pressure.

h) State types of Atomic spectroscopy.

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

a) State drawbacks of Thomson Atomic Model, and drawbacks of Rutherford Atomic Model.

b) Discuss scope and importance of IR-Spectroscopy.

c) Explain transverse nature of electro-magnetic wave.

d) Write short note on shell model.

e) State properties of Nuclear Forces.

f) Write short note on Reductant potential.

P.T.O.

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

a) Explain the principle and working of Bimetallic Thermometers.

b) Write short note on EMG.

c) Explain Nuclear magnetic resonance.

d) Describe NTC and PTC type of thermistors and hence explain the use of thermistors.

e) Explain chromatic aberration in brief.

f) Write short notes on first and second law of thermodynamics.

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

a) Explain construction of compound microscope with help of neat diagram.

b) Describe the construction and working of G.M. Counter.

c) What do you meant by rigid rotator? Hence obtain expression for energy of rigid rotator.

Q5) a) Explain vibrational spectra of simple harmonic Oscillator. **[8]**

b) Write short note on **[8]**

i) Space quantitation. ii) Spinning electron.

OR

a) Explain the term **[8]**

i) Resting potential. ii) Action potential.

b) Explain the construction and working of Bain bridge mass spectrometer. **[8]**

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

P333

[4019]-7

F.Y. B.Sc.

BIOTECHNOLOGY

Bb - 107 : MICROBIOLOGY

(2008 Pattern) (44080)

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 acidic stain with suitable example.
b) What is meant by umbonate colony?
c) What are T even phages? Give example.
d) Define capsule and state their chemical composition.
e) State two distinguishing characters of Algae and give suitable examples.
f) Define thermophilic bacteria with suitable examples.
g) What is meant by co - culture?
h) Define Binary - fission with suitable examples.

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

a) State the contributions of Louis Pasteur.
b) Define differential medium with suitable example.
c) State the principle and uses of autoclave.
d) Describe any one method to obtain pure culture.
e) Draw a neat and well labelled diagram of Bacterial spore.
f) Describe chlorophycophyta with suitable example.

P.T.O.

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

a) State the uses of inoculating needle in microbiology Laboratory.

b) Describe in brief the general characteristics of viruses.

c) Describe in brief the principle of acid fast staining with suitable example.

d) What is Lysogeny? Describe it with respect to lambda phage.

e) Describe antagonism with suitable examples.

f) State the general characteristics of Protozoa.

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

a) Describe the lytic cycle of T_4 bacteriophage.

b) Give an account of Algal classification.

c) Describe the mutualistic associations between the root system of higher plants and fungal hyphae.

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

a) Give a detailed account of cell walls of Gram positive and gram negative bacteria and state their role in Gram staining.

b) Describe in detail the sexual reproduction of fungi.

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

P334

[4019]-8

F.Y. B.Sc.

BIOTECHNOLOGY

Bb - 108 : Use of Computers

(2008 Pattern) (44090)

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

a) Define the terms
   i) ROM ii) Hardware
b) Write note on toolbar.
c) What is multimedia?
d) State the term biometrics.
e) State true or false. Justify your answer.
   i) Meta searches do not compile databases.
   ii) Batch file is used to execuse group of commands.
f) List the symbols used in drawing flowchart.
g) Explain the following terms
   i) Information. ii) Database.
h) What is MAN?

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

a) Explain the difference between windows and Linux.
b) What do you mean by computer? Explain the block diagram of computer.
c) Explain internet with its evaluation.
d) Write note on Bioinformatic tools.
e) Explain the features of algorithm.

P.T.O.

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

a) Explain twisted pair and coaxial cable.

b) Write note on Biological database challenges.

c) Distinguish between super computer and mainframe computer.

d) Differentiate between file system and DBMS.

e) List the rules to create flowchart with examples.

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

a) What is desktop? Explain the features of GUI using Windows O.S.

b) What is MS.Powerpoint? Explain the steps to create the presentation using powerpoint.

c) Explain different attribute types with respect to E.R.model.

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

a) Write note on MEDLINE.

OR

Explain different dynamic hashing techniques.

b) Explain the features and menus of MS-Excel.

OR

Write an algorithm to find reverse of the given number also draw flowchart.

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

P335

[4019]-201

S.Y. B.Sc.

BIOTECHNOLOGY

Bb - 221 : Environmental Biology & Biotechnology

(Sem. - II) (2008 Pattern) (54062)

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

Instructions to the candidates:

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

Q1) Answer any eight of the following: **[16]**

a) Explain thermosphere.
b) Diagramatically show horizons of soil.
c) Forms of soil water.
d) Types of succession.
e) Explain the term homeostasis.
f) What do you understand by bio-augmentation?
g) Explain energy budget.
h) Define optimum zone.
i) Explain the phenomenon of pedogenesis.
j) Explain Liebig's law of minimum.

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

a) Explain trophic structure & energy pyramid.
b) Describe ecological effects of pesticides.
c) Write a note on scope of ecology.
d) With suitable diagram describe carbon cycle.
e) Explain abiotic components of the environment..
f) Discuss types of ecosystems and their habitats.

P.T.O.

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

a) Explain role of Biotechnology in protection and preservation of environment.

b) How environmental pollutants can be detected? Explain in detail.

c) Describe methods for disposal of hazardous and aromatic wastes.

d) What are natural resources? Explain different methods for their conservation.

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

a) What is food chain? Describe types of food chain and add a note on its significance.

b) What are indicators? Enlist various types of indicators and explain in brief. How they are used to detect pollutants?

c) Define ecological succession. Describe different types of ecological succession.

Q5) What do you mean by bioremediation? Explain with example and add a note on its advantages. **[16]**

OR

Write in detail causes and effects of air pollution and measures to control it.

☛ ☛ ☛

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

P336

[4019]-202

S.Y. B.Sc.

BIOTECHNOLOGY

Bb - 222 : Plant and Animal Tissue Culture

(Sem. - II) (2008 Pattern) (54082)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Answers 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) State contribution of white to plant tissue culture.

b) What are macro - nutrients? Enlist macronutrients present in MS media.

c) Explain the principle of laminar air flow.

d) Write applications of leaf culture.

e) Explain demerits of micropropagation.

f) What is synchronization?

g) Describe the technique of nurse culture.

h) What do you understand by totipotency of plant cells?

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

a) What is somatic hybridization? Discuss any two methods to achieve it.

b) Enlist various types of suspension culture. Explain the parameters to assess growth of suspension.

c) Explain the origin of somaclonal variation. Add a note on selection of somaclonal variation at cellular level.

d) State different plant growth regulators employed in plant tissue culture. Add a note on their action.

e) What are artificial seeds? How they are produced? What is their significance?

P.T.O.

Q3) a) What is genetic transformation? Write in detail the techniques of indirect DNA transfer. **[8]**

OR

What are the different techniques used for production of haploids in vitro? Explain any one. Add a note on its significance.

b) Define secondary metabolites. Explain in detail biotransformation for production of secondary metabolites. **[8]**

SECTION - II

Q4) Attempt any six in brief: **[12]**

a) What are balanced salt solutions?

b) Give applications of lymphocyte culture.

c) How will you disinfect the incubators?

d) What is karyotyping?

e) Enlist advantages of suspension culture over adherent culture.

f) Define cell line and cell strain.

g) Why inverted microscopes are used to observe animal cells?

h) Explain use of antibiotics in ATC media.

Q5) Answer any three of the following: **[12]**

a) Explain advantages and disadvantages of serum in ATC media.

b) What is cross - contamination? How you will avoid it?

c) What are lympholytes? How do you initiate and maintain lympholyte culture?

d) Write a note on cell repositories.

e) What are applications and uses of animal tissue culture?

Q6) a) What are insect cell lines? Explain their establishment & maintenance.**[8]**

OR

Define organ culture describe various methods to carry out organ culture.

b) Explain in detail genetic and biochemical characterization of cell lines.**[8]**

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

P337

[4019]-203

S.Y. B.Sc.

BIOTECHNOLOGY

Bb - 223 : English

(New & Old Common) (Sem. - II) (54072)

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) The great advantage of early rising is the good start it gives us in our day's work. The early riser has done a large amount of hard work before other men have got out of bed. In the early morning this mind is fresh, and there are few sounds or other distractions, so the work done at the time is generally well done. In many cases the early riser also finds time to take some exercise in the fresh morning air, and this exercise supplies him with a fund of energy that will last until the evening. By beginning so early, he knows that he has plenty of time to do thoroughly all the work he can be expected to do, and is not tempted to hurry over any part of it. All his work being finished in good time, he has a long interval of rest in the evening before the timely hour when he goes to bed. He gets to sleep several hours before midnight, at the time when sleep is most refreshing and after a sound night's rest rises early next morning in good health and spirits for the labours of a new day.

It is very plain that such a life as this is far more conductive to health than that of the man who shortens his waking hours by rising late, and so can afford in the course of the day little leisure for necessary rest. Anyone who lies in bed late, must, if he wished to do a full day's work, go on working to a correspondingly late hour, and deny himself the hour or two of evening exercise that he ought to take for the benefit of his health. But, in spite of all his efforts, he will probably not produce as good results as the early riser, because he misses the best working hours of the day.

P.T.O.

i) What is the advantage of rising early? **[1]**

ii) Why is the work done in the early morning well done? **[2]**

iii) What enables the early riser to go to bed at the proper time? **[2]**

iv) Why is the late riser unable to do his work properly? **[2]**

v) Give a suitable title to the passage. **[1]**

b) Expand the following ideas: (any one) **[8]**

i) Experience is a great teacher.

ii) Honesty is the best policy.

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

Noun	Verb	Adjective	Adverb
——	——	peaceful	——
management	——	——	——
——	destroy	——	——
——	——	beautiful	——
——	——	——	skillfully

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

i) He failed in the examination because haven't (Study) at all.

ii) We have (Seen) the film yesterday.

iii) He (reply) that he was absolutely right.

iv) He has been (teach) since 1995.

v) The earth (revolve) around the sun.

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

i) Judicial and judicious.

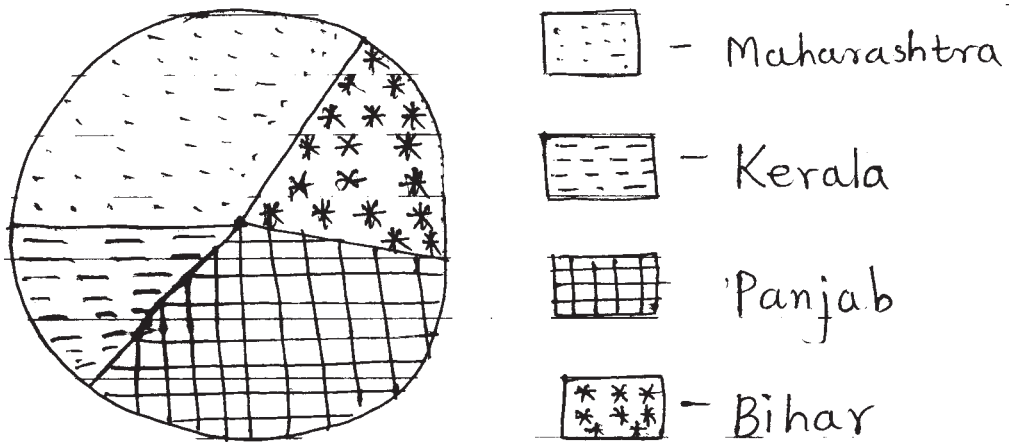
ii) Childish and childlike.

iii) Discover and invent.

iv) Graceful and gracious.

v) Desert and dessert.

Q3) a) Illustrate the following chart showing the product of grains in different states of India. **[8]**



b) Write an experimental reports on the efficiency of bioinoculant of Acetobacter species on sugarcane crop. **[8]**

Q4) a) Explain the important stages and features of note - making. **[6]**

b) Write a report on your study tour to NCL, Pune. **[10]**

OR

Write a note on the techniques of report writing.

Q5) a) Write an application for the post of lecturer in Biotechnology. **[8]**

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

	Prefix	Suffix
i)	Mono –	– ify
ii)	Super –	– logy
iii)	Vice –	– let
iv)	de –	– proof

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

P338

[4019]-204
S.Y. B.Sc.
BIOTECHNOLOGY
Bb - 224 : Metabolic Pathways
(Sem. - II) (2008 Pattern) (54042)

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 color pencils restricted to diagrams.***

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

a) Define spontaneous reactions.

b) Name the coenzyme used by carboxylase enzyme.

c) What are radio isotopes? Name two isotopes used in metabolic pathways.

d) Name two biological uncouplers of electron transport chain.

e) Sequentially, write the names of enzymes taking part in C_4 pathway.

f) How α, β and ω oxidation differ from each other?

g) Which enzyme regulates de - novo pathway of pyrimidine synthesis.

h) Give reaction catalyzed by SGPT.

i) With example, define Zymogens.

j) Calculate the energy transduced by a photon with wavelength (λ) of 420×10^{-7} cm

[Given : Plank constant = 1.58×10^{-34} cal.s

Speed of light 3×10^{10} cm/s and

Avagadro's number = 6.02×10^{23} photons/mol]

Q2) Justify any five of the following statements. **[5 × 3 = 15]**

a) Anapleurotic reactions are fill in reactions.

b) α KG collects all the $-NH_2$ groups from aminoacids for excretion.

c) C_2 pathway is wasteful pathway of energy.

d) ATcase (Aspartate Transcarbamylase) is pacemaker for CTP.

e) 9 of 20 amino acids are essential amino acids.

f) Alanine is glucogenic & isoleucine is ketogenic aminoacid.

P.T.O.

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

a) Substrate level phosphorylation.

b) Regulation of enzyme by compartmentation.

c) Ultrastructure of mitochondria.

d) Feedback inhibition.

Q4) Glycogen metabolism is reciprocally regulated, Explain. **[15]**

OR

Urea cycle and TCA cycle are interconnected, explain in detail.

Q5) Write only reactions for following (any three); **[3 × 5 = 15]**

a) Glucaneogensis.

b) β oxidation [18:0].

c) Glycolysis.

d) Purine biosynthesis.

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

P339

[4019]-301

T.Y. B.Sc.

BIOTECHNOLOGY

Bb - 331 : Microbial Biotechnology

(Sem. - III) (2004 & 2008 Pattern)

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

Instructions to the candidates:

1) ***Question No.1 and 7 are compulsory***
2) ***Attempt any three of the remaining questions.***
3) ***Draw neat labelled diagrams wherever necessary.***
4) ***Figures to the right indicate full makrs.***

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

a) Enlist any two chemical preservatives with their application and mode of action.

b) Justify - B. thuringensis is used in agriculture.

c) State the role of coliforms as index organisms of water potability.

d) State the effect of antibiotics on normal flora.

e) Define : Biomass yield coefficient.

f) State the importance of ED pathway.

g) What is rancidity.

h) What are second generation Penicillins? Give examples.

i) Diagrammatically represent a typical growth curve of bacteria in a batch culture.

j) State the names of two pathogens and the diseases caused by them in immunocompressed patients.

Q2) Explain the following: **[15]**

a) Molecular adaptations in Psychrophiles.

b) Commercial significance in Lactic - acid fermentation.

c) Novel pathways of microbial metabolism.

P.T.O.

Q3) a) Explain the method of screening auxotrophic mutants used for strain improvement. **[8]**

b) Describe the regulation of Arabinose Operon with suitable diagram. **[7]**

Q4) a) B. Cereus can cause food poisoning and food infection - explain. **[8]**

b) Describe the method of canning of food. **[7]**

Q5) a) Explain the principle and working of a water treatment plant. **[10]**

b) Justify : BOD reduction is crucial in waste water treatment. **[5]**

Q6) a) Explain in detail the prevention of tuberculosis and describe tubercle formation. **[8]**

b) Define selective toxicity and enlist the characteristics of an ideal chemotherapeutic agent. **[7]**

Q7) Write short notes on: **[15]**

a) Chemostat.

b) GMOs in industry.

c) Efficiency of Pasteurization.

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

P340

[4019]-302

T.Y. B.Sc.

BIOTECHNOLOGY

Bb - 332 : Animal and Plant Development

(Sem. - III) (2008 Pattern)

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

Instructions to the candidates:

1) ***Answer to each section should be written in separate answer books.***
2) ***Question No. 1 from each section is compulsory. From remaining questions, attempt any two from each section.***

SECTION - I

(Animal Development)

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

a) Delamination and ingression.

b) Capacitation.

c) Transdifferentiation.

d) Epiblast.

e) Acrosomal reaction.

Q2) a) What is pattern formation? Explain the role of maternal effect genes in pattern formation. **[8]**

b) Write a note on transgenic animals. **[7]**

Q3) a) Describe in details the 'Immunoglobulin genes'. **[7]**

b) Comment on various types of eggs on the basis of quantity and distribution of yolk. Add a note on the types of cleavage in each type. **[8]**

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

a) Cell lineage.

b) Grey crescent.

c) Differences between spermatogenesis and oogenesis.

P.T.O.

SECTION - II

(Plant Development)

Q1) Explain the terms with respect to plant development. **[10]**

a) Proembryo.

b) Anatropous ovule.

c) Cadastral genes.

d) Necrosis.

e) Coleoptile.

Q2) a) Explain in detail with the help of neatly labelled diagrams, the Crucifer type of embryogenic development. **[8]**

b) With the help of a neat diagram, explain the organisation of shoot apical meristem. **[7]**

Q3) a) 'Cell fate does not depend on cell lineage but is determined by positional information comment'. **[8]**

b) What is developmental plasticity? Discuss the factors affecting developmental plasticity in plants. **[7]**

Q4) a) Describe the various strategies used for developing transgenics in plants. **[8]**

b) Arabidopsis is a model system for studying plant developmental processes. Justify. **[7]**

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

P341

[4019]-303

T.Y. B.Sc.

BIOTECHNOLOGY

Bb - 333 : Biodiversity and Systematics

(2008 Pattern) (Sem. - III)

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

Instructions to the candidates:

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

Q1) Answer the following in 2 - 4 lines. **[10 × 2 = 20]**

a) Define amensalism with example.

b) What are Ecotypes?

c) Enlist any two ways of Entrainment of a biological clock.

d) Ecological mortality is greater than absolute mortality: Why?

e) Define Biosystematics.

f) 'Bacteria exchange genes but bacterial species necessarily share a gene pool' Why?

g) State Raunkier scale of frequency distribution of diversity.

h) Contrast systematics and classification.

i) State advantages of Numerical taxonomy.

j) Give Reason: More diverse the ecosystem more stable it is.

Q2) a) Elaborate on bioprospecting of phytochemicals with example. **[7]**

b) Give an account of classification of fungi. Add a note on the morphological keys used for the same. **[8]**

Q3) a) Explain in detail Development of behaviour in the organisms with appropriate example. **[8]**

b) Illustrate ways to conserve biodiversity. **[7]**

P.T.O.

Q4) a) State the milestones in Environmental legislation in India. Add a note on 'Handling hazardous microorganisms Rules' 2002. **[8]**

b) Explain importance of statistical tools in biodiversity analysis. Add a note on biodiversity indices. **[7]**

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

a) Attributes of population dispersion.

b) Phytogeography of India.

c) DNA hybridisation as a tool for classification of organisms.

d) FAME.

Q6) a) Describe interspecific and intraspecific interactions in organisms. **[8]**

b) Explain importance of Biodiversity as 'Gene Pool' **[7]**

Q7) a) 16S rRNA sequencing is a valuable tool for bacterial classification: Justify. **[5]**

b) Justify: Competition increases the diversity of the ecosystem. **[5]**

c) Write a note on 'Altruism'. **[5]**

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

P342

[4019]-401

T.Y. B.Sc.

BIOTECHNOLOGY

Bb - 341 : Large Scale Manufacturing Processes

(Sem. - IV) (2008 Pattern)

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

Instructions to the candidates:

1) ***Q. 1 and Q. 7 are compulsory.***
2) ***Attempt any three questions from the remaining.***
3) ***Figures to the right indicate full marks.***

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

a) State the types of bioproducts.

b) Define Nebla factor and define its role in a bioprocess.

c) State two examples of biotransformation in a bioprocess.

d) State two applications of immobilized enzymes in industry.

e) State the relation between $K_L A$ and viscocity.

f) Enlist the various tests used for quality assurance of vaccines.

g) State the role of precipitating agents in down stream processing.

h) State two applications of proteases in industry.

i) What are Amortized costs.

j) Enlist the different types of valve used in design of a fermenter.

Q2) a) Describe the role of various mutants with examples in amino - acid production. **[10]**

b) Describe in brief the theory of air filtration. **[5]**

Q3) a) Describe the physicomechanical methods of cell disruption. **[8]**

b) Describe methods for determination of cell - growth in a fermentation process. **[7]**

P.T.O.

Q4) a) Describe entrapment and encapsulation as methods of immobilization. **[8]**

b) Describe the manufacture of New castle disease vaccine. **[7]**

Q5) a) Explain with the help of a diagram the working of a computer controlled Fermenter. **[8]**

b) Describe scale up and enlist the criteria used for scale up in a bioprocess. **[7]**

Q6) a) Diagramatically represent the deep jet Fermenter and add a note on its working and applications. **[8]**

b) Describe in brief the measures for economizing a bioprocess. **[7]**

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

a) Spray drying as a method for down stream processing.

b) Energy balance in bioprocess.

c) Ame's Test.

d) Solid state Fermentation.

e) Methanolic yeast as SCP.

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

P343

[4019]-402

T.Y. B.Sc.

BIOTECHNOLOGY

Bb - 342 : Biotechnology in Agriculture and Health

(Sem. - IV) (2008 Pattern)

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

Instructions to the candidates:

1) ***Q. 1 and Q. 5 is compulsory.***
2) ***Attempt any two remaining 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 diagram if necessary.***

SECTION - I

(Agriculture)

Q1) Explain or define the following terms. **[10]**

a) Cybrids

b) Secondary metabolites.

c) Green home technology.

d) Trade mark.

e) Slow growth preservation.

Q2) a) Define metabolic engineering? Explain important approaches of metabolic engineering in plant biotechnology with suitable examples. **[8]**

b) What is Ti plasmid? How this plasmid is manipulated for introduction of desired gene? **[7]**

Q3) a) Describe the AFLP technique in detail & how it is used in generating map? **[8]**

b) Describe the steps of cryopreservation and Give its advantages & disadvantages. **[7]**

P.T.O.

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

a) Patent.

b) Stages of Micropropagation.

c) Application of Haploids in Agriculture.

SECTION - II

(Health)

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

a) Discuss diagnostic applications of PCR.

b) Discuss in brief two methods of organ culture.

c) Elaborate on uses of biopolymers in medicine.

d) What are the disadvantages of serum free media?

e) What are genetically engineered chimeric antibodies?

Q6) a) Give an account of importance of recombinant products for human health with the help of appropriate examples. **[8]**

b) Describe live attenuated vaccines and elaborate on two methods of preparation of live attenuated vaccines. **[7]**

Q7) a) Describe Human Genome Project and its implications in human health. **[8]**

b) Elaborate on biosensors with examples. **[7]**

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

a) Hybridoma technology and its applications in human health.

b) Methods of RFLP and their applications.

c) Methods of micromanipulations.

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

P344

[4019]-403

T.Y. B.Sc.

BIOTECHNOLOGY

Bb - 343 : Recombinant DNA Technology

(Sem. - IV) (2008 Pattern)

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

Instructions to the candidates:

1) ***Q.No.1 & 7 are compulsory.***
2) ***Attempt any 3 questions from the remaining.***
3) ***Figures to the right indicate full marks.***

Q1) Answer in 2 - 4 lines:- **[20]**

a) State the role of alkaline phosphatase in cloning.

b) DNA purity is checked spectrophotometrically. Justify.

c) Mention the role of isoamyl alcohol in Nucleic acid purification.

d) Enlist any two applications of genetic engineering in vaccine production with examples.

e) What are the types of membranes used in hybridization?

f) What are the non - radioactive labels used in cloning?

g) Enlist any four major break through discoveries in recombinant technology.

h) What are the methods of selection of transformants?

i) Enlist any four applications of Northern blotting.

j) What is an ideal host? Justify E.coli as an ideal host.

Q2) Explain in detail the Maxam - Gilbert's method of sequencing of DNA. **[15]**

Q3) a) Explain in detail the construction of genomic library. **[10]**

b) What are BAC vectors? Write a note on their properties and use. **[5]**

P.T.O.

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

P345

[4019]-702

T.Y. B.Sc.

BIOTECHNOLOGY

Bb - 332 : Recombinant DNA Technology

(Sem. - III) (2004 Pattern) (34023)

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

Instructions to the candidates:

1) ***Q.1 is compulsory.***
2) ***Attempt any four from the remaining questions.***
3) ***Figures to the right indicate full marks.***

Q1) Answer the following in 2 - 3 sentences:- **[20]**

a) What are shuttle vectors? Mention any two properties of these vectors.

b) State the role of H - 1 histone protein in packaging of DNA.

c) What is blue - white screening?

d) Write the function of phenol : chloroform isoamylalcohol in DNA purification.

e) Enlist the co - factors used by the enzyme alkaline phosphatase.

f) What is DEPC? Write its significance.

g) Enlist the restriction sites recognized by E.coRI and Sma I.

h) Tabulate any four vectors and their capacity to accept foreign DNA in terms of kbps.

i) Illustrate the reaction catalyzed by polynucleotide kinase.

j) Justify that cosmids are suitable vectors for cDNA library preparation.

Q2) Sanger's method of DNA sequencing can be automated, explain in detail. **[15]**

Q3) Write short notes on the following: **[15]**

a) Nick translation.

b) Western blotting.

c) Nylon membrane.

P.T.O.

Q4) a) Explain with the help of antibiotic resistance marker, insertional inactivation. **[7]**

b) Explain the term directional cloning. **[8]**

Q5) What is PCR cocktail? Enlist the ingridents along with their concentrations. Functions and reasons for including them in the cocktail. **[15]**

Q6) a) Explain the roles of the following in molecular cloning. **[8]**

i) Alkaline phosphatase.

ii) DNA ligase.

iii) Type II Restriction endonuclease.

iv) DNA pol I.

b) Name any two probes used in southern hybridization and explain how they are used and detected? **[7]**

Q7) a) Describe site directed mutagenesis. **[8]**

b) Illustrate the screening techniques for selection of recombinants. **[7]**

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

P346

[4019]-703

T.Y. B.Sc.

BIOTECHNOLOGY

Bb - 333 : Biodiversity & Systematics

(Sem. - III) (2004 Pattern) (34043)

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

Instructions to the candidates:

1) ***Q.No. 1 is compulsory. Out of remaining attempt any four.***
2) ***Figures to the right indicate full marks.***

Q1) Answer the following in 2 - 4 lines: **[10 × 2 = 20]**

a) Contrast systematics and phylogeny.

b) What is 'Endanged species'?

c) State major Zoogeographical Zones of India.

d) What is 'Agonism'?

e) Define Entrainment with example.

f) Give reason : Ecological natality is always greater than physiological natality.

g) Compare and contrast Trophic and hypervolume niche.

h) Define Ecotone and edge effect.

i) State milestones in Environmental legislation in India.

j) Define 'Biome'.

Q2) a) Elaborate on the growth forms of organisms with suitable examples. **[8]**

b) Explain bioprospecting of phytochemicals with example. **[7]**

Q3) a) Elaborate on the concept of community. Add a note on the significance in ecological studies. **[8]**

b) Give an account of The Forest (Conservation) Act, 1980. **[7]**

P.T.O.

Q4) Write notes on (any 3) **[15]**

a) Paleoecology.

b) Population age distribution.

c) Biological clock.

d) Biodiversity indices.

Q5) a) Elaborate on the following as a tool for classification. **[8]**

i) Morphology.

ii) Molecular studies.

iii) Cytotaxonomy.

iv) Chemotaxonomy.

b) Explain Ex-situ conservation of organisms. State conditions in which it is applicable. **[7]**

Q6) a) Give factors responsible for population dispersion. **[5]**

b) Explain communication in the organisms. **[5]**

c) Explain importance of biostatistics in biodiversity analysis. **[5]**

Q7) a) Describe intraspecific and interspecific interactions in the organisms with suitable examples. **[8]**

b) Explain Zoogeographical classification of world. **[7]**

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

P347

[4019]-801

T.Y. B.Sc. (Sem. - IV)

BIOTECHNOLOGY

Bb - 341 : Large Scale Manufacturing Processes (Backlog)

(2004 Pattern) (34014)

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) What are the various components of a bioprocess.

b) Define scale - up and scale - down in a bioprocess.

c) What is aspect ratio? State its role in bioreactor designing.

d) Define 'D' value. State its role in media sterilization.

e) What is bubble column fermenter?

f) What are load cells? Mention their use in bioprocess monitoring.

g) State the specifications of solvents used in liquid - liquid extractions.

h) What are precursors? Give an example.

i) What is broth rheology? How does it affect the aeration?

j) What is depreciation? State its role in the economics of a bioprocess.

Q2) a) Diagrammatically represent cylindrico - conical fermenter and explain its working and use. **[7]**

b) Explain the use of plackett - Burmann design in media optimization with an example. **[8]**

P.T.O.

Q3) a) Explain with the help of a flowsheet the fermentative production of vitamin B_{12}. **[10]**

b) Write the principle and applications of spray drying. **[5]**

Q4) a) Explain with the help of a diagram the working of a computer linked bioprocess. **[10]**

b) Write the substrates and applications of solid state fermentation. **[5]**

Q5) a) Explain the theory of depth filters and their sizing with an example. **[8]**

b) Explain the covalent binding method of immobilization with its applications. **[7]**

Q6) a) Explain the production of FMD vaccine. **[5]**

b) Draw a neat labelled diagram of disc bowl centrifuge. **[5]**

c) Explain a fed - batch bioprocess. **[5]**

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

a) SOP.

b) Commercial applications of proteases.

c) Sampling ports.

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

P348

[4019]-802

T.Y. B.Sc.

BIOTECHNOLOGY

Bb - 342 : Applications of Biotechnology in Agriculture and Health

(Sem. - IV) (2004 Pattern) (34024)

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

Instructions to the candidates:

1) ***Answer to each section should be written in separate answer books.***
2) ***Question No.1 and Q.5 are compulsory.***
3) ***From remaining questions attempt any two from each section.***

SECTION - I

(Agriculture)

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

a) Hybrid.
b) Double haploid.
c) RFLP.
d) Trade marks.
e) Co-integrate vectors.

Q2) a) What is IPR? Explain the procedure of patent filling with suitable examples. **[8]**

b) Explain the construction of green house with respect to irrigation facility, soil structure & fertigation. **[7]**

Q3) a) What is metabolic engineering? Explain it with suitable examples. **[8]**

b) What are transgenic plants? Add a note on ethical issues & risk assessment of GM crops. **[7]**

P.T.O.

Q4) Write short notes on (any three): **[15]**

a) Cryopreservation.

b) Electroporation.

c) AFLP.

d) Fully automated green house.

e) Micropropagation in Agriculture.

SECTION - II

(Health)

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

a) Mention any 2 applications of animal organ culture.

b) What is hybridoma technology.

c) State the use of RFLP as a diagnostic tool.

d) Give two applications of biosensors.

e) Mention any 2 applications of stem cell research.

Q6) a) What are monoclonal antibodies? Explain how they are produced by hybridoma technology. **[8]**

b) What is epidemeology? Describe the role of epidemeological studies in disease management. **[7]**

Q7) a) Explain the role of PCR in diagnostics. State its limitations as a diagnostic tool. **[8]**

b) What are vaccines? Describe common agents for active and passive immunization. **[7]**

Q8) Write short notes (any 3) **[15]**

a) Molecular markers.

b) Importance of recombinant products for human health.

c) Micromanipulation.

d) Subunit vaccines.

e) Cell cloning.

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

P349

[4019]-803

T.Y. B.Sc.

BIOTECHNOLOGY

Bb - 343 : Animal and Plant Development

(Sem. - IV) (2004 Pattern) (34044)

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

Instructions to the candidates:

1) ***Answer to each section should be written in separate answer books.***
2) ***Question number 1 from each section is compulsory. From remaining questions attempt <u>any two</u> from each section.***

SECTION - I

(Plant Development)

Q1) Explain the terms with reference to plant development. **[10]**

a) Senescence.
b) Totipotency.
c) Embryo Sac.
d) Phyllotaxy.
e) Quiascent centre.

Q2) a) What are auxins? Explain the biosynthesis, mode of action & effect on invivo plant development. **[8]**

b) Explain use of <u>Arabidopsis</u> System to understand patterning during vegetative development in plants. **[7]**

Q3) a) Compare the structure & activity of root & shoot apical meristems. **[8]**

b) What is plant tissue culture? Mention different culture types with their significance. **[7]**

Q4) a) Explain different techniques of DNA transfer to plants & add a note on their confirmation in transgenic plants. **[8]**

b) What is microspore? Explain it's development in Angiosperms. **[7]**

P.T.O.

SECTION - II

(Animal Development)

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

a) Progenitor cells.

b) Transdifferentiation.

c) Teratogenesis.

d) Competence.

e) Transgenic animals.

Q2) a) Describe the process of fertilization and add a note on its significance. **[7]**

b) Describe different types of eggs on the basis of quantity and distribution of Yolk. **[8]**

Q3) a) Describe the development of chick upto the formation of three germ layers. **[7]**

b) Explain the terms : Differentiation, De-differentiation, Re-differentiation & trans-differentiation with the help of limb regeneration. **[8]**

Q4) a) Describe the technique of animal cloning. **[7]**

b) Write a note on genetic basis of antibody diversity. **[8]**

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

P353

[4019]-101

S.Y. B.Sc. BIOTECHNOLOGY

Bb - 211 : Genetics and Immunology

(54011) (Sem. - I) (2008 Pattern)

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

Instructions to the candidates:

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

Q1) Attempt the following: (Any Eight) **[8 × 2 = 16]**

a) Monohybrid cross.
b) Mutagen.
c) F-phenocopies.
d) Operon.
e) Lethal genes.
f) Passive Immunity.
g) Helper T - Cell.
h) Phagocytosis.
i) Immunogenecity.
j) Lysozyme.

Q2) Attempt the following: (Any two) **[2 × 8 = 16]**

a) What is 'Law of Segregation' - explain with example.
b) Explain in detail mutation caused by UV.
c) What is phenotypic Lag? Explain its effect on expression of mutation at Phenotypic level.

P.T.O.

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

a) Explain complement fixation test and write its applications.

b) Discuss the different barriers of innate immunity in brief.

c) Write a note on toxoids.

d) Cellular immune response is MHC - restricted _____ Discuss.

e) Write the functions of different immunoglobulin molecules.

Q4) Attempt the following: (Any four) **[4 × 4 = 16]**

a) Describe in brief - 'Retroposons'.

b) Comment on reasons for Mendel's Success.

c) Explain different gene - interaction with example.

d) Write a note on insertion sequences in bacteria.

e) Explain the mechanism of gene transfer in Streptococcus faecalis.

Q5) Attempt the following: (Any two) **[2 × 8 = 16]**

a) Differentiate between Humoral and cellular immunity. Write the role of memory cell in adaptive immunity.

b) With a neat diagram explain the steps of inflammation. Mention the symptoms of inflammation.

c) Write a note on DNA-Vaccine. What are the advantages and disadvantages of DNA Vaccine.

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

P354

[4019]-102

S.Y. B.Sc. (Sem. - I)

BIOTECHNOLOGY

Bb - 212 : Cell Biology

(2008 Pattern) (54021)

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 a neat labelled diagrams wherever necessary.***
4) ***Use of color pencils restricted to diagrams.***

Q1) Attempt any ten of the following questions, as directed: **[20]**

1) List 2 functions of the cell membrane:

Questions 2 - 6 match the following organelles with their function: 2. Mitochondria; 3. Vacuoles; 4. Cilia; 5. Smooth ER; 6. Golgi apparatus.

A). Movement of the cell.

B) Lipid synthesis and transport.

C) "Powerhouse" of the cell makes ATP.

D) Storage areas, mainly found in plant cells.

E) Packages and distributes cellular products.

7) The diffusion of H_2O across a semi permeable or selectively permeable membrane is termed:

A. Active transport. B. Diffusion.

C. Osmosis. D. Endocytosis.

8) Oxygen enters a cell via:

A. Diffusion. B. Filtration.

C. Osmosis. D. Active transport

9) The term used to describe, "cell eating" is?

A. Exocytosis. B. Phagocytosis.

C. Pinocytosis. D. Diffusion.

P.T.O.

10) Which of the following requires energy?

A. Diffusion. B. Osmosis.

C. Active transport. D. Facilitated diffusion.

11) What is not found in the cell membrane?

A. Phospholipids. B. Proteins.

C. Galactose. D. Nucleic acids.

12) What is a cell?

A. The largest living units within our bodies.

B. Enzymes that "eat" bacteria.

C. Microscopic fundamental units of all living things.

D. All of the above.

Q2) Draw neat labeled diagrams of the following [Any three]: **[15]**

a) Sarcomere.

b) Smooth endoplasmic reticulum.

c) Telophase in Mitosis.

d) G protein cascade.

Q3) Write self explanatory notes on any three of the following **[15]**

a) Tight junctions.

b) Apoptosis cascade.

c) Numerical aperture and resolution of compound microscope.

d) Asymmetry of cell membrane.

Q4) Explain how yeast *cdc* mutants have been used to isolate the human homolog of yeast genes that regulate the cell cycle? **[15]**

OR

What is expected sub cellular distribution of protein disulphide isomerase (PDI) lacing C-terminal KDEL sequence?

Q5) Justify the following statements [Any three]: **[15]**

a) Chloroplasts contain two functionally and spatially distinct photosystems.

b) Molecular connection between extra cellular matrix (ECM) and cytoskeleton are defective in muscular dystrophy.

c) Plasmodesmata directly connect the cytosols of the adjacent cells in higher plants.

d) Maturation - promoting factor (MPF) stimulate meiotic maturation in oocyte and the mitotic maturation in somatic cells.

j) Which of the following enzymes involved in replication is helicase?

i) Dna A.

ii) Dna B.

iii) Dna C.

iv) Dna H.

Q2) Draw neat labeled diagrams of the following [Any three]: **[15]**

a) 80s Ribosome.

b) SOS repair.

c) Bacterial RNA polymerase.

d) Initiation complex of RNA pol I.

Q3) Write self explanatory notes on any three of the following: **[15]**

a) Dimethyl sulphonate as mutagen.

b) Proflavin as mutagen.

c) 5 - Bromo uracil as mutagen.

d) Excision repair.

Q4) Explain in detail the eukaryotic transcription as catalyzed by RNA pol II, add a note on post transcriptional events. **[15]**

OR

Describe in detail, the replication process taking place in the E. coli cells.

Q5) Justify the following statements [Any three]: **[15]**

a) Aminoacyl t-RNA synthase charges the t-RNA molecule.

b) IF 3 keeps the larger subunit and smaller subunits of ribosome separate.

c) Chloamphenicol inhibits the protein synthesis.

d) Larger subunit of ribosome has E, P and A sites.

Total No. of Questions : 5] **[Total No. of Pages : 4**

P356

[4019]-104

S.Y. B.Sc.

BIOTECHNOLOGY

Bb - 213 : Metabolic Pathways

(2004 Pattern) (Sem. - I) (24041)

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 a neat labeled diagrams wherever necessary.***
4) ***Use of color pencils restricted to diagrams.***

Q1) Attempt the following questions, as directed: **[20]**

a) Which of the following statements about the active site of an enzyme is correct?

i) The active site of an enzyme binds the substrate of the reaction it catalyses more tightly than it does the transition state intermediate.

ii) The active site of an enzyme binds the substrate of the reaction it catalyses less tightly than it does the transition state intermediate.

iii) The active site of an enzyme binds the product of the reaction it catalyses more tightly than it does the transition state intermediate.

iv) The active site of an enzyme is complementary to the substrate of the reaction it catalyses.

b) Which of the following statements about the nature of enzyme catalysis is correct?

i) An enzyme can change the equilibrium position of the reaction it catalyses by lowering the energy of activation of that reaction.

ii) An enzyme can lower the energy of activation of the reaction it catalyses by increasing the molecular collisions between the molecules.

iii) An enzyme lowers the free energy difference between substrate(s) and product(s) but it cannot change the equilibrium position of the reaction.

iv) An enzyme cannot change the equilibrium position of the reaction it catalyses but it lowers the energy of activation of that reaction.

P.T.O.

c) Which of the following statements about the ketone body acetoacetate is not correct?

i) Acetoacetate is oxidised to β-hydroxybutyrate.

ii) Acetoacetate is produced from excess acetyl-CoA in the liver.

iii) Acetoacetate spontaneously decarboxylates to acetone.

iv) Acetoacetate is oxidised as a fuel in peripheral tissues.

d) Which of the following statements about the regulation of a metabolic pathway is correct?

i) Most metabolic pathways are not regulated.

ii) Regulation of metabolic pathways always involves changing the amount of enzymes.

iii) Metabolic regulation always depends on control by hormones.

iv) Most metabolic pathways are regulated.

e) Which of the following statements about nicotinamide adenine dinucleotide (NAD+) is correct?

i) NAD+ is the initial electron donor in many metabolic oxidation reactions.

ii) NADH is the initial electron acceptor in many metabolic oxidation reactions.

iii) NAD+ is the initial electron acceptor in many metabolic oxidation reactions.

iv) NAD+ is a prosthetic group for several dehydrogenases.

f) Which of the following statements about Michaelis-Menten kinetics is correct?

i) Km, the Michaelis constant, is defined as the concentration of substrate required for the reaction to reach maximum velocity.

ii) Km, the Michaelis constant, is defined as the dissociation constant of the enzyme-substrate complex.

iii) Km, the Michaelis constant, is expressed in terms of the reaction velocity.

iv) Km, the Michaelis constant, is a measure of the affinity the enzyme has for its substrate.

g) Which of the following statements about the competitive inhibition of an enzyme-catalyzed reaction is correct?

i) A competitive inhibitor and substrate can bind simultaneously to the enzyme.

ii) The Vmax and Km (Michaelis constant) for a reaction are unchanged in the presence of a competitive inhibitor.

iii) The Vmax for a reaction remains unchanged in the presence of a competitive inhibitor.

iv) The Km for a reaction remains unchanged in the presence of a competitive inhibitor.

h) Which of the following statements about the mechanism of allosteric control of enzyme activity is correct?

i) Allosteric enzymes are single-subunit enzymes.

ii) Allosteric enzymes show a greater sensitivity to changes in substrate concentration than classical type enzymes with hyperbolic kinetics.

iii) Allosteric enzymes show Michaelis-Menten kinetics.

iv) Allosteric enzymes show a reduced sensitivity to changes in substrate concentration than classical type enzymes with hyperbolic kinetics.

i) Which of the following statements about the control of enzyme activity by phosphorylation is correct?

i) Phosphorylation of an enzyme is not a reversible process since it is a covalent modification.

ii) Phosphorylation of an enzyme occurs by protein phosphatases.

iii) Phosphorylation of an enzyme is an intracellular process and cannot occur in response to external signals.

iv) Phosphorylation of an enzyme results in a conformational change.

j) Which of the following correctly exhibits an example of metabolic control?

i) In cases where the direction of a metabolic pathway has to be reversed the pathway is controlled at an irreversible step.

ii) Regulatory changes in a pathway always occur slowly over periods of several hours or more.

iii) Enzymes which are controlled are always those which catalyse the first reaction of the pathway.

iv) Most enzyme control mechanisms are irreversible.

Q2) Write the reactions and enzymes for the following pathways [Any three]:**[15]**

a) B - Oxidation.

b) Urea Cycle.

c) Calvin cycle.

d) C - 2 Pathway.

Q3) Write self explanatory notes on any three of the following. **[15]**

a) TCA Cycle.

b) *De- novo* Pyrimidine synthesis.

c) Mitochondrial electron transport chain.

d) Glycogen synthesis.

Q4) Explain how light energy is trapped in the chloroplast of plant cells? **[15]**

OR

What is expected ATP loss when gluconeogenesis takes place for the supplement of glucose?

Q5) Justify the following statements [Any three]: **[15]**

a) Chloroplasts contain two functionally and spatially distinct photosystems.

b) Carnitine transports fatty acid across the inner membrane of mitochondria.

c) *Aspartate transcarbamylase* is the pacemaker enzyme in Purine biosynthetic reactions.

d) Exergonic reactions are spontaneous reactions.