Total No. of Questions : 5]

SEAT No. :

P163

[Total No. of Pages : 3

[4319]-1
F.Y.B.Sc. (Biotechnology)
CHEMISTRY
Bb - 101 : Fundamentals of Chemistry
(2008 Pattern)

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 indicates full marks.***
4) ***Use of logarithmic table and calculator is allowed.***

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

a) A sample of Helium has volume of 520mL at 100°C. Calculate the temperature at which the volume will become 260 mL. Assume that pressure remains constant.

b) Distinguish between order and molecularity.

c) What is meant by abnormal molecular weight.

d) Define the term component. How many components are present in the following system :

$$CaCO_{3(S)} \rightleftharpoons CaO_{(s)} + CO_{2(g)}$$ (heated in closed vessel)

e) What is effect of dilution of equivalent conductance of strong electrolyte.

f) How will you determine the solubility product of sparingly soluble salt by emf method?

g) What are distereomers?

h) Distinguish between sigma (σ) and pi (Π) bond.

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

a) State and explain Dalton's law of partial pressure.

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

c) What are colligative properties? Explain any one colligative property.

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

e) Discuss Debye - Huckel theory of activity coefficients of strong electrolyte.

f) Explain the factors affecting Vander Waal's forces.

P.T.O.

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

a) Define the term cryoscopic constant. Derive thermodynamically the relation.

$$K_f = \frac{RT_0^2}{1000L_f}$$

b) Explain the effect of hydrogen bonding on the following physical properties.

i) solubility and

ii) Viscosity.

c) Derive an expression for concentration cells with transference.

d) A second order reaction where a = b, is 30% completed with in 500 seconds. How long will it take for the reaction to go to 70% completion?

e) The osmotic pressure of a 5% by volume solution of a substance at 18°C is 6.64 atm. Calculate the molecular weight of the substance.

f) Describe eutectic phase diagram for zn - cd system.

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

a) What do you understand by 'geometrical isomerism'. Explain the use of E and Z nomenclature to describe geometrical isomers. Explain the stability of geometrical isomers.

b) What is plane polarised light? How it is related to optical activity? Explain the use of polarimeter to measure optical activity.

c) Explain the following types of organic reactions :

i) Substitution reactions and

ii) Oxidation and reduction reactions.

d) Balance the following equation by oxidation number method :

$$Na_2S_2O_3 + I_2 \rightarrow NaI + Na_2S_4O_6$$

e) Calculate EMF of the following cell at 25°C.

$$Cd_{(Hg)}\ [a = 0.1] \mid CdSO_4\ (solution) \mid Cd_{(Hg)}\ [a = 0.01]$$

f) Findout the pH of a 0.002 M acetic acid solution if it is 2.3% ionised at this dilution.

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

a) What are potentiometric titrations? Explain oxidation - reduction titration with suitable example.

b) Write notes on :

i) Common ion effect, and

ii) Conductometric titrations.

c) What do you mean by the transport number of ions? How is the transport number related to the speed of ions? Describe Hittorf's method for the determination of transport number of ions.

♦♦♦♦

Total No. of Questions : 5]

SEAT No. :

P164

[Total No. of Pages : 3

[4319]-2
F.Y.B.Sc. (Biotechnology)
PHYSICS
Bb - 102 : Fundamentals of Physics
(2008 Pattern)

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) What are the base units in SI system?

b) State Newton's law of viscosity.

c) Define surface tension. Give its SI unit.

d) State Brewster's law.

e) What do you mean by International practical temperature scale?

f) What is the change in the internal energy per gram of air if 12 gm of air is heated from 0°C to 5°C at constant volume by adding 120 calories of heat?

g) Briefly explain Fraunhofer diffraction.

h) The maximum value of the permeability of some metal is 0.130 T - m/A. Find the value of relative permeability and susceptibility. Given $\mu_0 = 4\pi \times 10^{-7}$ T - m/A.

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

a) Define standard units for luminus intensity and matter (amount of substance).

b) Show that the relationship between Young's modulus, modulus of rigidity and poisson's ratio is $Y = 2\eta(1+\sigma)$

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) Two horizontal pipes of diameters 3 cm and 6 cm are connected together. In the first pipe speed of water is 4 m/s and the pressure is 2.0×10^4 N/m^2 . Calculate the speed and pressure of water in the second pipe.

e) Explain the vapor compression refrigeration cycle.

f) Define efficiency of refrigerator. Find the efficiency of a refrigerator if coefficient of performance is 9.

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

a) Define pressure. With the help of suitable diagram explain how the mercury barometer is used to measure the atmospheric pressure.

b) A capillary tube of 0.50 mm in diameter has its lower end immersed in a liquid whose surface tension is 54×10^{-3} N/m. The density of liquid is 0.86×10^3 kg/m^3. Calculate the height at which the liquid rises (Angle of contact is 28°).

c) Define beat. Give its applications.

d) Calculate the change in entropy when 1 mole of an ideal gas is allowed to expand from a volume of 1 litre to a volume of 10 liters at 27°C.

e) What is biomagnetism? How it is useful in health care? Discuss with examples.

f) Which fields are included in the life sciences? Discuss the interrelationship between physics and life sciences.

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

a) With the help of suitable diagram explain the principle, construction and working of pitot's tube. Derive the necessary formula.

b) Show that an organ pipe open at both ends produces both even and the odd hormonics two open organ pipes open at both the ends sounding simultaneously produce 5 beats per second. If the smaller pipe is 66 cm long then determine the length of the bigger organ pipe (speed of sound in air is 330 m/s).

c) State the relationship between surface tension and surface energy. Discuss with examples the effect of temperature, contamination and solute on surface tension of liquid. Describe atleast four practical applications of capillary action.

Q5) a) Define electric line of force. Discuss various properties of electric lines of force.

Four point charges 10 μC, 15μC,10μC, and – 20 μC are placed on the four corners of a square of side 4 m. Calculate the total force on a charge 15 μC due to other three charges.

b) Explain the construction and the working of a Nicol prism.

Distinguish between Dextro - rotatory and Laevo - rotatory optically active substances. Show that at the polarizing angle, the reflected ray and refracted ray are perpendicular to each other.

[16]

OR

a) Describe a carnot cycle and show that efficiency of carnot's engine is a function of temperature only.

b) Define

i) Magnetisation

ii) Magnetic intensity

iii) Magnetic permeability

iv) Magnetic susceptibility.

Obtain the relationship between $\overline{B}, \overline{M}$ & $\overline{H}$.

♦♦♦♦

Total No. of Questions : 8]

SEAT No. :

P166

[Total No. of Pages : 3

[4319]-4
F.Y.B.Sc.
BIOTECHNOLOGY
Bb - 104 : Mathematics and Statistical Methods for Biologists
(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) ***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) Find the adjoint of matrix $A = \begin{bmatrix} 1 & 2 & 4 \\ 4 & 3 & 2 \\ 3 & 1 & -2 \end{bmatrix}$.

b) Find modulus and principal argument of $(1+i)^3 / (1-i)^2$.

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

d) State whether the sequence $< a_n >$, where $a_n = n\left[1 + \frac{(-1)^n}{n}\right]$ is oscillatory. Justify.

e) Examine the convergence of the series $\sum_{n=1}^{\infty} \frac{3n+2}{7n+8}$.

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

a) If $z_1, z_2 \in C$ such that $|z_1 - z_2| = |z_1 + z_2|$ then show that $\frac{iz_1}{z_2}$ is real, where $z_2 \neq 0$.

b) Show that the sequence $< a_n >$, where $a_1 = \sqrt{3}$, and $a_{n+1} = \sqrt{3 + a_n}$, for $n \geq 1$, is convergent.

P.T.O.

c) Solve : $(e^y + 1)\cos x\,dx + e^y \sin x\,dy = 0$.

d) Show that the vectors (1, –1, 2), (2, 3, 1), (–3, 3, 6) are linearly dependent.

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

f) Solve : $2x_1 + x_2 - 2x_3 = 8$

$3x_1 - 2x_2 - 4x_3 = 15$

$5x_1 + 4x_2 - x_3 = 1$

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

a) Solve : $\dfrac{dy}{dx} = \dfrac{x - y + 3}{2x - 2y + 5}$

b) Find five fifth roots of unity.

c) Solve the following system of linear equations.

$x - y + 2z - w = -1$

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

$-x + 2y - 4z + w = 1$

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

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

b) Determine whether the matrix A is diagonalizable. If so, find P and $P^{-1}AP$, where

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

SECTION - II

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

a) The monthly salaries of 10 employees of a firm are Rs. 2500, 2780, 2820, 2850, 2680, 2750, 2575, 3000, 2725, 2790. Find the average salary of the workers.

b) Define coefficient of variation.

c) Define the term median.

d) Explain, what is multiple correlation?

e) Explain the term 'random experiment' with an illustration.

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

a) Following data relates to the number of years lived after the retirement, by state government employees in an office?

No. of years	0-5	5-10	10-15	15-20	20-25
No. of employees	4	20	38	24	8

Calculate mode of the data.

b) An insurance agent knows from the past experience that the probability that person he visits will insure is 0.75. What is the probability that at least one of the seven persons he visits will insure?

c) Following are the waiting times (in minutes) of a medical representative during a week to meet the doctor in his clinic :

15, 20, 35, 42, 17, 25

Calculate the standard deviation of the waiting times.

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

e) State the test statistic used in chi - square test for independence of two attributes.

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

a) Explain the concepts of skewness and kurtosis. Also state their types.

b) The intelligence quotient (I.Q) of college students is known to be normally distributed with mean 100 and S.D.S. Calculate the probability that a randomly selected college student has I.Q. between go to 110.

c) Find the coefficient of correlation between X and Y from the following data :

$n = 20, \sum X = 180, \sum Y = 140, \sum X^2 = 2680, \sum Y^2 = 1425, \sum XY = 580.$

Q8) Attempt any one **[1 × 10 = 10]**

a) Explain the technique of one - way ANOVA.

b) Explain any two tests of hypothesis you have studied.

♦♦♦♦

Total No. of Questions : 5]

SEAT No. :

P171

[Total No. of Pages : 2

[4319]-101
S.Y.B.Sc. (Semester - I)
BIOTECHNOLOGY
Bb 211 : Genetics & Immunology
(Old and New 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) ***Draw neat and labelled diagrams wherever necessary.***

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

a) Enlist two mobile elements from yeast.

b) Define pleotropic genes with examples.

c) What are sex linked genes? Give examples.

d) Define double trisomy with example.

e) What are chromosomal aberrations? Enlist any two.

f) Define antigen and immunogen.

g) Write the names of different genes and their products in Arabinose operon.

h) Differentiate between CD_4 and CD_8 molecules.

i) What is the difference between killed and attenuated vaccines?

j) What are killer T - cells?

Q2) a) What is the role of cAMP in regulation of Lac operon. **[7]**

OR

Explain the mechanism of gene transfer by Agrobacterium tumefaciens.

b) "Gene linkage influences Mendelian ratio" Justify with examples. **[8]**

OR

Explain the sexual transformation of genetic material in bacteria.

P.T.O.

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

a) Describe aneuploidy in detail with one example.

b) Explain the following types of mutations in detail.

i) Transversion.

ii) Frame shift.

c) Describe the structure of bacterial plasmids with labelled diagram.

d) Explain "Principles of ELISA and western blot techniques are one and the same".

e) Give the structure of IgG antibody with its significance.

Q4) a) Describe the primary lymphoid organs in detail. **[7]**

OR

Explain the properties of T and B cell epilopes.

b) Describe the life cycle of bacteriophage with neat and labelled diagram. **[8]**

OR

Explain the clonal selection theory for antibody production.

Q5) Write in brief on : (Any three) **[3 × 5 = 15]**

a) Complement fixation test.

b) Spontaneous mutation and induced mutation.

c) Generalized transduction.

d) Monodonal Antibodies.

e) Radioimmuno assay (RIA).

♦♦♦♦

Total No. of Questions : 5]

SEAT No. : ____

P172

[Total No. of Pages : 2

[4319] - 102
S.Y.B.Sc. (Semester - I)
BIOTECHNOLOGY
Bb-212 : Cell Biology
(Old & New Course)

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

Instructions to the candidates:

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

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

a) Give unique features of cell theory.

b) Enlist the enzymes present in mitocondria's inner membrane.

c) Enlist the factors affecting cell size.

d) Write the role of spindle fibre in mitosis .

e) What are F_1 particle?

f) Define desmosomes.

g) Define facilitated diffusion.

h) Significance of s phase in cell cycle.

i) Write principle of scanning electron microscope.

j) Give functions of Lysosomes.

Q2) a) Explain with the help of neat & labelled diagram, structure & function of microtubules & micro filaments. **[8]**

OR

Describe different types of cell - surface receptors for cell signalling.

b) Write in detail types of plant tissues with labelled diagram. **[7]**

OR

Explain the role of extracellular matrix and the leucocyte migration.

P.T.O.

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

a) Explain cell differentiation with reference to plant cell.

b) Give structure & significance of tight junction.

c) Describe the process of neoplasic growth.

d) Explain photo system II.

e) Describe nucleus structure & give its functions.

Q4) a) Describe how Na^+ & K^+ ions moves across the cell membrane. **[8]**

OR

Give an account on mechanism of cell cycle regulation and add notes on check points in cell cycle.

b) Describe the role of oncogenes in cancer development. **[7]**

OR

Give structure and function-relation ship of Golgi bodies.

Q5) Write in brief on : (Any three) **[3 x 5 = 15]**

a) Role of caspases mediated cell signalling.

b) Structure and function of muscular tissue.

c) Inner and Outer membrane of mitochondria.

d) Structure and function of Peroxisomes.

e) Programmed cell death.

Total No. of Questions : 8]

P181

SEAT No. : ____

[Total No. of Pages : 2

[4319] - 302
T.Y.B.Sc. (Semester - III)
BIOTECHNOLOGY
Bb-332 : Animal & Plant Development
(2008 Pattern)

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

Instructions to the candidates:

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

SECTION-I
(Animal Development)

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

a) Cloning
b) Commitment
c) Fate map
d) Monoclonal antibodies
e) Cleavage

Q2) a) Describe the process of Gastrulation in chick and add a note on fate of the three germinal layers. **[8]**

b) Describe the steps involved in antibody diversity generation. **[7]**

Q3) a) With the help of model system Drosophila / any other explain the role of maternal influencing genes in patterning. **[8]**

b) What is transgenic technology? Explain with suitable examples. **[7]**

P.T.O

Q4) a) Describe the process and significance of fertilisation. **[8]**

b) Differentiate between epimorphosis and morphollaxis regeneration and describe the role of blastema during regeneration. **[7]**

SECTION-II
(Plant Development)

Q5) Explain the term with respect to plant development. **[10]**

a) Polarity

b) Redifferentiation

c) Senescence

d) Plant chimeras

e) Transgenic plants

Q6) a) Arabidopsis thaliana is a model organism to study plant developmental process at molecular level justify your answer. **[8]**

b) Describe in detail various strategies to transfer foreign genes in plants. **[7]**

Q7) a) Define plant hormones and its types explain role and mode of action of Auxin on plant development. **[8]**

b) Explain radial and axial patterning in plants and also mention some of the genes playing important role during the process. **[7]**

Q8) Explain the following : **[15]**

a) Flowering in plant is a well regulated phenomenon

b) Homeotic mutants

c) Scare crow and short root genes.

Total No. of Questions : 7]

SEAT No. :

P182

[Total No. of Pages : 2

[4319] - 303
T.Y.B.Sc. (Semester - III)
BIOTECHNOLOGY
Bb-333 : Biodiversity and Systematics
(2008 Pattern)

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

Instructions to the candidates:

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

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

a) Define home range.

b) Explain proto co-operation & give an example.

c) What is Agonism?

d) Explain the term alpha diversity.

e) Define Biosystematics.

f) What is migration?

g) Distinguish between desert & shrubland.

h) Explain commensalism with an example.

i) What is carrying capacity?

j) Explain habitat with an example.

Q2) a) Discuss major types of intraspecific and interspecific interactions. **[8]**

b) Mention the methods of ex situ conservation & explain any two of them. Add a note on limitations of it. **[7]**

Q3) a) Describe bioprospecting with special reference to plants. **[8]**

b) Morphological and molecular data are complimentary for taxonomy. Explain with suitable examples. **[7]**

P.T.O.

Q4) a) What is Biome? Enlist major world biomes. Describe any two of them. **[8]**

b) Write an account of national forest policy 1988. **[7]**

Q5) a) Describe the tools & techniques used for animal systematics. **[8]**

b) Describe the methods to measure biodiversity abundances & explain any two of the biological indices. **[7]**

Q6) a) Explain the concept of biological clock with examples. **[8]**

b) Describe different types of population dispersion and explain which factors are responsible to have uniform pattern of dispersion. **[7]**

Q7) Write short notes on (Any 3) **[15]**

a) Reasons for loss of biodiversity & its causes.

b) Population growth forms.

c) Key strategies of effective conservation.

d) Species diversity.

Total No. of Questions : 8]

P165

SEAT No. : ____

[Total No. of Pages : 2

[4319] - 3
F.Y. B.Sc.
BIOTECHNOLOGY
Bb-103 : Basic Biosciences
(2008 Pattern)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Draw neat and 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 insectivorous plants?

b) Give examples of root modifications which perform vital functions.

c) Enlist types of thickenings in xylem vessels.

d) Define aestivation.

e) Explain cryptochrome.

f) What is short day plants.

g) Give names of two biotechnologically important fungi.

h) What is ligule.

Q2) Write short notes on (Any three) **[12]**

a) Reproduction in Algae with suitable diagram.

b) Mechanism of Vernalization.

c) Glycolysis.

d) Types of cymose inflorences.

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

a) Explain life cycle of gymnosperm with suitable diagram.

b) Explain the development of seed in dicotyledones.

c) Describe with diagram primary structure dicot stem.

P.T.O

Q4) Define plant growth regulator. Enlist different plant growth regulators and its site of synthesis. Give application of any two of them. **[10]**

OR

Give general characters of Bryophytes and its economic importance.

SECTION - II

(Zoology)

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

a) Define osmoregulation.

b) What is royaljally.

c) Explain Vermiculture.

d) Define mutualism.

e) Give two key characters of phyllum echinodermata.

f) Enlist functions of integument.

g) Define polyculture.

h) Give two examples of porifera.

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

a) Symptom and control measures of jawar stem borer.

b) Bee management.

c) Characters of class-Reptillia.

d) Most specificity.

Q7) Answer the following questions (Any two) : **[10]**

a) Describe Blood vascular system in earthworm.

b) Explain colony organization in honeybee.

c) Describe fresh water aquaculture.

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

Give in detail life cycle of bombyx mori with diagram.

OR

Give comparative account on respiratory system in animals.

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Total No. of Questions : 5]

SEAT No. :

P167

[Total No. of Pages : 2

[4319] - 5
F.Y.B.Sc.
BIOTECHNOLOGY
Bb-105 : Fundamentals of Biological Chemistry
(2008 Pattern)

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

Instructions to the candidates:

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

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

a) Write MM equation.

b) Name coenzymes of Thiamin and Niacin.

c) What are essential amino acids? Give example.

d) Define Isoelectric pH.

e) What are nucleosides and nucleotides?

f) List out four functions of lipids.

g) Give the significance of Sanger's and Edmann reagent.

h) Write the structure of Maltose and Lactose.

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

a) Differentiate between α - helix and β - pleated structures of proteins.

b) What are lipoproteins? Give their significance.

c) Give the reaction mechanism of nucleophilic substitution reaction.

d) Differentiate between prokaryotes and eukaryotes.

e) Write note on rancidity of lipids.

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

a) Define saponification number and iodine number of lipids. Give its significance.

b) Write note on Ramachandran plot.

c) How are aminoacids separated by Paper chromatography.

P.T.O.

d) Write note on active site of enzymes.

e) What are the different forms of DNA? Give their features.

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

a) Explain the principle procedure and applications of Affinity chromatography.

b) Discuss Urey Miller's experiment.

c) Classify lipids with suitable examples.

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

a) Elaborate on various functions of proteins in our body.

b) Discuss competitive and noncompetitive inhibition of enzymes.

c) Explain transport of ions and molecules across the cell membrane.

Total No. of Questions : 5]

SEAT No. :

P168

[Total No. of Pages : 2

[4319] - 6
F.Y.B.Sc.
BIOTECHNOLOGY
Bb-106 : Biophysics and Instrumentation
(2008 Pattern)

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

Instructions to the candidates:

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

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

a) State different series in alkali(Na) atoms.

b) State application of radiowave and microwave.

c) State advantages and limitation of radioimmunoassay.

d) Give medical use of radioisotopes.

e) State the unit of radioactivity. Give unit of radioactive dosage.

f) Define

   i) Entropy

   ii) Enthalpy

g) State physical significance of entropy.

h) Define pH and pOH. Give its relation.

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

a) The wavelength of the first member of Balmer series is 6563A°. Calculate the wavelength of second member of Lymen series.

b) Explain the transverse nature of electromagnetic wave.

c) Calculate the time required for 10% of a sample of thorium to disintegrate. Assume the half life of thorium to be 1.4×10^{10} years.

d) Discuss electromagnetic wave spectrum in brief.

e) Explain biological effect of radiation.

f) State and explain Nernst equation.

P.T.O.

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

a) Write short note on EMG.

b) Explain principle, construction and working of Bimetallic thermometers.

c) Explain Nuclear magnetic resonance.

d) State advantages and disadvantages of platinum resistance thermometers.

e) Explain dissecting microscope with neat labelled diagram.

f) Explain the method of calculation of Gibbs free energy change from.

i) Equilibrium constant.

ii) From standard reaction potential.

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

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

b) Explain principle, construction and working of G.M. counter.

c) Discuss vibration spectra of simple harmonic oscillator.

Q5) a) Explain principle, construction and working of IR spectrometer, **[8]**

b) Explain principle, construction and working of pH meter. **[8]**

OR

a) State and explain Pauli's exclusion principle. Apply it to determine the maximum number of electron that can exist in a shell.

b) Explain the terms

i) Resting potential

ii) Action potential

Total No. of Questions : 5]

SEAT No. :

P169

[Total No. of Pages : 2

[4319] - 7
F.Y.B.Sc.
BIOTECHNOLOGY
Bb-107 : Microbiology
(2008 Pattern)

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 and draw an umbonate colony.

b) State two plant pathogens and the disease they cause.

c) Define : Chemoheterotrophs. Give a suitable example.

d) State two distinguishing characters of Fungi.

e) Define an acidic stain with suitable example.

f) Enlist the phases of bacterial growth curve.

g) State the principle of Autoclave.

h) Define : Rhizosphere.

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

a) State the uses of refrigerator in a microbiology laboratory.

b) A water sample was analyzed and the following data was obtained.

i) Volume of sample plated : 0.1ml

ii) Dilution of sample : 10^6

iii) Number of colonies obtained : 100.

Calculate the TVC of the sample.

c) Describe the use of enriched medium with a suitable example.

d) Justify : Pure culture is necessary for studying bacterial characteristics.

e) Explain : Viruses are a link between living & non-living.

f) Why is it necessary to enumerate bacteria?

P.T.O.

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

a) Describe Freeze drying as a method for preservation of bacteria.

b) Why is it advantageous for bacteria to grow in a biofilm?

c) Describe a method for cultivating anaerobic bacteria.

d) Classify bacteria depending upon their pH requirement for growth.

e) Describe the structure of T_4 bacteriophage.

f) State the principle of Flagella staining.

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

a) Describe the nodulation process in roots of Leguminous plants.

b) What are Mycorrhiza? Describe endomycorrhiza in brief.

c) Distinguish between Prokaryotes and Evkaryotes.

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

a) Describe the Neubauer chamber and explain the enumeration of bacteria using it.

b) Describe in detail the structure of gram positive and gram negative cell wall.

Total No. of Questions : 5]

SEAT No. :

P170

[Total No. of Pages : 2

[4319] - 8
F.Y. B.Sc.
BIOTECHNOLOGY
Bb - 108 : Use of Computers
(2008 Pattern)

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

Instructions to candidates :

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

Q1) Attempt all of the following : **[8 × 2 = 16]**

a) Define the terms :

i) Buffer.
ii) Plotter.

b) How to protect your system from virus?

c) List out various services of operating system.

d) State the term biometrics.

e) Define entity.

f) What is protocol?

g) What do you mean by parallel processing computers?

h) Define word processor.

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

a) Explain computer with block diagram.

b) Describe the following data models.

i) Network
ii) Relational.

c) Explain Google search engine in detail.

d) Describe B-tree indexed file.

e) Write note on biological databases.

P.T.O.

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

a) How to prepare chart in MS-Excel? Explain with suitable example.

b) Compare online and offline processing.

c) Draw a flowchart to check whether given number is prime or not.

d) Compare LAN and WAN.

e) Draw an E-R diagram for banking system.

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

a) Explain the features of Linux operating system. How it is better to use GUI than text based operations.

b) Write note on power point presentation and explain the steps to prepare presentation.

c) Write note on mail-merge of MS-Word.

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

a) Write an algorithm and draw flowchart to accept n numbers and sort them in ascending order.

OR

How database is different from conventional file system. explain with features.

b) Explain the characteristics and applications of algorithm.

OR

Write note on multimedia databases.

Total No. of Questions : 5]

SEAT No. :

P173

[Total No. of Pages : 2

[4319] - 103
S.Y. B.Sc. (Semester - I)
BIOTECHNOLOGY
Bb - 213 : Molecular Biology
(Old & 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) ***Draw neat and labelled diagrams wherever necessary.***

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

a) Give Griffith's contribution.

b) Write two distinguishing features of DNA polymerase - I & III.

c) State mechanism of action in U.V.mutagenesis.

d) What is satellite DNA?

e) Give two distinguishing features of 70-s and 80-s ribosomes.

f) Give the experimental tools used by Hershey and Chase.

g) Give two examples of histone proteins.

h) Enlist the enzymes involved in replication of E.coli DNA.

i) Define gene and allele.

j) Give contribution of Nirenberg in deciphering of genetic code.

Q2) a) Describe with diagram and significance the Avesy and coworkers experiment. **[7]**

OR

Describe with diagram and functions the tRNA and its sites.

P.T.O.

b) What are basic rules of DNA replication? Describe theta mode of DNA replication. **[8]**

OR

Describe SOS repair mechanism and its significance.

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

a) Describe post translational modifications.

b) Give distinguishing features of protein synthesis in prokaryotes and eukaryotes.

c) Describe structure and functions of eukaryotic mRNA.

d) Explain with example supressor mutations.

e) What is genetic code? Explain wobble hypothesis.

Q4) a) Justify : substitution mutations are always leaky where as frameshift mutations are never leaky. **[7]**

OR

Comment on introns and exons and their significance.

b) Describe in brief transcription process in prokaryotes and eukaryotes. **[8]**

OR

Elaborate the structure and organization of chromosome.

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

a) Features of genetic code in mitochondria.

b) Meselson and stahl's experiment.

c) Universality of genetic code.

d) Photoreactivation and its significance.

e) Different form's of DNA.

☒☒☒☒

Total No. of Questions : 5]

SEAT No. :

P174

[Total No. of Pages : 2

[4319] - 104
S.Y. B.Sc.
BIOTECHNOLOGY
Bb - 213 : Metabolic Pathways
(Sem. - I) (2004 Pattern)

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

Instructions to the candidates :

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

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

a) Distinguish between cyclic and non-cyclic photophosphorylation.

b) Name the co-enzyme involved in one carbon metabolism.

c) What is gout?

d) Name the enzymes that convert saturated fatty acids to unsaturated.

e) Draw the structure of cytosine and thymine.

f) Illustrate β-carbon of fatty acid.

g) Calculate energy associated with a photon, having wavelength (λ) of 463×10^{-7}cm [Given : Plank's constant - 1.58×10^{-34} cal.s
Speed of light - 3×10^{10} cm/s
A. Number - 6.02×10^{23} photons/mole]

h) Write the reactions of alcohol fermentation.

i) Define : Aspartate, Malate shuttle.

j) What are futile cycles?

Q2) Draw the structures of the following (any three) : **[3 × 5 = 15]**

a) Mitochondria.

b) Binding change mechanism (BOYER'S).

c) Non - cyclic photophosphorylation.

d) Local and global regulation of phosphofructokinase (PFK).

P.T.O.

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

a) Gluconeogenesis.

b) β - oxidation.

c) Nitrogen fixation.

d) Deamination of aminoacids.

Q4) How is the excess nitrogen, not required by cells excreted by ureotelic organisms? **[15]**

OR

Explain in detail the purine biosynthesis pathway.

Q5) Write <u>any three</u> of the following : **[3 × 5 = 15]**

a) Zymogen activation of chymotrypsin.

b) Covalent modification of enzyme.

c) Glycolysis.

d) Cori-cycle.

☒☒☒☒

Total No. of Questions : 5]

SEAT No. :

P175

[Total No. of Pages : 2

[4319] - 105
S.Y.B.Sc. (Semester-I)
BIOTECHNOLOGY
Bb-214 : Fundamentals of Ecology and Environment
(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 a neat labeled diagram wherever necessary***
4) ***Use of color pencils restricted to diagrams.***

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

a) Bioremediation.

b) Smog

c) Habitat.

d) Niche

e) Thermal Pollution

f) Stratosphere

g) Homeostatic Imbalance

h) Cybernettics

i) Energy recovery

j) Waste handling.

Q2) Sketch the diagrammatic representation of any three of the following: **[15]**

a) Food chain.

b) Energy budget

c) Nitrogen cycle

d) Phosphorous cycle

P.T.O

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

a) Landfill Incineration.

b) Waste hierarchy

c) Biotransformation.

d) Polluter pays principle.

e) Eutophication.

Q4) Explain the term Biotransformation with the reference to **[15]**

a) Plastic

b) Aromatics and

c) Hazardous wastes

(or)

Write an assay on Ecological succession?

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

a) Nitrogen pollution from fertilizers continues to grow

b) Arsenic in drinking water.

c) Ocean acidification - Acid rains affecting oceans.

d) Humans are bigger CO_2 emitters than volcanoes.

Total No. of Questions : 5]

SEAT No. :

P176

[Total No. of Pages : 2

[4319] - 201
S.Y. B.Sc. (Semester - II)
BIOTECHNOLOGY
Bb - 221 : Environmental Biology and Biotechnology
(Old and New 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) ***Draw neat and labelled diagrams wherever necessary.***

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

a) What is the concept of Climax?

b) Explain in brief cybernetics.

c) Give two examples of chemical carcinogens.

d) Enlist two methods of waste disposal.

e) Give two factors contributing to eutrophication.

f) Enlist two chlorinated pesticides.

g) Define limiting factor.

h) What is energy budget?

i) Differentiate between stratosphere and hydrosphere.

j) Describe homeostasis.

Q2) a) What is an ecosystem? Describe with example the development and evolution of ecosystem. **[7]**

OR

What is an air pollution? Describe various air pollutants and methods to monitor and control of air pollution.

b) What are pesticides? Describe the threat posed by chemical pesticides to environmental health and possible control measures. **[8]**

P.T.O.

OR

What is waste disposal? Describe waste disposal by dilution and factors influencing it.

Q3) Answer the following in brief (Any Three): **[3 x 5 = 15]**

a) Trickling filters and their applications.

b) Symbiotic N_2–fixation in nature & its significance.

c) Ecological succession.

d) With example describe a bioremediation process.

e) Phosphorus cycle in nature & its significance.

Q4) a) What is water pollution? Describe method of detection of faecal pollution of water. **[7]**

OR

What is an acid rain? Explain its causes & control measures.

b) What is a case study? Describe a case study pertaining to environmental clearing. **[8]**

OR

What is hazardous waste? Describe in detail any two methods of its disposal.

Q5) Write in brief on (Any three): **[3 x 5 = 15]**

a) Global warming its effects and causes.

b) Biotransformation of plastics.

c) Explain the ecological importance of esturine ecosystem.

d) Comment on biological control of chemical environment.

e) Ecological efficiency.

Total No. of Questions : 6]

SEAT No. :

P177

[Total No. of Pages : 2

[4319] - 202
S.Y. B.Sc. (Semester - II)
BIOTECHNOLOGY
Bb - 222 : Plant and Animal Tissue Culture
(Old and New)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Answers to the sections must be written on separate answer books.***
3) ***Figures to the right indicate full marks.***
4) ***Draw neat labelled diagram wherever necessary.***

SECTION - I

Q1) Answer the following in 2-3 sentences: **[5 x 2 = 10]**

a) Distinguish between caulogenesis and rhizogenesis.

b) Somaclonal variations.

c) Give important contribution of Murashige and Skoog to PTC.

d) What is feeder layer technique?

e) Explain the term 'Cybrids'.

Q2) Answer the following (Any Three): **[3 x 5 = 15]**

a) Give an account of leaf culture. Add note on its significance.

b) What is cell synchronization? Explain various methods used to achieve it.

c) What is scaling up? Add note on different factors affecting sec. metabolite production under in-vitro conditions.

d) How triploid plants are produced using PTC technique? Add note on significance of it.

e) Explain in detail various steps involved in micropropagation.

P.T.O.

Q3) a) 'Justify' Agrobacterium mediated transformation is indirect method of DNA transfer. **[8]**

OR

Write in detail protocol for isolation of protoplast. Explain various methods used for protoplast fusion.

b) What is somatic embryogenesis? Explain in detail how they are produced. **[7]**

OR

Give in detail protocol for haploid production. Comment on different factors affecting it.

SECTION - II

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

a) What is the role of serum in subculturing?

b) Why CO_2 gas is supplied to animal cell cultures?

c) Define:

i) Primary cell cultures.

ii) Passaging number.

d) Describe immortalization.

e) What do you mean by confluent growth & contact inhibition?

Q5) Attempt any three of the following: **[3 x 5 = 15]**

a) What is cell bank? How cell lines are preserved in cell banks?

b) Explain disaggregation of tissue with reference to trypsinization.

c) Explain the concept of cell transformation.

d) Give the applications of animal tissue culture.

e) What is Karyotyping? How it helps to characterize a cell line.

Q6) a) What is cell line? Describe the types of cell lines with their characteristics in detail. **[7]**

OR

How do you establish and maintain mammalian cell line?

b) How insect cell line is established? Add a short note on its applications. **[8]**

OR

What is organ culture? Describe the types of organ culture with its applications.

Total No. of Questions : 5]

SEAT No. :

P178

[Total No. of Pages : 4

[4319] - 203
S.Y. B.Sc. (Semester - II)
BIOTECHNOLOGY
Bb - 223 : English
(Old & New Course)

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) Read the passage carefully and answer the questions given.

I do not for a moment wish to denigrate the tremendous achievements of science and technology over the last few centuries. We have made tremendous and dazzling progress in the twentieth century. The transformation of agricultural and industrial production; the breakthroughs in all branches of science, specially medicine and surgery, the communications revolution that has converted this world into a global village in our very lifetime, the astounding adventure into space through which man has landed on the moon and is reaching out to the planets even the stars beyond, all these represent a truly remarkable achievement of the human mind. However, as always against the brightest light there falls the darkest shadow.

With all its wealth and technology, two-third of the human race today lives below what can be considered a satisfactory standard of living, and one-third are infact below the poverty line. Even as we meet here, in this beautiful town of Assissi sacred to the memory of St. Francis who loved all beings, millions of children go to sleep hungry, their bodies stunted, their minds distorted by malnutrition and lack of medical facilities. Ten days' expenditure on armaments can abolish hunger on this planet. So, it is high time for all the nations to think seriously over the issue and make the lives of people better to survive. It's the United Nations to observe and make nations to plan for the future generations.

<u>Questions</u> :

i) Which are the tremendous achievements of science and technology? **[2]**

ii) What has converted the world into a global village? **[2]**

iii) What does the speaker say about the children? **[2]**

iv) What do the phrases 'the brightest light' and 'the darkest shadow' refer to? **[2]**

P.T.O.

b) Expand **any one** of the following ideas into fifteen sentences. **[8]**

i) Change is the rule of nature.

ii) Where there is will, there is a way.

Q2) a) Complete the table using noun forms, verb forms or adjective forms of the words given. **[6]**

Noun	Verb	Adjective
	answer	
destruction		
	apply	
		beautiful
disagreement		
	produce	

b) Provide one word for the following groups of words (any four) : **[4]**

i) Head of an academic institute at higher level.

ii) Blind faith or belief that particular events happen in a way that cannot be explained by science.

iii) A person who expects good to happen.

iv) Games that are played within four walls.

v) An unusual, exciting or dangerous experience, journey or series of events.

c) Use correct forms of verbs and complete the sentences (any four) : **[4]**

i) Today, we (be + live) in a time of great and continuing change.

ii) The police (arrest) the driver and sent him to the jail.

iii) Ishant is a brilliant student. He (have + be + read) reference books since morning.

iv) When the demonstrator came in, Ranjana (be + work) on her laptop.

v) Every college library (allow) students to take the books home.

d) Use articles *a*, *an*, *the* and complete the paragraph. **[2]**

One of ------- students is going to present ------- paper at the National Seminar held in Hyderabad. His paper is ------- interesting study of changing lifestyle of plants. I think ------- paper will be acclaimed by one and all.

Q3) a) Convert the following information in the form of a paragraph of about 15 sentences. **[8]**

Vitamins : Sources and Benefits

Vitamins	Sources	Benefits
A	Milk, Eggs, Butter Cream, Yellow fruits	Healthy growth of eyes and skin
B	Meat, Eggs, Fresh peas, Pulses, Groundnut	Improves digestion, increases appetite
C	Fruits, Vegetables, Pickles, Jam, Leafy vegetables, Amla	Healthy blood vessels, strong bones and teeth
D	Sunlight, Fish oil,	Strong and sturdy bones and sound teeth

b) Write a paragraph describing centralised process of admission to XIth science in Zenith College, Pune with the help of the following points.**[8]**

[Collect the form -- fill it by giving preferences of the colleges -- submit at the centre -- waiting list -- read allotment in the newspaper -- fill in the form of the college allotted -- attach documents -- consult a teacher for admissions -- do attestation from the authority -- pay the fees].

Q4) a) Write a précis of the following paragraph to its one third length. Suggest a suitable title. Provide the rough draft also. **[8]**

Discipline is necessary in every institution or organization. There should be discipline in the army, the navy, the scout camp, etc. Likewise there should be discipline at school.

A school has a number of disciples. They must behave well when they are in school. The word 'discipline' is derived from disciples. There are no rules and regulations about discipline at school. Students should behave in a decent manner. They should not play mischief in the school. They should be polite and should respect their elders.

Pupils in every class should observe discipline. When a teacher teaches a certain subject, they should not talk. No pupil should disturb the class by making any sound or gesture. None of them should laugh loudly. A pupil should not enter class after the period starts without taking permission of his teacher. In the same way, he should not leave the class without his teacher's permission. When pupils enter the school in the morning they should not come in crowds nor should they make noise. They should not loiter in the corridor or the lobby, but should go to their classes Likewise when the last bell rings they should not run out of their classes, should not make noise, should not make mischief and should not fight or quarrel for the sake of fun. (219)

b) Edit the following paragraph making corrections in spelling and punctuation. **[8]**

Kishori came late madhukar said when will you make arengements for the trip kishori replied eagrly where to go madhukar answered we had desided to go to mahableshwar but it seems you are not eager about it kishori retorted no I am quite intrested but what about Sagar and his frendz I don't know said madhukar.

OR

As a press reporter prepare a report of an accident that took place in a chemical plant in your town. **[8]**

Q5) a) As the Head of the Department of Microbiology of your college write a letter to a supplier placing order for the purchase of equipment necessary for college laboratory. **[8]**

b) Form one word each with the following prefixes and suffixes. **[8]**

Prefixes : pro-; extra-; counter-; auto-

Suffixes : -ous; -ify; -ful; -cide

Total No. of Questions : 5]

SEAT No. : ____

P179

[Total No. of Pages : 2

[4319] - 204
S.Y.B.Sc. (Semester - II)
BIOTECHNOLOGY
Bb - 224 : Metabolic Pathways
(Old & 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 color pencils restricted to diagrams.***

Q1) Attempt the following in 2 to 3 sentences. **[20]**

a) Distinguish between starch and glycogen.

b) What are fatty acids? How are they classified?

c) Enlist the enzymes participating in C_2 pathway.

d) Give significance of glyoxylate pathway.

e) Define deamination reaction.

f) How does cell synthesis glucose in absence of carbohydrate diet.

g) Write the definition of Gibb's free energy.

h) Draw the diagram of F_0-F_1 ATPase.

i) Why should the fatty acid be activated before catabolism?

j) Anabolism consumes energy justify the statement.

Q2) Draw the diagrams of (Any three). **[15]**

a) Mitochondria.

b) Electron transport chain.

c) Light reaction of photo synthesis.

d) Binding change mechanism of Boyer.

P.T.O.

Q3) Write only reactions of (Any three). **[15]**

a) Glycolysis.

b) Calvin cycle.

c) Urea cycle.

d) Transamination reaction.

Q4) Explain TCA cycle in details, add a note on its significance. **[15]**

OR

Describe β-oxidation of palmitic acid in detail, add a note on its energetics.

Q5) Write short notes on any three. **[15]**

a) Essential and nonessential aminoacids.

b) Enthalpy.

c) Exothermic reactions.

d) Glyconeogenesis.

e) Glycogen synthesis.

Total No. of Questions : 7]

SEAT No. : ____

P180

[Total No. of Pages : 2

[4319] - 301
T.Y.B.Sc. (Semester-III)
BIOTECHNOLOGY
Bb-331 : Microbial Biotechnology
(Old & New)

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

Instructions to the candidates:

1) ***Questions No. 1 & 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 marks.***

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

a) Mention any two contributions of Robert Koch in Medical Microbiology.

b) State the principle of completed test in coli form detection.

c) Enlist any two genes of trp operon with their function.

d) 'Chemolithotrophs play an important role in biogeochemical cycles'. Justify giving any one example.

e) Give the role of Agarobacterium rhizogenes in plant genetic engineering.

f) Write the principle of Ozonization in water treatment.

g) What is stormy fermentation?

h) What are added and developed preservatives ? Give one example of each.

i) What is selective toxicity?

j) Calculate the substrate consumed in a batch process if :

Yx/s = 0.5 and the biomass produced is 6g/lit.

P.T.O.

Q2) a) Explain the molecular adaptations of halophiles.

b) Explain catabolite repression in lac operon.

c) Compare and contrast oxygenic and anoxygenic photosynthesis. **[15]**

Q3) a) What are analogue resistant mutants? Explain their role in strain improvement with examples. **[8]**

b) Explain the significance of interrupted mating experiment in gene mapping. **[7]**

Q4) a) Explain the process of canning in detail. **[8]**

b) What are starter cultures? Explain their role in dairy. **[7]**

Q5) a) Explain with the help of a diagram the principle and working of Anaerobic digestor in waste water treatment. **[10]**

b) Explain Eijkman's test used in analysis of water. **[5]**

Q6) a) Explain cholera with respect to its causative agent, foods involved and mechanism of action. **[8]**

b) Enlist the protein synthesis inhibitor antibiotics with their mode of action. **[7]**

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

a) Continuous culture.

b) Phosphatase test.

c) Normal flora of skin and its importance.

Total No. of Questions : 7]

SEAT No. : ____

P183

[Total No. of Pages : 2

[4319] - 401
T.Y.B.Sc. (Semester-IV)
BIOTECHNOLOGY
Bb-341 : Large Scale Manufacturing Processes
(Old & New)

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) Give the importance of lab-scale studies in bioprocess.

b) What are non-fixed pore(depth) filters? Give their use.

c) What is a steam trap? Give its role.

d) Justify the importance of antifoaming agents with examples.

e) Give an equation that correlates K_L.a and OTR.

f) Enlist four substrates used in solid state fermentation.

g) What are in-line sensors? Give two examples.

h) What are SOPs? Write their importance.

i) Write principle of ion-exchange chromatography.

j) What is amortised cost?

Q2) a) Describe the large scale production and recovery of vitamin B12 with the help of a flow diagram. **[10]**

b) Draw a labelled diagram of Bubble column fermenter. **[5]**

P.T.O.

Q3) a) Describe encapsulation and adsorption methods for enzyme immobilization. Write their advantages and disadvantages **[7]**

b) Explain different methods to measure dissolved oxygen. Add a note on the regulation of dissolved oxygen in bioprocess. **[8]**

Q4) a) Describe solid and liquid shear methods for intracellular product recovery. **[8]**

b) Describe following Quality Control Tests : **[7]**

i) Pyrogen testing.

ii) AMES test.

Q5) a) Describe Plackett-burman design and write its advantage over conventional method of media optimization. **[8]**

b) Define biotransformation with one example. Write its advantages. **[7]**

Q6) a) What is single cell protein? Explain production of spirullina, with its advantages over other SCP's. **[8]**

b) Write a note on Fed-batch fermentation with respect to definition, establishment and applications. **[7]**

Q7) Write short note on (Any three) : **[15]**

a) Del factor.

b) Distillation.

c) Role of mass-balance in fermentation.

d) Scaling down process.

e) Types of Impellers.

Total No. of Questions : 8]

SEAT No. :

P184

[Total No. of Pages : 2

[4319] - 402

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

BIOTECHNOLOGY

Bb-342 : Biotechnology in Agriculture and Health

(2008 Pattern)

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

Instructions to the candidates:

1) ***Q.1 and Q.5 are compulsory.***
2) ***Attempt any two remaining from each section.***
3) ***Answer to each section should be written on separate answer books.***
4) ***Figures to the right indicate full marks.***
5) ***Draw neat and labelled diagrams wherever necessary.***

SECTION - I

(Agriculture)

Q1) Define or explain the following terms : **[10]**

a) Seed Bank.

b) RFLP.

c) Biotransformation.

d) Cybrids.

e) Ti-Plasmid.

Q2) a) Describe the green house technology w.r.t. Humidity, Temperature, Light and Irrigation facilities. **[8]**

b) What is metabolic engineering? Explain the large scale production of plant based drugs. **[7]**

Q3) a) Define IPR and Patenting. Explain Patenting with suitable examples. **[8]**

b) Give an account of the methodology of Agrobacterium mediated genetic transformation. **[7]**

P.T.O.

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

a) Applications of Micropropagation.

b) Cryopreservation.

c) Molecular markers.

d) Bt-cotton.

SECTION - II
(Health)

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

a) Define HAT medium. Explain the action of its key components.

b) 'Organ culture cannot be maintained for long term'. Justify.

c) Mention any four types of vaccines.

d) Define molecular markers. Give any two examples.

e) What is tissue engineering?

Q6) a) Explain in detail the advantages of serum free media over media with serum. **[8]**

b) "Human Genome Mapping" has potential to improve human health. Justify with examples. **[7]**

Q7) Enlist different types of biosensors and explain principle, functioning and application of any two in detail with diagram. **[15]**

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

a) Recombinant products in human health.

b) Applications of cell and organ culture.

c) Animal cell bioreactors.

Total No. of Questions : 7]

SEAT No. :

P185

[Total No. of Pages : 2

[4319] - 403
T.Y.B.Sc. (Semester-IV)
BIOTECHNOLOGY
Bb-343 : Recombinant DNA Technology
(2008 Pattern)

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

Instructions to the candidates:

1) ***Question No. 1 & 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) What are restriction endonuclease III ? Give examples.

b) Write the significance of the ratio of absorbance at 260:280nm in determining DNA purity.

c) Comment on the rate of chain termination if the ratio of ddNTP : dNTP is

i) 1 : 100 and

ii) 1 : 50

d) Define plasmid curing.

e) What does Cohen & Boyer's strategy imply?

f) Write the advantage of nylon membrane over nitrocellulose membrane in southern Blotting.

g) What is the difference between cDNA Library & genome library?

h) What is RT-PCR?

i) Comment on chemical-mediated transformation.

j) What is Humulin?

P.T.O.

Q2) Explain any one method of DNA sequencing along with its advantages and disadvantages. **[15]**

Q3) a) Elaborate any one method used for the construction of genomic library and enlist various vectors used in the construction. **[10]**

b) Write a note on DNA finger printing. **[5]**

Q4) a) Explain any two methods used for screening of recombinants. **[10]**

b) Comment on strategy applied in site directed mutagenesis. **[5]**

Q5) Explain

a) Analytical gel electrophoresis. **[5]**

b) Ti Plasmid as a vector. **[5]**

c) Hazards and ethical issues associated with recombinant organisms. **[5]**

Q6) Digramatically represent & explain the process of cloning a foreign gene into a plasmid cloning vector. **[15]**

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

a) Northern Blotting.

b) Purification of nucleic acid based on density.

c) Restriction mapping.

Total No. of Questions : 7]

SEAT No. :

P222

[Total No. of Pages : 2

[4319]-32

T.Y. B.Sc. (Semester - III)

BIOTECHNOLOGY

Bb-332: Recombinant DNA Technology

(2004 Pattern)

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 in 2-4 lines. **[20]**

a) State the role of ligase enzyme in molecular cloning.

b) What are M13 vectors? Give any two properties of these vectors.

c) What is the role of chloroform and absolute alcohol in DNA extraction.

d) Enlist any four major discoveries in genetic engineering.

e) What are type II restriction enzymes?

f) Write any two applications of genetic engineering.

g) Mention use of X-gal and IPTG for selection of recombinants.

h) What are λ replacement vectors?

i) Write the applications of northern blotting.

j) Explain transformation frequency and transformation efficiency.

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

Q3) a) Explain the method of cDNA library synthesis. **[7]**

b) Explain the extraction and purification methods for DNA. **[8]**

Q4) a) Describe the technique of southern blotting. **[10]**

b) Describe different methods used for transformation. **[5]**

P.T.O.

Q5) Write short notes : **[15]**

a) Shuttle vectors.

b) Homopolymer tailing and adaptors.

c) Guidelines in RDT.

Q6) a) Explain the factors affecting PCR efficiency. **[8]**

b) Describe α complementation. **[7]**

Q7) a) Explain any one method of plasmid purification and role of plasmids as vectors. **[10]**

b) Compare & contrast polymerases. **[5]**

Total No. of Questions : 8]

SEAT No. :

P223

[Total No. of Pages : 2

[4319] - 42
T.Y. B.Sc. (Sem. - IV)
BIOTECHNOLOGY
Bb - 342 : Applications of Biotechnology in Agriculture and Health
(2004 Pattern)

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

Instructions to the candidates :

1) ***Answers to each section should be written in separate answer books.***
2) ***Q. 1 and Q. 5 is compulsory.***
3) ***From remaining questions attempt any two from each section.***

SECTION - I
(Agriculture)

Q1) Define or explain the terms : **[10]**

a) QTL.

b) Cryopreservation.

c) Haploids.

d) IPR.

e) Biotransformation.

Q2) a) Describe the green house technology w.r.t. temperature, humidity, light and irrigation facilities. **[8]**

b) Give an account of the process for the production of plant based drugs. **[7]**

Q3) a) What are molecular markers? Explain any two different molecular markers used in crop improvement. **[8]**

b) Describe any two methods of gene transfer in plants. **[7]**

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

a) Molecular Farming.

b) Stages of Micropropagation.

c) Patenting with examples.

d) GM Crops.

P.T.O.

SECTION - II

(Health)

Q5) Define / Explain the following : **[10]**

a) Subunit vaccine.

b) Micromanipulation.

c) Serum free media.

d) Animal cell cloning.

e) Tissue engineering.

Q6) a) Explain the use of RFLP in diagnostics. **[7]**

b) Describe the applications and limitations of PCR as a diagnostic tool. **[8]**

Q7) a) Describe in brief the tools used in epidemeological study of diseases. **[8]**

b) Diagrammatically explain the working and principle of any one biosensor. **[7]**

Q8) a) Explain the role of recombinant products in human health with examples. **[7]**

b) Explain in brief the technique of monoclonal antibody production. **[8]**

Total No. of Questions : 8]

SEAT No. :

P224

[Total No. of Pages : 2

[4319]-43

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

BIOTECHNOLOGY

Bb-343: Animal and Plant Development

(2004 Pattern)

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

Instructions to the candidates :

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

SECTION - I

(Plant Development)

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

a) Microsporogenesis.

b) Protoderm.

c) Phytohormones.

d) Cell lineage in plants.

e) Homeotic genes.

Q2) a) What are transgenic plants? Explain any two techniques in detail. **[8]**

b) Give an account on short patterning with suitable diagram. **[7]**

Q3) a) Give a detailed account on Meristem development. **[8]**

b) Explain different stages of somatic embryogenesis with suitable diagram. **[7]**

Q4) Write short notes on (Any 3) : **[15]**

a) Differentiation and Redifferentiation.

b) Apoptosis in plant cells.

c) Plasticity.

d) Floral patterning.

P.T.O.

SECTION - II

(Animal Development)

Q5) Explain : **[5 × 2 = 10]**

a) Spermiogenesis.

b) Cell repository.

c) Telo lecithal eggs.

d) Hyper activation.

e) Morphogenetic movement.

Q6) a) Explain in detail the process of egg metabolic activation. **[8]**

b) With the help of a flow chart explain the process of oogenesis. **[7]**

Q7) a) Define embryonic induction. Explain with an appropriate example. **[7]**

b) What is Cleavage? Describe various patterns of cleavage and the factors influencing the cleavage patterns. **[8]**

Q8) Write short note on (any three) : **[3 × 5 = 15]**

a) Cloning in mammals.

b) Blastulation.

c) Progenite cells and cell lineage.

d) Fertilization.

Total No. of Questions : 5]

SEAT No. :

P295

[Total No. of Pages : 2

[4319] - 205
S.Y. B.Sc. (Semester - II)
BIOTECHNOLOGY
Bb - 213 : Molecular Biology
(2004 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 labelled diagrams wherever necessary.***
4) ***Use of color pensils restricted to diagrams.***

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

a) How protein disulphide isomerase helps in post translation modification?

b) Eukaryotic transcription requires 3 RNA polymerases, why?

c) Give the names and the role of inhibitors of replication.

d) Distinguish between translation and transversion mutation.

e) What is meant by 'nuclear localization sequence'?

f) Define okazaki fragments.

g) Write four salient features of polytene chromosome.

h) What is the role of pribnow box?

i) Differentiate between polycistron and polyribosome.

j) Enlist the names of transcription factors of prokaryotic system.

Q2) Give reasons for the following (any five) : **[5 × 3 = 15]**

a) Ty elements in yeast and copia elements in Drosophila are reterotransposons.

b) Repressor protein binds to operator.

P.T.O.

c) Silencers and enhancers act as transcription factor.

d) Topoisomerases play important role in DNA replication.

e) Nucleosomes contain octameric histone protein core.

f) 98% of genome does not participate in expression.

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

a) Type I and type II topoisomerases.

b) Mutagens and carcinogens.

c) Codons are recognized by more than one anticodons.

d) Chaperone proteins and protein disulphide isomerase.

e) Antitermination.

Q4) a) Explain the functions of cAMP and catabolite activator protein (CAP) in modulating the expression of lac operon. **[8]**

OR

How mutation can be corrected by employing -

i) Excission repair.
ii) Mismatch repair.

b) List the major components that must be present in an invitro system for the synthesis of E.coli protein from a mixture of aminoacids. **[7]**

OR

Illustrate the mutations caused by -

i) Alkylating agents.
ii) Acridine dyes.

Q5) a) Describe how the GTP-GDP cycle of EFTu controls its affinity for its reaction partners.

b) Why does 70s ribosomes split into 50s and 30s and not 50s and 20s?

c) Describe how puromycin was used to define the A and P site of ribosome. **[15]**