Total No. of Questions : 7]

SEAT No. :

P302

[Total No. of Pages : 2

[4119] - 401

T.Y. B.Sc.

BIOTECHNOLOGY

Bb - 341 : Large Scale Manufacturing Processes

(2008 Pattern) (Sem. - IV) (64014)

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

Instructions to the candidates:-

1) ***Q1 and Q7 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) Write any two examples of biomass based products with their use.

b) What is Del factor? Give the importance of Delfactor in sterilization.

c) What is biotransformation? Give any one example of a product obtained by biotransformation.

d) Enlist the chemical methods used for cell disruption.

e) Name different types of temperature sensors used in fermenters.

f) What is depreciation? What is the effect of depreciation on fermentation economics?

g) 'The time and temperature regime used in media sterilization affects the nutrient quality of media'. Justify.

h) Give the mode of action of antifoam agents.

i) What is the importance of partition coefficient in solvent extraction?

j) What is GILSP?

Q2) a) Describe the large scale production of penicillin with the help of a flow diagram. **[10]**

b) What is cross flow filtration? What are its advantages over conventional filtration? **[5]**

P.T.O

Q3) a) Describe covalent bonding as a method of immobilization. **[7]**

b) Explain different methods of measurement of inlet and exit gases during fermentation. **[8]**

Q4) a) Explain giving example how Ion-exchange chromatography can be used for recovery of an antibiotic. **[8]**

b) Diagrammatically represent the layout of a computer controlled fermenter. **[7]**

Q5) a) What is solid state fermentation? Describe solid state fermentation in terms of: **[7]**

- Substrates used
- Products formed and
- Advantages and disadvantages.

b) Explain the theory and types of filters used for sterilization. **[8]**

Q6) a) Explain different types of carbon and Nitrogen sources used in fermentation media. **[10]**

b) In a certain fermentation broth, saturation oxygen level was found to be 0.018 m moles.dm^{-3}, and the concentration of dissolved was 0.004 m moles.dm^{-3}. If the volumetric mass transfer coefficient is 58.2 h^{-1}, Calculate the oxygen uptake rate of the fermentation broth. **[5]**

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

a) LAL test.

b) Scale up.

c) Packed bed reactor.

d) Factors affecting fermentation economics.

e) Energy balance and its role in media design.

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Total No. of Questions : 8]

SEAT No. :

P303

[Total No. of Pages : 2

[4119] - 402

T.Y. B.Sc.

BIOTECHNOLOGY

Bb - 342 : Biotechnology in Agriculture and Health

(2008 Pattern) (Sem. - IV) (64024)

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 on right indicate full marks.***
5) ***Draw neat and labelled diagram, if necessary.***

SECTION - I

(Agriculture)

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

a) Haploids

b) QTL.

c) Co-integrat vector.

d) Cryopreservation.

e) Transgenic plants.

Q2) a) Define IPR. Explain in details the process of patent and characteristics of patent. **[8]**

b) Enlist methodologies of gene transfer in crop plants. Explain any two of them. **[7]**

Q3) a) Explain the construction of green house with respect to irrigation facility and soil-structure. **[8]**

b) What is metabolic engineering? Explain it with suitable examples. **[7]**

P.T.O.

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

a) Stages of Micropropagation.

b) Risk assessment of GM product.

c) Cauliflower Mosaic Virus (CaMV) as vector.

d) AFLP and its application.

SECTION - II

(Health)

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

a) Mention any 2 applications of animal organ culture.

b) Enlist five potential applications for tissue engineering.

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

d) Enlist any four types of Biosensors.

e) What are retroviruses.

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

b) Write the objectives of Human Genome Project. Add a note on ethics related to human genome project. **[7]**

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

b) Write down the different types of vaccines. Describe common agents for active & passive immunization. **[7]**

Q8) Write short notes (any three): **[15]**

a) Working principle of Biosensor.

b) Micromanipulation.

c) Scale up of adherant culture

d) Cell cloning.

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Total No. of Questions : 7]

SEAT No. :

P331

[Total No. of Pages : 2

[4119] - 32
T.Y. B.Sc.
BIOTECHNOLOGY
Bb - 332 : Recombinant DNA Technology
(2004 Pattern) (Sem. - III) (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 in 2-3 lines: **[20]**

a) What are cosmid vectors? Write their significance.

b) DEPC treated water is used for washing glasswares in RNA lab, justify.

c) Enlist the names of any four antibiotics along with their mode of action.

d) Why tris saturated phenol is used in DNA purification?

e) State the significance of insertional inactivation.

f) Write the salient features of PBR-322.

g) What are six cutlers and eight cutlers?

h) Define :-

i) Neoschizomers ii) Isoschizomers.

i) Illustrate the reaction catalyzed by DNA pol I.

j) Write the role of Ethidium bromide used in agarose gels.

Q2) Explain in detail southern hybridization. **[15]**

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

a) BAP, CIAP and SAP.

b) RFLP.

c) Blue write screening.

P.T.O

Q4) a) Explain DNA sequencing by 'Chain termination method'. **[8]**

b) Explain the steps involved in PCR. **[7]**

Q5) a) Describe the techniques used in screening the recombinants. **[8]**

b) Discuss the flow chart of Northern blotting. **[7]**

Q6) Attempt any three: **[15]**

a) Directional cloning.

b) DNA ligase.

c) DNA pol I

d) PUC - 19

Q7) a) Explain the role of DMS, Hydrazine in the Maxam Gilberts DNA sequencing method. **[7]**

b) Describe the method employed in site directed mutagenesis in detail. **[8]**

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Total No. of Questions : 7]

SEAT No. :

P332

[Total No. of Pages : 2

[4119] - 33

T.Y. B.Sc.

BIOTECHNOLOGY

Bb - 333 : Biodiversity and Systematics

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

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

Instructions to the candidates:-

1) ***Q.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 proto-cooperation and commenealism.

b) What is 'Red data book'?

c) Define Valnerable species.

d) State major phytogeographical zones of India.

e) What is Altruism?

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

g) Operational control is the altimate control of behaviour. Why?

h) Define mutualism with example.

i) State Gause's principle of population exclusion.

j) What is Tm? Give its significance in taxonomy.

Q2) a) Define a community. Elaborate on qualitative and Quantitative characters of a community. **[8]**

b) Give an account of phytogeography of India. **[7]**

Q3) a) Explain the attributes of population dispersion. **[8]**

b) Elaborate on the concept of 'Bioprospecting' with one example. **[7]**

P.T.O

Q4) a) Give an account of the wildlife (Conservation) Act. 1972. **[8]**

b) Explain in detail conservation strategies for endangered organisms. **[7]**

Q5) a) Explain the significance of chemotaxonomy in classification of bacteria. **[8]**

b) Describe the developmental stages in behaviour of organisms. **[7]**

Q6) Write notes on (any three): **[3 × 5 = 15]**

a) Carrying capacity.

b) Ecolone and Edge effect.

c) Agonism.

d) Cytotaxonomy.

Q7) a) Explain niche and its types. **[5]**

b) Give Merits and Demerits of five kingdom classification system. **[5]**

c) Write down classification of Homo Sapien. **[5]**

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Total No. of Questions : 8]

SEAT No. :

P333

[Total No. of Pages : 2

[4119] - 42

T.Y. B.Sc.

BIOTECHNOLOGY

Bb - 342 : Applications of Biotechnology in Agricultural and Health (2004 Pattern) (Sem. - IV) (34024)

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.1and Q.5 is compulsory.***
3) ***From remaining questions attempt any two from each section.***

SECTION - I

(Agriculture)

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

a) Patent.

b) Cryopreservation.

c) Barcoding.

d) Binary vector.

e) Microsatellite markers.

Q2) a) What is green house? Compare & contrast fully automated and semi automated green house. **[8]**

b) What is plant transformation? Explain Agrobacterium tumefaciens mediated gene transfer. **[7]**

Q3) a) What are molecular markers? Explain different classes of molecular markers add a note on it's implications in plant breeding. **[8]**

b) What is molecular farming? Write in detail the success story of any one edible vaccine. **[7]**

P.T.O.

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

a) Application of transgenic plants.

b) Golden Rice.

c) Protected cultivation.

d) Particle Bombardment.

e) QTL.

SECTION - II

(Health)

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

a) Enlist applications of animal cell culture.

b) What is tissue engineering?

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

d) Enlist any four types of biosensors.

e) What are the risk of applications of stem cell research.

Q6) a) What is hybridoma? Explain the steps involved in production of hybridoma clone. **[8]**

b) Describe in brief the tools used in epidemeological studies of diseases. **[7]**

Q7) a) What are molecular markers? Explain their role in diagnostics. **[8]**

b) Describe the technique of application of animal cell cloning. **[7]**

Q8) Write short notes (any three): **[15]**

a) Recombinant vaccines.

b) Shuttle vectors.

c) Distinguish between serum containing medium and serum free medium.

d) Role of biosensors in diagnostics.

e) Scale up of suspension culture.

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Total No. of Questions : 8]

SEAT No. :

P334

[Total No. of Pages : 2

[4119] - 43
T.Y. B.Sc.
BIOTECHNOLOGY
Bb - 343 : Animal and Plant Development
(2004 Pattern) (Sem. - IV) (34044)

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 from each section is 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) De differentiation.

b) Phyllotaxy.

c) ABA.

d) Plasticity.

e) Quiascent centre.

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

b) What is floral patterning? Explain homeotic genes involved in Arabidopsis floral patterning. **[7]**

Q3) a) Elaborate organogenesis & embryogenesis techniques of plant tissue culture with suitable examples. **[8]**

b) Illustrate microsporogenesis & megasporogenesis in Angiosperms. **[7]**

P.T.O

Q4) a) Enlist methods to transfer DNA into plants? Explain advantages & disadvantages of direct DNA uptake. **[8]**

b) What is fertilization? Explain double fertilization in plants. **[7]**

SECTION - II

(Animal Development)

Q5) Explain the terms: **[10]**

a) Stem cells.

b) Polyspermy

c) Superficial cleavage.

d) Spermeogenesis.

e) Competence.

Q6) a) Describe the process of spermatogenesis and add a note on its significance. **[7]**

b) Describe the cleavage pattern on the basis of quantity and distribution of Yolk. **[8]**

Q7) a) Describe process of gastrulation in frog and add a note on fate of 3 germinal layers. **[7]**

b) What is transgenic technology? Explain with suitable examples. **[8]**

Q8) a) What is apoptosis? Describe the role of Apoptosis in limb development. **[7]**

b) Describe in detail the process of pattern formation in animals. **[8]**

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Total No. of Questions : 5]

SEAT No. :

P280

[Total No. of Pages : 3

[4119] - 1

F.Y. B.Sc.

BIOTECHNOLOGY

Bb - 101 : Fundamentals of Chemistry

(44010) (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) ***Figures to the right indicate full marks.***
4) ***Use of logarithmic table and calculator is allowed.***

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

a) The kinetic energy of N_2 at 25°C is 7.482 KJ. Calculate the number of moles of gas [R = 8.314 JK^{-1} $mole^{-1}$].

b) How will you determine the rate constant of 1st order reaction graphically?

c) Vapour pressure of 0.1M NaCl solution is less than vapour pressure of 0.1M glucose solution. Explain.

d) Why four phases are not equillibrium simultaneously in sulphur system?

e) At 20°C the velocity of migration of silver ion is 5.77 x 10^{-4} cm/sec and that of nitrate ion is 6.33 x 10^{-4} cm/sec. Calculate the transport numbers of silver and nitrate ions.

f) Distinguish between reversible and irreversible cell.

g) Explain the representation of an organic molecule using Newman projection formula.

h) Explain the formation of ionic bond with suitable example.

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

a) What are different types of molecular velocities? How they are related to each other?

b) Derive an expression for rate constant of second order reaction with equal initial concentration of reactants.

P.T.O

c) Derive thermodynamically $\Pi = CRT$.

d) State and explain reduced phase rule with suitable example.

e) State the principle of solubility product. How is the solubility of a salt is affected by the presence of a common ion?

f) Explain the formation of sigma (σ) and Pi (π) bonds with suitable examples.

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

a) Draw vapour pressure - temperature curve for solvent and solution, prove that elevation of boiling point of solution is a colligative property.

b) Explain the effect of hydrogen bonding on following properties

i) Physical state.

ii) Melting and boiling points.

c) What is single electrode potential? Derive Nernst equation for the following reaction. $aA + bB \rightleftharpoons cC + dD$.

d) A first order reaction has a rate constant of 1.5×10^{-4} sec^{-1}. How long will 5 gms of this reactant take to reduce to 3 gms.

e) An aqueous solution of a substance containing 8.5 gms in 100 ml boils at 101.97 ^{o}C under 760 mm pressure. What is its molecular weight? [Given Kb = 0.51 for 1000g].

f) Discuss salient features of lead-silver system.

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

a) What is conformational isomerism? Explain the conformations of n-butane with the help of energy profile diagram.

b) What is geometrical isomerism? Explain the following physical properties of geometrical isomers :

i) Dipole moment.

ii) Melting point.

c) Explain the following types of organic reactions :

i) Elimination reactions.

ii) Oxidation and reduction reactions.

d) The resistance of a decinormal solution of an electrolyte was found to be 250 Ohms. Calculate the specific and equivalent conductance of the solution if the electrodes in the cell are 2.0 cm apart and have area 4.0 cm^2.

e) Balance the following equation by oxidation number method.

$S + HNO_3 \rightarrow SO_2 + NO_2 + H_2O$

f) Calculate ΔH and ΔS for the following reaction at 25°C

$Zn_{(s)} + Cu^{++} \rightleftharpoons Zn^{++} + Cu_{(s)}$, the emf of cell at 25°C is 1.10 Volts and $\left[\frac{dE}{dT}\right] = 2.1 \times 10^{-4}$ Volts.deg^{-1}. [Given : F = 96500 C].

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

a) What are different types of electrodes? Explain any two electrodes with reference to

i) Representation.

ii) Electrode reaction.

iii) Nernst equation.

b) What are chemical cells? Explain the chemical cell without transference with the help of following cell.

i) $Pt, H_2(g, p) \mid HCl_{(a)} \mid AgCl_{(s)}, Ag_{(s)}$ (⊖ left, ⊕ right)

ii) $Zn_{(s)} \mid ZnSO_4{}_{(a)} \mid Hg_2SO_{4(s)}, Hg_{(l)}, Pt$ (⊖ left, ⊕ right)

c) State and explain Faraday's first and second law of electrolysis.

Total No. of Questions : 5]

SEAT No. :

P281

[Total No. of Pages : 3

[4119] - 2

F.Y. B.Sc. (Biotechnology)

PHYSICS

Bb - 102 : Fundamentals of Physics

(44020) (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) Why Kelvin is called as thermodynamic temperature scale?

b) State Newton's law of viscosity.

c) Define angle of contact.

d) State Brewster's law.

e) Give relationship between Celcius & Fahrenhiet scale.

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

g) Explain Fresnel 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 <u>any four</u> : **[16]**

a) Define standard units for current and temperature.

b) Show that the relationship between Young's modulus, bulk modulus and Poisson's ratio is $Y = 3K(1 - 2\sigma)$.

P.T.O

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.

d) Three capilaries of same length but internal radii 3r, 4r and 5r are connected in series and a liquid flows through them in streamline condition. If the pressure across the third capilary is 8.1 mm, deduce the pressure across the first capilary.

e) Explain the vapour compression refrigeration cycle.

f) Define coefficient of performance. Find the coefficient of performance of a reversible engine working between the temperature rang $27^{o}C$ and $52^{o}C$.

Q3) Attempt <u>any four</u> : **[16]**

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

b) Consider a soap film on a rectangular frame of wire of area 4×4 cm^2. The area of the soap film is increased to 4×5 cm^2, find the work done in the process. The surface tension of the soap film is 3×10^{-2} N/m.

c) Define beat. Give applications of beat.

d) Calculate the change in entropy when 8 gm of ice at $0^{o}C$ is converted into water at the same temperature. The latent heat of ice is 80 cal/gm.

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

f) Define life sciences. Explain the role of physics in life sciences.

Q4) Attempt <u>any two</u> : **[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 only odd hormonics are obtained in organ pipe closed at one end and open at the other end.

The length of an organ pipe open at one end is 0.6 m. If the velocity of sound in air is 330 m/s, then what will be the fundamental frequency of the pipe?

c) Define surface tension. Discuss with examples the effect of temperature, contamination and solute on surface tension of liquid.

Describe at least four practical applications of Capillary action.

Q5) a) Describe a Carnot's engine and show that its efficiency is a function of temperature.

b) Distinguish between paramagnetic, diamagnetic and ferromagnetic materials on the basis of susceptibility and permeability. Also discuss practical applications of these materials. **[16]**

OR

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

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

b) Explain the following in brief :

i) Principle of laser.

ii) Basic requirements for laser action.

iii) Conditions for laser action.

iv) Pumping process in laser device.

Total No. of Questions : 8]

SEAT No. : ____

P282

[Total No. of Pages : 2

[4119] - 3

F.Y. B.Sc.

BIOTECHNOLOGY

Bb - 103 : Basic Biosciences

(44040) (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) ***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) Define Secretary tissues.
b) Enlist different types of thallus found in algae.
c) Define plant growth regulators.
d) Explain recemose inflorence.
e) Give examples of root modification which perform function of support?
f) Explain Drupe type of fruit.
g) What is rhizome?
h) Give two unique characters of plant cells.

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

a) Meristematic tissue.
b) Application of auxin in plant growth.
c) Key characters of fungi.
d) Androecium.

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

a) Define phytochrome. Give concept and role of phytochrome.
b) Describe different types of seed germination and factors affecting it.
c) Describe primary structure of monocol leaf.

P.T.O

Q4) Define Metabolism. Enlist different major pathways. Explain any one of them. **[10]**

OR

Describe the life cycle of Gymnosperm with neat diagram & suitable examples.

SECTION - II
(Zoology)

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

a) Give two respiratory organs in Vertebrates.
b) Define endoparasite.
c) Give two characters of phyllum Arthropoda.
d) What is Bee Venom?
e) Explain structural host specificity.
f) Give uses of silk.
g) Define Ammonotelism.
h) Give any two examples of phyllum protozoa.

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

a) Digestive system of phyllum Annelida.
b) Schistosoma.
c) Brinjal fruit Borer.
d) Vermi culture.

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

a) Explain importance of animal classification in our life with examples.
b) What is host parasite relationship? Explain any two types of it.
c) Describe cultivation of mulberry.

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

Describe asexual & sexual cycle of Plasmodium with suitable example.

OR

Describe in detail different types of Mariculture.

Total No. of Questions : 7]

SEAT No. :

P283

[Total No. of Pages : 4

[4119] - 4

F.Y.B.Sc.

BIOTECHNOLOGY

Bb - 104 : Mathematics and Statistical Methods for Biologists

(44050) (2008 Pattern)

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

Instructions to the candidates:-

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

SECTION - I

(Mathematics)

Q1) Attempt each of the following: **[4 x 2 = 8]**

a) If $A=\begin{bmatrix}1 & 2 & 1\\ 2 & 1 & 0\end{bmatrix}$ and $B=\begin{bmatrix}1 & 2\\ 2 & 1\\ 0 & 1\end{bmatrix}$ then find $(AB)^{-1}$ if it exists.

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

c) Determine whether the vectors (–1, –1, –1), (–1, –1, 0) and (–1, 0, 0) in R^3 are linearly dependent.

d) If $z = x.\tan(xy)$ then find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$.

Q2) Attempt <u>any four</u> of the following : **[4 x 4 = 16]**

a) Find the rank of a matrix $A=\begin{bmatrix}1 & 0 & 0 & 0\\ 0 & 1 & 1 & 1\\ 0 & 2 & 5 & -2\\ 0 & 1 & 7 & -7\end{bmatrix}$.

P.T.O

b) Show that the sequence $\sqrt{3}, \sqrt{3\sqrt{3}}, \sqrt{3\sqrt{3\sqrt{3}}}, \ldots\ldots$ is convergent.

c) Find five 5th roots of –1.

d) If $u = \frac{x}{y} + \frac{y}{z} + \frac{z}{x}$ then prove that $xu_x + yu_y + z.u_z = 0$.

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

f) Solve the following system of linear equations.

$x - y + z = 0$

$x + 2y - z = 0$

$2x + y + 3z = 0$

Q3) Attempt <u>any two</u> of the following : **[2 x 8 = 16]**

a) Verify Cayley-Hamilton theorem for the matrix $A = \begin{bmatrix} 2 & -1 & 0 \\ 1 & 4 & -3 \\ 5 & -2 & 6 \end{bmatrix}$.

b) Solve the following differential equation $\frac{dy}{dx} = \frac{x^2 + y^2}{x^2 + xy}$.

c) If $z = \log\left(\frac{x^3 + y^3}{x^2 + y^2}\right)$ then prove that $xz_x + yz_y = 1$.

d) Test the convergence of the series $1 + \frac{1}{2^2} + \frac{2^2}{3^3} + \frac{3^3}{4^4} + \frac{4^4}{5^5} + \ldots\ldots$

SECTION - II

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

a) The rainfall (in mm) at a particular place on 10 random days in August 2010 was recorded as follows :
25.9, 26.2, 20.7, 20.7, 22.8, 20.7, 24.1, 21.9, 23.4, 28.0.
Determine mode of the data.

b) Define coefficient of variation.

c) State the properties of mean.

d) Define partial correlation coefficient.

e) Define independence of two events.

Q5) Attempt any four : **[4 x $2\frac{1}{2}$ = 10]**

a) A sample of 90 leaves was collected from a garden and the length was measured. It gave the following frequency table :

Length	15 - 18	18 - 21	21 - 24	24 - 27	27 - 30
No. of leaves	5	20	25	13	7

Calculate the median length of the leaves.

b) If 10% of a consignment of eggs are bad, what is the probability that half a dozen eggs chosen at random contain at least one bad egg?

c) In a square meter area the average number of worms per square centimeter is 2. What is the probability of finding less than 2 worms in a randomly selected square centimeter area?

d) Variables x_1 and x_2 are uncorrelated; the coefficient of correlation between x_1 and x_3 is 0.64 and that between x_2 and x_3 is 0.59. Calculate $R_{1.23}$.

e) State the formulae for combined mean and combined variance of the two groups of observations.

Q6) Attempt any two : **[2 x 5 = 10]**

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

b) Define normal distribution. State its properties.

c) Find the coefficient of correlation for the data given below :

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

Q7) Attempt any one : **[1 x 10 = 10]**

a) The following table gives the ages and blood pressures of 10 women.

Age (X)	56	42	36	47	49	42	60	72	63	55
B.P. (Y)	147	125	118	128	145	140	155	160	149	150

i) Find the correlation coefficient between X and Y.

ii) Determine the two linear regression equations.

iii) Estimate B.P. of a woman whose age is 45 years.

b) i) Find quartile deviation of the following frequency distribution :

Daily wages	Below 50	50 - 70	70 - 90	90 - 110	Above 110
No. of workers	14	62	69	18	7

ii) Among 64 offsprings of a certain cross between pigs 34 were red, 10 were black and 20 were white. According to genetic model these numbers must be in the ratio 9 : 3 : 4. Are the data consistent with the model at 5% l.o.s?

Total No. of Questions : 5]

SEAT No. :

P284

[Total No. of Pages : 2

[4119] - 5

F.Y. B.Sc.

BIOTECHNOLOGY

Bb - 105 : Fundamentals of Biological Chemistry

(44060) (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) Define pH and pK.

b) What are coenzymes? Give examples.

c) How do amphipathic lipids behave in water?

d) Name two aromatic amino acids.

e) What is the significance of peptide bond.

f) List out the biomolecules that form cell membrane.

g) Write the structure of Lactose and Sucrose.

h) What is salting in and salting out of proteins?

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

a) Differentiate between anomers and epimers.

b) List out the features of peptide bond.

c) Write note on active site of enzymes.

d) What is the principle involved in electrophoresis?

e) Give the reaction of aminoacids with Sanger's and Dansyl chloride reagent with significance.

P.T.O

Q3) Answer <u>any four</u> of the following : **[16]**

a) What are lipoproteins? Give their significance.

b) Differentiate between saponification number and acid number.

c) Give the reaction mechanism of nucleophilic substitution reaction.

d) Write note on dialysis technique.

e) What are reducing and non reducing sugars? Give examples.

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

a) Classify Aminoacids based on 'R' group.

b) Explain Watson and Crick model of DNA.

c) Discuss the steps involved in desalting of proteins by gel filtration.

Q5) Attempt <u>any two</u> of the following : **[16]**

a) Discuss the concept of polymerisation to form macromolecules in cell.

b) Explain active and passive transport across membranes in a cell.

c) Describe the mechanism of competitive and non competitive enzyme inhibition.

Total No. of Questions : 5]

SEAT No. :

P285

[Total No. of Pages : 2

[4119] - 6

F.Y. B.Sc.

BIOTECHNOLOGY

Bb - 106 : Biophysics and Instrumentation

(44070) (2008 Pattern)

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

Instructions to the candidates:-

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

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

a) What are quantum number? Give physical interpretation of various quantum number required to define the electronic configuration of atoms.

b) State application of Radiowave and Microwaves.

c) State application of fluorescence spectroscopy & state types of it.

d) Give medicinal uses of radioisotopes.

e) Discuss hazardous effects of radioactivity.

f) Define

i) Entropy ii) Enthalpy

g) Explain how energy conversion is possible in mitochondria and chloroplast.

h) Define pH and pOH. Give its relation.

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

a) Calculate the K.E and P.E of an electron in the first orbit of hydrogen atom. Given $e = 1.6 \times 10^{-19}$C and $r = 0.53 \times 10^{-10}$ m.

b) Explain transverse nature of electromagnetic wave.

P.T.O

c) i) Define half-life.

ii) The half life of radon is 3.8 days. After how many days will only $\frac{1}{20}$ of a radon sample be left over?

d) Discuss electromagnetic wave spectrum in brief.

e) Give an expression for calculation of decay constant and hence derive an expression of half life period.

f) State and explain Nernst equation.

Q3) Answer <u>any four</u> of the following : **[16]**

a) Write short node on ERG.

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

c) Explain construction and working of Bain bridge mass spectrometer.

d) State advantages and disadvantages of platinum resistance thermometers.

e) Explain Electron microscope with neat labelled diagram.

f) Explain the method to calculation Gibbs free energy change from

i) Equilibrium constant.

ii) From standard reaction potential.

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

a) Discuss scanning electron microscope in brief.

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

c) Explain rotational spectra of non rigid molecule.

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

b) Explain principle, construction and working of centrifuge machine. **[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. **[8]**

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

i) Origin of Bioelectricity.

ii) Sodium and Potassium Transport.

Total No. of Questions : 5]

SEAT No. :

P286

[Total No. of Pages : 2

[4119] - 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 diagram wherever necessary.***
3) ***Figures to the right indicate full marks.***

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

a) State the role of oil in preservation of Bacteria.

b) State two distinguishing characters of Fungi.

c) What is meant by synthetic medium?

d) State the composition of Nutrient broth.

e) Define Prokaryotes and give suitable example.

f) State Beer's law.

g) State the names of two spore-forming Bacteria.

h) State the names of two Mesophilic Bacteria.

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

a) State the principle and uses of Autoclave.

b) On analyzing a river water sample the following data was obtained. Calculate the TVC of the water.

i) Volume plated 0.1 ml.

ii) Dilution plated 10^5.

iii) Number of colonies obtained 71.

P.T.O

c) Describe in short the phases of bacterial growth.

d) What is meant by selective medium? Give suitable example.

e) State the uses of Freeze drying as a method of preservation of Bacteria.

f) Classify Bacteria depending upon their optimum temperature required for growth.

Q3) Attempt <u>any four</u> : **[16]**

a) Describe in brief the formation of Biofilm.

b) State the principle involved in Gram staining.

c) Describe in brief the working of a colorimeter.

d) With the help of a suitable example describe parasitism.

e) Justify the importance of Bergey's Manual in Microbiology.

f) State in brief the functions of Bacterial cell-membrane.

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

a) Describe a method to obtain a pure culture of Bacteria.

b) Describe Acid-Fast staining and give suitable example.

c) Describe colony characters of Bacteria.

Q5) Attempt <u>any one</u> : **[16]**

a) Explain in detail the lytic cycle of Bacteriophage.

b) Describe the different characteristics of Bacteria used for their classification.

Total No. of Questions : 5]

SEAT No. : ____

P287

[Total No. of Pages : 2

[4119] - 8

F.Y. B.Sc.

BIOTECHNOLOGY

Bb - 108 : Use of Computers

(44090) (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 diagrams wherever necessary.***

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

a) What is WAN?

b) Define relationship set.

c) State advantages of star topology.

d) Define bioinformatics.

e) What do you mean by www.?

f) Define the terms

i) RAM ii) Software

g) What is multimedia?

h) Define protocol.

Q2) Attempt <u>any four</u> of the following : **[4 x 4 = 16]**

a) Compare multimedia and biological databases.

b) What is hashing? Describe static and dynamic hash function.

c) Explain Yahoo search engine in detail.

d) How to derive tables from E.R. diagram? Explain with example.

e) Describe the following data models :

i) Hierarchical ii) Relational

P.T.O

Q3) Attempt <u>any four</u> of the following : **[4 x 4 = 16]**

a) Write note on mainframe computer.

b) How DBMS is better than flat files?

c) Write note on biological data.

d) Describe evolution of computers in detail.

e) Draw flowchart to find GID of two numbers.

Q4) Attempt <u>any two</u> of the following : **[2 x 8 = 16]**

a) Write note on excel worksheet and explain steps to prepare pie graph.

b) Explain different types of attributes required for E.R. diagram.

c) Explain the features of windows O.S.

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

a) Write an algorithm and draw flowchart to find reverse of given number.

OR

Write note on MEDLINE.

b) Write note on Hashing.

OR

Explain the characteristics of algorithm with example.

Total No. of Questions : 5]

SEAT No. : ____

P288

[Total No. of Pages : 2

[4119] - 101

S.Y. B.Sc.

BIOTECHNOLOGY

Bb - 211 : Genetics & Immunology

(Sem. - I) (54011) (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 labelled diagrams wherever necessary.***

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

a) Define Cistron.

b) Differentiate between Monohybrid and dihybrid cross.

c) What is co-dominance?

d) Give the different types of mutations.

e) What is the difference between F^+ and Hfr^+ strains?

f) Define

i) Isotype and ii) Idiotype

g) Define MHC molecule.

h) What do you mean by killed Vaccine.

i) Give full form of BCG.

j) Differentiate between variable and constant region of autibody.

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

a) What are frame shift mutations? Explain insertion and deletion of bases with their effects.

b) What is the concept of dominance? Explain with examples.

c) What is operon? Describe in detail the mechanism of gene-regulation in trytophan operon.

P.T.O.

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

a) Define vaccine. Enlist its type along with example of each.

b) Differentiate between active and passive immunity.

c) Write a note on different subsets of T-cells and their functions.

d) Discuss in brief different barriers of innate immunity.

e) Draw the diagram of I_gD and write its significance.

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

a) What are plasmids? Describe various properties of plasmid.

b) What is generalized transduction? Explain with example.

c) Justify: Mutations caused by 5-bromourasyl are always leaky whereas mutations caused by acridive dyes are never leaky.

d) What is competence state? Explain the changes occur when cells acquire competence in transformation process.

e) What are chromosomal aberrations? Explain with example.

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

a) Classify immunoglobulins on the basis of their fine structure.

b) What is complement system? Describe in detail the two major pathways of complement system.

c) Differentiate between Monoclonal and polyclonal antibodies. Write in brief the hybridoma technology.

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Total No. of Questions : 5]

SEAT No. :

P289

[Total No. of Pages : 2

[4119] - 102

S.Y. B.Sc.

BIOTECHNOLOGY

Bb - 212 - Cell Biology

(Sem. - I) (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 the following questions, as directed: **[20]**

1) List 2 functions of the vacuole in plant cells:

   Questions 2 - 6. Escherichia coli cells are about 2 μm (microns) long and 0.8 m in diameter.

2) How many E.coli cells laid end to end would fit across the diameter of a pin head? (Assume a pinhead diameter of 0.5mm.)
3) What is the volume of an E.coli cell? (Assume it is a cylinder, with the volume of a cylinder given by V = r^2h, where = 3.14)
4) What is the surface area of an E. coli cell? What is the surface to-volume ratio of an E.coli cell?
5) Glucose, a major energy-yielding nutrient, is present in bacterial cells at a concentration of about 1 mM. How many glucose molecules are contained in a typical E.coli cell? (Recall that Avogadro's number 6.023×10^{23}.)
6) An E.coli cell contains about 15,000 ribosomes, which carry out protein synthesis. Assuming ribosomes are spherical and have a diameter of 20 nm (nanometers), what fraction of the E.coli cell volume is occupied by ribosomes?
7) Bacteria contain granules that represent storage form of polymerized metabolites like sugars these are

   A) Starch. B) Glycogen.

   C) Acemannan. D) - Hydroxybutyric acid.

P.T.O.

8) _____ is vesicle 0.2-0.5 m in diameter, bounded by a single membrane. They contain hydrolytic enzymes such as protease, if set free, could degrade essential cell constituents. They are of cellular components formed by budding from the Golgi apparatus.

A) Peroxisomes. B) Lysosomes.
C) Glyoxysomes. D) Microsomes.

9) Which of the following requires energy?

A) Diffusion B) Osmosis
C) Active transport D) Facilitated diffusion

10) What is tonoplast?

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

a) Golgi complex.
b) Nuclear pore complex.
c) Anaphase in Mitosis.
d) Receptor Tyrosine Kinase (RTKase) signaling cascade.

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

a) Desmosomes.
b) G protein cascade.
c) Microtome.
d) Cell synchronization.

μ

Q4) Explain, how the functional aspects of mitochondria and chloroplast are similar, yet their structural aspects differ? **[15]**

OR

a) What does gelsolin do to actin filament? How does the cell control gelsolin activity and for what purpose? **[8]**
b) How is the structure of intermediate filament subunits related to the function of the assembled filament? **[7]**

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

a) Even single cells can have sex.
b) Animal cells produce their own external environments and glues.
c) Cells die from aggravated assault or an internal program.
d) Brown fat mitochondria contain an uncoupler of oxidative phosphorylation.

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Total No. of Questions : 5]

SEAT No. :

P290

[Total No. of Pages : 3

[4119] - 103

S.Y. B.Sc.

BIOTECHNOLOGY

Bb - 213 - Molecular Biology

(Sem. - I) (2008 Pattern) (54041)

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]**

a) Which of the following statements is correct, according to Chargaff's rules?

i) All DNA molecules contain the same proportions of A, C, G and T.
ii) Single - stranded RNA molecules contain the same amount of A and U.
iii) In double-stranded DNA, the amount of T equals the amount of C.
iv) In double-stranded DNA, the amount of G equals the amount of C.

b) Approximately what proportion of the human genome is made up of repetitive DNA sequences?

i) 1% ii) 15%
iii) 50% iv) 90%

c) In which of the following would you find telomeres?

i) Human mitochondrial DNA
ii) Human chromosomes.
iii) Bacterial chromosomes.
iv) The influenza virus genome.

d) Which of the following is the name of the human genetic disorder resulting from defects in nucleotide excision repair?

i) Hereditary nonpolyposis colorectal cancer (HNPCC).
ii) Xeroderma pigmentosum (XP).
iii) Lynch syndrome.
iv) Diabetes.

P.T.O

e) Which of the following reactions is required for proofreading (i.e. correcting replication errors) during DNA replication by DNA polymerase III?

i) 3' -5' exonuclease activity.

ii) 5' - 3' exonuclease activity.

iii) 3' - 5' endonuclease activity.

iv) 5' - 3' endonuclease activity.

f) Which of the following does the abbreviation TBP stand for?

i) TATA - box binding protein.

ii) Transcription associated factor.

iii) Transcription factor binding protein.

iv) TATA box polymerase.

g) In bacterial promoters, which of the following describes the 'Pribnow box'?

i) The 5' untranslated region.

ii) The - 10 box

iii) The - 35 box

iv) The termination sequence.

h) The deadly 'death cap' mushroom, Amanita palloides, produces a toxin called α-amanitin. Which cellular process is inhibited by this toxin?

i) DNA synthesis. ii) Cell division.

iii) RNA synthesis. iv) RNA splicing

i) Which of the following proteins involved in peptide initiation and chain elongation is a GTPase switch?

i) Only EF - Tu ii) Only EF - G

iii) Both EF-Tu and EF-G iv) Initiation factor 2

j) Which of the following enzymes involved in ribosomal protein synthesis is a ribozyme i.e. a catalytic RNA molecule?

i) Amino acyl t-RNA synthase.

ii) Peptidyl transferase.

iii) Releasing factors 1 and 2.

iv) Ribosome recycling factor.

Q2) Draw neat labelled diagrams of the following [Any Three]: **[15]**

a) t-RNA.

b) Hershy and Chase experiment.

c) Bacterial origin of replication.

d) Initiation complex of RNA pol III.

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

a) Properties of genetic code.

b) 70s Ribosome.

c) Base analogs.

d) Excision repair.

Q4) Explain in detail the prokaryotic translation; add a note on post translational events. **[15]**

OR

Describe in detail, the post transcriptional events taking place in the eukaryotic cells.

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

a) DNA polymerase has 5' - 3' polymerase and 5' - 3' exonuclease activity.

b) DNA pol III has high processivity.

c) DNA polymerase I participate in excision of primers from leading and lagging strands of newly replicated DNA.

d) DNA polymerase III has proofreading property.

☛ ☛ ☛

Total No. of Questions : 5]

SEAT No. : ____

P291

[Total No. of Pages : 2

[4119] - 104

S.Y. B.Sc.

BIOTECHNOLOGY

Bb - 213 - Metabolic Pathways

(Sem. - I) (2004 Pattern) (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 neat labelled diagrams wherever necessary.***
4) ***Use of color pencils restricted to diagrams.***

Q1) Attempt the following in 2-3 sentences **[8 × 2 = 16]**

a) Define Amphibolic reactions.

b) Distinguish between exergonic and endergonic reactions.

c) What do you understand by metabolism?

d) Name the coenzyme participating in acetyl carrier and acyl transfer.

e) Enlist enzymes taking part in C_4 pathway.

f) Why ATP is reffered to as energy currency of cell?

g) How many ATP molecules are generated, when glucose is converted to lactate?

h) What are essential and non essential fatty acids?

Q2) Write short notes on (<u>any four</u>) **[4 × 4 = 16]**

a) Transketolases.

b) Enthalpy.

c) Non competitive inhibition.

d) Feedback inhibition.

e) Line weaver Burk plot.

P.T.O

Q3) Derive MM equation and add a note on calculation of Km. **[16]**

OR

Explain the light harvesting light energy transduction to chemical energy and C_3 pathway for fixing carbon.

Q4) a) Discuss β-oxidation in details. **[8]**

b) Describe pyrimidine syntheses in detail. **[8]**

OR

a) Discuss gluconeogenesis, add a note on its regulation. **[8]**

b) Describe urea cycle in detail. **[8]**

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

a) Glycogenolysis.

b) Enzyme classification.

c) Glycolysis.

d) Transmination.

☛ ☛ ☛

Total No. of Questions : 5]

SEAT No. : ____

P292

[Total No. of Pages : 2

[4119] - 105

S.Y. B.Sc.

BIOTECHNOLOGY

Bb - 214 - Fundamentals of Ecology and Environment

(Theory) (Sem. - I) (2004 Pattern) (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 neat and labelled diagrams wherever necessary.***

Q1) Answer the following in brief: **[10 × 2 = 20]**

a) What is stratosphere?

b) Define autotrophs.

c) Define xerosere.

d) Define ecological niche.

e) What is artificial ecosystem?

f) What is microbial ecology?

g) What is Food - web?

h) What is Cybernettics?

i) Define ecological pyramid.

j) Explain the natural resources.

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

a) Explain carbon cycle with suitable examples.

b) Explain Green house effect.

c) What is Homeostasis? Explain different controls operating in an ecosystem.

d) Comment on indicator & detecting system of pollution.

P.T.O

Q3) a) Explain the lotic and lentic ecosystem in freshwater. **[8]**

OR

Explain Shelford's law of tolerance in an ecosystem. **[8]**

b) What is Marine ecology? Describe marine habitats with reference to their characteristic features. **[7]**

Q4) a) Explain biological control of chemical environment. **[8]**

OR

Describe the sources of water pollution. Add a note on Entrophication. **[8]**

b) Explain the principles pertaining to limiting factors with a suitable example. **[7]**

Q5) a) What is Biremediation? Give its types. Explain how it can be used for environmental clean up. **[8]**

b) Explain in detail the environmental pollution caused by pesticides. **[7]**

OR

a) Explain the term food spoilage. Illustrate with milk and bread spoilage. Which measure should be taken to prevent food spoilage. **[8]**

b) Write a note on biochemical methods for detection of pollution. **[7]**

Total No. of Questions : 5]

SEAT No. :

P293

[Total No. of Pages : 2

[4119] - 201

S.Y. B.Sc.

BIOTECHNOLOGY

Bb - 221 : Environmental Biology and 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 the following in brief: **[20]**

a) What are food chain?

b) What is a imperfect cycle?

c) Explain the concept of climax.

d) Comment on heterotrophic succession.

e) What are biosensors? Give an appropriate example.

f) What are the causes of water pollution?

g) What is homeostasis?

h) Explain trophic level of an ecosystem.

i) Explain stratosphere.

j) What is green house effect?

Q2) Answer the following - any three: **[15]**

a) Explain forest biome with adaptation.

b) What is the significance of phosphate solubilisation in biosphere?

c) What is radiation pollution? Explain the causes of this pollution.

d) Explain in brief about oxidation pond.

P.T.O

Q3) Write short notes on any three. **[15]**

a) Types of succession.

b) Climax concept and theories.

c) Ecological efficiency.

d) Biotransformation of plastics.

e) Methods for detection of water pollution.

Q4) Attempt any two: **[15]**

a) Write notes on industrial pollution.

b) Explain energy budget with example.

c) Write methods for disposal of municipal waste.

Q5) What are natural resources? Discuss conservation strategies of natural resources. **[15]**

OR

Explain phytoremediation with example. Add notes on its advantages and limitations.

Total No. of Questions : 6]

SEAT No. : ____

P294

[Total No. of Pages : 2

[4119] - 202

S.Y. B.Sc.

BIOTECHNOLOGY

Bb - 222 : Plant & Animal Tissue Culture

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

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

Instructions to the candidates:-

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

SECTION - I

Q1) Attempt any four of the following: **[4 × 2 = 8]**

a) Distinguish between Heteroploid and heterokaryon.

b) Define synchronization.

c) State the applications of leaf culture.

d) Enlist the advantages of artificial seeds.

e) What is virus indexing?

Q2) a) What is somatic hybridization? Discuss the methods to achieve it. **[8]**

b) Describe applications and limitations of somaclonal variations. **[8]**

Q3) Write self explainatory notes on (any four) **[4 × 4 = 16]**

a) Shoot tip (apex) culture.

b) Indirect organogenesis.

c) Plant growth regulators.

d) Electroporation.

e) Etiolated growth.

P.T.O

SECTION - II

Q4) Attempt the following four questions. **[4 × 2 = 8]**

a) Distinguish between a cell line and cell strain.

b) Define colony forming efficiency.

c) State the significance of feeder layer.

d) What is serum free media?

e) How will the mycoplasma infection detected in cell culture?

Q5) a) How do you initiate and maintain lymphocyte culture? **[8]**

b) Describe steps involved in fibroblast culture add a note on precautions to be taken during the procedure. **[8]**

Q6) Write self explainatory notes on any four: **[4 × 4 = 16]**

a) Population doubing time.

b) Subculturing.

c) Crypopreservation.

d) Karyotyping.

e) Enzymatic tissue disaggregation.

Total No. of Questions : 5]

SEAT No. :

P295

[Total No. of Pages : 4

[4119] - 203

S.Y. B.Sc.

BIOTECHNOLOGY

Bb - 223 : English

(Sem. - II) (Old & New) (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) Read the passage carefully and answer the questions given.

The great advantage of early rising is the good start it gives 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 the mind is fresh, and there are few sounds or other distractions so that work done at that 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 at 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 time, he has 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.

Questions:

i) What is the passage about? **[2]**

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

iii) Why an early riser gets to sleep before others? **[2]**

iv) What is the effect of early rising on our health and spirits? **[2]**

P.T.O

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

i) United we stand, divided we fall.

ii) Honesty is the best policy.

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

Noun	**Verb**	**Adjective**
		manageable
presentation		
	generate	
contradiction		
		integrative
	evaluate	

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

i) One who is able to speak two languages.

ii) Something that cannot be seen.

iii) A room or hall with equipment for physical exercise.

iv) A small printed advertisement that is given to people by hand.

v) A person living in a country of which he is not a citizen.

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

i) My grandmother was (narrate) an interesting story at that time.

ii) The student (have + be) solving the problem for an hour now.

iii) Yesterday, the attendant (take out) the samples from the incubator for the practical examination.

iv) The researcher (sit) in the laboratory for a long time everyday reading references for the experiments.

v) We (be + play) while she was watching television.

d) Use articles a, an, the wherever necessary. **[2]**

City life is interesting but in a city ____ man seldom knows his neighbour. This strangeness does not grow in ____ man ____ feeling of sympathy and affection for others. _____ affectionate fellow is socially well off and has many relations.

Q3) a) Convert the following information in the form of a tree diagram. **[8]**

The total working staff of 'Sumeet Industries, Pvt. Ltd., Pune' is 600 of which one sixth i.e. 104 are women. The class I officers are 2% i.e. 12. The class II officers are 10% of which 35 are supervisors and 25 are technicians. The remaining are class III employees. Majority of the employees are permanent and their number is 476. The remaining workers are temporary. As far as age is concerned, half of the employees are middle aged, i.e. between 31 and 45 years. The number of younger employees i.e. between the age 25 and 30 years and the older ones i.e. those above 45 is approximately the same. They are 146 and 154 respectively.

b) Write a paragraph of about 14 to 16 sentences discussing the procedure for Apical Meristem culture. **[8]**

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

The Boy Scout Movement was planned and organised by General Baden Powell. He wanted to do something that would make school boys dutiful, disciplined, and useful to society. He organised them in military fashion. He gave them a uniform and rigorous training. He made them take a vow to observe a set of rules faithfully. He took them in their holidays to camps and made them put up tents, make fire, cook their food, and mend their clothes - in a word to depend upon themselves for all their personal needs. He also taught them how to put on a fire, how to render first aid in case of accidents, how to carry out messages and do other useful works. The Boy Scout is meant to be friend of all. He must learn to obey his leader and to take the lead himself if necessary. He must be courageous and kind. He must do his duties without question or argument. In this way the Scout, after spending two to three years in the Movement becomes an ideal citizen. Today, the movement has come a long way and continues successfully with Girl Scout Movement in majorities of the nations. India has a long tradition of the Movement and has largest number of members in the world making youngsters ideal citizens of the world. (221).

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

vikrant what are you doing ive been waitting for half an hour now

waiter im sory sir ill serv you tea in a few minites

vikrant but i cant wait any more i have to go to the stetion

waiter yes sir here it is thank you sir for coming

vikrant here is the bil

OR

c) Write a report of the study tour to a Biotech Park that your department organised recently. **[8]**

Q5) a) Write a letter of application for the post of a Junior Researcher to be sent to Jayraj Biotech Pvt. Ltd, Mumbai 33. Attach your bio-data. **[8]**

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

Prefixes: sub- ; re- ; extra- ; anti-

Suffixes: -ness; -ist; -cide; -al

Total No. of Questions : 5]

SEAT No. :

P296

[Total No. of Pages : 2

[4119] - 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) Answer the following questions in 2-3 sentences **[8 × 2 = 16]**

a) Write the reaction catalyzed by phosphorylase.

b) Distinguish between TPP and Biotin.

c) Constrast between NAD^+ and FAD^+.

d) Enlist the enzymes participating in C_4 pathway.

e) Define feedback inhibition.

f) What is metabolism, catabolism, anabolism and amphibolic pathways?

g) Name the step, in which oxidation takes place in glycolysis.

h) Mention the steps in which glucose loses it's 6 carbons when it is metabolised to CO_2.

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

a) G protein cascade.

b) Glycogen.

c) Bacterial electron transport chain.

d) Lollypop experiment of calvin.

e) Boyer's binding change mechanism.

P.T.O

Q3) Write only reactions of the following (any four) **[4 × 4 = 16]**

a) SGPT SGOT reaction.

b) Malate aspartate shuttle.

c) Carnitine translocating fatty acids.

d) C_3 pathway.

e) Transaldolase & transketolase reaction.

Q4) a) Explain in detail the Z-scheme of photosynthesis. **[8]**

b) Describe purine synthesis & regulation. **[8]**

OR

Explain HMP pathway in detail. **[16]**

Q5) Discuss the breakdown of glucose to pyruvate in detail, add a note on its regulation and energetics. **[16]**

OR

a) Explain β oxidation of fatty acids. **[8]**

b) Role of multienzyme complex in metabolism. **[8]**

Total No. of Questions : 5]

SEAT No. : ____

P297

[Total No. of Pages : 2

[4119] - 205

S.Y. B.Sc.

BIOTECHNOLOGY

Bb - 213 : Molecular Biology

(Sem. - II) (2004 Pattern) (24062)

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 pencil restricted to diagrams.***
4) ***Draw neat labelled diagrams wherever necessary.***

Q1) Attempt the following in 2-3 sentences **[8 × 2 = 16]**

a) What are hot spots?

b) Enlist any two physical and chemical mutagens.

c) Define - Introns and exons.

d) How purines differ from pyrimidines.

e) Why is the nascent polypeptide glycosylated?

f) Distinguish between monocistron & polycistron.

g) Draw the structure of mitotic chromosome.

h) State any four postulates of genetic code.

Q2) Write short notes on (any four) **[4 × 4 = 16]**

a) Ribosomes.

b) Euchromatin.

c) Inhibitors of translation.

d) Antitermination.

e) Attenuation.

P.T.O

Q3) Draw the diagrams of following (any four) **[4 × 4 = 16]**

a) t-RNA.

b) Initiation complex of protein synthesis.

c) Leading and lagging strand of DNA replication.

d) RNA polymerase.

e) SOS Repair.

Q4) a) Explain mutations caused by Base analogs & alkylating agents. **[8]**

b) Discuss Mismatch repair and exassion repair in detail. **[8]**

OR

Describe in detail the DNA replication, as taking place in E.coli. **[16]**

Q5) Explain post transcriptional modifications in detail. **[16]**

OR

Explain post translational modifications in detail. **[16]**

☛ ☛ ☛

Total No. of Questions : 6]

SEAT No. :

P298

[Total No. of Pages : 2

[4119] - 206

S.Y. B.Sc.

BIOTECHNOLOGY

Plant & 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 on the right indicate full marks.***
4) ***Draw a neat labelled diagram wherever necessary.***
5) ***Use of colour pencils restricted to diagrams.***

SECTION - I

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

a) Explain totipotency of plant cells.

b) Write two applications of leaf culture.

c) Type I Callus and Type II Callus.

d) Differentiate between embryo and embryoid.

Q2) a) Define secondary metabolites. Explain in detail the biotransformation for production of Secondary Metabolites. **[8]**

b) Describe in detail various methods of protoplast fusion. **[8]**

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

a) Habituation of cultures.

b) Significance of Somaclonal variations.

c) Artificial seeds and their significance.

d) Limitations of micropropagation.

P.T.O

SECTION - II

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

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

b) Enlist advantages of suspension culture over adherant culture.

c) Cryopreservation.

d) What is holding medium.

Q5) a) Define organ culture and describe various methods of organ culture. **[8]**

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

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

a) Chemically defined media & its significance.

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

c) What is feeder layer? Add a note on its importance.

d) Immortal cell lines.

Total No. of Questions : 7]

SEAT No. :

P299

[Total No. of Pages : 2

[4119] - 301

T.Y.B.Sc.

BIOTECHNOLOGY

Bb - 331: Microbial Biotechnology

(Common to Old & New Course) (Sem. - III) (64013)

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

Instructions to the candidates:

1) ***Question 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) Define Canning.

b) Justify 'use of agrobacterium tumefacience in agriculture'.

c) State the role of BOD reduction in effluent treatment process.

d) Enlist any two factors affecting human normal flora.

e) What is commercial significance of lactic acid fermentation.

f) Define biomass yield coefficient.

g) What is sweet curdling?

h) What is second generation penicillin? Give examples.

i) Diagrammatically represent typical growth curve.

j) Write any two bacterial diseases affecting respiratory system with it's causative agents.

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

a) Molecular adaptation in thermophiles.

b) Significance of Etner - Duodroff (ED) pathway.

c) 'Microbes have pathway other than phototrophy and heterotrophy' explain.

P.T.O.

Q3) a) What is the role of cell permeability mutants in glutamic acid production. **[8]**

b) Describe regulation of arabinose operon with suitable diagram. **[7]**

Q4) a) Explain botulism with respect to symptoms and foods involved. **[7]**

b) Comment on time temperature relationship with respect to Pasteurization. Add note on confirmation of efficiency of pasteurization. **[8]**

Q5) a) Explain effluent treatment plant with principles. **[10]**

b) Justify, 'coliform detection is important for water treatment'. **[5]**

Q6) a) Explain drug resistance phenomenon and mode of treatment against tuberculosis. **[8]**

b) Which are cell wall inhibitor antibiotics? Explain characters of ideal chemotherapeutic agent. **[7]**

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

a) Chemostat.

b) Genetically modified organisms (GMO) in medicine.

c) Most probable number (MPN) test.

Total No. of Questions : 8]

SEAT No. :

P300

[Total No. of Pages : 2

[4119] - 302
T.Y. B.Sc.
BIOTECHNOLOGY
Bb - 332 : Animal and Plant Development
(2008 Pattern) (Sem. - III) (64023)

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 from each section is compulsory. From remaining questions attempt any two from each section.***

SECTION - I
(Animal Development)

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

a) Teratogenesis.

b) Morphogen.

c) Fertilization envelop.

d) Zygotic genes.

e) Stem cell plasticity.

Q2) a) Explain in details the process of chick development upto formation of three germ layers. **[8]**

b) Write a note on genetic basis of antibody diversity. **[7]**

Q3) a) Explain terms dedifferentiation, transdifferentiation & describe the process of regeneration of limbs. **[8]**

b) Comment on importance of monospermy & describe the mechanisms to prevent polyspermy. **[7]**

Q4) a) Explain in details the process of oogenesis and with the neat & labelled diagrams, explain the structure of male & female gametes. **[7]**

b) Write short notes on: **[8]**

i) Nieuwkoop's centre.

ii) Ageing.

P.T.O.

SECTION - II
(Plant Development)

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

a) Juvenile phase.
b) Clonal Analysis.
c) Suspensor.
d) STM gene.
e) Double fertilization.

Q6) a) Compare the developmental processes of plants and animals. **[8]**

b) Describe in detail the ABC model of floral patterning. **[7]**

Q7) a) With the help of neatly labelled diagrams explain embryogenic development in monocotyledons. **[8]**

b) Enlist the various plant hormones and discuss the role of any two in detail in plant development. **[7]**

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

a) Programmed cell death in plants.
b) Somatic embryogenesis.
c) Developmental plasticity in plants.

Total No. of Questions : 7]

SEAT No. :

P301

[Total No. of Pages : 2

[4119] - 303

T.Y.B.Sc.

BIOTECHNOLOGY

Bb - 333: Biodiversity and Systematics

(2008 Pattern) (Sem. - III) (64033)

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. **[10 x 2 = 20]**

a) Define Altruism with example.

b) Enlist the methods of homing of organisms.

c) What are 'Ecological Equivalents'?

d) Why 16s rRNA is used as a classification tool?

e) Operational control is the ultimate control of behaviour. Why?

f) State conditions in which ex-situ conservation is preferred over in situ conservation.

g) Physiological natality is always greater than realised natality. Why?

h) Define: Clade.

i) Enlist sampling methods of biodiversity.

j) Give Reason : 'Cyanobacteria were earlier classified in Kingdom plantae but now grouped in Kingdom Monera'.

Q2) a) Explain the IUCN categories of organisms. Add a note on the 'Biodiversity hotspots'. **[8]**

b) Give a account of Growth forms with appropriate examples. **[7]**

Q3) a) Elaborate on the keys used for five kingdom classification with examples. **[8]**

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

P.T.O.

Q4) a) Explain the stages of development of behaviour. **[8]**

b) Justify : Competition increases the diversity of the ecosystem. **[7]**

Q5) a) What is a species diversity index? Enlist Biodiversity indices. Add a note on its applications. **[8]**

b) Explain the reasons for population fluctuation in an ecosystem. **[7]**

Q6) a) Give an account of molecular taxonomy. **[7]**

b) Elaborate on Bioprospecting of Bacterial Product with example. **[8]**

Q7) Write notes on (any 3): **[3 x 5 = 15]**

a) Niche and its types.

b) Social behaviour.

c) Present day human problems whose solutions involve biogeographic considerations.

d) FISH.

Total No. of Questions : 7]

SEAT No. :

P304

[Total No. of Pages : 2

[4119] - 403

T.Y.B.Sc.

BIOTECHNOLOGY

Bb - 343 : Recombinant DNA Technology

(Sem. - IV) (64044) (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) State role of polynucleotide kinase in molecular cloning.

b) Sample analyzed spectrophotometrically. gave ratio of A_{260}/A_{280} 0.5, interpret the results.

c) Mention the role of chloroform, isoamyl alcohol and phenol in nucleic acid purification.

d) Enlist applications of M-13 bacterophage in genetic engineering.

e) Specify the role of X - gal and IPTG in selection of recombinants.

f) Define - High capacity vectors.

g) Distinguish between southern, northern and western blotting.

h) Write the structure of dideoxynucleotide.

i) What do you understand by biotinylated probe?

j) Enlist four major break through discoveries in recombinant DNA technology.

Q2) Write an assay on PCR. Covering following points. **[15]**

a) PCR Cocktail.

b) Designing of primers.

c) PCR reaction.

d) Assessment of PCR products.

P.T.O.

Q3) a) Explain in detail, the strategy used in construction of cDNA library. **[10]**

b) Distinguish between insertional and replacement λ vectors. **[5]**

Q4) a) Describe α complementation in details. **[10]**

b) Discuss the role, the cofactor used and reaction catalyzed by DNA ligases. **[5]**

Q5) a) Explain in details the plasmids, their properties and their role as vectors. **[8]**

b) Describe chromosome walking. **[7]**

Q6) Attempt the following in 5-6 sentences. **[15]**

a) Applications of genetic engineering.

b) Guidelines for release of engineered life.

c) DNA fingerprinting.

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

a) DNA polymerases.

b) Steps in RNA purification.

c) Chemical cleavage method of DNA sequencing.