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F.Y.B.Sc.

BIOTECHNOLOGY

Bb-101: Fundamentals of Chemistry

(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

1)   *Neat diagrams must be drawn wherever necessary.*

2)   *Figures to the right indicate full marks.*

3)   *All questions carry equal marks.*

4)   *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed*

5)   *All questions are compulsory.*

Q1) Answer the following.   **[8×2=16]**

a)   Explain with examples the types of isomerism exhibited by Aldehydes.

b)   Define root mean square and most probable velocity.

c)   Define polymorphism and give different types of allotropy.

d)   The solubility of $CaCO_3$ is 0.0305g/litre of the solution. Calculate the solubility product of $CaCO_3$. [Molecular weight of $CaCO_3$ = 100].

e)   State the standard. EMF (E°) of the given cell reaction. $Zn + Cu^{2+} \rightleftharpoons Zn^{2+} + Cu$

f)   Distinguish between order and molecularity.

g)   State and Explain common ion effect.

h)   Define and explain optical isomerism.

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

    a) What is lowering of vapour pressure? Explain relative lowering of vapour pressure of solvent with help of Raoult's law.

    b) What is first order reaction? Derive the rate constant for first order reaction.

    c) Define and Explain the formation of ionic and co-ordinate bond with suitable examples.

    d) Draw the different conformations of propane and comment on stability and energy with help of energy profile diagram.

    e) Explain the Boyle's and charle's law and deduce these laws from kinetic gas equation.

    f) State and explain briefly the. Markowni Koff's rule and Anti - Markowni Koff's rule.

Q3) Answer the following (any four). [4×4=16]

    a) Difference between order and molecularity.

    b) In the first order reaction, 50% of reaction completed in 60 min; calculate time required for 90% completion of reaction.

    c) Draw the phase diagram of silver - lead system and apply Gibb's phase rule.

    d) State the postulates of Heitler - London and pauling slater theory.

    e) Explain the colligative properties and show elevation in boiling point is a colligative property.

    f) Explain the different types of molecular velocities and drive the relation between them.

Q4) Answer the following (Any two). [2×8=16]

   a) Draw and explain any four plots of conductometric titration.

   b) Write a note on QSAR theory and give the synthesis of Aspirin, Paracetamol/ and methylorange.

   c) What do you mean by single electrode potential? Give different types of electrodes and explain any two types briefly.

Q5) Answer the following (Any one). [1×16=16]

   a) Give the classification of electrochemical cells and explain each type with suitable example with reference to representation.

   b) What is isomerism? Give the classification of isomerism and explain each class briefly.

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F.Y. B.Sc.
BIOTECHNOLOGY
Bb-102 : Fundamentals of Physics
(2013 Pattern) (Semester - I)

Time : 3 Hours]   *[Max. Marks : 80*
Instructions to the candidates:
   1) All questions are compulsory.
   2) Figures to the right indicate full marks.
   3) Use of calculators is allowed.
   4) Neat diagrams must be drawn wherever necessary.

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

   a)   Define atomic mass unit(amu).

   b)   Define elastic limit.

   c)   Why hydrostatic pressure is a scalar quantity?

   d)   What is wettability of a liquid?

   e)   State characteristics of transverse waves.

   f)   State Zeroth Law of thermodynamics.

   g)   What is a refrigerent?

   h)   Define electric intensity.

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

   a)   Explain the role of physics in life sciences.

   b)   Distinguish between fundamental and derived units. Classify the following units into fundamental and derived units.
        matter, walt, second, joule, ampere, kilogram, newton, candela.

c) Show that relation between Young's modulus, Bulk modulus and Poisson's ratio is Y = 3k(1-2σ).

d) Define pressure. With the help of a neat diagram explain how mercury barometer can be used for measurement of atmospheric pressure.

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

f) A big drop of water of radius R is formed by combining 1000 small droplets of water of radius r each. What will be the change in its surface energy?

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

a) State and explain principle of superposition of waves. Give two examples.

b) Write a note on thermal equilibrium.

c) State and explain first law of thermodynamics.

d) Write a note on temperature-entropy diagram of a refrigerator.

e) A capacitor of capacitance C, a coil of inductance L, and a resistance R are placed in series with a lamp and an alternating voltage V. Its frequency f is varied from a low to a high value while the magnitude of V is kept constant. Describe and explain how the brightness of the lamp varies. If v = 0.01 v, C= 0.4 μF, L = 0.4 H and R = 10Ω. Calculate resonant frequency and maximum current.

f) Distinguish between paramagnetic and ferromagnetic materials.

Q4) Solve any two of the following. [2×8=16]

a) With the help of a suitable diagram, define Poisson's ratio. Show that its maximum value is 0.5

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

c) Define surface tension. Explain factors affecting surface tension. State four applications of surface tension.

d) Show that only odd harmonic are obtained in an organ pipe closed at one end and open at the other end.
The length of an organ pipe open at one end is 0.6m. If the velocity of sound in air is 330m/s, what will be the fundamental frequency of the pipe?

Q5) Solve any one of the following. **[16]**

a) State and prove Gauss's law in magnetism. Give its importance.

b) Define electric lines of force. Discuss various properties of electric lines of force. Four point charges 10µc, 15µc, 10µc and –20µc are placed on the four corners of a square of side 4m. Calculate the total force on a charge 15µc due to other three charges.

OR

a) State conditions of LASER action. Discuss the characteristics of LASER.

b) Show that entropy of a system remains costant in an adiabatic change. An ideal gas absorbs 1000 kcal of heat from the source and does an amount of work 8400 joules during its expansion. How much is the increase in energy?

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SEAT No. :

[Total No. of Pages : 2

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F.Y.B.Sc.

BIOTECHNOLOGY

Bb-103 : Basics of Plant and Animal Sciences

(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

    1)   Answer to the two sections should be written in separate answer books.

    2)   All questions are compulsory.

    3)   Neat diagrams must be drawn wherever necessary.

    4)   Figures to the right indicates full marks.

SECTION - I

(Botany)

Q1) Answer the following questions :   **[4 × 2 = 8]**

    a)   Define recemose inflorence.

    b)   What is nastic movement?

    c)   Define osmosis.

    d)   What is rhizome? Give examples.

Q2) Write short notes on (Any two) :   **[2 × 4 = 8]**

    a)   Leaf types & Margins.

    b)   Ultra structure of plant cell.

    c)   Role of Auxins in Plant development.

Q3) Attempt the following (Any Two) :   **[2 × 4 = 8]**

    a)   Give functions of roots & its modification.

    b)   Describe the complexity in organization of Algae plant body.

    c)   Draw labelled diagram of internal structure of stem.

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

    a)   Draw and describe Kreb cycle in detail.

    b)   Define essential elements & enlist different essential elements. Give role and deficiency of any three.

    c)   Describe the anatomy of flower with suitable diagram.

SECTION - II
(Zoology)

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

    a)   Give two examples of Phylum Annelida.

    b)   Enlist any two hormones of Adrenal gland.

    c)   Mention two characteristics of Aves.

    d)   Give two examples of cranial nerves.

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

    a)   Structure and function of connective tissue.

    b)   Fresh water Aquaculture.

    c)   Nervous system of frog.

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

    a)   Write a short note on physiological significance of O_2-dissociation curves.

    b)   Explain the working of Frog heart.

    c)   Write a note on parasitic adaptations of Plasmodium.

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

    a)   Describe the structure and function of Pituitary gland.

    b)   What is Apiculture? Explain the method of Apiculture.

    c)   Give an account on the life cycle of Fasciola hepatica.

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Total No. of Questions : 6]

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SEAT No. :

[Total No. of Pages : 3

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F.Y.B.Sc. (Biotechnology)
MATHEMATICS AND STATISTICS
Bb-104 : Mathematical and Statistical Methods for Biologists
(2013 Pattern)

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

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *Figures to the right indicate full marks.*

    3)   *Use of non-programmable scientific calculator is allowed.*

    4)   *Solve each section on separate answer paper.*

SECTION-I

Q1) Attempt each of the following.   **[4 × 2 = 8]**

    a)   Find eigenvalues of $A = \begin{bmatrix} 2 & 1 \\ 0 & 3 \end{bmatrix}$. Hence write eigenvalues of A^3.

    b)   Check for exactness, the following differential equation: $(3x^2 y - 6x)\, dx + (x^3 + 2y)\, dy = 0$

    c)   Find real and imaginary parts of $Z = \dfrac{i^4 + i^2 + 1}{i^7 + i^3}$.

    d)   Use E-definition to prove that $\lim\limits_{n \to \infty} \dfrac{1}{n+1} = 0$.

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

    a)   Find rank of the following matrix. $A = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 3 & 4 & 5 & 2 \\ 2 & 3 & 4 & 0 \end{bmatrix}$

    b)   Find the stationary point and determine the nature of the following function. $f(x, y) = x^2 + 3xy + y^2$.

    c)   Test the convergence of the series $\sum\limits_{n=1}^{\infty} \dfrac{n^n}{e^n}$.

    d)   Find integrating factor of the following differential equation and hence find its solution. $(1 + xy)\, y\, dx + (1 - xy)\, x\, dy = 0$.

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e) Solve the following system of linear equations.
$2x + 4y + z = 3$
$3x + 2y - 2z = -2$
$x - y + z = 6$

f) Check whether the following vectors are linearly dependent in $\mathbb{R}^4$.
$\{(1, 0, 1, 2), (0,1, 1, 2), (1, 1, 1, 3)\}$

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

a) Show that the following matrix is diagonalizable. Also find P that diagonalizer A.

$$A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \\ 0 & 1 & 1 \end{bmatrix}$$

b) i) If $u = \log(x^2 + y^2)$, then show that $\dfrac{\partial^2 u}{\partial x^2} + \dfrac{\partial^2 u}{\partial y^2} = 0$.

ii) Find the value of $\left(1+i\sqrt{3}\right)^5 + \left(1-i\sqrt{3}\right)^5$.

c) Solve the differential equation $\dfrac{dy}{dx} = \dfrac{x+y-3}{2(x+y)}$.

d) Let $x_1 = \sqrt{3}, x_n = \sqrt{3x_{n-1}}, \ n \geq 2$. Show that $\{x_n\}$ is monotonically increasing and bounded above. Also find $\lim\limits_{n\to\infty} \{x_n\}$.

SECTION-II

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

a) Define normal distribution also state its mean and variance.

b) Explain the term sample with illustration.

c) Explain the concept of multiple correlation.

d) Compute Q_1 and Q_3 for given data 10, 15, 13, 16, 19, 7, 2, 9.

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

a) If three digit number is formed out of 4,6,7,8,5 without repeating any digit, find probability that it is divisible by 5.

b) Compute coefficient of variation for given data, 7,5,3,6,9.

c) Write a short note on poisson distribution.

d) IF $P(A) = \dfrac{1}{2}$ $P(B) = \dfrac{2}{5}$, $P(A \cap B) = \dfrac{1}{3}$. Find

   i) $P(A \cup B)$

   ii) $P(A' \cap B')$

e) Calculate coefficient of correlation by using given data:

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

f) Define :

   i)   Statistic.

   ii)   Null hypothesis.

   iii) Standard error.

   iv) Critical region.

Q6) Attempt any two.   **[2 × 8 = 16]**

a) Explain the test procedure for testing equality of two population means for paired and unpaired data.

b) Compute mean, median and mode for the following frequency distribution.

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

c) What do you mean by analysis of variance technique.

d) Describe tests based on χ^2 distribution.

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F.Y.B.Sc.

BIOTECHNOLOGY

Bb-105: Fundamentals of Biological Chemistry

(2013 Pattern) (Semester - I)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

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

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

   a) Define buffering capacity.

   b) Give mathematical form of first law of the thermodynamics.

   c) What do you mean by D - sugars.

   d) Enlist aromatic and sulphur containing amino acids.

   e) Give example and structure of fatty acid containing four double bonds

   f) What is Edman's reagent? Give it's role in protein sequencing.

   g) Define holoenzyme.

   h) Draw structure of Adenylate.

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

   a) Explain in brief the mechanism of buffer action.

   b) Distinguish between Glycogen and amylopectin.

   c) What are waxes and give their physiological importance.

   d) Elaborate the findings of pauling and corey with respect to peptide bond.

P.T.O.

e)   How allosteric enzyme play role in regulation of enzyme activity

f)   Name the coenzyme forms of vit B_1 and vit B_3. Give the biochemical reactions catalyzed by them.

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

a)   Describe the interaction of biomolecules with water.

b)   What are disaccharides? Write the structure of one reducing and one non reducing sugar.

c)   Discuss Biological functions of lipids.

d)   Give an account of quaternary structure of protein with example.

e)   Explain in brief reversible inhibition of enzyme.

f)   Write the salient features of watson and crick model of DNA.

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

a)   Explain different fat indices of lipids and Give significans of each.

b)   Explain in detail different forces stabilising nucleic acid.

c)   Classify carbohydrates based on functional group, no of carbon atoms and numbers of monomeric units diagrammatically.

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

a)   Explain in detail methods of protein sequencing

b)   Discuss in detail enzyme classification with example.

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F.Y.B.Sc.

BIOTECHNOLOGY

Bb-106 : Biophysics and Instrumentation
(2013 Pattern) (Semester-I)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *Draw neat & labelled diagrams wherever necessary.*

    3)   *Figures to right indicate full marks.*

    4)   *Use of scientific calculator is allowed.*

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

    a)   State Bohr's second postulate.

    b)   Draw transverse nature of electromagnetic wave.

    c)   Enlist the types of nuclear forces.

    d)   What is active transport ?

    e)   Enlist various types of electrodes used in pH meter.

    f)   What is R.C.F?

    g)   Enlist types of optical microscope.

    h)   State Lambert's law.

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

    a)   Explain vector atom model.

    b)   Write a note on a liquid drop model.

    c)   Write a note on bimetallic thermometer.

    d)   Find the number of an electron in L- shell.

    e)   Using sommerfeld model find the shapes of subshell when n=2.

    f)   Write properties of electromagnetic waves.

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

    a)   Explain construction and working of the phase contrast microscope.

    b)   Explain chromatic aberrations.

    c)   Write note on mass transport.

    d)   Write note on thermocouple.

    e)   Draw energy level diagram of Na- atom.

    f)   Show that density of nucleus is independent of atomic mass number A.

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

    a)   Explain UV- visible spectroscopy with ray diagram.

    b)   Give principle, working & applications of scintillation counter.

    c)   What is pH? Explain construction & working of pH meter.

    d)   Explain working and construction of Bright and Dark field microscope.

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

    a)   i)   Describe RIA with respect to principle, advantages and disadvantages.

            ii)   Biological effects of radiations.

<div align="center">OR</div>

    b)   Explain the following:

            i)   Resolving power of the microscope.

            ii)   Rayleigh criterion.

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F.Y.B.Sc.

BIOTECHNOLOGY

Bb-107: Microbiology

(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *Draw neat labelled diagrams wherever necessary.*

    3)   *Figures to right indicate full marks.*

Q1) Answer the following: **[8×2=16]**

    a)   Enlist the two characteristics of Eubacteria.

    b)   Define the acidic stain with example.

    c)   Write two functions of capsule of bacteria.

    d)   Write the role of NaCl in microbial culture media.

    e)   Write two contributions of Robert Koch.

    f)   Write two characteristics of stationary phase.

    g)   Write the biosafety measures for BSL1 laboratory.

    h)   What are autotrophs give two examples.

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

    a)   Justify: Blood agar is a enriched and differential media.

    b)   Write note on Blood staining.

    c)   Justify: Viruses are obligate intracellular parasite.

    d)   Explain filteration method used in sterilization.

    e)   Write note on Binary fission in bacteria with neat labelled diagram.

    f)   What is Breed count method? Write its advantages and disadvantages.

Q3) Write self explainatary notes on any four of the following: [4×4=16]

   a)   Bacterial growth curve.

   b)   Flagella staining.

   c)   Structure and functions of endospore.

   d)   Spread plate technique.

   e)   Cyanobacteria.

   f)   Lichen.

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

   a)   Write the principle and method for Acid fast staining.

   b)   Write note on animal-microbe interactions with example.

   c)   Explain any two methods used for long term preservation and maintenance
        of microbial culture.

Q5) Write note on instruments used in physical sterilization with respect to principle
and working.   **[16]**

<p style="text-align:center">OR</p>

Describe the ultrastructure of cell wall of bacteria? And write significance of
cell wall composition in Gram staining of bacteria.   **[16]**

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F.Y.B.Sc.
BIOTECHNOLOGY
Bb - 108 : Computers and Applications
(2013 Pattern) (Semester - I)

Time : 3Hours]

[Max. Marks : 80

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

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

a) What is primary memory? List different types.

b) Define an entity. Give example.

c) Give difference between Compiler and Interpreter.

d) What is a bridge?

e) Write features of supercomputer.

f) What is GUI? Give its components.

g) State True/false. Justify.

"Data stored on magnetic tape can be accessed randomly".

h) Write use of MedLine and PubMed.

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

a) What is an operating system? Discuss various services provided by operating system.

b) What is network topology? Explain star topology in detail.

c) Write a short note on Generations of computers.

d) Explain structure of hard disk. Also explain its working.

e) What is an Attribute? Explain its types with example.

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

   a)   Differentiate between a computer virus & worm.

   b)   Discuss how a formula can be used in MS-Excel.

   c)   What is a search engine? Explain in short yahoo search engine.

   d)   What are output devices? Explain any one in detail.

   e)   Discuss features of Linux operating system.

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

   a)   Explain ISO-OSI model in detail.

   b)   What is E-R model? Discuss various notations used in E-R diagram.

   c)   What are different types of graphs available in MS-Excel. Discuss steps for creation of any two types of graphs.

Q5) Attempt the following: [2×8=16]

   a)   Write algorithm and flowchart to display table of a given number.

<div align="center">OR</div>

       Write algorithm and flowchart to determine whether given number is palindrome or not.

   b)   Write algorithm and flowchart to check whether given number is a prime number or not.

<div align="center">OR</div>

       What is data abstraction? Discuss various levels of data abstraction.

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S.Y.B.Sc.

BIOTECHNOLOGY

Bb-211: Genetics & Immunology

(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

1) All questions are compulsory.

2) Figures to the right indicate full marks.

3) Draw neat and labelled diagrams wherever necessary.

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

a)   State the law of complete dominance. Give an example.

b)   What is chromosomal interference?

c)   What is penetrance?

d)   State the cause and symptoms of Down's syndrome.

e)   State the mode of action of UV as a mutagenic agent.

f)   Enlist the salient features of plasmids.

g)   Give the genes of arabinose operon and its products.

h)   State the difference between F^+ and Hfr strain.

i)   What are insertion sequences?

j)   What is pleiotropy?

Q2) Answer the following: **[5×2=10]**

a)   Name any two scientists with their contribution in the field of immunology.

b)   What are haptens?

c)   Define the terms isotype, allotype and idiotype.

d)   State the principle of precipitation reaction.

e)   Define natural passive immunity. Give an example.

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

   a)   What are duplicate genes? Explain with an example.

   b)   Define chromosomal abberation. Explain chromosomal translocation in detail.

   c)   Compare and contrast lytic and lysogenic cycle is phages.

   d)   Describe in detail the Hardy Weinberg principle.

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

   a)   Discuss attenuation regulation in tryptophan operon.

   b)   Draw and explain ten symbols used in pedigree analysis.

   c)   Describe the transposons in yeast and human systems.

   d)   Define mutations. Explain different types of mutations.

Q5) Answer any one of the following: **[10]**

   a)   What is meant by linkage? Explain complete and incomplete linkage with examples.

   b)   Discuss in details the process of transformation in Haemophilus. Add a note on competence.

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

   a)   With a neat labelled diagram explain in details the structure and function of thymus.

   b)   Elaborate on the different factors which affect antigeneity of a molecule.

   c)   What are APC.s? Discuss the process of antigen presentation.

   d)   Enlist different types of vaccines. Compare between attenuated and killed vaccines.

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S.Y.B.Sc.

BIOTECHNOLOGY

Bb-212 : Cell Biology

(2013 Pattern) (Semester-I)

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

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *Figures to the right indicate full marks.*

    3)   *Draw neat labelled diagrams wherever necessary.*

Q1) Answer in brief: **[10×2=20]**

    a)   Cellular diversity in animals - Explain.

    b)   Explain role of anaphase promoting complex.

    c)   What are condensins & cohesins?

    d)   Transmembrane proteins.

    e)   What is simple diffusion?

    f)   Explain function of vacuoles.

    g)   Signal recognition particle [SRP].

    h)   Structure of microtubules.

    i)   What is necrosis?

    j)   Role of cell adhesion molecules.

Q2) Short notes on (Any three)   **[3×5=15]**

    a)   Lysosomes - structure & function.

    b)   Primary cell wall in plants.

    c)   Carrier mediated transport.

    d)   Intrinsic pathway of apoptosis.

Q3) Attempt any three: [3×5=15]

    a)   Discuss the role of signal sequences in protein sorting.

    b)   Explain the structure & function of ABC transporter.

    c)   Comment on the differences between exocytosis & endocytosis.

    d)   Explain the functions of light harvesting complex & antenna complex.

Q4) a)   Describe working of Na^+-K^+ ATPase.   [7]

    b)   Give an account on mitochondrial electron transport chain.   **[8]**

<div align="center">OR</div>

    a)   Explain the process of nuclear export.   [7]

    b)   Comment on molecular events in G_1, S & G_2 phases of cell cycle. Add a note on its regulation.   **[8]**

Q5) a)   Elaborate on the process of photorespiration.   [7]

    b)   Give an account on lipids in plasma membrane. Comment on membrane asymmetry.   **[8]**

<div align="center">OR</div>

    a)   Discuss the mechanism of nerve impulse transmission.   [7]

    b)   Give a detailed account on etiology of cancer.   **[8]**

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S.Y.B.Sc.

BIOTECHNOLOGY

Bb-213: Environmental Biology and Biotechnology

(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

1)   *All questions are compulsory.*

2)   *Figures to the right indicate full marks.*

3)   *Draw neat and suitable diagrams wherever necessary.*

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

a)   What is xerosere?

b)   Enlist the gases emitted by automobiles.

c)   What is biocides?

d)   Define environment.

e)   Explain the term pedogenesis.

f)   Define co-metabolism.

g)   Define food web.

h)   TRAFFIC.

i)   Enlist four bioindicators.

j)   What is allogenic succession.

Q2) Answer the following questions (Any three): **[15]**

    a)   What is lithosphere? Illustrate briefly.

    b)   Write in brief about green house effect.

    c)   Give applications of GIS in environmental monitoring.

    d)   What is biomedical waste? Mention various steps of disposal of biomedical waste.

Q3) a)   Enlist and explain different methods of phyto remidiation. Add a note on its advantages and limitations. **[8]**

    b)   What are ecosystem energetics? Describe the energy flow in a typical ecosystem. **[7]**

<div align="center">OR</div>

    a)   Elaborate different methods of ex-situ conservation. **[8]**

    b)   Define ecosystem. Give an account of the structure of aquatic ecosystem. **[7]**

Q4) a)   Define biogeography. Explain different biogeographic regions of India.**[8]**

    b)   Describe in detail sources, effect and control measure of water pollution.**[7]**

<div align="center">OR</div>

    a)   Give an account of microbial degradation of pesticide. **[8]**

    b)   Discuss importance of EIA in relation with developmental plans of country. **[7]**

Q5) Write notes on (Any three): **[15]**

    a)   Types of ecological succession.

    b)   Phosphorus cycle.

    c)   Earth summit.

    d)   Integrated waste management.

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S.Y.B.Sc.

BIOTECHNOLOGY

Bb-221: Moleculer Biology

(2013 Pattern) (Semester - II)

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

Instructions to the candidates:

1) All questions are compulsory.

2) Draw neat labelled diagrams wherever necessary.

3) Figures to the right indicate full marks.

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

a)   What is B. Form DNA?

b)   Write the findings of Hershy - chase experiment.

c)   Define: Gene Cluster.

d)   What is Kinetochore?

e)   What is enchromatin?

f)   Role of Initiator Proteins.

g)   What is origin of replication in Prokaryotes?

h)   What are exons?

i)   Role of DNA pol II.

j)   Define: SOS - response.

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

a)   Processing of m - RNA in eukaryotes.

b)   Lac operon.

P.T.O.

c)   Non - histone proteins.

d)   Glycosylation of proteins.

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

a)   Explain the process of protein import to mitochondria..

b)   Write a note on termination of DNA replication in prokaryotes.

c)   What are single peptide? Give an account.

d)   Discuss the bacterial genome organisation.

Q4) Answer any one.   **[1×15=15]**

a)   Give a detail account of protein synthesis in prokaryotes

OR

b)   Describe in detail transcription process in prokaryotes.

Q5) a)   Write a note various ways of regulation of transcription process in eukaryotes.   **[8]**

b)   What are histones? Give an account of histone modifications.   **[7]**

OR

a)   Describe the efforts made by Dr. HarGovind Khurana and his colleagues in order to decipher the universal genetic code.   **[8]**

b)   What is end replication? Describe mechanism of end replication facilitated by Telomerase.   **[7]**

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S.Y.B.Sc.

BIOTECHNOLOGY

Bb-222 : Plant & Animal Development

(2013 Pattern) (Semester-II)

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

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *Answers to the two sections should be written on separate answer sheets.*

    3)   *Draw neat diagrams wherever necessary.*

    4)   *Figures to the right indicate full marks.*

SECTION-I

Plant Development

Q1) Answer in 2-3 sentences: **[5×2=10]**

    a)   What is Suspensor?

    b)   Define competence.

    c)   Enlist types of ovule.

    d)   Give role of ABC model genes in floral patterning.

    e)   What is quiescent centre.

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

    a)   Why <u>Arabidopsis</u> is used as a model plant to study plant development?

    b)   Explain process of development of embryo sac.

    c)   Write note on vegetative patterning.

    d)   Explain unique features of plant development.

    e)   Describe the role of plant growth hormones in plant development.

Q3) Attempt any one: **[1×10=10]**

    a)   With neat labelled diagram enumerate the process of microsporogenesis & male gametophyte development.

    b)   Explain developmental events leading to apoptosis in plants. Add note on significance of it in plant development.

SECTION-II

Animal Development

Q4) Answer the following: [5×2=10]

    a)   What is spermiogenesis?

    b)   Define the terms-Emboly, Fate maps.

    c)   What are pleuripotent stem cells?

    d)   Explain superficial cleavage.

    e)   What is Transdifferentiation?

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

    a)   How polyspermy is prevented during fertilization?

    b)   Describe the process of oogenesis.

    c)   Elaborate any two patterns of animal regeneration.

    d)   Describe the concept of ageing.

    e)   What are the causes of teratogenesis? Explain role of any one teratogen.

    f)   Explain how zygotic genes plays role in pattern formation.

Q6) Attempt any one of the following: [1×10=10]

    a)   Write a note on:

        i)   Apoptosis

        ii)   Cell lineage

    b)   What are morphogenetic movements? Explain the role of three germ layer formation in frog.

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S.Y.B.Sc.

BIOTECHNOLOGY

Bb-223 : Scientific Writing and Communication

(2013 Pattern) (Semester - II)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

　1)　All questions are compulsory.

　2)　Figures to the right indicate full marks.

Q1) Answer in brief :   **[5 × 2 = 10]**

　a)　What are synonyms? Give two examples.

　b)　What is a conjunction?

　c)　Enlist any two frequently confused words.

　d)　Enlist any four types of written presentation.

　e)　Give two examples of Literature citation systems.

Q2) Write short notes on : (Any 4)   **[4 × 5 = 20]**

　a)　Short communication.

　b)　Components of Acknowledgement in a research article.

　c)　Deductive reasoning.

　d)　Cohesion and coherence in a written presentation.

　e)　Importance of statistics in data analysis.

　f)　Methods of presentation of results in a research paper.

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

Describe the steps involved in preparing and submitting a manuscript for publication in a research journal.

OR

Explain ways in which an oral presentation can be made effective.

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S.Y.B.Sc.

BIOTECHNOLOGY

Bb-224 : Metabolic Pathways

(2013 Pattern) (Semester-II)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:

1) *All questions are compulsory.*

2) *Figures to the right indicate full marks.*

3) *Draw neat diagrams wherever necessary.*

Q1) Answer in 2-3 sentences. **[5×2=10]**

a) Write the significance of Large Km value.

b) What do you mean by substrate level phosphorylation? Give one example.

c) Define anapleurotic reactions. Give an example.

d) Name the different enzymes of FA synthase complex.

e) What are glucogenic amino acids? Give 2 examples.

Q2) Attempt any four. **[4×5=20]**

a) How glycogen synthesis and degradation are regulated?

b) What are phospholipids. Write a note on phospholipid synthesis.

c) How is ammonia incorporated into biomolecules in Nitrogen metabolism?

d) Illustrate with structures and enzymes the reactions of Hatch slack pathways.

e) Enlist various energy rich compounds and their significance with 2 examples.

f) What are allosteric enzymes? Explain their role in regulation of enzyme activity.

P.T.O.

Q3) Attempt any one.   [1×10=10]

    a)   Explain in details oxidative and non oxidative reactions of HMP shunt. Briefly describe uses of NADPH.

    b)   Discuss in details the C3 cycle with structures and eznymes.

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Total No. of Questions :5]

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T.Y.B.Sc.

BIOTECHNOLOGY

Bb-331: Microbial Biotechnology

(2013 Pattern) (Semester - III)

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

Instructions to the candidates:

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

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

    a)   Name any two scientist with their contribution in medical microbiology.

    b)   What is respiratory quotient?

    c)   State any two advantages of normal flora.

    d)   What is meant by putrefaction?

    e)   What is mastitis test?

    f)   What is false presumptive test?

    g)   Enlist two names of organisms used in preparation of biofertilizer with their role.

    h)   Enlist four inhibitory substances present in food that inhibit the growth of organism.

    i)   Define coagulation.

    j)   What is sauerkraut?

Q2) Attempt the following questions (any 3)   **[15]**

    a)   What are thermophiles? Explain adaptation in thermophiles.

    b)   Explain the process of canning in detail

P.T.O.

c) Describe the kinetics of growth in a batch culture.

d) Explain with the help of neat labelled diagram an anaerobic digestor

Q3) Write a short notes on (any 3)   **[15]**

a) Microbial polysaccharides.

b) Types of pasteurization.

c) IMViC Test.

d) Wine production.

Q4) a) Describe various methods of cell immobilization. Add a note on its advantages & disadvantages.   **[8]**

OR

What is food intoxication? Describe food intoxication by <u>Aspergillus Flavus.</u>   **[8]**

b) Enlist extrinsic & intrinsic factor responsible for food spoilage. Explain any two intrinsic factors in detail.   **[7]**

OR

Describe in detail any two methods for grading of milk.   **[7]**

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

a) Describe the Tetanus with respect to

i) Causative agent

ii) Symptoms.

iii) Pathogenesis.

iv) Diagnosis

v) Treatment

b) Explain various drinking water purification methods with suitable example.
                                    [15]

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SEAT No. :

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[Total No. of Pages : 2

T.Y.B.Sc.

BIOTECHNOLOGY

Bb-332 : Plant and Animal Tissue Culture

(2013 Pattern) (Semester-III)

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

Instructions to the candidates:

1) All questions are compulsory.

2) Draw neat labelled diagrams wherever necessary.

3) Figures to the right indicate full marks.

4) Answer to each section should be written in separate answer book.

SECTION-I

Plant Tissue Culture

Q1) Answer in brief: **[5×2=10]**

　　a)　What is totipotency?

　　b)　What is meant by synchronisation of suspension cultures?

　　c)　Enlist two applications of endosperm culture.

　　d)　Explain the term dedifferentiation.

　　e)　What is "hardening" of tissue culture plants?

Q2) Answer any four: **[4×5=20]**

　　a)　What is somaclonal variation? How do these variation originate?

　　b)　Explain the role of addituies in plant tissue culture media.

　　c)　Write a short note on embryo culture.

　　d)　Differentiate between direct and indirect morphogenesis.

　　e)　Describe the various parameters used to monitor growth of a suspension culture.

　　f)　What is callus? Describe the various morphological characteristics of callus.

P.T.O.

Q3) Attempt any one: **[1×10=10]**

Describe the various types of sterilisation procedures used in plant tissue culture.

OR

What is somatic embryogenesis ? Give an account of the various stages of embryogenesis? Add a note on applications of this type of tissue culture technique.

SECTION-II

Animal Tissue Culture

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

a) Filter sterilization of medium is preferred method of sterilization on ATC.Justify.

b) Comment on cell surface treatment of tissue culture flasks.

c) What is the role of CO_2 incubators in ATC ?

d) Microbial contamination is a threat to animal tissue culture. Justify.

e) What are optimal growth conditions for insect cell cultures?

Q5) Anawer the following. (Any 4)   **[4×5=20]**

a) Write the characteristics of finite and transformed cell lines.

b) Write a note on physicochemical requirements of animal cells growing in culture.

c) Define primary culture. Elaborate the method to isolate lymphocytes for culture.

d) Describe various functions of cell bank.

e) Define viable cell count and describe any one method for enumerating viable cells.

f) Explain how biochemical parameters can be used to characterise cell lines.

Q6) What are 3 dimensional cultures ? Enlist and explain different methods to establish 3 D cultures. Mention their applications.   **[1×10=10]**

OR

Give a detailed account of evolution of a cell line.

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T.Y.B.Sc.

BIOTECHNOLOGY

Bb-333: Biodiversity and Systematics

(2013 Pattern) (Semester - III)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

    1)   All questions are compulsory.

    2)   Figures to the right indicate full marks.

    3)   Draw neat labeled diagrams wherever necessary.

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

    a)   Distinguish between α-diversity and β-diversity.

    b)   Give names of any two Biodiversity Hotspots.

    c)   What is migration?

    d)   Define molecular taxonomy.

    e)   What is taxonomic hierarchy?

    f)   Define speciation.

    g)   What is innate behavior?

    h)   What is predation.

    i)   Differentiate between species richness and species evenness.

    j)   What is domestication?

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

    a)   Keystone species.

    b)   Outcomes of Rio conference.

    c)   Population dispersion.

    d)   The Biological diversity Act 2002.

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

    a)   Mention changes in biodiversity over geological time scale.

    b)   Describe grassland biome with example.

    c)   Species diversity decreases as we move away from the equator towards pole. 'Justify'.

    d)   Comment on Agricultural Biodiversity.

Q4) a)   Give an account of conservation strategies of Biodiversity.   **[8]**

    b)   Comment on behavioral patterns of animals.   **[7]**

<div align="center">OR</div>

    a)   What is species diversity Indices? Explain Shannon Index and Simpson Index.   **[8]**

    b)   State significance of histological and anatomical tools in classification.**[7]**

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

    a)   Importance of Biodiversity.

    b)   Biosystematics.

    c)   Documentation of Biodiversity.

    d)   Role of NGO's in Biodiversity conservation.

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T.Y.B.Sc.

BIOTECHNOLOGY

Bb-341: Large Scale Manufacturing Process

(2013 Pattern) (Semester - IV)

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

Instructions to the candidates:

1)   All questions are compulsory.

2)   Draw neat labelled diagram wherever necessary.

3)   Figures to the right indicate full marks.

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

a)   Define fermentation. Enlist any two types.

b)   Explain secondary screening.

c)   What are the analogue resistant mutants used in strain improvement?

d)   Comment on 'Antifoaming agents'.

e)   Describe media used for animal cell culture.

f)   Explain the term 'Thermal Death time'.

g)   Comment on - precipitation.

h)   Explain - Scale down.

i)   What are seals? Enlist their types.

j)   Enlist basic objectives in developing economically viable process.

Q2) Write short note on (Any three):   **[3×5=15]**

a)   Air lift fermentor.

b)   Impellar and its types.

c)   Standard operating practices (SOP)

d)   AMES test.

P.T.O.

Q3) Attempt any three from the following: [3×5=15]

    a) Explain - plant cell Bioreactor.

    b) Describe pH control in fermentation process.

    c) Explain single cell protein.

    d) Comment on drum drying and spray drying.

Q4) a) What is biotransformation? Comment on Ascorbic acid biotransformation and its applications. [7]

<div align="center">OR</div>

       What is $K_L a$? Describe concept and importance of $K_L a$ value.

    b) Give the principle of centrifugation. Describe any two types of centrifuges used in the industry [8]

<div align="center">OR</div>

       Explain in brief Bubble column and Bubble cap bioreactors.

Q5) Explain in brief measurement and control of following bioprocess parameters.

    a) Temperature

    b) Dissolved oxygen

    c) Microbial Biomass

<div align="center">OR</div>

Elaborate large scale manufacturing process of penicillin with respect to producer organism, inoculum development, production medium and product recovery. [15]

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T.Y.B.Sc.

BIOTECHNOLOGY

Bb-342 : Biochemical and Biophysical Techniques

(2013 Pattern) (Semester-IV)

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

Instructions to the candidates:

    1)   All questions are compulsory.

    2)   Draw neat labelled diagrams wherever necessary.

    3)   Figures to the right indicate full marks.

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

    a)   What are weak electrolytes.

    b)   Define pH.

    c)   State Beer's Law.

    d)   What is bathochromic shift.

    e)   Enumerate the various components of a compound microscope.

    f)   What is partition coefficient.

    g)   What is activity staining in electrophoresis.

    h)   Define frequency of EMR.

    i)   What is retention time in chromatography.

    j)   Define Resolving power of Microscope.

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

    a)   What is fluorescence? What are fluorophores? Explain their use in fluorescence spectroscopy.

    b)   What is gel filtration. Give its principle and applications.

    c)   What is SDS PAGE? Give the principle of SDS-PAGE and enlist the applications of this technique.

    d)   What is paper chromatography? Explain the terms mobile phase, stationary phase and partition coefficient.

P.T.O.

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

    a) Ultra Centrifugation.

    b) Molar extinction coefficient.

    c) Cation exchange chromatography.

    d) Biological buffers.

Q4) a) What is EMR. Enumerate its properties and justify its use in various spectroscopies. **[8]**

    b) Give a detailed account of various lab safety procedures adopted. **[7]**

<p align="center">OR</p>

    a) Give the principle, working and applications of Confocal Microscopy.

    b) Explain the principle and working of phase Contrast Microscopy. State its limitations.

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

    a) What is emission spectroscopy. Give a detailed account of fluorescence spectroscopy with applications.

    b) Discuss Centrifugation with respect to:

        i) g and RPM values

        ii) Sedimentation coefficient

        iii) Density gradient centrifugation

        iv) Analytical vs Preparative centrifugation

        v) Rotor types

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T.Y.B.Sc.

BIOTECHNOLOGY

Bb-343 : Recombinant DNA Technology

(2013 Pattern) (Semester - IV)

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

Instructions to the candidates:

   1)   ***All questions are compulsory.***

   2)   ***Draw neat labelled diagrams wherever necessary.***

   3)   ***Figures to the right indicate full marks.***

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

   a)   Mention any two milestones of genetic engineering.

   b)   What are type III restriction endonucleases?

   c)   Mention the properties of ideal host used in genetic engineering.

   d)   Explain λ insertion vectors.

   e)   Write any two guidelines in RDT.

   f)   A260 : A280 ratio is 1.4 for the given sample. Comment on the composition & purity of the sample.

   g)   Define genomic library.

   h)   Write any two applications of genetic engineering.

   i)   Mention types of probes.

   j)   Explain activity of RNA as e H.

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

   a)   Role of Ti plasmid.

   b)   Parameters for successful transformation.

   c)   Alkaline lysis method of plasmid isolation.

   d)   Restriction mapping.

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

    a)   Shuttle vectors.

    b)   Improtant DNA modifying enzymes in RDT.

    c)   Dideoxynucleotides and applications.

    d)   RAPD.

Q4) a)   Elaborate an steps in cDNA library synthesis. Add a note on applications of cDNA library. **[7]**

    b)   Describe in detail any one method of site directed mutagenesis. **[8]**

<div align="center">OR</div>

    a)   Comment on artificial chromosomes and their applications in RDT. **[7]**

    b)   Give a detailed account of Southern blotting. **[8]**

Q5) a)   Explain in detail the method of Maxam-Gilbert DNA sequencing. Also comment on advantages and limitations of this method. **[15]**

<div align="center">OR</div>

    b)   Describe in detail the steps in polymerase chain reaction. Add a note on troubleshooting of PCR. **[15]**

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