

Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 4

P663

[5017]-101

F.Y. B.Sc.

MATHEMATICS

MT - 101 : Algebra and Geometry

(2013 Pattern) (Paper-I)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Attempt Any Eight of the following:

[16]

- a) Define partition of a non-empty set.
- b) Compute addition table for Z_6 .
- c) Find the value of a , if $x + 2$ is a factor of $x^2 - ax + 6$.
- d) Find the eigen values of a matrix $A = \begin{bmatrix} 2 & 3 \\ 0 & 4 \end{bmatrix}$.
- e) Is system of following linear equations consistent? Justify your answer.
$$x + y = 1$$
$$2x + 2y = 1$$
- f) Find the centre of conic $3x^2 - 4xy + 6y^2 + 11x - 17y + 13 = 0$.
- g) Find the joint equation of the planes $2x + 3y - z = 0$ and $x - y + 5z = 0$.
- h) Find the equations of the line through $(3, 1, 2)$ and perpendicular to the plane $2x - 2y + z + 3 = 0$.

P.T.O.

i) Find the centre and radius of the sphere

$$x^2 + y^2 + z^2 + 6x - 4y + 2z + 5 = 0.$$

j) Define cylinder.

Q2) Attempt Any Four of the following:

[16]

a) Using principle of mathematical induction prove that 3 divides $n^3 + 2n$, where $n \in \mathbb{N}$.

b) If p is a prime integer and $a, b \in \mathbb{Z}$ such that $p \mid (a \cdot b)$, then prove that either $p \mid a$ or $p \mid b$.

c) Let \sim be an equivalence relation on X . Prove that any two equivalence classes are either identical or disjoint.

d) Solve $x^3 - 9x^2 + 23x - 16 = 0$, whose roots are in A.P.

e) Find the eigen values and eigen vectors of $A = \begin{bmatrix} 1 & 2 \\ 3 & 2 \end{bmatrix}$.

f) Examine the consistency of the system and if consistent solve it.

$$2x + 6y = -11$$

$$6x + 20y - 6z = -3$$

$$6y - 18z = -1$$

Q3) Attempt Any Two of the following:

[16]

a) i) Find the g.c.d. of 3645 and 2357. Also find integers x and y such that $219 = 3645x + 2357y$.

ii) Let $a, b, c, d \in \mathbb{Z}$. If $a \equiv b \pmod{m}$ and $c \equiv d \pmod{m}$ then prove that $ac \equiv bd \pmod{m}$.

- b) i) Solve: $27x^3 + 42x^2 - 28x - 8 = 0$, whose roots are in G.P.
- ii) If $f(x) \in \mathbb{R}[x]$ is a non constant polynomial with root $a + ib$, then prove that $a - ib$ is also a root of $f(x)$, where $b \neq 0$.

c) Verify Cayley-Hamiltonian theorem for the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}$

and hence find A^{-1} .

Q4) Attempt Any Four of the following: **[16]**

- a) By rotating the axes, origin being unchanged, the expression $ux + vy$ becomes $u'x' + v'y'$, show that $u^2 + v^2 = u'^2 + v'^2$.
- b) Prove that every equation of first degree in x, y, z represents a plane.
- c) Find the perpendicular distance of a point $P(6, 6, -1)$ from the line $\frac{x-2}{1} = \frac{y-1}{2} = \frac{z+3}{-1}$. Also find the co-ordinates of its foot.
- d) Find the co-ordinates of the centre and radius of the circle $x^2 + y^2 + z^2 - 2x - 4y + 2z - 30 = 0, 2x - y + 2z - 7 = 0$.
- e) Find the condition that the plane $lx + my + nz = p$ is tangent plane to the sphere $x^2 + y^2 + z^2 = a^2$. Also find the point of contact.
- f) Find the equation of right circular cylinder of radius 2 having an axis of the line $\frac{x-1}{2} = \frac{y-2}{1} = \frac{z-3}{2}$.

Q5) Attempt Any Two of the following:

[16]

a) Reduce the equation $5x^2 + 6xy + 5y^2 - 10x - 6y - 3 = 0$ to its standard form and name the conic.

b) i) Show that the lines $\frac{x+3}{2} = \frac{y+5}{3} = \frac{z-7}{-3}$ and

$\frac{x+1}{4} = \frac{y+1}{5} = \frac{z+1}{-1}$ are coplaner and find the equation of the plane containing them.

ii) If the homogeneous second degree equation

$ax^2 + by^2 + cz^2 + 2fyz + 2gzx + 2hxy = 0$ represents two planes, then prove that $abc + 2fgh - af^2 - bg^2 - ch^2 = 0$.

c) i) Find the equation of the sphere described on the line joining the points $A(x_1, y_1, z_1)$ and $B(x_2, y_2, z_2)$ as end points of diameter.

ii) Find the equation of right circular cone with vertex at $(2, 1, -1)$, axis the line $\frac{x-2}{-1} = \frac{y-1}{1} = \frac{z+1}{3}$ and semivertical angle 30° .



Total No. of Questions : 5]

SEAT No. :

P664

[5017]-102

[Total No. of Pages : 4

F.Y. B.Sc.

MATHEMATICS

MT - 102 : Calculus and Differential Equations

(2013 Pattern) (Paper-II)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Attempt Any Eight of the following:

[16]

- a) Find greatest lower bound and least upper bound of the set

$$\left\{ -\frac{1}{3}, \frac{7}{4}, -\frac{1}{5}, \frac{11}{6}, -\frac{1}{7}, \dots \right\}.$$

- b) Solve the inequality $4 - 7x < 3x - 16$.

- c) Use $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$ to evaluate $\lim_{x \rightarrow 0} \frac{\sin 5x - \sin 3x}{x}$

- d) State Maclaurin's theorem with Lagrange's form of remainder.

- e) If $y = \tan^{-1} x$ then prove that $(1 + x^2) y_2 + 2xy_1 = 0$.

- f) Evaluate $\int_0^{\frac{\pi}{2}} \cos^5 x \, dx$.

- g) Define non-homogeneous differential equation of first degree and first order.

- h) Define self orthogonal family of curves.

P.T.O.

i) Solve: $\frac{dy}{dx} + \sqrt{\frac{4-y^2}{25-x^2}} = 0$.

j) Solve $(p-2)(p+3) = 0$, where $p = \frac{dy}{dx}$.

Q2) Attempt Any Four of the following:

[16]

a) Prove that $|x+y| \leq |x| + |y|, \forall x, y \in \mathbb{R}$.

b) Show that if $\lim_{x \rightarrow a} f(x)$ exists then it is unique.

c) State and prove Rolle's theorem.

d) Evaluate $\lim_{x \rightarrow 0} \frac{x \cos x - \log(1+x)}{x^2}$.

e) If $y = (x^2 - 1)^n$ then prove that $(x^2 - 1)y_{n+2} + 2xy_{n+1} - n(n+1)y_n = 0$.

f) Discuss the continuity of the function $f(x)$ at $x = 4$ where

$$\begin{aligned} f(x) &= \frac{x^2}{4} - 4, \quad \text{if } 0 < x < 4 \\ &= 0, \quad \text{if } x = 4 \\ &= 4 - \frac{64}{x^2}, \quad \text{if } x > 4. \end{aligned}$$

Q3) Attempt Any Two of the following:

[16]

a) Let f be a continuous function on a closed and bounded interval $[a, b]$ such that $f(a)$ and $f(b)$ are of opposite signs. Then prove that there is at least one c in (a, b) such that $f(c) = 0$.

b) i) If $y = e^{ax} \cos x \sin x$ then prove that

$$y_n = \frac{1}{2} e^{ax} (a^2 + 4)^{n/2} \sin \left[2x + n \tan^{-1} \left(\frac{2}{a} \right) \right].$$

ii) Use Taylor's theorem to express the polynomial $2x^3 + 7x^2 + x - 6$ in powers of $(x - 2)$.

c) i) Prove the Maclaurin's series expansion $e^{\sin x} = 1 + x + \frac{x^2}{2} - \frac{x^4}{8} + \dots$.

ii) Evaluate $\lim_{x \rightarrow 0} (\operatorname{cosec} x)^{\frac{1}{\log x}}$

Q4) Attempt Any Four of the following:

[16]

a) Evaluate $\int \frac{x^2 + 1}{(x^2 - 1)(x^2 - 4)} dx$.

b) Solve: $\frac{dy}{dx} = \tan^2(x + y)$.

c) Solve: $x^3 dx - (x + y^3) dy = 0$.

d) Explain the method of solving differential equation $\frac{dy}{dx} + p(x)y = q(x)y^n$.

e) Find the orthogonal trajectories of the family of curves $x^2 + y^2 = 2ax$.

f) Define Clairaut's equation and explain the method of solving it.

Q5) Attempt Any Two of the following:

[16]

a) If $I_n = \int (a^2 + x^2)^{\frac{n}{2}} dx$ then prove that $I_n = \frac{x}{n+1} (a^2 + x^2)^{\frac{n}{2}} + \frac{na^2}{n+1} I_{n-2}$

Hence evaluate $\int (a^2 + x^2)^{\frac{3}{2}} dx$.

b) State and prove necessary and sufficient condition for differential equation $M dx + N dy = 0$ to be exact.

c) i) Solve: $(x^2 y^2 + 5xy + 2) y dx + (x^2 y^2 + 4xy + 2) x dy = 0$.

ii) Solve: $y = -px + p^2 x^4$.



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 3

P665

[5017]-103

F.Y. B.Sc.

PHYSICS-I

**Mechanics, Heat and Thermodynamics
(2013 Pattern) (Paper-I) (New Course)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of log table and calculator is allowed.*
- 4) *Neat diagrams must be drawn wherever necessary.*

Q1) Attempt All of the following:

[16]

- a) State and explain Newton's second law of motion.
- b) Define potential energy of a body. Give its SI unit.
- c) State Pascal's law.
- d) Calculate the Poisson's ratio for metal, if Young's modulus of metal is 8×10^{10} N/m² and modulus of rigidity is 3×10^{10} N/m².
- e) Define critical temperature and critical pressure of the gas.
- f) State first law of thermodynamics. Give its physical significance.
- g) Give the principle of resistance thermometer.
- h) Calculate the efficiency of the Carnot's engine working between 100°C and 0°C.

Q2) Attempt Any Four of the following:

[16]

- a) What is pseudo force? Illustrate with examples.
- b) Explain the term work done. Calculate the work done by a constant force.

P.T.O.

- c) Describe in detail Jaeger's method to determine surface tension of a liquid.
- d) A body of mass 8 kg at rest is subjected to a force of 32 N. What is the kinetic energy acquired by the body at the end of 5 sec.
- e) Show that the work done of a body during volume strain is $\frac{1}{2} \times \text{volume stress} \times \text{change in volume}$.
- f) A metal cube of side 6 cm and relative density 8 gm/cm³ is suspended by a string so as to be completely immersed in a liquid of density $1.2 \times 10^3 \text{ kg/m}^3$. Find the tension in the string.

Q3) Attempt Any Four of the following:

[16]

- a) Describe Andrew's experiment on carbondioxide.
- b) Prove that slope of adiabatic curve through a point in P-V diagram is γ times the slope of the isothermal curve through the same point.
- c) Derive first Tds equation.
- d) A 1.5 litre of hydrogen at 137°C and $10^6 \text{ dynes cm}^{-2}$ pressure expands isothermally, until it's volume is doubled. Find the pressure of the gas.
- e) Calculate the change in entropy when 20 gm of ice at 0°C is converted into water at the same temperature. (Given: latent heat of fusion = 80 cal/gm).
- f) The resistance of platinum wire is 6 ohm at 0°C and 7.2 ohm at 100°C. Calculate the temperature coefficient of resistance.

Q4) Attempt Any Two of the following:

[16]

- a) State and prove Bernoulli's theorem.
- b) i) What is torsional oscillations? Derive an expression for the modulus of rigidity (η)
- ii) What force is required to accelerate 1200 kg car from 5 m/s to 25 m/s in time of 5 sec?

- c) i) Show that the value of Poisson's ratio lies between -1 and 0.5.
- ii) Calculate the surface tension of the liquid which rises 50 cm in a circular tube, 0.04 mm in diameter. Relative density of the liquid is 0.8. (Given - the angle of contact = 20°).

Q5) Attempt Any Two of the following:

[16]

- a) Explain diesel cycle with an indicator diagram. Obtain an expression for the efficiency of the diesel engine.
- b) i) State the principle of a refrigerator and explain the coefficient of performance of the refrigerator.
- ii) The Van-der-Waal's constant for a gas are $a = 1.328 \times 10^2$ dynes cm^3/mole and $b = 32$ cm^3/mole upto what maximum temperature will the Joule-Thomson expansion produce cooling? ($R = 8.31$ J/mole-K).
- c) i) Explain construction and working of gas filled thermometer.
- ii) Find the increase in boiling point of water at 100°C when pressure is increased by one atmosphere, where 1 gm of water vapour occupies volume 1598 cm^3 . (Latent heat of fusion = 540 cal/gm).



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 3

P666

[5017]-104

F.Y. B.Sc.

PHYSICS-II

Physics Principles and Applications and Electromagnetics

(New Course) (2013 Pattern) (Paper-II)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to right indicate full marks.*
- 3) *Use of log tables and calculator is allowed.*
- 4) *Neat diagrams must be drawn wherever necessary.*

Q1) Attempt All of the following:

[16]

- a) Define wave length. Calculate wave length of the wave with frequency of 4 GHz.
- b) Give the equation of wave length in Paschen Series of hydrogen atom.
- c) Define ionic bond. Give example.
- d) What do you meant by stimulated emission?
- e) Give the relation between \vec{B} , \vec{M} and \vec{H} .
- f) State Ampere's Circuital law.
- g) Define terms - Electric dipole and dipole moment.
- h) Calculate the electric field intensity due to a point charge 2×10^{-10} C at a distance of 1 m away from it

[Given - $\epsilon_0 = 8.85 \times 10^{-12}$ C²/N-m²]

Q2) Attempt Any Four of the following:

[16]

- a) Explain Laser action using four level energy system.
- b) Explain in short X-ray radiography.

P.T.O.

- c) What is meant by metallic bonding? Explain the properties of metallic crystal.
- d) The vibration frequency for a diatomic molecule HF is 1.24×10^{14} Hz. The mass of hydrogen atom and fluorine atom are 1.67×10^{-27} kg and 3.15×10^{-26} kg respectively. Find force constant K. For interatomic force.
- e) A microwave radiation has a frequency of 12 GHz. What would be the energy of the photon corresponding to this radiation?
[Given - $h = 6.626 \times 10^{-34}$ Js]
- f) Find the wave number of second line of the Paschen Series.
[Given - $R = 1.097 \times 10^7 \text{ m}^{-1}$]

Q3) Attempt Any Four of the following:

[16]

- a) Obtain an expression for torque on a dipole placed in an uniform electric field.
- b) Using Biot - Savart's, obtain expression for magnetic field produced in long straight conductor.
- c) What is hysteresis? Using hysteresis curve explain the terms retentivity and coercivity.
- d) A solenoid of 300 turns/m is carrying a current of 4 Amp. If the core is made of iron, which has a relative permeability of 5000, determine the magnetic intensity H, magnetization M and magnetic induction B inside the core [Given - $\mu_0 = 4\pi \times 10^{-7} \text{ Wb/A-m}$]
- e) Calculate the force between two balls each having a charge of $16 \mu\text{C}$ and are 10cm apart.
[Given - $\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2/\text{N-m}^2$]
- f) Two point charges in a dielectric medium having $K = 5.2$ interact with a force of 8.6×10^{-3} N. What would be the force if the charges were in free space?

Q4) Attempt Any Two of the following:

[16]

- a) State principle and applications of following
 - i) Microwave Oven
 - ii) RADAR
 - iii) Pyroelectric thermometer
 - iv) Solar cell
- b)
 - i) Give the physical properties of covalent compounds.
 - ii) The series limit wavelength for Balmer series of hydrogen spectrum is 3645 . Calculate the value of Rydberg constant.
- c)
 - i) What are the advantages of Bohr's model?
 - ii) The lowest vibrational states of the NaCl molecule are 0.063 eV apart. Find approximate force constant of this molecule.
[Given - Mass of Na = 3.82×10^{-26} kg Mass of Cl = 5.81×10^{-26} kg].

Q5) Attempt Any Two of the following: $\overset{\circ}{A}$

[16]

- a) Obtain an expression for electric field intensity on the axis of charged disc.
- b)
 - i) Explain polar and non-polar molecule. What will be the effect of electric field on them?
 - ii) An aluminium wire of diameter 0.3 cm carries a current of 15 Amp. Find the magnetic field on the surface of the wire.
[Given - $\mu_0 = 4\pi \times 10^{-7}$ Wb/A – m].
- c)
 - i) Derive an expression for the magnetic field at a point inside the winding of toroid.
 - ii) A bar magnet made of iron has magnetic moment 3.0 A-m² and mass 3×10^{-3} kg. If the density of iron is 6×10^{-3} kg/m³, find the intensity of magnetization.



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 3

P667

[5017]-105

F.Y. B.Sc.

CHEMISTRY-I

**Physical and Inorganic Chemistry
(2013 Pattern) (Paper-I) (Theory)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Answer the following questions:

[16]

- a) What is positive catalysis. Give one suitable example.
- b) Give the rule of differentiation of a product of two functions.
- c) Write any two limitations of first law of thermodynamics.
- d) Explain the term viscosity of liquid and give its unit.
- e) State Heisenberg's uncertainty principle.
- f) Define:
 - i) Molarity
 - ii) Normality
- g) Explain in brief formation of ionic bond with suitable example.
- h) How many moles are present in 0.5 gram of HNO_3
(At. wts: H = 1, N = 14, O = 16).

Q2) Attempt Any Four of the following:

[16]

- a) Explain spontaneous and non-spontaneous processes with the help of suitable examples.
- b) Discuss the effect of temperature on:
 - i) Vapour pressure
 - ii) Viscosity

P.T.O.

- c) Draw the graph of linear function and find the expression for the following:
- Linear function passing through $(-1, 2)$ and $(1, 3)$.
 - Linear function whose X-intercept = -2 and Y intercept = 3 .
- d) Distinguish between physical adsorption and chemical adsorption.
- e) Give properties and applications of emulsion.
- f) Derive an equation for the radius of n^{th} orbit on the basis of Bohr's theory.

Q3) Answer Any Four of the following:

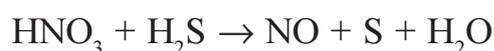
[16]

- If $Y = \frac{x^2 + 5}{x - 2}$, find $\frac{dy}{dx}$
 - Solve the integral $\int_1^3 x^3 dx$.
- Define catalyst. Explain general characteristics of catalytic reaction.
- Obtain an expression for entropy change of an ideal gas when its pressure and temperature are changed simultaneously.
- Derive the expression for de-Broglie's wavelength in terms of momentum of a particle.
- Obtain the values P_c , V_c and T_c in terms of a , b and R .
- What are the types of liquid crystals? Discuss thermotropic crystals.

Q4) Attempt Any Four of the following:

[16]

- Balance the following equation by oxidation number method.



- What is sp^3 hybridisation? Explain with suitable example.
- What are the limitations of VSEPR theory?

- d) Explain the formation of O_2 molecule on the basis of atomic orbital overlap.
- e) Define:
- i) Standard solution
 - ii) Mole
 - iii) Equivalent weight
 - iv) Gram molecular volume
- f) PCl_5 shows dsp^3 hybridisation. Explain.

Q5) Solve Any Four of the following: [16]

- a) How will you prepare 0.25 N 250 ml HCl solution from conc. HCl solution whose specific gravity is 1.18 and contains 35.00% HCl by weight.
- b) The molecular weight of a chemical compound is 119.88. What will be the volume displaced by 0.164 gram of the compound at $22^\circ C$ and 755 mm pressure.
(Aq. tension at $22^\circ C = 20$ mm).
- c) Calculate the frequency and wavenumber associated with radiation of wavelength 620 nm and 460 nm.
- d) A heat engine operates between $20^\circ C$ and $160^\circ C$. It absorbs 64.53 k. cal of heat from the source. Calculate the maximum workdone by the engine. [Given 1 cal = 4.184 J].
- e) Calculate the pressure exerted by one mole of carbon dioxide at $127^\circ C$ when it occupies a volume of 0.5 litre.
[Given $a = 3.66 \text{ atm L}^2 \text{ mole}^{-1}$, $b = 0.0428 \text{ l.mole}^{-1}$ and $R = 0.082 \text{ lit. atm K}^{-1} \text{.mole}^{-1}$].
- f) Calculate the entropy change in a reversible isothermal process at $30^\circ C$ when 3 moles of a gas changes its volume from 20 litre to 10 litre.
[Given $R = 8.314 \text{ J K}^{-1} \text{ mole}^{-1}$].



Total No. of Questions : 5]

SEAT No. :

P668

[5017]-106

[Total No. of Pages : 4

F.Y. B.Sc.

CHEMISTRY-II

**Organic and Inorganic Chemistry
(2013 Pattern) (Paper-II) (Theory)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Answer the following:

[16]

- a) Explain the term tautomerism with suitable example.
- b) Draw zigzag structure for the following compounds
 - i) Isopropyl alcohol
 - ii) Hexanal
- c) Explain the following terms.
 - i) Enantiomers
 - ii) Configuration
- d) Acetic acid is weaker acid than chloroacetic acid. Explain.
- e) Benzaldehyde doesnot undergo Aldol condensation. Explain.
- f) Alkali metals are more reactive than alkaline earth metals. Explain.
- g) Define:
 - i) Ionization energy
 - ii) Electronegativity
- h) Why group VI A elements are named as chalcogens?

Q2) Attempt Any Four of the following:

[16]

- a) Discuss conformational isomerism in propane with energy profile diagram.
- b) What is inductive effect? Give different types of inductive effect. Why dimethylamine is stronger base than methylamine?

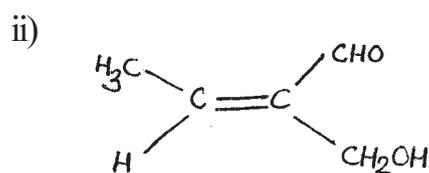
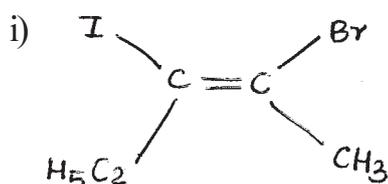
P.T.O.

- c) What are alkenes? Give major and minor products when propene reacts with
- HBr
 - $\text{H}_2\text{O} / \text{H}^\oplus$.
- d) What are alcohols? Give classification of alcohols. How will you prepare ethyl alcohol by using Grignard's reagent.
- e) What are carboxylic acids? How will you prepare acetic acid from -
- Acetonitrile
 - Dry ice
- f) What are phenols? What is the action of following reagents on phenol?
- dil HNO_3
 - $\text{Br}_2 / \text{water}$

Q3) Attempt Any Four of the following:

[16]

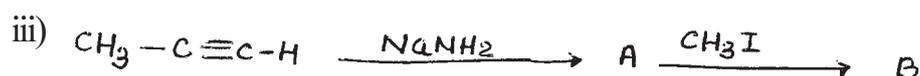
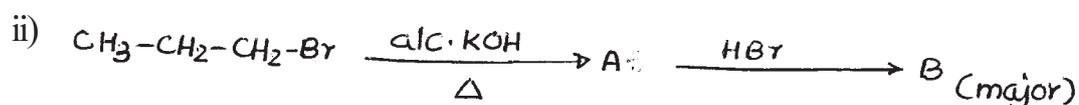
- a) What are alkanes? How will you prepare propane from
- Propene
 - 2-bromopropane
- b) What are amines? How will you prepare aniline from
- benzene
 - benzamide
- c) What are alkyl halides? What is the action of CH_3MgBr on the following compounds?
- acetaldehyde
 - acetone
- d) Assign E or Z configuration of the following compounds



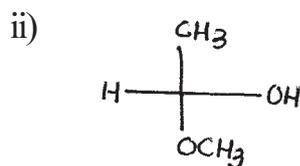
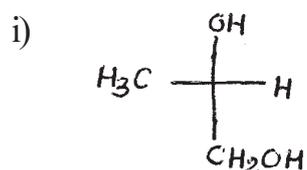
- e) What are aldehydes? Explain perkin reaction with suitable example.
- f) What is hyperconjugation? Write different hyperconjugative structures for toluene.

Q4) Attempt Any Four of the following: [16]

- a) Identify the products (A) and (B) and rewrite the reactions any two.



- b) Assign R or S configuration of the following compounds



- c) Write short notes on -

- i) Saytzeff's rule
- ii) Huckel rule of aromaticity
- d) What is hybridisation? Discuss formation of acetylene molecule using the concept of hybridisation.
- e) Explain anomalous behaviour of Boron in group III A elements.
- f) Explain the diagonal relationship between beryllium and aluminium.

Q5) Attempt Any Four of the following:

[16]

- a) Explain the periodicity in properties of alkaline earth metals with respect to atomic size and ionization energy.
- b) Give the names of group IA elements and write electronic configuration for group IA elements.
- c) Describe the separation of alkali metals using crown ethers.
- d) Write note on silicates.
- e) Draw the structures of Al_2Br_6 , IF_7 , H_2SO_4 and ClF_3 .
- f) Explain the periodicity in properties of Group V A elements with respect to Ionization energy and Electronegativity.



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

P669

[5017]-107

F.Y. B.Sc.

BOTANY

**BO - 111 : Fundamentals of Botany (Plant Diversity,
Plant Morphology and Anatomy)
(2013 Pattern) (Theory) (Paper-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) *Neat labelled diagrams must be drawn wherever necessary.*

Q1) Attempt the following:

[16]

- a) What are Algae?
- b) Give any two characters of Gymnosperms.
- c) Mention any two classes of Algae proposed by G.M. Smith (1955).
- d) Mention any two types of Lichens based on thallus structure.
- e) Write any two characters of Angiosperms.
- f) What is descriptive morphology?
- g) What is placentation?
- h) Mention any two importance of Anatomy.

Q2) Attempt Any Four of the following:

[16]

- a) Write the symptoms of 'white rust' disease.
- b) Give general characters of Lichens.
- c) Write general characters of pteridophytes.
- d) Write importance of morphology in nomenclature.
- e) Describe any two modifications of leaf with examples.
- f) Describe types of meristem based on position.

P.T.O.

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

- a) Structure of mycelium in Albugo (cystopus).
- b) Prothallus in Nephrolepis.
- c) Characters of Monocotyledons.
- d) Bulb.
- e) Functions of Roots.
- f) Drupe.

Q4) Attempt Any Two of the following: **[16]**

- a) Write general characters of Algae.
- b) Describe Antheridium and Archegonium in Riccia.
- c) Define aestivation and describe any four types of aestivation.
- d) Define tissue. Explain characters and functions of collenchyma.

Q5) Describe male cone and megasporophyll with structure of ovule in Cycas. **[16]**

OR

Describe internal structure of Dicotyledon stem and monocotyledon stem.



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

P670

[5017]-108

F.Y. B.Sc.

BOTANY

**BO - 112 : Industrial Botany-I & II
(2013 Pattern) (Paper-II) (New)**

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 the following:

[16]

- a) Enlist any two resources used in timber industry.
- b) What is green house technology?
- c) Enlist methods of plant propagation.
- d) What is hardening in plant tissue culture?
- e) Define biofuel.
- f) What is Integrated pest management?
- g) Give any two products of penicillium.
- h) What is canning?

Q2) Attempt Any Four of the following:

[16]

- a) Write the limitations of green house technology.
- b) What is the commercial significance of plant tissue culture?
- c) Write about plant resources used in mushroom cultivation.
- d) What is the source and applications of Indiarra?
- e) What are the products and applications of yeast?
- f) Describe cold storage in fruit processing.

P.T.O.

Q3) Write short notes on Any Four of the following:

[16]

- a) Forest nursery.
- b) Preparation of culture media for plant tissue culture.
- c) Commercial significance of mushrooms.
- d) Concept of biofuel.
- e) Azadiractin.
- f) Fungal genera used in enzyme and food industries.

Q4) Attempt Any Two of the following:

[16]

- a) Describe the cultivation practices in Rose.
- b) What is layering? Give an account of air layering?
- c) What are the types of pharmaceutical products? Add a note on churna, Asava and Arista.
- d) What is fruit processing? Add a note on concept and need of fruit processing.

Q5) What is seed production? Write a note on seed processing and seed marketing with reference to cotton.

[16]

OR

What are biofertilizers? Describe it's need and write about Nitrogen fixing biofertilizers.



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

P671

[5017]-109

F.Y. B.Sc.

ZOOLOGY

**ZY - 101 : Animal Systematics and Diversity-I & II
(2013 Pattern) (Paper-I)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Define/Explain:

[16]

- a) Cytopyge.
- b) Nomenclature.
- c) Clitellum.
- d) Nematoda.
- e) Nictitating membrane.
- f) Anura.
- g) Urochordata.
- h) Vocal sacs.

Q2) Write short notes on (Any Four):

[16]

- a) Salient features of class Cestoda.
- b) Distinguishing characters of protista.
- c) Morphology of Paramoecium.
- d) Systematic position of frog.
- e) Salient features of class - Pisces.
- f) General characters of Hemichordata.

P.T.O.

Q3) Attempt the following (Any Four): **[16]**

- a) Give the distinguishing characters of porifera.
- b) State the distinguishing characters of phylum protozoa.
- c) With the help of suitable diagrams describe the structure and functions of spermatheca in Earthworm.
- d) Write note on neoteny in amphibia.
- e) Describe the general characters of cephalochordata.
- f) Sketch and label internal structure of Heart of Frog.

Q4) Attempt the following (Any Two): **[16]**

- a) Describe the process of conjugation in paramoecium.
- b) Describe the digestive system of Earthworm.
- c) What is parental care? Give an account of parental care in any two amphibians.
- d) With the help of labeled diagram describe the brain of frog.

Q5) Describe the central nervous system of Earthworm. **[16]**

OR

Describe the sexual dimorphism in Frog. Explain in detail the male reproductive system of Frog.



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

P672

[5017]-110

F.Y. B.Sc.

ZOOLOGY

**ZY - 102 : Fundamentals of Cell Biology and Genetics
(2013 Pattern) (Theory) (Paper-II)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Define / Explain:

[16]

- a) Phenotype.
- b) Cytoplasmic inheritance.
- c) Complementary factor.
- d) Incomplete dominance.
- e) Peroxisomes.
- f) Endoplasmic reticulum.
- g) Cell cycle.
- h) Mitochondrion.

Q2) Write short notes on (Any Four):

[16]

- a) Phenyl ketonuria.
- b) What are lethal Genes? Explain lethal genes in Mus musculus.
- c) What is genetic counseling? Explain its importance.
- d) Describe various branches of Cell Biology.
- e) What are lysosomes? Give the functions of Lysosomes.
- f) Define cytoplasm. Give its composition.

P.T.O.

Q3) Attempt the following (Any Four): **[16]**

- a) Describe the “Law of Dominance”.
- b) Write a note on Hypertrichosis.
- c) Describe Down’s Syndrome (Mongolism).
- d) Sketch and label the “Structure of Mitochondrion”.
- e) Write a short note on “Eukaryotic cell”.
- f) Distinguish between “cytoplasmic stain and nuclear stain”.

Q4) Attempt the following (Any Two): **[16]**

- a) What is sex determination? Explain XX-XY and ZZ-ZW methods of sex determination.
- b) What is polygenic inheritance? Explain it with reference to skin colour in man.
- c) Describe the ultrastructure of nuclear membrane with special reference to ‘nuclear pore complex’.
- d) Describe ‘Fluid Mosaic Model’ with the help of suitable figure.

Q5) Describe the morphological structure of a chromosome and add a note on various types of chromosomes. **[16]**

OR

Define Mitosis. Describe the process of mitosis with suitable figures.



Total No. of Questions :5]

SEAT No. :

[Total No. of Pages :2

P673

[5017] - 111

F.Y.B.Sc.

GEOLOGY

Mineralogy and Petrology

(2013Pattern) (Paper - 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 diagrams wherever necessary.*

Q1) Answer the following in 2-3 lines.

[16]

- a) Define a mineral.
- b) What is conglomerate?
- c) Define plane of symmetry of a crystal.
- d) What is petrography?
- e) Define strike of a bed.
- f) What is magma?
- g) Define fracture.
- h) Name the instrument used to find the specific gravity in minerals.

Q2) Answer the following (Any Four):

[16]

- a) Give an account of minerals used in fertilizer industry.
- b) Define Hardness. Explain the Moh's scale of hardness.
- c) Explain ionic bonding in minerals with suitable egs.
- d) Explain the process of evaporation in mineral formation.
- e) Describe the Inosilicate structure with suitable egs.
- f) Explain the various branches of mineralogy.

P.T.O.

Q3) Answer the following (Any Four). **[16]**

- a) Give the diagnostic characters of Metamorphic rocks.
- b) Give the classification of Igneous rocks on the basis of colour Index.
- c) Explain Laccolith and Lopolith.
- d) What are the different kinds of Metamorphism? Explain Thermal Metamorphism.
- e) Describe an anticline and syncline.
- f) Explain Rock- Cycle.

Q4) Answer the following (any two). **[16]**

- a) State the various optical properties of minerals in between crossed Nicols. Explain anisotropism.
- b) Give the tabular classification of sedimentary Rocks (Products of Weathering).
- c) Explain the following structure of Igneous Rocks.
 - i) Blocky Lava.
 - ii) Ropy Lava
- d) Give the various forms with indices present in Monoclinic systems, type Gypsum.

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

Define an unconformity and state the different types of unconformity. Explain angular unconformity.

OR

Give the crystallographic axis, elements of symmetry, definition of various forms with indices present in orthorhombic system, type Baryte.



Total No. of Questions :5]

SEAT No. :

[Total No. of Pages :2

P674

[5017] - 112

F.Y.B.Sc.

GEOLOGY

Physical Geology and Palaeontology

(2013Pattern) (Paper - II)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

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

Q1) Answer the following questions:

[16]

- a) What is Petrification?
- b) Define the term Isostasy.
- c) Mention all the branches of Palaeontology.
- d) What is continental drifting?
- e) Draw diagram to show all the various types of Septa in corals.
- f) Mention all the depositional landforms formed by the action of glaciers.
- g) Define hinge line in lamellibranch shell.
- h) Define the term weathering.

Q2) Answer the following questions (Any Four):

[16]

- a) Describe the Hydrosphere of the earth.
- b) Define Geology. Give an account of the size, shape and density of the earth.
- c) Describe delta and its types formed by the action of rivers.

P.T.O.

- d) Explain the Fold and Fault Block mountains.
- e) What is a disaster? Give its types and effects.
- f) Describe seacliff and sea arch.

Q3) Answer the following questions (Any Four) [16]

- a) Differentiate between regular and irregular Echinoids.
- b) Describe the hard part morphology of cephalon of Trilobites.
- c) Explain the uses of fossils in Biology (Palaeontology).
- d) Describe ornamentation in Lamellibranch shell.
- e) Explain the conditions necessary for fossilization.
- f) Describe the hard part morphology of interior of Nautilus Shell.

Q4) Answer the following questions (Any Two). [16]

- a) Define a volcano. Explain the structure of a typical volcano.
- b) Describe the hard part morphology of a brachiopod shell.
- c) Describe the different types of sanddunes formed by the action of wind.
- d) Define a fossil. Give the techniques used in collection (spot and channel) preservation and illustration of mega fossils.

Q5) Give the systematic position, morphology of hard parts and geological and geographical distribution of a typical Gastropod Shell. [16]

OR

- Q5) a) Explain the internal structure of the earth. [8]**
- b) What are earthquakes? Describe how earthquakes are recorded. [8]



Total No. of Questions : 5]

SEAT No. :

P675

[5017]-113

[Total No. of Pages : 4

F.Y.B.Sc.

STATISTICS / STATISTICAL TECHNIQUES

Descriptive Statistics

(Paper - I) (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 statistical tables and calculator is allowed.*
- 4) *Symbols have their usual meanings.*

Q1) Attempt each of the following:

- a)
 - i) Define SRSWOR. [1]
 - ii) Define the term open end class. [1]
 - iii) State any two demerits of median. [1]
 - iv) Define the term primary data. [1]
- b) Choose the correct alternative for the following: [1 each]
 - i) Variance of X is the
 - A) First raw moment. B) Second raw moment.
 - C) Second central moment. D) First central moment.
 - ii) If X is constant then $\text{corr}(X, Y)$ is:
 - A) 1 B) -1
 - C) 0 D) Indeterminate
 - iii) Yule's coefficient of association lies between
 - A) $[0, 1]$ B) $[-1, 1]$
 - C) $(0, \infty)$ D) $(-\infty, \infty)$
 - iv) If mode of the frequency distribution is 35, mean is 31, then the coefficient of skewness is
 - A) Greater than zero. B) Less than zero.
 - C) Equal to zero. D) Cannot be determined.

P.T.O.

- c) i) Find geometric mean from the following set of observations: [2]
 2, 24, 38, 46, 12
- ii) Find third central moment if [2]
 $\mu'_1=10, \mu'_2=40, \mu'_3=80$
- iii) Explain the term population with an illustration. [2]
- iv) Explain the term continuous variable with an illustration. [2]

Q2) Attempt any Four of the following: [4 each]

- a) Show that covariance is invariant to the change of origin.
- b) Show that, S.D. \geq M.D. about mean.
- c) You are given the following information about two variables X and Y.

$$n = 10, \Sigma x^2 = 385, \Sigma y^2 = 192, \bar{x} = 5.5, \bar{y} = 4, \Sigma(x - \bar{x})(y - \bar{y}) = -35$$

Find regression line of Y on X.

- d) Calculate Fisher's price index number using following data:

Item	Base year		Current year	
	Price	Quantity	Price	Quantity
A	18	2	24	1.5
B	12	30	15	15
C	20	15	30	15
D	10	30	19	25

- e) Spearman's rank correlation coefficient between the marks in English and marks in statistics for a group of students is 0.5. If the sum of squares of differences between ranks is 42, find the number of students in the group. Assume no rank is repeated.
- f) State any two merits and two demerits of standard deviation.

Q3) Attempt any Four of the following:

[4 each]

- a) Explain the procedure of drawing Stratified random sample.
- b) Calculate harmonic mean from the following data:
8, 4, 9, 7, 10, 11, 5, 6.
- c) Define raw moments and central moments of a frequency distribution and express fourth central moment in terms of raw moments.
- d) Two groups of sizes 40 and 50 have same mean and standard deviation 20 and 10 respectively. Find variance of the combined group.
- e) Is the following information consistent?
(A) = 30, (B) = 40, (AB) = 35, N = 100.
- f) Calculate coefficient of correlation from the following information:
 $n = 5$, $\Sigma x = 25$, $\Sigma x^2 = 150$, $\Sigma y = 25$, $\Sigma y^2 = 150$, $\Sigma xy = 140$.

Q4) Attempt any two of the following:

[8 each]

- a)
 - i) Test whether the attributes A and B are independent, given that
(AB) = 256, (α B) = 768, (A β) = 48, ($\alpha\beta$) = 144.
 - ii) What is meant by association of two attributes? How is it measured?
- b)
 - i) Show that Bowley's coefficient of skewness lies between -1 and +1.
 - ii) The mean and variance of a distribution are 30 and 64 respectively and its Pearson's coefficient of skewness is 0.25, find mode and median.
- c)
 - i) What is correlation? Using scatter diagram explain various types of correlation.
 - ii) The first four moments of a distribution about the value 5 are 2, 20, 40 and 200 respectively. Find third central moment and comment upon the type of skewness.
- d) Explain the terms:
 - i) Order of a class.
 - ii) Attribute.
 - iii) Dichotomy.
 - iv) Ultimate class frequency.
 - v) Positive attribute and positive class.
 - vi) Negative attribute and negative class.

Q5) Attempt any one of the following:

- a) i) Let (X_i, Y_i) $i = 1, 2, \dots, n$ are n observations on bivariate random variable (X, Y) . Derive the equation of line of regression of Y on X. [8]
- ii) Define an index number and state its two uses. [4]
- iii) Write a short note on Kurtosis. [4]
- b) i) Karl Pearson's coefficient of correlation between X and Y obtained from 10 pairs of observations is 0.5. Means of X and Y are 12 and 15 respectively. Standard deviations of X and Y are 3 and 4 respectively. While checking it was noticed that one of the observation was wrongly entered as 16 instead of 26 for X series and as 9 instead of 18 for Y series. Calculate the correct coefficient of correlation. [8]
- ii) Show that $\beta_2 \geq 1$. [4]
- iii) Show that $V(X + Y) = V(X - Y)$ if X and Y are uncorrelated. [4]



Total No. of Questions : 5]

SEAT No. :

P676

[5017]-114

[Total No. of Pages : 4

F.Y.B.Sc.

STATISTICS / STATISTICAL TECHNIQUES
Discrete Probability and Probability Distributions
(Paper - II) (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 statistical tables and calculator is allowed.*
- 4) *Symbols have their usual meanings.*

Q1) Attempt each of the following:

- a) i) Give one real life situation where Poisson distribution can be applied. [1]
- ii) A discrete random variable (r.v.) X has mean = 5 and variance = 9. Find second raw moment of X. [1]
- iii) If $X \sim p(m)$ then state mean of X. [1]
- iv) Define a degenerate distribution. [1]
- b) Choose correct alternative for the following: [1 each]
- i) Let $P(A) = 0.6$ and $P(B) = 0.5$. If A and B are independent events then $P(A \cap B)$ is :
- A) 0.6 B) 0.5
C) 0.30 D) 0.1
- ii) If $X \sim B\left(n, p = \frac{1}{3}\right)$ and mean of X is 5 then the value of n is:
- A) 15 B) 5
C) 5/3 D) 10/3
- iii) If $P(A \cup B) = 1$, then two events A and B are:
- A) mutually exclusive B) exhaustive
C) dependent D) independent

P.T.O.

- iv) If X and Y are independent r.v.s. with c.g.f. $K_X(t)$ and $K_Y(t)$ respectively, then $K_{X+Y}(t)$ is:
- A) $K_X(t) * K_Y(t)$ B) $K_X(t)/K_Y(t)$
 C) $K_X(t) - K_Y(t)$ D) $K_X(t) + K_Y(t)$
- c) i) State the addition theorem of probability for two events A and B . [2]
 ii) If Karl Pearson's coefficient of correlation between X and Y ($\rho(x, y)$) is -0.6 , then find $\rho(-x, -y)$ [2]
 iii) Explain with an illustration, what is meant by a Bernoulli trial. [2]
 iv) Define conditional probability of an event. [2]

Q2) Attempt any four of the following: [4 each]

- a) Let X and Y are two discrete r.v.'s. Show that $E(X + Y) = E(X) + E(Y)$.
- b) Let A and B are two events defined on a sample space Ω . If A and B are independent then show that A' and B' are also independent.
- c) Define the following terms:
- i) Event,
 ii) Complement of an event,
 iii) Sure event and
 iv) Impossible event.
- d) A personnel officer knows that 25% of the applicants for a certain position are suitable for the job. What is the probability that the 4th person interviewed will be the first one who is suitable?
- e) If $P(A) = P(B) = \frac{1}{2}$ and $P(A \cup B) = \frac{2}{3}$ find
- i) $P(\text{exactly one of } A \text{ and } B \text{ occurs})$
 ii) $P(\text{none of } A \text{ and } B \text{ occurs})$.
- f) Give classical definition of probability. State the axioms of probability.

Q3) Attempt any four of the following:

[4 each]

- a) Find the m.g.f. of r.v. X having a geometric distribution with p.m.f.,
$$P(X = x) = p q^x \quad ; \quad x = 0, 1, 2, \dots, \quad 0 < p < 1, \quad q = 1-p$$
$$= 0 \quad ; \quad \text{otherwise.}$$
- b) Let $X \sim B(n, p)$. Find mean of X .
- c) If X and Y are two independent discrete r.v's with $\sigma_x = 9$ and $\text{Var}(X - 3Y) = 99$, find σ_y .
- d) The joint p.m.f. of (X, Y) is,
$$P(x, y) = K xy \quad ; \quad K > 0; \quad x = 1, 2; \quad y = 1, 2.$$
$$= 0 \quad ; \quad \text{otherwise.}$$

Find

- i) the value of K and
- ii) marginal p.m.f. of X .
- e) A die is rolled twice. If sum of upper most faces is more than 4 find the probability that both the outcomes are different.
- f) What is the probability that non-leap year should have fifty three sundays?

Q4) Attempt any two of the following:

[8 each]

- a) Obtain the mode of Poisson distribution with parameter m .
- b) State and prove binomial approximation to hypergeometric distribution.
- c) The joint probability distribution of (X, Y) is as given below:

X \ Y	0	1
0	$\frac{1}{4}$	$\frac{1}{4}$
1	$\frac{1}{8}$	$\frac{3}{8}$

Find correlation coefficient between X and Y .

- d) For a certain probability distribution if $\mu_1^1 = 5, \mu_2 = 2, \nu_1 = 1$ and $\nu_2 = 1$,
Find first four raw moments.

Q5) Attempt any one of the following:

a) i) State the p.m.f. of Poisson distribution with parameter m . Obtain c.g.f. of it and hence find variance of the distribution. **[8]**

ii) The joint p.m.f. of (X, Y) is given by,

$$P(x, y) = k(2x + 3y) \quad ; \quad k > 0; \quad x = 0, 1, 2; \\ y = 1, 2, 3. \\ = 0 \quad ; \quad \text{otherwise.}$$

Find

I) k

II) $V(X | Y = 3)$. **[2+6]**

b) i) I) State and prove Baye's theorem. **[6]**

II) Define mutually exclusive events. **[2]**

ii) The p.m.f. of X is given by,

$$P(x) = kx \quad ; \quad x = 1, 2, 3, 4, 5 \\ = 0 \quad ; \quad \text{otherwise}$$

Find

I) k

II) $P(X < 3 | X \text{ is odd})$

III) median of X .

[2 + 4 + 2]



Total No. of Questions :5]

SEAT No. :

[Total No. of Pages :2

P677

[5017] - 115

F.Y.B.Sc.

GEOGRAPHY - I

Gg 110 : Geomorphology

(New Course) (2013 Pattern) (Paper - I)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *All questions carry equal marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Use of map stencils is allowed.*

Q1) Answer the following in twenty words (Any Eight).

[16]

- a) What is astnehosphere?
- b) List the branches of physical Geography.
- c) What is Isostasy?
- d) What are 'P' Waves?
- e) What is a major Plate?
- f) How are igneous rocks formed?
- g) What is weathering?
- h) What are 'V' shaped valleys?
- i) What are moraines?
- j) What is a Pedestal rock?

Q2) Explain the following in 150 words (Any four):

[16]

- a) Division of geological time scale into eras.
- b) Temperature variations in the layers of the interior of the earth.

P.T.O.

- c) Evidences in support of the continental drift theory.
- d) Biological weathering.
- e) Types of mass movements.
- f) Cross profile of a river.

Q3) Answer the following in 150 words (Any four): **[16]**

- a) Composition of the interior of the earth.
- b) What is horst and graben structure? Explain with diagram.
- c) Discuss the types of volcanic eruptions in brief.
- d) Discuss components of a sea wave.
- e) What is a barkhan? Explain it with a neat labelled diagram.
- f) How is a sea arch formed? Explain it with a diagram.

Q4) Answer the following in 300 words: (Any two) **[16]**

- a) Define Geomorphology and discuss the importance of its study.
- b) What are crustal movement? Discuss any three types of folds.
- c) What is chemical weathering? Discuss any two types in detail.
- d) Explain the processes of sea-wave erosion.

Q5) Answer the following in 500 words: (Any one) **[16]**

What is the plate tectonics theory? Discuss its evolution and the different types of plates and plate margins.

OR

What are the three basic river mechanisms? Explain erosion and discuss any four erosional features.



Total No. of Questions :5]

SEAT No. :

[Total No. of Pages :2

P678

[5017] - 116

F.Y.B.Sc.

GEOGRAPHY - II

**Gg - 120 : Climatology and Oceanography
(2013Pattern) (Paper - II)**

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *All questions carry equal marks.*
- 3) *Draw neat diagrams wherever necessary.*
- 4) *Use of map stencil is allowed.*

Q1) Answer the following in twenty words (Any Eight).

[16]

- a) What is Insolation?
- b) What is Lapse rate?
- c) What is condensation?
- d) What do you mean by El Nino?
- e) What do you mean by pressure gradient?
- f) Define Oceanography.
- g) What is continental shell?
- h) What do you mean by Tides?
- i) What is wave length?
- j) Define submarine relief.

Q2) Explain the following in 150 words (Any four):

[16]

- a) Nature of climatology.
- b) Temperature inversion.

P.T.O.

- c) Humidity.
- d) Salinity of partially Landlocked seas.
- e) Dead sea.
- f) Causes of tides.

Q3) Answer the following in 150 words (Any four): **[16]**

- a) Importance of climatology.
- b) Albedo of the Earth.
- c) South west monsoon winds.
- d) Submerged coast.
- e) Relief structure of pacific ocean.
- f) Dalmation coast.

Q4) Answer the following in 300 words (Any two). **[16]**

- a) Explain the structure of atmosphere.
- b) Describe low clouds in details.
- c) Explain the causes of ocean currents.
- d) Explain the factors affecting distribution of salinity.

Q5) With a neat diagram explain the distribution of pressure belts over the earth's surface. **[16]**

OR

Explain nature and scope of Oceanography.



Total No. of Questions :5]

SEAT No. :

[Total No. of Pages :2

P679

[5017] - 117

F.Y.B.Sc.

MICROBIOLOGY

Introduction to Microbiology

(2013Pattern) (Paper - 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 righth indicate full marks.*

Q1) Attempt the following.

[16]

- a) What are buffers? Give two examples.
- b) Name any two diseases caused by Bacteria.
- c) Define - Nucleotides.
- d) Name any two endospore producing bacteria.
- e) Give any two ways in which Normal flora is useful to the host.
- f) Match the following-
 - i) Beadle & Tatum
 - ii) Edwadr Jenner
 - a) Plant viruses
 - b) Genes and mutation
 - c) Vaccination
- g) Fill in the Blanks-

The organs of motility in Paramecium are _____ and in Entamoeba are _____.
- h) State True or False-
 - i) Glycogen bodies are stores of carbohydrates.
 - ii) Gram negative cell wall contains high percentage of peptidoglycan as compared to Gram positive cell wall.

P.T.O.

Q2) Write short notes on Any four:- [16]

- a) Developments in chemotherapy.
- b) River's postulates.
- c) Metachromatic granules.
- d) Types of spores in Fungi.
- e) Immunoglobulins.
- f) Functions of cell membrane.

Q3) Attempt Any Four of the following. [16]

- a) Enlist any four diseases caused by Rickettsia. Name their vectors.
- b) Give a brief account of food and dairy microbiology.
- c) Give applications and advantages of Bio control agents.
- d) Discuss in brief the ICTV classification of viruses.
- e) Write short note on Medical Microbiology.
- f) State and describe germ theory of fermentation.

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

- a) Give the general characters of Bacteria. Add a note on Archae bacteria.
- b) Explain with neat labelled diagram Swan neck flask experiment by Pasteur to disprove spontaneous Generation Theory.
- c) What is RNA? Give its types, and explain their function and structure.
- d) Name the different types of bonds in Biomolecules. Explain co- valent bonds in detail.

Q5) Attempt Any One of the following. [16]

- a) Describe structure and function of flagella in bacteria.
- b) What are carbohydrates? Give its classification and describe their functions with suitable examples.



Total No. of Questions :5]

SEAT No. :

[Total No. of Pages :2

P680

[5017] - 118

F.Y.B.Sc.

MICROBIOLOGY

Basic Techniques in Microbiology

(New Course - 2013Pattern) (Paper - 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) Attempt the following.

[16]

- a) Name two examples of acidic stains.
- b) What is gaseous sterilization? Give one example.
- c) Match the following.
 - i) Peptone - 'C' Source
 - ii) Glucose - 'C' &/'N' Source
- Growth factors source.
- d) Define - Lyophilization.
- e) Define - Generation time.
- f) State true or false.
 - i) Direct microscopic count is used to enumerate viable bacteria
 - ii) Diauxic growth curve shows one log phase
- g) What are acidophiles? Give any one example of acidophilic bacteria.
- h) Define - oligodynamic action of heavy metals.

Q2) Write short notes on any four.

[16]

P.T.O.

- a) Direct microscopic count method.
- b) Cultivation of photosynthetic bacteria.
- c) Role of accentuators in staining.
- d) Phenol coefficient.
- e) Use of agar - in microbiological media.
- f) Magnification in compound microscopy.

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

- a) What is differential medium? Explain with suitable example.
- b) With neat labelled diagram explain growth phases of bacterial culture.
- c) What is culture collection centre? Give its role.
- d) Explain the mechanism of Gram's staining.
- e) Describe filtration as a method of sterilization.
- f) What are chromatic aberrations?

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

- a) With suitable diagram explain the principle of dark field microscope.
- b) Describe plate count methods for enumeration of bacteria.
- c) What is disinfection? Explain the mode of action of any two disinfectants.
- d) Explain the effect of pH and temperature on the growth of bacteria.

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

- a) What is sterilization? Explain the use of heat for sterilization.
- b) Explain nutritional requirements of micro - organisms. Give nutritional classification of bacteria with suitable examples.



Total No. of Questions :5]

SEAT No. :

[Total No. of Pages :2

P681

[5017] - 119

F.Y.B.Sc.

EXPERIMENTAL PSYCHOLOGY

General Psychology

(2013Pattern) (Paper - I)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Draw neat diagrams must be drawn whenever necessary.*
- 3) *Figures to the right side indicate full marks.*

Q1) Answer in 20 words. (8 out of 10)

[16]

- a) Define Psychology.
- b) Enlist the names of neurotransmitters.
- c) Define perception.
- d) What is frustration?
- e) What is need for achievement?
- f) State the full form of EQ.
- g) What is forgetting?
- h) State the full form of MMPI.
- i) Write the formula of IQ.
- j) What is thinking?

Q2) Answer in 50 words (4 out of 6)

[16]

- a) State the functions of Pituitary gland.
- b) Explain the motivational cycle.
- c) Illustrate approach - approach type of conflict.
- d) Explain love as a basic emotion.
- e) Explain the method of insight learning.
- f) Explain the basic concept in measurement at intelligence.

P.T.O.

Q3) Answer in 150 words (4 out of 6): **[16]**

- a) Explain the structure and function of spinal cord.
- b) Explain the perceptual illusion.
- c) State hunger as a biological motive.
- d) Explain joy as a basic emotion.
- e) Explain the logical thinking.
- f) Explain the decision making.

Q4) Answer in 300 words (2 out of 4). **[16]**

- a) Explain the structure and function of Neuron.
- b) Describe the types of attention.
- c) Describe the theories of emotion
- d) Explain the Thorndike's laws of learning.

Q5) Answer in 500 words (1 out of 2). **[16]**

- a) Explain the fields of psychology.
- b) What is personality? Explain Freud's psychoanalytical theory of personality.



Total No. of Questions :5]

SEAT No. :

[Total No. of Pages :2

P682

[5017] - 120

F.Y.B.Sc.

PSYCHOLOGY

Experimental Psychology

(2013 Pattern) (Paper - II)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

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

Q1) Answer in 20 words. (8 out of 10)

[16]

- a) Define Experiment.
- b) Define variable.
- c) State the full form of AL and DL.
- d) State the precaution of Method of Average Error.
- e) What is problem solving?
- f) Define learning.
- g) What is simple reaction time?
- h) Define Psychological test.
- i) State the formula of IQ.
- j) State the full form of DAT.

Q2) Answer in 50 words (4 out of 6):

[16]

- a) Explain the goals of experimental Psychology.
- b) State the importance of problem in experimentation.

P.T.O.

- c) State the Weber Law.
- d) Explain the performance test.
- e) Describe GATB (General Aptitude Test Battery).
- f) Describe the Test of WAIS.

Q3) Answer in 150 words (4 out of 6): **[16]**

- a) Describe the application of organizational Psychology.
- b) Explain the insight learning in problem solving.
- c) State the nature of mental image.
- d) State the importance of reaction time.
- e) State the characteristics of Psychological test.
- f) Write short note on SPM.

Q4) Answer in 300 words (2 out of 4). **[16]**

- a) Explain the history of Experimental Psychology.
- b) Explain the types of variable.
- c) Describe the types of reaction time.
- d) State the comparison of Individual and Group Test.

Q5) Answer in 500 words (1 out of 2). **[16]**

- a) What is Psycho physics? Explain the basic concepts of Psychology.
- b) Define Learning. Describe the experiment on classical conditioning and its characteristics.



Total No. of Questions : 5]

SEAT No. :

P683

[5017]-123

[Total No. of Pages : 3

F.Y.B.Sc.

ELECTRONIC SCIENCE

**EL 101: Principles of Analog Electronics
(2013 Pattern) (New Syllabus) (Paper-I)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to candidates:

- 1) *All questions are compulsory.*
- 2) *Neat and labelled diagram must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of calculator and log table is allowed.*

Q1) Answer the following questions in brief.

[16]

- a) State Thevenin's Theorem.
- b) Draw circuit symbols of
 - i) UJT
 - ii) JFET
- c) Define
 - i) CMRR
 - ii) Slew rate of OPAMP
- d) What is reactance ? Define capacitive and inductive reactance.
- e) State the essential biasing condition in order to operate transistor in active region.
- f) Give the colour code for
 - i) $47k\Omega$, 10% tolerance
 - ii) $100k\Omega$, 5% tolerance.
- g) Draw I-V characteristics of zener diode.
- h) A two stage amplifier has $AV_1 = 200$ and $AV_2 = 50$. Find the total gain in dB.

Q2) Attempt any four of the following:

[16]

- a)
 - i) What is transformer ? Draw its circuit symbol. Define efficiency of transformer.
 - ii) What is switch ? State at least two types of switches.
- b) With a neat diagram explain RC low pass filter circuit. Explain cut off frequency relation.
- c) Draw block diagram of regulated power supply. Explain function of each block in brief.

P.T.O.

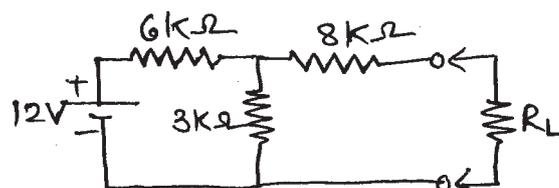
- d) Define clipper. Explain any one type of clipper circuit in brief.
- e) Explain transistor as a switch.
- f) Draw circuit diagram of OPAMP as inverting configuration. Derive the expression for its output voltage.

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

- a)
 - i) What is fuse? Explain its use in electronic equipments.
 - ii) Differentiate between primary and secondary cells.
- b) Explain concept of phase difference - Draw waveforms to show phase differences of
 - i) 0°
 - ii) 90°
 - iii) 180°
- c) Explain working of half wave rectifier. Draw input output waveforms.
- d) Give classification of amplifiers on the basis of its operating point. Explain it using d.c.load line.
- e) Draw equivalent circuit of UJT. Explain its working and define intrinsic stand off ratio.
- f) Explain schmitt trigger circuit using opamp. Derive relation for UTP and LTP.

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

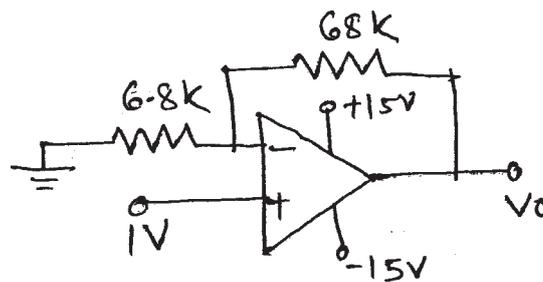
- a)
 - i) Explain fiber cable.
 - ii) What is connector? Give its two applications.
- b) Distinguish between common base and common emitter configuration of transistor.
- c) Describe operating principle of photodiode.
- d) Describe emitter characteristics of UJT. Show different regions on characteristics.
- e) Explain block diagram of opamp.
- f) Using Maximum power transfer theorem, determine the values of R_L and power delivered of the following circuit.



Q5) Attempt any four of the following.

[16]

- a) i) Two capacitors of values $10\ \mu\text{F}$ and $20\ \mu\text{F}$ are connected in series. What is its effective capacitance? Also estimate the capacitance value when connected in parallel.
- ii) A transformer is marked as 230V AC, 50 Hz, 0-9 V, 500 mA. Explain the meaning of each of them.
- b) State and prove superposition theorem.
- c) i) Draw circuit symbols of
- 1) MOSFET.
 - 2) BJT.
- ii) Explain potential divider biasing method for transistor.
- d) Explain FET as Voltage Variable Resistor (VVR)
- e) Explain how RC circuit works as integrator.
- f) Find output voltage (V_o) of following circuit.



Total No. of Questions : 5]

SEAT No. :

P684

[5017]-124

[Total No. of Pages : 2

F.Y.B.Sc.

ELECTRONIC SCIENCE

EL-102 : Principles of Digital electronics

(Paper II) (New -2013 Pattern)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat labelled diagram must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of calculator is allowed.*

Q1) Answer the following questions in brief.

[16]

- a) What is an ASCII code ?
- b) What is k-map ? Where it is used ?
- c) What is multiplexer ? Write it's application.
- d) Define half adder. Write it's truth table.
- e) Convert following numbers into 1's Complement 101101 ,100010.
- f) What is flip flop ? Write different types of flipflops.
- g) List important characteristics of logic families.
- h) State the advantages of Schottky TTL over standard TTL.

Q2) Answer any four of the following:

[16]

- a) Draw the circuit of 3-input DTL NAND gate. Explain it's action.
- b) Differentiate synchronous and asynchronous counters.
- c) Construct 8:1 multiplexer using two 4:1 multiplexers and give it's function table.
- d) Perform subtraction using 1's complement method.
 - i) $(20)_{10} - (14)_{10}$
 - i) $(45)_{10} - (22)_{10}$
- e) Draw the logic circuit and obtain the truth table for the following expression.

$$Y=AB+\bar{A}B+ABC$$

- f) With suitable example explain Gray code system.

P.T.O.

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

- a) Describe BCD to seven segment display decoder/driver.
- b) Draw the circuit of 3-bit asynchronous up counter. Write its truth table.
- c) Compare CMOS and TTL logic families.
- d) Explain NOR gate circuit with transistor.
- e) State and verify Demorgan theorem.

$$\overline{(A \cdot B)} = \bar{A} + \bar{B}$$

- f) Perform subtraction using 2's Complement method.
 - i) $(56)_{10} - (34)_{10}$
 - ii) $(69)_{10} - (41)_{10}$

Q4) Answer any four of the following. **[16]**

- a) Draw the logic symbol of full adder and write its truth table.
- b) Simplify the following logic expression using k-map.
$$Y = \bar{A} B \bar{C} D + A B \bar{C} D + A B C D + A \bar{B} C \bar{D}$$
- c) Explain application of EXOR Gate as parity checker.
- d) Explain D-Flipflop with proper diagram and truth table.
- e) Explain Decimal to BCD encoder with the help of logic diagram.
- f) Explain decade counter with proper logic circuit and truth table.

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

- a) What is logic gate ? List different logic gates.
- b) What is ring counter ? Write its applications.
- c) Design basic AND gate using only NOR gates.
- d) What is the difference between decoder and de-multiplexer.?
- e) Explain how EXOR gate can work as two bit Comparator.
- f) Explain 1:2 Demultiplexer using suitable circuit.



Total No. of Questions : 4]

SEAT No. :

P685

[5017]-125

[Total No. of Pages : 2

F.Y.B.Sc. (Annual)

DEFENCE AND STRATEGIC STUDIES

DS - 1 : Evolution of Strategic Thought

(2013-2014 Pattern) (New Course) (Paper - I)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Answer in 20 words each [Any Ten]:

[20]

- a) Who was Machiavelli?
- b) What do you mean Nationalism?
- c) By whom Arthasastra “well known literature it was wrote”?
- d) Define “Total War”.
- e) Who was the founder of Professional Army?
- f) Which theory it was introduced by Prof Mackinder?
- g) Which warfare it was adopted by Sun-tzu?
- h) Define “Geopolitics”.
- i) State the meaning of “Tactics”.
- j) By whom the theory of sea power it was introduced?
- k) Which theory it was introduced by Douhet?
- l) What do you mean by strategy?
- m) State the meaning of “Air Power”.

Q2) Answer in 50 words [Any Two]:

[10]

- a) Write few lines on “Industrial Revolution”.
- b) Explain in brief concept of geopolitics.
- c) Write a few lines on “Adam Smith”.
- d) What do you know about Haushofer?

P.T.O.

Q3) Answer in 150 words [Any Two]:

[20]

- a) Discuss in detail the “Origin of Modern War”.
- b) Write a note on “Kautilya”.
- c) Explain in brief the causes of war.
- d) Explain the views of Mao-Tse-Tung on “Guerilla Warfare”.

Q4) Answer in 300 words [Any Two]:

[30]

- a) Evaluate the geopolitical thoughts of Prof. Mackinder.
- b) Write a note on Views of Douhet on “Air Power”.
- c) Explain the elements of naval power as per A.T. Mohan.
- d) Highlight on “Impact of American Civil War”.



Total No. of Questions : 4]

SEAT No. :

P686

[5017]-126

[Total No. of Pages : 2

F.Y.B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS-2: India's National Security

(New Course) (2013 Pattern) (Paper-II)

Time : 3 Hours]

[Max. Marks : 80

Instructions to candidates:

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

Q1) Answer in 20 words each (any ten)

[20]

- a) What is National Security?
- b) When India got its sovereignty?
- c) What is meant by Insurgency?
- d) How will you differentiate terrorist and insurgent?
- e) Write the duration of Kashmir Operation.
- f) Relate threats and its abetments.
- g) Introduce ISRO.
- h) Introduce Mohammed Ali Jinnah.
- i) Define Terrorism.
- j) Who was Maharaja Hari Singh?
- k) Briefly introduce 1971 WAR.
- l) What is D- DAY?
- m) What do you mean by AWACS ?

Q2) Answer in 50 words each (any two)

[10]

- a) Write about the Kargil War.
- b) Write about the Military Operations in Hyderabad.
- c) How External elements abet to LIC? Justify.
- d) Explain about the geostrategic importance of Himalaya.

P.T.O.

Q3) Answer in 150 words (any two) **[20]**

- a) What are the constraints and compulsion in a democracy in controlling LIC ?
- b) Explain about the Indo- Pakistan relations.
- c) Explain about the role of naval power in 1971.
- d) Explain about the role of Science & Technology In defence preparedness.

Q4) Answer in 300 words (any two) **[30]**

- a) Discuss indo- Pak relation with special reference to Kashmir.
- b) Explain about the Theory of Nuclear deterrence.
- c) Explain the role of IAF in 1971 War.
- d) Explain about India's defence policy.



Total No. of Questions : 4]

SEAT No. :

P687

[5017]-127

[Total No. of Pages : 2

F.Y.B.Sc.

DEFENCE AND STRATEGIC STUDIES

**DS-3: International Security
(2013 Pattern) (Paper-III)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to candidates:

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

Q1) Answer in 20 words (any ten)

[10×2=20]

- a) State the meaning of International Security.
- b) What do you mean by National Power.
- c) Write the meaning of Arms Control.
- d) State the meaning of Neutrality.
- e) Write the meaning of National values.
- f) Define nation state.
- g) Define War.
- h) State the meaning of nationalism.
- i) Define Conflict studies.
- j) What do you mean by pacific settlement?
- k) What is Conflict Management?
- l) State the meaning of globalization.
- m) Define Balance of power.

Q2) Answer in 50 words (any two)

[2×5=10]

- a) Explain characteristics of Nation.
- b) Discuss techniques of Balance of power.
- c) Explain merits of Neutrality.
- d) Discuss principles of Non alignment.

P.T.O.

Q3) Answer in 150 words (any two)

[2×10=20]

- a) Explain demerits of Balance of power.
- b) Discuss problems of Disarmament.
- c) Discuss problems of collective security.
- d) Discuss role of U.N in Arms Control.

Q4) Answer in 300 words (any two)

[2×15=30]

- a) Discuss role of U.N in conflict resolution.
- b) Explain significance of and scope of peace and conflict studies.
- c) Write a note on India's regional security environment.
- d) Write a short note on Neutrality.



Total No. of Questions : 5]

SEAT No. :

P688

[5017]-128

[Total No. of Pages : 2

F.Y.B.Sc.

ENVIRONMENTAL SCIENCE

EVS-101: Fundamentals of Environmental Chemistry &

Environmental of Biology

(Theory) (2013 Pattern) (Paper-I)

Time : 3 Hours]

[Max. Marks : 80

Instructions to candidates:

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

Q1) Answer the followings in not more than 5 lines:

[16]

- a) Define: Equivalent weight.
- b) Write the principle of Conductivity meter.
- c) What are non-ionic detergents?
- d) Define: Environmental chemistry.
- e) State the difference between Eras & Periods.
- f) What are bryophytes and pteridophytes.
- g) Write aim of Taxonomic principles
- h) What are Halophytes? Give one example.

Q2) Answer any four of the following:

[16]

- a) Explain theory of survival of fittest.
- b) Describe Biographical profile of India.
- c) Discuss morphological & biological concept of species.
- d) Explain Sulphur- Oxides chemistry in atmosphere .
- e) Discuss food adulterants properties & their effects.
- f) Describe microbial transformation of Hydrocarbons and Iron.

P.T.O.

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

- a) Green Chemistry.
- b) Phosphorus cycle with diagram.
- c) Human exposure to heavy metals- Absorption & influence.
- d) Linnaeus System of Classification.
- e) Ecological adaptations of Hydrophytes.
- f) The concept of species in Taxonomy.

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

- a) Explain the various interactive reactions occurring between segments of environment.
- b) Describe the various food additives and their effects.
- c) Explain classification of Animals based on form.
- d) Describe major food plants of world & India.

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

- a) Describe major forest types of India.
- b) Explain in detail chemistry of Cd & Arsenic.



Total No. of Questions : 5]

SEAT No. :

P689

[5017]-129

[Total No. of Pages : 2

F. Y. B.Sc.

ENVIRONMENTAL SCIENCE

**EVS-102: Fundamentals of Environmental Geosciences & Fundamentals of Environmental Pollution
(2013 Pattern) (paper-II) (New course)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Answer the following in not more than 5 lines:

[16]

- a) What is Metamorphism?
- b) Name the instrument used to measure Atmospheric temperature.
- c) Write the composition of soil.
- d) What is Earthquake ?
- e) Define: Pollutant and give one example.
- f) Mention any two benefits of organic farming.
- g) Write the sources of Radioactive pollution.
- h) State the difference between Biodegradable and non-biodegradable waste.

Q2) Answer any four of the following

[16]

- a) Define precipitation and explain the factors affecting on it.
- b) Describe the causes, effects and control measures of flood.
- c) What is temperature inversion ? Describe any 3 types of it.
- d) Enlist major air pollutants and explain case study of London smog.
- e) Describe the sources and effects of pesticide accumulation with examples.
- f) Explain the effects of noise on living & non- living things.

P.T.O.

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

- a) Plate Tectonic theory.
- b) Soil profile with diagram
- c) Significance of Solar and wind energy.
- d) Green house effect.
- e) Effects of Soil pollution on soil quality.
- f) Appropriate irrigation and drainage techniques.

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

- a) Describe the factors affecting rate of condensation.
- b) Explain soil formation process in detail.
- c) Discuss the effects of solid waste pollution with suitable case study.
- d) Explain effects of thermal air pollution on physical and biological environment.

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

- a) What do precipitation mean ? Explain the factors affecting it. Describe the different forms of precipitation.
- b) Explain Biofertilisers with respect to definition, types and significance.



Total No. of Questions : 4]

SEAT No. :

P690

[Total No. of Pages : 2

[5017] - 130
F.Y. B.Sc.
FOUNDATION COURSE
Restructuring
(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.*

Q1) Explain the following concept in 50 words. (Any two) **[10]**

- | | |
|---------------------------|-------------------------|
| a) Hypothesis | b) Privatization |
| c) Co-operative Movements | d) National Integration |

Q2) Write the following short notes in 100 words. (Any four) **[20]**

- | | |
|------------------------|-----------------------|
| a) National values | b) Scientific methods |
| c) Women - Empowerment | d) Globalization |
| e) Society | f) Nation |

Q3) Write the answer of the following in 200 to 250 words each (Any Three)[30]

- a) Write note on Human Right and Responsibility.
- b) Write the causes of Indian Regionalism.
- c) Give the note on Indian Economy.
- d) Describe the scientific methods.

Q4) Write answer of Any one of the following in 500 words : **[20]**

- a) Give an account of Indian Religion.
- b) Write the merits and Demerits of Democracy.



[P.T.O.]

Total No. of Questions : 4]

P690

[5017] - 130

F.Y. B.Sc.

पायाभुत अभ्यासक्रम
Restructuring
(2013 Pattern)
(मराठी रूपांतर)

वेळ : 3 तास]

[एकूण गुण : 80

- सूचना :- 1) सर्व प्रश्न सोडविणे आवश्यक आहेत.
2) उजवीकडील अंक पूर्ण गुण दर्शवितात.
3) संदर्भासाठी मूळ इंग्रजी प्रश्नपत्रिका पहावी.

-
- प्रश्न 1) पुढील संकल्पना 50 शब्दात स्पष्ट करा. (फक्त दोन) [10]
अ) गृहितके ब) खाजगीकरण
क) सहकारी चळवळी ड) राष्ट्रीय एकात्मता
- प्रश्न 2) पुढील टिपा प्रत्येकी 100 शब्दात लिहा. (फक्त चार) [20]
अ) राष्ट्रीय मूल्ये ब) वैज्ञानिक पद्धती
क) महिला सबलीकरण ड) जागतिकीकरण
इ) समाप्त ई) राष्ट्र
- प्रश्न 3) पुढील प्रश्नांची उत्तरे 200 ते 250 शब्दात (फक्त तीन) लिहा. [30]
अ) मानवी हक्क व कर्तव्य लिहा.
ब) भारतातील प्रदेशिक वादाची कारणे.
क) भारतीय अर्थव्यवस्थेवर थोडक्यात चर्चा करा.
ड) वैज्ञानिक पद्धतीवर चर्चा करा.
- प्रश्न 4) पुढीलपैकी एका प्रश्नाचे उत्तर 500 शब्दात लिहा. [20]
अ) भारतीय धर्मावर सविस्तर चर्चा करा.
ब) लोकशाहीचे गुण व दोष स्पष्ट करा.



Total No. of Questions : 10]

SEAT No. :

[Total No. of Pages : 3

P691

[5017]-131

F.Y.B.Sc

INDUSTRIAL CHEMISTRY

Surface Chemistry and Catalysis

(Vocational) (New) (2013 Pattern) (Paper-I)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

SECTION-I

Q1) Define and explain the following forms. **[8]**

- a) Adsorbent.
- b) Gold number.
- c) Auto catalysis.
- d) Sol.

Q2) Answer any two of the following **[8]**

- a) State and explain the Tyndall effect.
- b) Explain the properties of gel.
- c) State and explain Freundlich adsorption isotherm.

Q3) Answer any two of the following **[8]**

- a) 'Enzyme catalysis is highly specific and selective'. Explain.
- b) Write a short note on colloidal dispersion.
- c) What are kinetic properties of solutions.

P.T.O.

- Q4)** Answer any one of the following: [8]
- a) Give a detailed account of Adsorption theory of Catalysis.
 - b) Explain phenomenon of :
 - i) Electrophoresis.
 - ii) Electroosmosis.

- Q5)** Answer any two of the following: [8]
- a) Give the mechanism of enzyme catalysis as suggested by Michaelis and Menton.
 - b) Write a short note on Coagulation.
 - c) Explain active centers on catalyst surface.

SECTION-II

- Q6)** Answer the following: [8]
- a) Define and explain Gram atom.
 - b) What is an isobaric process? Explain.
 - c) Define volume percent.
 - d) How many atoms are present in 112g of Nitrogen.

- Q7)** Answer any two of the following. [8]
- a) Write a note on recycling and by- passing operations.
 - b) Explain the enthalpy change for mixture of gases.
 - c) Explain material balance involved in drying.

- Q8)** Answer any two of the following. [8]
- a) Give the aspects of process flow sheet.
 - b) Write a short note on heat of formation.
 - c) Write a short note on adiabatic process.

- Q9)** Answer any one of the following. [8]
- a) What is a system? Classify different types of systems. Determine energy balance on closed system.
 - b) State and explain Gibb's phase rule. How it is applied to one component system.

Q10) Solve any two of the following: **[8]**

- a) 5.5 kg of O_2 contained in a closed container of volume 1 m^3 is heated without exceeding a pressure of 7 atmosphere. Calculate the maximum temperature of gas attained.
- b) 49 gms of sulphuric acid is dissolved in water to prepare 500 ml of solution. Find normality and molarity of the solution.
- c) What is the strength of Na_2CO_3 solution in gm/ lit. If 10gm of Na_2CO_3 is dissolved in 200 ml solution?



Total No. of Questions : 6]

SEAT No. :

[Total No. of Pages : 2

P692

[5017]-132

F. Y. B.Sc. (Vocational)

BIOTECHNOLOGY

**Voc.Biotech-101 : Biochemistry and Microbiology
(New Syllabus) (2013 Pattern) (Theory) (Paper-I)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Use separate-Answerbook for section-I and section-II*
- 3) *Figures to the right indicate full marks.*

SECTION-I

(Biochemistry)

Q1) Answer the following questions in short. **[8]**

- a) What are enzymes? Give example.
- b) Give composition of nucleotide.
- c) What are phospholipids? Give example.
- d) Define epimers.

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

- a) What are lipoproteins ? Give classification of lipoproteins.
- b) Explain the effect of pH on enzyme activity.
- c) Describe the structure of tRNA.
- d) Enlist the functions of proteins.
- e) Explain β -oxidation of palmitic acid.

Q3) Answer any two of the following **[16]**

- a) Explain glycolysis with respect to energetics and features.
- b) Explain the physical properties of lipids. Write a note on saponification reaction of lipids.
- c) Describe the DNA model proposed by Watson and Crick.

P.T.O.

SECTION-II
(Microbiology)

Q4) Answer following questions in short. **[8]**

- a) Define mutualism. Give one example of mutualism.
- b) Name any two phosphate solubilizing organisms.
- c) What are thermophiles? Give example.
- d) State any two Koch's postulates.

Q5) Attempt any four of the following **[16]**

- a) What is pure culture? Describe a technique of pure culture.
- b) Differentiate between prokaryotic and eukaryotic organisms.
- c) Write a note on biofilm formation.
- d) Capsule staining is considered as negative staining! Explain
- e) What is quorum sensing ? Explain in brief about quorum sensing.

Q6) Answer any two of the following. **[16]**

- a) Discuss why coliforms are used as indicator bacteria in bacteriological analysis of water. Explain method used for performing presumptive test.
- b) Enlist various differential staining processes. Explain any one differential staining process in detail.
- c) With help of suitable diagrams describe morphology of bacterium and bacteriophage.



Total No. of Questions :5]

SEAT No. :

P2199

[5017]-133

[Total No. of Pages :2

F.Y.B.Sc. (Vocational)

PHOTOGRAPHY & AUDIO-VISUAL PRODUCTION

Basic Photography and Appreciation of Media

(Paper - 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 labeled diagrams wherever necessary.*

Q1) Answer the following:

[16]

- a) What does ISO mean?
- b) Write down two equivalent exposures for f 11 @ 1/125 sec.
- c) What information is provided by the viewfinder of a DSLR camera?
- d) Why do you need the mirror in the DSLR camera?
- e) Explain what do you mean by a blurred image.
- f) What is the function of the focusing screen in a DSLR camera?
- g) What is the difference between refraction and diffraction of light?
- h) Draw a diagram and explain the concept of total internal reflection of light.

Q2) Answer ANY FOUR of the following:

[16]

- a) Explain the term 'amateur photographer'.
- b) Compare the focal plane shutter and the leaf shutter.
- c) Draw a diagram and explain the concept of magnification of an image.
- d) Draw a diagram and explain the chromatic aberration. How is it reduced?
- e) How is a photographic image analyzed technically?

P.T.O.

Q3) Answer ANY FOUR of the following: [16]

- a) Draw a diagram and show the working of a focal plane shutter at slow shutter speeds.
- b) Draw a diagram and explain what do you mean by the ‘distortions’ produced by a simple lens. How are the distortions reduced?
- c) What do you mean by f number? Write down the f number scale. What is a full stop, half stop and intermediate stop?
- d) Give suitable examples and differentiate between a ‘news’ and a ‘photo news’.
- e) Give suitable examples and differentiate between a ‘public place’ and a ‘private place’ as understood by a photographer.

Q4) Answer ANY TWO of the following: [16]

- a) How important is photography in various walks of life?
- b) How would you analyze photography and as a medium of mass communication.
- c) Discuss the role of a photographic image in the print media.

Q5) Answer ANY ONE of the following: [16]

- a) Discuss any four elements of composition. Draw suitable sketches for supporting your discussion.
- b) Draw a neat and labeled diagram and describe the construction and working of a DSLR camera.

EEE

Total No. of Questions : 5]

SEAT No. :

P693

[5017]-134

[Total No. of Pages : 2

F.Y.B.Sc. (Vocational)

ELECTRONIC EQUIPMENT MAINTENANCE (EEM)

Maintenance Concepts, Instruments and Appliances

(Paper - I) (New Course) (2013 Pattern)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Attempt all of the following.

[16]

- a) What is MTBF ?
- b) What are different types of failures ?
- c) What are different parts of PMMC meter ?
- d) If the PMMC meter resistance is 100Ω & full scale deflection current is 1mA calculate the shunt resistance to measure 10mA current.
- e) What is precision of the instrument? If voltmeter measures five readings: 97, 95, 96, 94 & 93. What is precision of voltmeter?
- f) What is loading effect of instrument?
- g) What is basic difference between AF signal generator & RF signal generator?
- h) What is function of magnetron in microwave oven?

Q2) Attempt any FOUR of the following:

[16]

- a) What is reliability of a component or an instrument with a suitable example.
- b) What is redundancy of a system? Explain with suitable examples.
- c) Explain the working of series type ohmmeter.

P.T.O.

- d) What are the advantages of SMPS over linear power supply ?
- e) What are diff - faults in hearing aids ?

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

- a) Explain the working DC voltmeter. If $R_m=100\Omega$, $I_m=1\text{mA}$, convert PMMC meter into voltmeter of range 0-100V by selecting series Resistance R_s .
- b) What is meggar? Explain it with suitable circuit arrangement.
- c) Write a short note on digital voltmeter.
- d) Explain the working of single trace Oscilloscope.
- e) Write a short note on : Electronic ignition system.

Q4) Attempt any TWO of the following: [16]

- a) Explain the working of RF signal generator with its block diagram.
- b)
 - i) Explain the working of AC ammeter.
 - ii) Explain the working of AC voltmeter.
- c) Explain the working of Automatic electric Iron.

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

- a) Explain the working of digital multimeter.
- b)
 - i) Explain the different parts of electric geyser.
 - ii) Explain the concept of auto ranging.
- c) Explain the working of fully automatic washing machine with its block diagram.

✓ ✓ ✓

Total No. of Questions : 5]

SEAT No. :

P694

[5017]-135

[Total No. of Pages : 2

F.Y.B.Sc. (Vocational)

INDUSTRIAL MICROBIOLOGY

Microorganisms and Systems for Fermentation Processes

(Paper - I) (Theory) (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) *All questions carry equal marks*
- 4) *Draw neat labeled diagrams wherever necessary.*
- 5) *A calculator is allowed.*

Q1) Answer each sub-question in one or two lines; Fill in the blanks; State whether the statement is true or false **[16]**

- a) What is Bergeys manual of determinative bacteriology ?
- b) What are GMM? Give example.
- c) How many significant digits are there in 15.0067?
- d) A perfect vacuum corresponds to an absolute pressure of -----
- e) Define, 'Accuracy'
- f) Name any two culture collection center
- g) *Ashbya gossypii* is natural overproducer of Riboflavin or Vitamin B₁₂. (True/False)
- h) Which scale is used for measurement of salt concentration in brine ?

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

- a) What is culture collection? What is their role in Industrial Microbiology?
- b) Draw the flow chart of production process in typical industrial microbiology establishment.
- c) Discuss the different meanings of word 'Fermentation'

P.T.O.

- d) Give an account of Intellectual property rights in industrial microbiology
- e) What is error in Measurements? How is it classified?
- f) Calculate the height in inches and aspect ratio of the fermenter having radius 4.5 inches and volume 1000 cubic inches. (Given $\Pi = 3.14$)

Q3) Write short note on any FOUR of the following **[16]**

- a) Physical variables.
- b) Generally regarded as safe microbes.
- c) Fungi in industrial microbiology.
- d) Methods of bacterial culture preservation.
- e) Strain improvements.
- f) Stoichiometry.

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

- a) Explain ideal characteristics of strains used in fermentation.
- b) Explain the process of development of pharmaceutical product.
- c) Explain the WHO's classification of microorganisms on the basis of hazards.
- d) The bio-burden of manufacturing area was investigated by exposing on 10 nutrient agar plates. The settling velocity (CFU/s/cm²) calculated for each plate was as follows: 0.026; 0.078; 0.087; 0.062; 0.016; 0.045; 0.065; 0.043; 0.088; 0.067. Calculate average settling velocity and standard deviation.

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

- a) Explain different methods for presentation of data with diagrams wherever applicable.
- b) What are model? Explain different components of a model. Draw a flowchart for cyclic process of model construction, verification and application.

✓ ✓ ✓
2

Total No. of Questions : 5]
P695

SEAT No. :

[Total No. of Pages : 2

[5017]-136

F.Y.B.Sc. (Vocational)

COMPUTER HARDWARE & NETWORK ADMINISTRATION

Essentials of Computers

(Paper - I) (2013 Pattern) (78710)

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 diagrams wherever necessary.*

Q1) Attempt the following:

[16]

- a) What is flash memory ?
- b) What is BIOS ?
- c) Why Hard disc drive is a fixed disc kind of a drive ?
- d) What is USB ?
- e) What is instruction prefetch ?
- f) Write full forms of : UPC, EBCDIC, ALU, MODEM.
- g) What is MOUSE?
- h) Define Microprocessor.

Q2) Attempt any FOUR:

[16]

- a) What is SIMM/DIMM ? Explain their need.
- b) Distinguish between Dot Matrix / Inkjet printer.
- c) Write in short about computer generations.
- d) Write a short note on: MICR Scanner.
- e) Give details of the components connected to motherboard.
- f) Write short note on RAM.

P.T.O.

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

- a) Write a short note on LASER printer.
- b) What is packing of microprocessor ? How the cooling is achieved ?
- c) What is Clock ? How it is obtained in computer ?
- d) What is formatting ? What are different utility tools in computer ?
- e) Explain bus structure in computer.
- f) Explain CD - ROM.

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

- a) Write a note on Memory for computer giving details of Auxillary and Main Memory.
- b)
 - i) How sound is generated for the computer to be produced from mike ?
 - ii) Comment on characteristics of computer.
- c) Explain offline and online UPS.

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

- a) Write a note on Displays. What is VDU ?
- b)
 - i) Write a short note on DMA.
 - ii) What is digitizer ?
- c) Write notes on
 - i) Cables & connectors
 - ii) Front & rare panel of CPU

✓ ✓ ✓

Total No. of Questions :[5]

SEAT No. :

P696

[5017]-137

[Total No. of Pages : 2]

F. Y. B.Sc. (Vocational)

SEED TECHNOLOGY

Morphology, Plant Breeding and Testing for Cultivar Genuineness

(Paper - I) (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) *Draw neat labeled diagrams wherever necessary.*

Q1) Answer in two lines (Any eight)

[8×2=16]

- a) Which are the essential whorls of a typical flower ?
- b) Give an example of berry type of fruit.
- c) What is natural vegetative propagation ?
- d) Give any two objectives of plant breeding.
- e) Write any two merits of plant introduction
- f) Give any two differences between seed and grain
- g) What are mutagens ?
- h) What is phenol colour test ?
- i) Define embryo culture.

Q2) Attempt any FOUR of the following

[4×4=16]

- a) Describe flower of okra in detail.
- b) Discuss on sexual reproduction in plants.
- c) Give the contrivances in cross pollination.
- d) Comment on multiplication activity in plant breeding.
- e) Write applications and limitations of mutation breeding.

P.T.O.

Q3) Write notes on any FOUR of the following.

[4×4=16]

- a) Development of male gametophyte.
- b) L.S. of Ovule
- c) Development of dicot embryo
- d) Important achievements of plant introduction
- e) Electrophoresis

Q4) Attempt any TWO of the following

[2×8=16]

- a) Define fertilization. Comment on the process of fertilization in angiosperms.
- b) Describe legume and capsule type of fruits with suitable examples and diagrams.
- c) What is hybridization? Comment on intervarietal and distant hybridization.

Q5) Write the diagnostic characters, floral formula and floral diagram of families Solanaceae and Poaceae **[16]**

OR

Define mass selection. Write procedure, advantages, disadvantages and achievements of mass selection.

✓ ✓ ✓

Total No. of Questions :10]

SEAT No. :

P697

[5017]-138

[Total No. of Pages : 3

**F.Y.B.Sc. (Vocational)
INDUSTRIAL CHEMISTRY-II
(2013 Pattern) (Paper -II) (New)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

SECTION-I

Q1) Answer the following: [08]

- a) Give two advantages of solid fuels.
- b) Give any two properties of coke.
- c) What is sweetening of gasoline? Give one example.
- d) Give any two uses of kerosene.

Q2) Answer any TWO of the following: [08]

- a) Describe the synthesis of Bio - gas.
- b) Write a short note on coal - tar and its composition.
- c) Explain the classification of fuels.

Q3) Answer any TWO of the following: [08]

- a) Write a note on water gas.
- b) Write a note on natural solid fuels.
- c) Give a brief account of fractional distillation of coal oil.

P.T.O.

Q4) Answer any ONE of the following: [08]

- a) Differentiate between thermal and catalytic cracking.
- b) Give a comparative account of proximate and ultimate analysis of coal.

Q5) Answer any TWO of the following: [08]

- a) What is calorific value? Give the method for determination of calorific value.
- b) Give a brief account of the petrochemicals derived from alkanes.
- c) Write a descriptive account of the manufacture and treatment of coke-oven gas.

SECTION-II

Q6) Answer the following: [08]

- a) What is meant by leaching of ores?
- b) Define what is an ore and alloy, giving one example each.
- c) Give the names of two varieties of mica and list its uses.
- d) What is a slag ? Give examples.

Q7) Answer any TWO of the following: [08]

- a) Describe the process of magnetic concentration of an ore.
- b) Describe extraction of silver by hydrometallurgy.
- c) Write a short note on clay.

Q8) Answer any TWO of the following: **[08]**

- a) What are silicates ? Discuss structure and properties of different silicates.
- b) Give a detailed account of different allotropes of carbon.
- c) What is ore - dressing ? Describe the process of extraction of an ore by froth floatation.

Q9) Answer any ONE of the following: **[08]**

- a) What is refining of ores? Describe in detail processes used for refining.
- b) Give an account of thermodynamics of reduction.

Q10) Answer any TWO of the following: **[08]**

- a) What is metallurgy ? Give the divisions of metallurgy.
- b) Discuss in brief kinetics of roasting.
- c) Write a short note on asbestos.

✓ ✓ ✓

Total No. of Questions : 6]

SEAT No. :

P698

[5017]-139

[Total No. of Pages : 3

F.Y.B.Sc. (Vocational)

BIOTECHNOLOGY

**Voc. Biotech. - 102 : Biophysics, Instrumentation and Mathematics,
Statistics, Computer for Biologists
(2013 Pattern) (New Syllabus) (Theory) (Paper - II)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Use separate Answer book for section I & II.*
- 3) *Figures to the right indicate full marks.*

SECTION - I

(Biophysics and Instrumentation)

Q1) Answer the following in short:

[8]

- a) State the Beer's law.
- b) Define centrifugation.
- c) Give principle of electrophoresis.
- d) Enlist the components of lens system of compound microscope.

Q2) Answer Any Four of the following:

[16]

- a) What is Chromatography? Explain principle and working of thin layer chromatography.
- b) Differentiate between nephelometer and turbidometer.
- c) Describe darffield microscopy in brief.
- d) Explain the working of spectrophotometer.
- e) Describe the technique of paper electrophoresis.

P.T.O.

Q3) Answer any Two of the following: [16]

- What are radioisotopes? Discuss the role of radioisotopes in biological sciences.
- Explain the principle of ion-exchange Chromatography. Give its applications.
- Describe IR spectroscopy. Give applications of IR spectroscopy in biological sciences.

SECTION - II

(Mathematics, Statistics and Computer for Biologists)

Q4) Answer the following questions in short: [8]

- What is histogram?
- Enlist input devices of personal computer.
- Evaluate $\lim_{x \rightarrow 1} \frac{x^3 - 1}{x - 1}$.
- If $y = \sin(\log x)$, find $\frac{dy}{dx}$.

Q5) Answer any four of the following: [16]

- Explain student-t test with suitable example.
- What is correlation? Discuss positive correlation with suitable example.
- Evaluate $\int \frac{2x+1}{\sqrt{x^2+x+5}} dx$.
- If $\theta = \frac{\pi}{2}$, then find $\cos(\theta + \pi)$ and $\sin\left(\theta + \frac{3\pi}{2}\right)$.
- If $f(x) = \begin{cases} \frac{x^2-9}{x-3} & \text{if } x \neq 3 \\ 10 & \text{if } x = 3 \end{cases}$, then find $\lim_{x \rightarrow 3} f(x)$. Is $\lim_{x \rightarrow 3} f(x) = f(3)$?

Q6) Answer any two of the following:

[16]

- a) What is sampling? Describe various methods of sampling.
- b) Give applications of computer in industry.

c) i) Find limit of the sequence $\left\{ \frac{\sin n}{n} \right\}_{n=1}^{\infty}$.

ii) Discuss the convergence of the series $\sum_{n=0}^{\infty} \left(\frac{2}{3} \right)^n$.

- d) i) If n is a positive integer then prove that

$$\binom{n}{0} + \binom{n}{1} + \dots + \binom{n}{n-1} + \binom{n}{n} = 2^n,$$

where $\binom{n}{r} = \frac{n!}{(n-r)!r!}, 0 \leq r \leq n$.

ii) If $y = \frac{\sin(\log(\sqrt{x} + e^x))}{\tan x + 2^x}$, then find $\frac{dy}{dx}$.



Total No. of Questions :5]

SEAT No. :

P2200

[5017]-140

[Total No. of Pages :2

F.Y.B.Sc. (Vocational)

PHOTOGRAPHY & AUDIO-VISUAL PRODUCTION

**Introduction to Mass Communication and Media Scene in India
(2013 Pattern) (Paper - II)**

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

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

Q1) Attempt any two of the following:

[16]

- a) Illustrate the different barriers in communication.
- b) Explain with suitable examples the definition of 'communication'.
- c) Write short note on:
 - i) Difference between verbal communication and non-verbal communication.
 - ii) Inverted Pyramid.

Q2) Attempt any four of the following:

[16]

- a) Explain Aristotle's model of communication.
- b) Explain the meaning of intra-personal communication.
- c) You have to take an interview of a sports person who has been awarded *Padmashree*. What questions will you ask him / her?
- d) Explain with examples the meaning of moral policing.
- e) What is the difference between group communication and mass communication?

P.T.O.

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

- a) What are the different content types? Give examples.
- b) Explain with examples the importance of 5W and 1H questions in the context of news writing.
- c) Explain some of the restrictions posed by law on the content.
- d) Illustrate the Bharatshastra's model of communication.
- e) Explain the importance of language in communication.

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

- a) Explain how communication impacts the audience.
- b) Write a news report of about 100 words on a bank robbery that occurred on Gokhale Road. You can imagine the details and write.
- c) What are the merits and demerits of radio as a medium of mass communication.

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

- a) Explain the importance of photographs in newspapers and what precautions you would take while publishing the photographs.
- b) Write short notes on:
 - i) Three stages of inter-personal communication.
 - ii) One-to-one communication.
- c) Draw the block diagram of Shanon and Weaver model of communication and explain each block.

EEE

Total No. of Questions :5]

SEAT No. :

P699

[5017]-141

[Total No. of Pages : 2

F.Y.B.Sc. (Vocational)

ELECTRONIC EQUIPMENT AND MAINTENANCE

Electronic Components, Circuit And Equipment Assembly

(2013 Pattern)(Paper -II)

Time : 3 Hours]

Max. Marks : 80

Instructions to the candidates:

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

Q1) Attempt the following questions.

[16]

- a) Explain uses of resistors in circuits any two.
- b) Explain the use of capacitors in Electronic circuits.
- c) Name different types of transformers any four.
- d) Explain the use of MCB.
- e) Explain the use of contactor.
- f) Explain the term absolute maximum rating.
- g) Explain the importance of LEDS for lighting.
- h) Explain the use of circuit diagram.

Q2) Attempt any FOUR of the following.

[16]

- a) Explain the use of Inductors in Electronic circuits.
- b) Explain common faults that occur in Resistances.
- c) Explain the importance of data sheets.
- d) Explain Amp - Hour in Electrochemical cells.
- e) Draw circuit symbols of different component and name them minimum 6.

P.T.O.

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

- a) Explain the use of bread board, and also draw its internal connections.
- b) Explain use of different types of PCBS.
- c) Explain use of good and bad solder Joints.
- d) Explain the Importance of shielding and grounding.
- e) Explain different types of cables.

Q4) Attempt any TWO of the following: [16]

- a) Name different types of earthing and explain plate earthing with diagram.
- b) Explain SMD and also explain assembling technique for SMD.
- c) With the help of a neat diagram explain front and rear view of panel.

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

- a) Explain causes and remedies of dry solder.
- b) With the help of a neat diagram explain wiring of a fan regulator and fan.
- c) Explain different types of enclosures used in industry also explain NEMA enclosure.

✓ ✓ ✓

Total No. of Questions : 5]

SEAT No. :

P700

[5017]-142

[Total No. of Pages : 2

**F.Y.B.Sc. (Vocational)
INDUSTRIAL MICROBIOLOGY
Industrial Processes and Products
(Theory) (Paper - II) (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) *All questions carry equal marks.*
- 4) *Draw neat labeled diagrams wherever necessary.*
- 5) *Scientific calculators are allowed.*

Q1) Answer the following

[16]

- a) Name any two natural food preservatives.
- b) Write role of restriction enzymes in recombinant DNA technology.
- c) Name any two antibiotic producers.
- d) Name any two secondary metabolites produced in fermentation industry.
- e) What is seed investment?
- f) Write examples of probiotic organisms.
- g) Write elemental formula of microbial cell.
- h) Write the applications of monoclonal antibodies.

Q2) Attempt any FOUR of the following:

[16]

- a) Explain the properties of ideal antifoam agent.
- b) Enlist advantages of metabolic engineering.
- c) Explain the role of enzymes in leather industry.
- d) Discuss any two carbon sources used in industrial fermentation process.
- e) Enlist various critical tests for CEO of company.
- f) Explain need of construction of business plan.

P.T.O.

Q3) Write short note on any FOUR of the following **[16]**

- a) Activated sludge plant.
- b) Patent .
- c) Competitive advantage.
- d) Airlift bioreactor.
- e) Process economics.
- f) Operating cost

Q4) Answer any TWO of the following **[16]**

- a) Write a note on industrial acetic acid production with reference to substrates & organisms involved in the production process.
- b) What is capital cost? Explain capital cost estimates.
- c) With the help of neat and labeled diagram explain function of bioreactor in biotechnology industry.
- d) Enlist the factors affecting design and optimization of fermentation system.

Q5) Answer any ONE of the following **[16]**

- a) Define strain improvement? Explain any five advantages of metabolic engineering in detail.
- b) Discuss in detail the 'Industrial fermentation media'.

✓ ✓ ✓

Total No. of Questions : 5]

SEAT No. :

P701

[5017]-143

[Total No. of Pages : 2

F.Y.B.Sc. (Vocational)

COMPUTER HARDWARE & NETWORK ADMINISTRATION

Computer Organisation (Hardware & Software Aspects)

(2013 Pattern) (Paper-II) (78720)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Attempt the following

[16]

- a) Define LAN.
- b) What is HDMI?
- c) Define Assembler.
- d) What is simulator?
- e) Explain firmware with example.
- f) List different segment registers of 8086.
- g) What is debugger?
- h) Explain flag register of 8086.

Q2) Attempt any FOUR :

[16]

- a) Explain any two logical instructions of 8086.
- b) Write notes on ANDROID Operating System.
- c) Write notes on Wi-Fi System.
- d) Define Math coprocessor.
- e) Explain main functions of Operating System.
- f) What is multimedia?

P.T.O.

Q3) Attempt any FOUR:

[16]

- a) Explain application software with examples.
- b) Define algorithm with example.
- c) What is Tri state buffer.
- d) Define System Software.
- e) Write notes on microprocessor.
- f) Draw and explain different symbols used in flow chart.

Q4) Answer any TWO :

[16]

- a) Explain logical system architecture of computer with block diagram.
- b) Explain different network topologies in detail.
- c) Define
 - i) POST.
 - ii) Emulator.

Q5) Attempt any TWO

[16]

- a) Explain Network Operating System and its main functions.
- b) Explain data transfer and arithmetical instructions of 8086.
- c) Define
 - i) Internet.
 - ii) Control panel of window.

✓ ✓ ✓

Total No. of Questions : 5]

SEAT No. :

P702

[5017]-144

[Total No. of Pages : 2

F.Y.B.Sc. (Vocational)

SEED TECHNOLOGY

Seed Physiology and Seed Production

(Paper-II) (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) *Draw neat labeled diagrams wherever necessary.*

Q1) Attempt the following (Any Eight).

[8×2=16]

- a) What is seed deterioration?
- b) Define seed germination.
- c) What is seed longevity?
- d) Define seed vigour.
- e) What are breeder's seeds?
- f) What is isolation distance?
- g) Enlist different types of nursery beds.
- h) Define roguing.
- i) Define genetic purity of seed.

Q2) Attempt any FOUR of the following :

[4×4=16]

- a) Give the compositions of seed storage.
- b) Comment on biological changes during seed germination.
- c) Explain various factors affecting seed vigour.
- d) Comment on State Seed Corporation and its objectives.
- e) Explain various methods involved in evaluation and release of new variety.
- f) Comment on land requirement and cultural practices in seed production.

P.T.O.

Q3) Write notes on any FOUR of the following:

[4×4=16]

- a) Physiology of seed development.
- b) Synthetic seeds.
- c) Short term and long term seed storage.
- d) Importance of drainage.
- e) Care during harvesting and threshing.
- f) Sources of irrigation.

Q4) Attempt any TWO of the following.

[2×8=16]

- a) Define seed germination. Explain types of seed germination.
- b) Comment on seed aging and seed deterioration.
- c) Explain, seed as a basic input in agriculture.
- d) Describe different methods of sowing.

Q5) Define seed dormancy? Explain different causes and methods to break seed dormancy. **[16]**

OR

Give causal organism, symptoms, disease cycle and control measures for jowar smut.

✓ ✓ ✓