

Total No. of Questions :5]

SEAT No. :

P344

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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 the right indicate full marks.*

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

- a) Let $X = \{a, b, c\}$ and $R = \{(a, a), (b, b), (a, b), (a, c)\}$ be a relation on X . Is R an equivalence relation? Justify your answer.
- b) Let $a, b, c \in \mathbb{Z}$. If $a|b$ and $b|c$, then prove that $a|c$.
- c) Use remainder theorem to compute the remainder when $f(x) = x^4 - 3x^3 - 7x^2 - 2$ is divided by $g(x) = x - 2$.
- d) Find the eigen values of a matrix $A = \begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$.
- e) If A is non-singular matrix and λ is an eigen value of A , then prove that $\frac{1}{\lambda}$ is an eigen value of A^{-1} .
- f) Determine the nature of conic $5x^2 + 6xy + 5y^2 - 10x - 6y - 3 = 0$.
- g) Find the angle between the planes $2x - y + 2z + 1 = 0$ and $3x + 2y + 6z - 5 = 0$
- h) Find the equations of a line joining the points $(-2, 1, 3)$ and $(3, 1, -2)$
- i) Find the equation of tangent plane to the sphere $x^2 + y^2 + z^2 = 14$ at a point $(1, 2, 3)$ on it.
- j) Define right circular cone.

P.T.O.

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

- a) Prove that congruence relation modulo m in Z is an equivalence relation.
- b) Prove that $\sqrt{3}$ is not a rational number.
- c) Prove that $(x - \alpha)$ is a factor of polynomial $f(x) \in R[x]$ if and only if $f(\alpha) = 0$.
- d) Using Gauss elimination method solve :

$$x + y + 2z = 8$$

$$-x - 2y + 3z = 1$$

$$3x - 7y + 4z = 10$$

- e) Verify Cayley-Hamiltonian theorem for the matrix $A = \begin{bmatrix} 3 & -2 \\ -1 & 2 \end{bmatrix}$ and hence find A^{-1} .

- f) Find the rank of matrix $A = \begin{bmatrix} 3 & 2 & -1 & 3 \\ 2 & 3 & -4 & 7 \\ 5 & -2 & -1 & -2 \end{bmatrix}$

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

- a) State and prove division algorithm theorem for Z .
- b) i) Find the greatest common divisor of $f(x) = x^4 + 3x^2 + 2$ and $g(x) = x^3 - x^2 + x - 1$.
- ii) Find the greatest common divisor of 595 and 252. Also find m and n such that $(595, 252) = 595m + 252n$, for some $m, n \in Z$.
- c) Determine the values of k so that the system

$$x + y + kz = 1$$

$$x + ky + z = 1$$

$$kx + y + z = 1$$

- i) has unique solution
- ii) has no solution
- iii) infinite number of solutions

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

- a) Shift the origin to a suitable point so that the equation $x^2 - 6x - 4y - 1 = 0$ will be in the form $x^2 = 4by$. State value of b .
- b) Obtain the equation of a plane in the normal form.
- c) Find the equations of a line through $(-2, 3, 4)$ and parallel to the planes $2x + 3y + 4z = 5$ and $3x + 4y + 5z = 6$.
- d) Prove that the plane section of a sphere is a circle.
- e) Prove that the straight line $\frac{x+1}{4} = \frac{y-2}{1} = \frac{z-2}{1}$ touches the sphere $x^2 + y^2 + z^2 = 9$. Also find the point of contact.
- f) Find the equation of a cylinder whose generators are parallel to the line $\frac{x}{2} = \frac{y}{1} = \frac{z}{3}$ and whose guiding curve is the ellipse $x^2 + 2y^2 = 1$ and $z = 0$.

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

- a) Reduce the equation $5x^2 - 6xy + 5y^2 + 18x - 14y + 9 = 0$ to standard form and name the conic.
- b)
 - i) Find the angle between two lines whose d.c.s. are l_1, m_1, n_1 and l_2, m_2, n_2 .
 - ii) Find the equation of the plane which is perpendicular to the plane $5x + 3y + 6z + 8 = 0$ and which contains the line of intersection of the planes $x + 2y + 3z - 4 = 0, 2x + y - z + 5 = 0$
- c)
 - i) Show that the spheres $x^2 + y^2 + z^2 - 4x - 2y - 4z + 5 = 0$ and $x^2 + y^2 + z^2 - 6x - 6y + 17 = 0$ touches each other. Also find point of touching.
 - ii) Find the equation of right circular cone having vertex at the origin, the axis of line whose equations are $\frac{x}{l} = \frac{y}{m} = \frac{z}{n}$ and semivertical angle is α .



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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 right indicate full marks.*

Q1) Attempt any eight of the following:

[16]

- a) Find supremum and infimum of set

$$S = \left\{ 1 - \frac{1}{n} : n \in N \right\}, \text{ if they exist.}$$

- b) Let $f(x) = \frac{|x-1|}{x-1}, x \neq 1$. Find $\lim_{x \rightarrow 1^+} f(x)$.

- c) By using L'Hospital's rule evaluate $\lim_{x \rightarrow 1} \frac{2^x - 2}{x - 1}$.

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

- e) State Leibnitz's theorem.

- f) Evaluate $\int_0^{\pi/2} \sin x^5 dx$.

P.T.O.

- g) Define linear differential equation.
- h) Examine exactness of differential equation
 $(ax + hy)dx + (hx + by)dy = 0$.
- i) Solve: $(1 + y^2)dx = x^2 dy$.
- j) Find the orthogonal trajectories of family of circles whose centres at the origin and radius a .

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

- a) For $x, y \in \mathbf{R}$, prove that $|x + y| \leq |x| + |y|$. Hence prove that $|x - y| \leq |x| + |y|$.
- b) If $\lim_{x \rightarrow a} f(x)$ exists, then prove that f is bounded in some deleted neighbourhood of the point $x = a$.
- c) Evaluate: $\lim_{x \rightarrow 0} \left[\frac{1}{x} - \frac{1}{e^x - 1} \right]$.
- d) State and prove Lagrange's mean value theorem.
- e) If $y = \log(x + \sqrt{1 + x^2})$, then prove that
 $(1 + x^2)y_{n+2} + (2n + 1)x y_{n+1} + n^2 y_n = 0$.
- f) Express the polynomial $2x^3 + 7x^2 + x - 6$ in powers of $(x - 2)$.

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

- a) i) Solve the inequality $|3x + 4| < |x + 2|$.
- ii) Define absolute value of the real number. If $a \geq 0$, then prove that $|x| \leq a$ if and only if $-a \leq x \leq a$.

- b) i) Using $\epsilon - \delta$ definition of limit show that $\lim_{x \rightarrow 0} \frac{2x^2 + 3}{x + 5} = \frac{3}{5}$.
- ii) Find numbers α and β if the function f is continuous at every point in $(-2, 2)$, where

$$f(x) = \begin{cases} x + \alpha, & \text{if } -2 < x < 0 \\ 2x + 1, & \text{if } 0 \leq x < 1 \\ \beta - x, & \text{if } 1 \leq x < 2 \end{cases}$$

- c) i) In Cauchy mean value theorem for functions $f(x) = e^x$ and $g(x) = e^{-x}$ on $[a, b]$, show that 'c' is arithmetic mean between a and b .
- ii) Suppose $a < b$ and f is derivable on (a, b) . If $f'(x) > 0, \forall x \in (a, b)$, then prove that f is strictly increasing function on (a, b) .

Q4) Attempt any four of the following:

[16]

- a) Evaluate $\int \frac{x^2 + x + 1}{(x + 1)^2(x + 2)} dx$.
- b) Explain the method of solving the differential equation $\frac{dy}{dx} = \frac{a_1x + b_1y + c_1}{a_2x + b_2y + c_2}$, when $\frac{a_1}{a_2} = \frac{b_1}{b_2}$.
- c) Solve: $(x^2 + y^2 + x)dx + xy dy = 0$.
- d) Solve: $\frac{dy}{dx} + \frac{y}{x} = x^2y^6$.
- e) Show that the family $y^2 = 4a(x + a)$ is self orthogonal.
- f) Explain the method of solving differential equation $f(x, y, p) = 0$, which is solvable for y .

Q5) Attempt any two of the following:

[16]

a) If $I_n = \int \sin^n x \, dx, n \geq 2$, then prove that $I_n = \frac{-\cos x \sin^{n-1} x}{n} + \frac{n-1}{n} I_{n-2}$.

Hence evaluate $\int_0^{\pi/2} \sin^8 x \, dx$.

b) i) Solve: $(x - y - z)dx - (2x - 2y - 3)dy = 0$.

ii) If M and N are homogeneous functions of same degree in x and y and $Mx + Ny \neq 0$. Then prove that $\frac{1}{Mx + Ny}$ is an integrating factor of differential equation $Mdx + Ndy = 0$.

c) i) Obtain the differential equation for the circuit involving L and R along with $e(t)$ all in series and solve it.

ii) Solve: $x^2 p^2 - 5xyp + 6y^2 = 0$.

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F.Y.B.Sc.

PHYSICS

Mechanics, Heat and Thermodynamics

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

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Attempt all of the following.

[16]

- a) State newton's third law of motion.
- b) Define kinetic energy of a body. Give its S.I.Unit.
- c) What do you mean by turbulet flow?
- d) Obtain the relation between volume strain and longitudinal strain.
- e) Define critical temperature and critical pressure of a gas.
- f) State zeroth law of thermodynamics.
- g) State the advantages of mercury thermometer.
- h) Calculate the change in entropy when 8 gm of ice at 0 °C is converted into water at the same temperature.

(Latent heat of ice = 80 Cal/gm)

Q2) Attempt any four of the following.

[16]

- a) What is electromagnetic force ? Give its properties.
- b) State and prove work-energy theorem.
- c) Explain jaeger's method to determine surface tension of liquid.

P.T.O.

- d) Find the work done in moving a particle along a vector.

$\vec{r} = (3\hat{i} - 5\hat{j} + 7\hat{k})$ meter if the applied force is.

$\vec{f} = (3\hat{i} + \hat{j} + 2\hat{k})$ Newton.

- e) What pressure should be applied to a lead block to reduce its volume by 10% ? Bulk modulus of lead = 6×10^9 N/m².
- f) A metal cube of side 6cm and relative density 8 is suspended by string so as to completely immersed in a liquid of density 1.2×10^3 kg/m³. Find the tension in the string.

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

- a) Describe Amagat's experiment.
- b) Derive an expression for work done during an adiabatic process.
- c) Show that the entropy remains constant during reversible cyclic change.
- d) A 1.2 litre of hydrogen at 137 °C and 10^6 dyne/cm² pressure expands isothermally, until its volume is doubled. Find the pressure of the gas.
- e) A reversible refrigerator works between 0 °C and 30 °C. Calculate the coefficient of performance.
- f) Find the temperature on fahrenheit and kelvin scale corresponding to 30 °C.

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

- a) State and prove Bernoullies theorem.
- b) i) State Hook's law of elasticity. Define young's modulus and Bulk modulus of elasticity.
- ii) What force is required to accelerate 2500 kg car from 15 m/s to 25 m/s in time 2 sec.?
- c) i) Show that the value of Poisson's ratio (σ) lies between -1 and 0.5
- ii) What will be the work done in blowing soap bubble of radius 2 cm, the surface tension of soap solution is 0.035 N/m?

Q5) Attempt any two of the following.

[16]

- a) Obtain an expression for the efficiency of the Otto engine in terms of compression ratio.
- b) i) What is Carnot cycle? Explain it with suitable diagram.
ii) Calculate the Van-der-Waal's constant for dry air, given that.
 $T_c = 135^\circ\text{K}$, $P_c = 37.4$ atmosphere.
 $R = 82.07 \text{ cm}^3 \text{ atm.K}^{-1}$.
- c) i) Explain principle and working of platinum resistance thermometer.
ii) Calculate the depression in the melting point of ice produced by increasing the pressure by two atmospheres ($1 \text{ atm} = 1.013 \times 10^5 \text{ N/m}^2$).
The latent heat of fusion of ice at 0°C is 80 K cal/kg . The specific volume of ice at 0°C is $1.09 \times 10^{-3} \text{ m}^3/\text{kg}$ and that of water at the same temperature is $1.00 \times 10^{-3} \text{ m}^3/\text{kg}$. ($J = 4200 \text{ joules /K cal}$)

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F.Y.B.Sc.

PHYSICS-II

Physics Principles and Applications and Electromagnetics

(2013 Pattern) (New Course) (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) *Use of logtables and calculator is allowed.*
- 4) *Neat diagrams must be drawn wherever necessary.*

Q1) Attempt ALL of the following:

[16]

- a) What do you mean by pumping in lasers?
- b) Define ionic bond. Give examples.
- c) State Bohr's postulates.
- d) Calculate the energy of photon of yellow light with frequency of 5.25×10^{14} Hz, in both, joule and electron volt.
- e) What do you mean by electric polarization.
- f) Explain in brief paramagnetism.
- g) State importance of Ampere's circuital law.
- h) A conductor having a charge density $120 \mu\text{C}/\text{m}^2$ kept in air. Find the magnitude of electric intensity at a point near the conductor.

Q2) Attempt any four of the following:

[16]

- a) Explain the basic arrangement of Radar. State its applications.
- b) Explain in detail population inversion process in lasers.
- c) Explain construction and working of solar cell.
- d) The force constant of vibration in oxygen (O_2) molecule is 1180 N/m . The mass of oxygen atom is $2.66 \times 10^{-26} \text{ kg}$. Find the energy separation between adjacent vibrational levels of molecule in joule and electron volt.

P.T.O.

- e) Find the wave number of second line of Paschen series. (Given: $R = 1.097 \times 10^7 \text{ m}^{-1}$)
- f) A microwave radiation has frequency of 14 GHz. What would be the wavelength and energy of photon corresponding to this radiation. (Given: $h = 6.626 \times 10^{-34} \text{ Js}$)

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

- a) Using Biot-Savart's law, obtain an expression for magnetic field produced in long straight conductor.
- b) Distinguish between diamagnetic and ferromagnetic material.
- c) Using Gauss's theorem, obtain an expression for electric intensity at a point due to uniformly charged non-conducting sphere.
- d) Calculate the electric field due to dipole of dipole moment $2 \times 10^{-10} \text{ c-m}$ at a distance of 1 m from it on its axis. (Given: $P = 2 \times 10^{-10} \text{ c-m}$, $r = 1 \text{ m}$)
- e) A bar magnet made of iron has magnetic moment 4.0 A/m^2 and mass $5 \times 10^{-3} \text{ kg}$. If the density of iron is $6 \times 10^3 \text{ kg/m}^3$, find the intensity of magnetization.
- f) A solenoid of 500 turns/m is carrying current 3A. If the core is made of iron which has a relative permeability of 5000, determine the magnitude of magnetic intensity and magnetization.

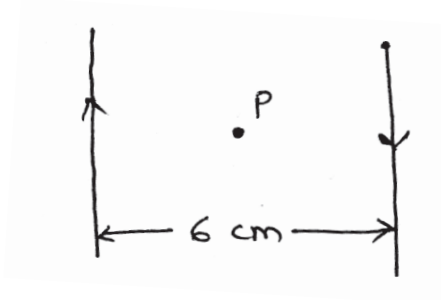
Q4) Attempt any two of the following: [16]

- a) Explain the various sources of electromagnetic waves.
- b) i) Explain induced absorption and spontaneous emission in detail.
- ii) CO molecule absorbs infrared radiations of frequency $6.42 \times 10^{13} \text{ Hz}$. What is the force constant of the bond in CO molecule and what is the spacing between the vibrational energy levels. (Given: $\mu = 1.14 \cdot 10^{-26} \text{ kg}$)
- c) i) What do you mean by covalent bond? Explain the properties of covalent compounds.
- ii) The first line of Balmer series of hydrogen atom has wavelength of 6563 \AA . Calculate the wavelength of second line of Balmer series.

Q5) Attempt any Two of the following:

[16]

- a) What is electric dipole? Obtain an expression for electric potential at any point due to an electric dipole.
- b)
 - i) Explain the concept of electric field.
 - ii) The following figure shows two long straight wires carrying electric current 10 A in opposite directions. The separation between the wires is 6 cm. Find magnetic field at point P midway between the wires.



- c)
 - i) Explain the terms
 - 1) magnetic induction (\vec{B}) and
 - 2) magnetic intensity (\vec{H}).
 - ii) Calculate the force between two balls each having charge of $12 \mu\text{c}$ and are 8 cm apart.



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F.Y.B.Sc.

CHEMISTRY - I

Physical and Inorganic Chemistry

(2013 Pattern) (Paper - I)

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 logtable and calculator is allowed.*

Q1) Answer the following questions:

[16]

- a) Give the rule of differentiation of a product of two functions.
- b) Define and explain compressibility factor.
- c) What is meant by positive catalysis? Give one example of it.
- d) What is photoelectric effect?
- e) Give the limitations of third law of thermodynamics.
- f) Define : i) Oxidation ii) Reduction
- g) How many moles are present in 2.5 grams of CaCO_3 ?
(At. wt. Ca = 40, C = 12, O = 16)
- h) Explain in brief sigma (σ) and pi (π) bond.

P.T.O.

Q2) Attempt any four of the following:

[16]

- a) Write the assumptions of kinetic theory of gases.
- b) What is adsorption isotherm? Explain Freundlich adsorption isotherm.
- c) Draw the graph of linear function and find the expression for the following.
 - i) Linear function passing through (0, -2) and (-2, 1).
 - ii) Linear function when slope and intercept are given slope = -4, intercept = 3.
- d) Describe the operations of carnot cycle and derive the expression for efficiency.
- e) What is Heisenberg's uncertainty principle? Give its physical significance.
- f) What are emulsions? How are they prepared? How are they classified?

Q3) Answer any four of the following:

[16]

- a)
 - i) If $Y = \frac{(3x+1)}{(x^3+5)}$ find $\frac{dy}{dx}$.
 - ii) Solve integral $\int x^{3/2}.dx$
- b) What are the types of liquid crystals? Discuss thermotropic liquid crystals.
- c) Define viscosity of a liquid. Give its unit. Discuss the method to measure viscosity of a liquid by ostwald's viscometer.
- d) What is the catalyst? Explain general characteristics of catalytic reaction.
- e) Obtain the expression for entropy change of an ideal gas when its volume and temperature are changed simultaneously.
- f) State and explain the assumptions of Bohr's theory.

Q4) Attempt any four of the following:

[16]

- a) $[\text{Ni}(\text{CN})_4]^{2-}$ shows dsp^2 hybridisation. Explain.
- b) Draw the structures of
- i) ClF_3 ii) XeOF_4 iii) XeO_3 iv) PCl_5
- c) Balance the following reaction by oxidation number method.
- $$\text{Fe}^{2+} + \text{ClO}_3^- + \text{H}^+ \rightarrow \text{Fe}^{3+} + \text{Cl}^-$$
- d) Explain the bond angle in BrF_3 is less than that in ClF_3 .
- e) Explain in brief formation of co-ordinate bond with suitable example.
- f) Calculate the oxidation number of the following
- i) Mn in KMnO_4 ii) S in $\text{Na}_2\text{S}_2\text{O}_3$
- iii) Cr in KCrO_4 iv) Cl in KClO_3

Q5) Solve any four of the following:

[16]

- a) Calculate the density of SO_2 gas per litre at 40°C and 730 mm pressure.
- (At NTP, 1 mole of gas \equiv 22.4 litres).
- b) 25 ml of solution of NaOH containing 4.0 grams in 1000ml requires 20ml of HCl and 10ml of H_2SO_4 for complete neutralisation. Calculate the normality and strength of acids and base.
- c) Calculate the entropy change when one mole of an ideal gas is heated from 80°C to 180°C at constant pressure.

[Given CP = $7.88 \text{ cal. deg}^{-1} \text{ mole}^{-1}$].

d) Find the wave length of carbondioxide molecule at a velocity of 540 ms^{-1} .

[Given : $h = 6.625 \times 10^{-34} \text{ J.S}$].

e) Calculate the pressure exerted by one mole of methane at 127°C when it occupies a volume of 0.8 litre.

[Given : $a = 2.29 \text{ atm l}^2 \text{ mol}^{-2}$, $b = 0.0428 \text{ l mole}^{-1}$, $R = 0.082 \text{ lit atm K}^{-1} \text{ mole}^{-1}$].

f) Calculate the radius of the K shell of hydrogen atom.

[Given : $h = 6.62 \times 10^{-27} \text{ erg.s}$; $M = 9.11 \times 10^{-28} \text{ g}$ and $e = 4.80 \times 10^{-10} \text{ e.s.u}$].



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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 following terms:
 - i) Asymmetric carbon atom.
 - ii) Dextrorotatory compound.
- b) Draw zig-zag structure for the following compounds.
 - i) Diethyl ether
 - ii) Butanoic acid
- c) What is bond angle? Explain with suitable example.
- d) What is hydrogen bonding? Explain with suitable example.
- e) Alcohols have higher boiling point than hydrocarbons of comparable molecular weight, Explain.
- f) Alkali metals are good reducing agents. Explain.
- g) What is the general electronic configuration of group IIIA and VII A elements?
- h) Give different allotropes of carbon.

P.T.O.

Q2) Attempt any four of the following:

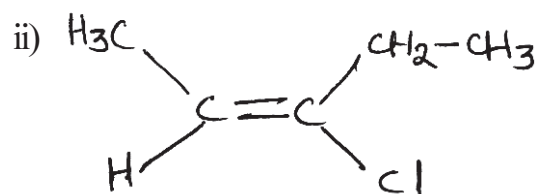
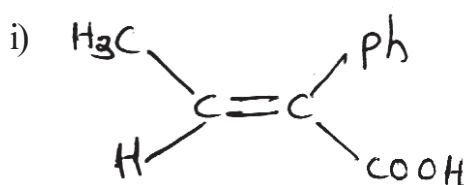
[16]

- a) What is resonance effect? Draw the resonance structures of
- Aniline
 - 2 - butenol
 - Butadiene
- b) Discuss conformational isomerism in n-butane with energy profile diagram.
- c) What are carboxylic acids? What is the action of following on benzoic acid?
- Conc - $\text{HNO}_3/\text{H}_2\text{SO}_4$
 - NaHCO_3
- d) What are alcohols? How will you prepare ethyl alcohol from,
- Acetaldehyde
 - formaldehyde
- e) What are alkynes? How acetylene is obtained from
- Methane
 - Calcium carbide
- f) What is Friedel-Craft alkylation? How is it carried out by using different alkylating agents.

Q3) Attempt any four of the following:

[16]

- a) What are amines? How are they classified? How will you prepare ethylamine from methyl cyanide.
- b) What are alkyl halides? Give its classification. What is the action of following reagents on ethyl bromide?
- alc. KOH
 - Sodium ethoxide
- c) Assign E or Z configuration of the following compounds.

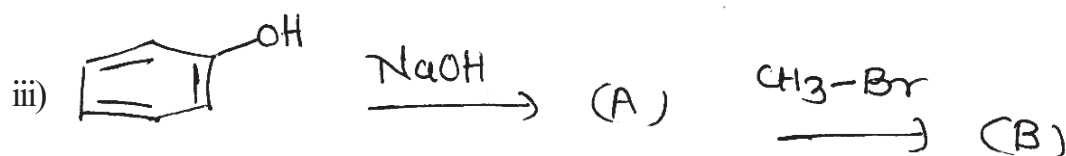
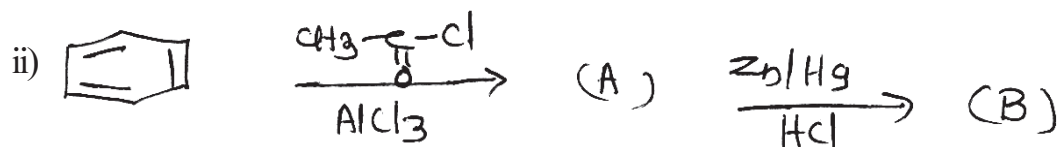
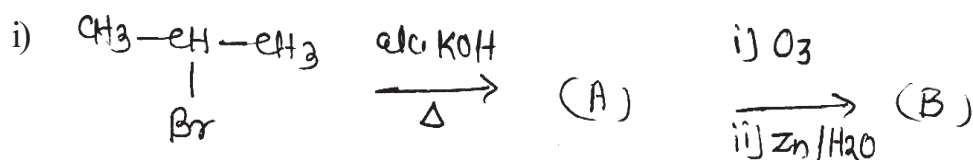


- d) What are alkenes? How will you prepare propene from
 i) propyl bromide ii) 1 - propanol
- e) Explain Cannizzaro's reaction with suitable example.
- f) What is Steric effect? N, N-dimethyl aniline is a weaker base than 2, 6 - dimethyl N, N-dimethyl aniline: Explain.

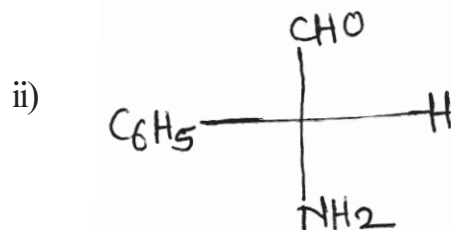
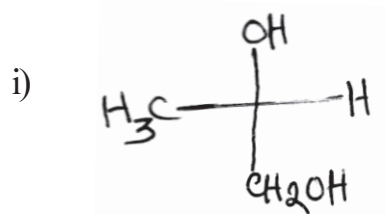
Q4) Attempt any four of the following:

[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) What is hybridisation? Discuss formation of methane molecule using the concept of hybridisation.

- d) Write short notes on:
- Williamson's Synthesis
 - Reimer Tiemann reaction.
- e) Explain anomalous behaviour of Nitrogen in group VA elements.
- f) Explain the diagonal relationship between Lithium and Magnesium.

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

- Explain periodicity in properties of alkali metals with respect to atomic size and oxidation state.
- Give the names and write electronic configuration, of group IIA elements.
- Give different applications of alkaline earth metals in Biology, Industry and Agriculture.
- Explain bonding and shape of IF_7 molecule.
- Draw the structures of IF_5 , H_3PO_4 , SiO_4^{4-} and ICl .
- Explain periodicity in properties of group VIA elements with respect to Ionisation energy and electronegativity.



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

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[5215]-7

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 fungi?
- b) Give any two characters of Pteridophytes.
- c) Give any two characters of Algae.
- d) Write any two examples of Lichen.
- e) Mention two classes of Angiosperms.
- f) What is Morphology?
- g) Give any two forms of corolla.
- h) Define Anatomy.

Q2) Attempt any four of the following.

[16]

- a) Give an outline of classification of Fungi according to G.M. Smith (1955).
- b) Give economic importance of Lichens.
- c) Describe prothallus in Nephrolepis.
- d) Give importance of Morphology in identification of plants.
- e) Describe any two modifications of stem with examples.
- f) Define and write functions of meristem.

P.T.O.

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

- a) Structure of oogonium in Albugo (cystopus).
- b) Structure of Antheridium in Nephrolepis.
- c) Characters of Angiosperms.
- d) Pneumatophore.
- e) Functions of leaf.
- f) Legume.

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

- a) Describe lateral conjugation in Spirogyra.
- b) Describe external structure of gametophyte in Riccia.
- c) Describe any two types of cymose inflorescence.
- d) What are vascular bundles? Describe types of conjoint vascular bundles.

Q5) Give an account on general characters of Gymnosperms. Mention an outline of classification of Gymnosperms proposed by chamberlain (1934).

OR

Describe internal structure of Dicotyledon stem and leaf. **[16]**



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

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[5215]-8

F.Y.B.Sc.

BOTANY

BO-112: Industrial Botany

(2013 Pattern) (71420) (Theory) (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) What is green house technology?
- b) What is explant?
- c) What is ginning?
- d) Enlist any two plants used for biofuel production.
- e) Write any four uses of mushrooms.
- f) What is biocontrol?
- g) Give names of any two fungi used in industries.
- h) What is cold storage in fruit processing?

Q2) Attempt any four of the following:

[16]

- a) Give advantages of green-house technology.
- b) Describe the advantages of organic farming.
- c) Write a note on value added products of mushrooms.
- d) What is the source and uses of azadiraction?
- e) Give the applications of penicillium.
- f) Write about commercial significance of fruit processing industry.

P.T.O.

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

- a) Floriculture
- b) Types of organic fertilizers.
- c) Importance of seed industries.
- d) Biofuels.
- e) Importance of biopesticides.
- f) Food Industry.

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

- a) Describe the cultivation practices in Gerbera.
- b) What is plant tissue culture? Write an account of methods of sterilization and inoculation techniques.
- c) What are biofertilizers? Describe need and add a note on blue green algae.
- d) What is fruit processing? Enlist the types of fruit processing. Add a note on preparation of Jam.

Q5) What is plant propagation? Describe in detail the natural methods of vegetative propagation. [16]

OR

Write the botanical source, active principle and medicinal uses of Asparagus. Add a note on nutraceuticals.



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

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[5215]-9

F.Y.B.Sc.

ZOOLOGY

**ZY-101 : Animal Systematics and Diversity - I & II
(2013 Pattern) (Theory) (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) Cyclosis.
- b) Binomial Nomenclature.
- c) Hermaphrodite.
- d) Cestoda.
- e) Apoda.
- f) Hibernation.
- g) Brow spot.
- h) Cephalo chordata.

Q2) Write short notes on (Any Four):

[16]

- a) Calcarea.
- b) Diagnostic features of Animalia.
- c) Trichocysts in Paramecium.
- d) General characters of Urochordata.
- e) Ventricles of frog brain.
- f) General characters of bony fishes.

P.T.O.

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

- a) Give the distinguishing characters of Protozoa.
- b) Describe the structure and function of ovary of Earthworm.
- c) State the distinguishing characters of phylum Coelenterata.
- d) Describe parental care in any two Amphibians.
- e) Describe the general characters of Hemichordata.
- f) Sketch and label the Alimentary canal of frog.

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

- a) Describe the process of Binary fission in Paramecium.
- b) Describe the external character's of Earthworm.
- c) What is migration? Give an account of any two types of migrations in fishes.
- d) With the help of labelled diagram describe the internal structure of heart of frog.

Q5) Describe the digestive system of Earthworm. Add a note on physiology of digestion.

OR

Describe the female reproductive system of frog. **[16]**



Total No. of Questions : 5]

SEAT No. :

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[Total No. of Pages : 2

[5215]-10

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 the following.

[16]

- a) Dominance
- b) Gene
- c) Golgi complex
- d) Lethal gene
- e) Peroxisome
- f) Ribosome
- g) Nucleoplasm
- h) Mitochondria

Q2) Write short notes on(Any four):

[16]

- a) Give an account of any one inborn error of metabolism in human.
- b) Kappa particles in Paramecium.
- c) Haemophilia
- d) Give an account of structure and functions of the Golgi complex.
- e) Enlist four functions of cytoplasm.
- f) Define cell. Give an account of scope of cell biology.

P.T.O.

Q3) Attempt the following(Any four):

[16]

- a) Define Syndrome. Describe Turner's syndrome.
- b) Describe the law of segregation with suitable example.
- c) What is Eugenics? Explain different methods of negative engenics.
- d) What is stain? Write note on vital stain.
- e) Write short note on Prokaryotic cell.
- f) Explain the functions of Endoplasmic reticulum.

Q4) Attempt the following(Any Two)

[16]

- a) With suitable example explain complementary factor. (9 : 7)
- b) Describe the medicolegal importance of Rh factor. Give defination of Rh factor.
- c) Give an account of chemical composition of plasma membrane.
- d) Explain ultrastructure of nuclear envelope.

Q5) a) What is Gynandromorphism? With suitable examples describe the various types of gynandromorphs. **[16]**

OR

- b) What is cell cycle? Explain different stages of cell cycle.



Total No. of Questions :5]

SEAT No. :

[Total No. of Pages :2

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[5215] - 11

F.Y.B.Sc.

GEOLOGY

Mineralogy and Petrology

(2013 Course) (Revised Course) (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 right indicates full marks.*

Q1) Answer the following questions.

[16]

- a) Define Strike & dip of a bed.
- b) Define Oxidation & Supergene enrichment.
- c) Give the name of the mineral formed by phyllosilicate structure.
- d) Give name of the rocks which show clastic texture.
- e) Define Angular Unconformity.
- f) Define Atoms and Ions.
- g) Define lamination?
- h) Give Igneous rock classification based on colour index code.

Q2) Answer the following questions (Any four)

[16]

- a) Describe the construction of clinometer compass.
- b) Define metamorphism. Describe its agents and kinds of metamorphism.
- c) Give the name of minerals used in cement and paint industries.
- d) Describe the Normal and Reverse fault.
- e) What is Petrological microscope? Give the list of parts of the petrological microscope.
- f) Describe the terms Polymorphism and Isomorphism.

P.T.O.

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

- a) Define mineralogy. Describe its branches.
- b) Define fold. Describe the various parts of fold with neat labelled diagram.
- c) Describe the following metamorphic rocks.
 - i) Marble
 - ii) Hornblende schist
- d) Describe the following properties of a mineral
 - i) Lustre
 - ii) Hardness
- e) Define the term Weathering, erosion and denudation
- f) Describe the importance of mineralogy.

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

- a) Describe the various optical properties of mineral under Plane Polarised Light (PPL).
- b) Define Magma. Give its composition. Add a note on the classification based on occurrence of Igneous rock.
- c) Define a Mineral. Explain Ionic and covalent bonding forces in crystals with suitable examples.
- d) Explain the following intrusive forms.
 - i) sill
 - ii) dyke

Q5) Give the elements of Symmetry, crystallographic axes and the forms with indices present in Orthorhombic system, Baryte Type. [16]

OR

- a) Define Texture. Give the factors controlling textures of Igneous rocks. Add a note on Equigranular and inequigranular textures of Igneous rocks. [8]
- b) Define Metamorphism. Write on following structures in metamorphic rocks. [8]
 - i) Gneissose
 - ii) Schistose
 - iii) Granulose.



Total No. of Questions :5]

SEAT No. :

[Total No. of Pages :2

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F.Y.B.Sc.

GEOLOGY

Physical Geology and Palaeontology

(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) Neat labelled diagrams must be drawn wherever necessary.*

Q1) Answer the following questions:

[16]

- a) Define Palaeontology.
- b) What are disasters?
- c) Draw diagram to show various types of septa in corals.
- d) Define Isostasy.
- e) Give any two uses of fossils.
- f) What is continental drifting?
- g) What are residual mountains.
- h) Define sampling. Mention two types of sampling methods.

Q2) Answer the following questions (any four)

[16]

- a) Describe the Earth's Lithosphere.
- b) Explain the different types of sutures in Ammonoids.
- c) Explain the concept of Plate tectonic theory.
- d) Briefly describe the hard part morphology of Lamellibranch Shell.
- e) Describe the various effects of disasters.
- f) Describe the Apical disc in Regular Echinoids.

P.T.O.

Q3) Answer the following questions (any four) **[16]**

- a) Explain the life during Mesozoic Era.
- b) Describe the various products of Volcanic activity.
- c) Explain the internal structure of the Earth.
- d) What are Echinoids? Give their geological and geographical distribution.
- e) What are Earthquakes? Explain the terms focus, epicentre and isoseismal lines.
- f) Describe Imprints and Carbonisation mode of fossil preservation.

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

- a) Describe
 - i) Potholes
 - ii) Mushroom Rock
 - iii) Yardangs.
- b) Give an account of any four forms shown by Gastropod Shells.
- c) Explain the erosional landforms formed by sea action.
- d) Describe the hard part morphology of a Trilobite.

Q5) Define Geology. Explain the Nebular Hypothesis to explain the origin of the Solar System. Add a note on the size, shape and average density of the earth.

[16]

OR

- a) Describe the hard part morphology of a typical Brachiopod Shell. **[8]**
- b) Define a fossil. Explain the conditions necessary for fossilization. **[8]**



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 4

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F.Y.B.Sc.

STATISTICS

Descriptive Statistics

(2013 Pattern) (Paper - I)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicates full marks.*
- 3) *Use of statistical tables and calculators is allowed.*
- 4) *Symbols have their usual meanings.*

Q1) Attempt each of the following:

- a)
 - i) Define the term Attribute. [1]
 - ii) State any two merits of arithmetic mean. [1]
 - iii) Define the term class-boundaries. [1]
 - iv) Define the term sample. [1]
- b) Choose the correct alternative for each of the following: [1 each]
 - i) Which of the following is a measure of central tendency.
A) Arithmetic mean B) Variance
C) Range D) S.D.
 - ii) If the smallest value in a set of observations is 82 and it's range is 22, the largest value of the set is
A) 60 B) 104
C) 22 D) 82

P.T.O.

Q3) Attempt any four of the following:

[4 × 4 = 16]

- a) What is correlation? Explain its different types with illustrations.
- b) Explain how to obtain quartiles in case of frequency distribution.
- c) Define central moments. State the relationship between 4th central moment and raw moments.
- d) Make a critical comparison between Laspeyre's and Paasche's index numbers.
- e) For a bivariate data we have:

$$\bar{X} = 53, \bar{Y} = 28, b_{yx} = -1.5, b_{xy} = -0.2.$$

- Find
- i) Correlation coefficient between X and Y.
 - ii) estimate Y for X = 60.
- f) In an examination 60% passed in Mathematics, 52% passed in statistics while 32% failed in both the subjects. Find the percentage of students passed in both the subject.

Q4) Attempt any two of the following:

[2 × 8 = 16]

- a)
 - i) Show that correlation coefficient is independent of change of origin and scale numerically.
 - ii) Is the following information consistent:
 $N = 100, (A) = 30, (B) = 40, (AB) = 35.$
- b)
 - i) Explain the advantages of sampling over census.
 - ii) If X and Y are uncorrelated variables then show that, $\text{Var}(X + Y) = \text{Var}(X - Y).$
- c)
 - i) Discuss the effect of change of origin and scale on arithmetic mean.
 - ii) Spearman's rank correlation coefficient between the marks in Accountancy and statistics for a group of students is 0.5. If the sum of squares of differences between the ranks is 42 find the number of students in the group assume that no rank is repeated.
- d)
 - i) State and prove minimal property of mean squared deviation.
 - ii) If the first three raw moments of a distribution are 1, 4 and 10 respectively, compute coefficient of skewness (γ_1) and comment on the type of skewness.

Q5) Attempt any one of the following:

[1 × 16 = 16]

- a) i) Derive an expression for line of regression of Y on X, for a set of n observations on a bivariate random variable (X, Y). **[8]**
- ii) Explain the term Kurtosis. Give a measure of Kurtosis. **[4]**
- iii) Given that; $r = 0.4$, $\sum(X - \bar{X})(Y - \bar{Y}) = 108$, $\text{Var}(Y) = 9$, $\sum(X - \bar{X})^2 = 900$. Find number of pairs of observations (n). **[4]**
- b) i) Define following terms: **[8]**
- I) Bowley's coefficient of skewness.
- II) Independence of two attributes.
- III) Coefficient of determination.
- IV) Coefficient of association.
- ii) Calculate Fisher's price index number for the following data: **[4]**

Commodities	2011		2012	
	Price (₹)	Quantity (Kg.)	Price (₹)	Quantity (Kg.)
A	20	8	40	6
B	50	10	60	5
C	40	15	50	10

- iii) Discuss any one problem involved in construction of an index number. **[4]**



Total No. of Questions : 5]

SEAT No. :

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[5215]-14

[Total No. of Pages : 6

F.Y. B.Sc.

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

Q1) a) Attempt each of the following:

- i) Give one real-life situation where geometric distribution can be applied. **[1]**
 - ii) Let $X \sim B\left(10, \frac{1}{2}\right)$, state the mean of X. **[1]**
 - iii) Ten Television (T.V.) sets are checked and number of defective sets are noted. Write down the sample space for this experiment. **[1]**
 - iv) State moment generating function (m.g.f.) of Poisson distribution with parameter m. **[1]**
- b) Choose the correct alternative for each of the following: **[1 each]**
- i) If $P(A \cup B) = 1$, then the two events A and B are:
 - A) Mutually exhaustive events.
 - B) Dependent events.
 - C) Mutually exclusive events.
 - D) Independent events.
 - ii) If $X \sim B(n, p)$, then
 - A) Mean < Variance
 - B) Mean = Variance
 - C) Mean > Variance
 - D) Variance = 2 · Mean

P.T.O.

- iii) If X and Y are independent random variables with m.g.f.s $M_X(t)$ and $M_Y(t)$ respectively, then $M_{X+Y}(t)$ is:
- A) $M_X(t) + M_Y(t)$ B) $M_X(t) \cdot M_Y(t)$
 C) $M_X(t) - M_Y(t)$ D) $M_X(t) / M_Y(t)$
- iv) If X and Y are two random variables with $E(X) = 4$, $E(Y) = 10$ then $E(2X - Y + 5)$ is:
- A) -6 B) -3
 C) $+2$ D) 3
- c) i) Define pairwise independence of three events. [2]
 ii) Find the probability that a non-leap year should have 53 Sundays. [2]
 iii) If A and B are two events with $P(A) = 0.6$, $P(B) = 0.5$, find $P(A' \cap B)$. [2]
 iv) The cumulative distribution function (c.d.f.) of a discrete random variable (r.v.) X is; [2]

X	1	2	3	4	5
F(x)	0.20	0.28	0.48	0.85	1

Find the probability distribution of X .

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

- a) Explain the following terms with one illustration each:
- i) Sample space.
 ii) Relative complement of an event A with respect to B .
- b) Let A, B, C be three events defined on Ω , such that A and B are mutually exclusive, A and C are independent and B and C are independent. If $P(A) = \frac{1}{4}$, $P(B) = \frac{1}{3}$, $P(C) = \frac{1}{6}$ then find:
- i) $P(A \cup B \cup C)$
 ii) $P(A' \cap B' \cap C')$
- c) Let X and Y be two independent discrete random variables. Show that $E(X \cdot Y) = E(X) \cdot E(Y)$.

- d) Three books are selected at random from a shelf containing 4 novels, 2 books of poems and a dictionary. Find:
- The probability that 2 novels and 1 poem book is selected.
 - The probability that a dictionary is not selected.
- e) Define cumulant generating function (c.g.f.) of a discrete random variable X . If X and Y are two independent random variables with c.g.f.s $K_X(t)$ and $K_Y(t)$ respectively, then show that $K_{X+Y}(t) = K_X(t) + K_Y(t)$.
- f) The probability distribution of X is as follows:

X	-3	-2	-1	0	1
$P(X = x)$	0.1	0.2	0.3	0.25	0.15

Find:

- The cumulative distribution function of X .
- Median of X .
- $P(X \geq -1)$

Q3) Attempt any four of the following:

[4 each]

- Define Bernoulli distribution with parameter p . Obtain its mean and variance.
- Let A and B be two events defined on Ω , such that $P(A) = \frac{3}{4}$ and $P(B) = \frac{5}{8}$, show that $\frac{3}{8} \leq P(A \cap B) \leq \frac{5}{8}$.
- Let X be discrete r.v. with probability mass function (p.m.f.),

$$P(X = x) = \frac{x}{10}, \quad x = 1, 2, 3, 4$$

$$= 0, \quad \text{otherwise}$$

Find $E(2X)$ and $E(X^2)$.

- It is known that 32% of the college teachers hold the research degree such as M.Phil./Ph.D. Find the probability that 4th teacher interviewed will be the first one having research degree.

- e) If A, B, C are any three events defined on Ω , with $P(B) > 0$ then prove that $P[(A \cup C)|B] = P(A|B) + P(C|B) - P[(A \cap C)|B]$.
- f) Let A and B be two events defined on a sample space Ω , write the expressions for the following events.
- At least one occurs.
 - Both occurs.
 - None occurs.
 - A occurs but not B.

Q4) Attempt any two of the following:

- a) i) State and prove Bayes' theorem. [6]
- ii) If the m.g.f. of r.v. X is $M_X(t) = (0.4 + 0.6e^t)^{10}$, identify the probability distribution of X. [2]
- b) The joint p.m.f. of bivariate discrete r.v. (X, Y) is

$$P[X = x, Y = y] = \frac{2x + 3y}{72}, \quad x = 0, 1, 2$$

$$, \quad y = 1, 2, 3$$

$$= 0, \quad \text{otherwise}$$

Find conditional variance of Y given $X = 1$ ($\text{Var}(Y | X = 1)$) [8]

- c) i) Two balls are to be selected at random from 4 red, 2 black and 3 white balls. Let X and Y denote number of red and black balls respectively selected in the sample. Obtain the joint probability distribution of (X, Y). [6]
- ii) State any two properties of distribution function of a discrete r.v. [2]
- d) i) State and prove recurrence relation for probabilities of binomial distribution with parameters n and p. [4]
- ii) Define Poisson distribution. State its mean, variance and additive property. [4]

Q5) Attempt any one of the following:

- a) i) A bivariate discrete r.v. (X, Y) has joint probability distribution,

X \ Y	1	2	3
1	$\frac{1}{8}$	0	$\frac{2}{8}$
2	$\frac{2}{8}$	$\frac{1}{8}$	$\frac{2}{8}$

Find correlation coefficient between X and Y. [8]

- ii) Distinguish between Deterministic and Non-deterministic experiments. Give one illustration of each. [4]

- iii) Given that : $P(A_1) = P(A_2) = P(A_3) = \frac{1}{3}$

$$\text{and } P(B|A_1) = \frac{6}{10}, P(B|A_2) = \frac{2}{8}, P(B|A_3) = \frac{1}{9}$$

Find $P(A_1 | B)$. [4]

- b) i) The joint probability distribution of (X, Y) is given below: [8]

X \ Y	0	1	2	3
0	K	3K	2K	4K
1	2K	6K	4K	8K
2	3K	9K	6K	12K

Find:

- I) K
 II) $P[X + Y \leq 1]$
 III) $F(1, 1)$
 IV) $P[Y = 2 | X = 1]$

- ii) Give the classical definition of probability and state its limitations. **[4]**
- iii) If X and Y are independent discrete random variables such that, $\text{Var}(X) = 4$ and $\text{Var}(Y) = 3$. Compute **[4]**
- I) $\text{Var}(2X + 5)$
- II) $\text{Var}(2X - 5Y - 1)$



Total No. of Questions :5]

SEAT No. :

[Total No. of Pages :2

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[5215] - 15

F.Y.B.Sc.

GEOGRAPHY - I

**Gg -110: Geomorphology
(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) Define Physical Geography.
- b) What is Nife?
- c) Define Rift Valley.
- d) Define folding.
- e) Define Minerals.
- f) Define Rocks.
- g) State any two characteristics of Igneous rocks.
- h) What is biological weathering.
- i) What is mass movement?
- j) State any two erosional landforms of Glaciers.

Q2) Explain the following in 150 words (Any Four)

[16]

- a) Jigsaw fit
- b) Normal Faults

P.T.O.

- c) Shield Volcanoes.
- d) Rocks and minerals
- e) River Delta.
- f) Morains.

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

- a) Explain importance of Geomorphology.
- b) Explain causes of plates movement.
- c) Explain types of folds.
- d) Explain the sedimentary rocks in detail.
- e) Explain mass movements.
- f) Explain the formation of Block Mountain.

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

- a) Explain the nature of Geomorphology.
- b) Explain Isostatic Equilibrium in brief.
- c) What are types of Weathering? Explain the processes of Mechanical Weathering.
- d) Describe the depositional landforms created by wind.

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

Define earthquake. Explain causes and effects of the earthquake.

OR

Describe the landforms created by erosional work of Sea Weaves.



Total No. of Questions : 5]

SEAT No. :

[Total No. of Pages : 2

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[5215]-16

F.Y.B.Sc.

GEOGRAPHY - II

Gg - 120 : Climatology and Oceanography

(2013 Pattern) (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 and sketches wherever necessary.*
- 4) *Use of map stencil is allowed.*

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

[16]

- a) Define Insolation.
- b) What is orographic rainfall?
- c) What do you mean by Doldrum?
- d) Branches of climatology.
- e) Define Condensation.
- f) Define Continental shelf.
- g) Define Oceanography.
- h) What do you mean by haff Nehrung coast?
- i) Define fully landlocked sea.
- j) What do you mean by gulf stream?

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

[16]

- a) Vertical distribution of atmospheric temperature.
- b) Westerlies wind.

P.T.O.

- c) Land and sea breezes.
- d) Importance of oceanography.
- e) Sea plain.
- f) Currents of Indian ocean.

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

- a) Effects of global warming.
- b) Mountain and Valley winds.
- c) Dew point.
- d) Continental slope.
- e) Fiord coast.
- f) Salinity of red sea.

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

- a) Explain heat budget of the earth.
- b) Explain the types of cloud.
- c) Explain submerged coast.
- d) Explain any four factors affecting horizontal distribution of ocean water temperature.

Q5) Explain the structure of atmosphere with neat diagram. **[16]**

OR

Explain in detail Equilibrium theory of Tide.



Total No. of Questions : 5]

SEAT No. :

P360

[5215]-17
F.Y.B.Sc.

[Total No. of Pages : 2

MICROBIOLOGY
Introduction to Microbiology
(New Course - 2013 Pattern) (Paper-I) (Theory)

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) Match the following:
 - i) Beadle & Tatum
 - ii) Karl Landsteiner
 - 1) Human Blood Group
 - 2) Cell Theory
 - 3) Genes as Regulatory Agents.
- b) Name two motile bacteria.
- c) Define: Buffers. Give two examples.
- d) Give two functions of glycogen bodies.
- e) Name the two pentose sugars in nucleic acids.
- f) State true or false:
 - i) Lipids are polymers of fatty acids and glycerol.
 - ii) Carbohydrates are polymers joined by peptide bonds.
- g) Fill in the blanks:
 - i) _____ is used as probiotic culture.
 - 1) Rhizobium
 - 2) E.coli
 - 3) Lactobacillus
 - 4) None of the above
 - ii) _____ is father of chemotherapy.
 - 1) Fleming
 - 2) Pasteur
 - 3) Paul Ehrlich
 - 4) None of the above
- h) Name any two human diseases caused by protozoa.

P.T.O.

Q2) Write short notes on Any Four of the following: [16]

- a) Classes of protozoa.
- b) Carboxysomes
- c) Hydrogen bonds
- d) Discovery of Microscope
- e) Viroids & prions.
- f) Developments of vaccines.

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

- a) State River's postulates.
- b) Give functions of bacterial capsule.
- c) Explain structure and functions of phospholipids.
- d) Explain structure of DNA.
- e) Give steps in bacterial sporulation.
- f) Comment on discovery of anaerobic life.

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

- a) Describe the general characters of fungi.
- b) What are ribosomes? Explain structure and functions of bacterial ribosomes.
- c) What is normal flora of human body? Explain the significance of normal flora with suitable example.
- d) With a neat labelled diagram explain Swan-necked flask experiment by Pasteur.

Q5) Attempt Any one of the following: [16]

- a) With a neat labelled diagram, explain composition, structure and functions of bacterial cell membrane.
- b) What are proteins? Explain the various levels of protein organization. Add a note on structure of haemoglobin.



Total No. of Questions :5]

SEAT No. :

[Total No. of Pages :2

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[5215] -18

F.Y.B.Sc.

MICROBIOLOGY

Basic Techniques in Microbiology (Paper - II)

(2013 Pattern) (New) (Theory)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

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

Q1) Answer the following :

[16]

- a) Define - Diauxic growth.
- b) $1 \mu\text{g} = \text{_____ mg} = \text{_____ g}$.
- c) Rubber gloves can be sterilized in _____.
- d) Define - Generation time.
- e) Peptone serves as source of _____ and _____ in nutrient agar.
- f) Name two dyes used in fluorescence microscopy.
- g) TVC can be determined by _____ and _____.
- h) Write two examples of psychrophiles.

P.T.O.

Q2) Write short notes on any four: [16]

- a) Fixatives in staining methods.
- b) Uv Radiations as sterilization agent.
- c) Enrichment of bacteria.
- d) Nitrogen estimation as a method of growth measurement.
- e) Condensers in microscope.
- f) Cultivation of photosynthetic bacteria.

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

- a) Differentiate between - Thermophiles and mesophiles.
- b) Justify - Macconkey's agar is a selective as well as differential medium.
- c) What is synchronous culture? Describe a method to induce synchrony.
- d) Explain TVC as a method of enumeration of bacteria.
- e) Describe phenol coefficient to check the efficiency of disinfectant.
- f) Discuss the role of culture collection centres. Site the names of two culture collection centers.

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

- a) What is differential staining? Explain Gram staining method.
- b) Describe bacterial growth phases in a batch culture.
- c) What are aberrations in lenses? Describe spherical and chromatic aberrations.
- d) What is pure culture? Explains methods to obtain it.

Q5) Attempt any one of the following; [16]

- a) Enlist chemical agents used for disinfection. Give mode of action of any two of them. Add a note on characteristics of an ideal disinfectant.
- b) Describe the structure and working of bright field microscope.

EEE

Total No. of Questions :5]

SEAT No. :

[Total No. of Pages :2

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[5215] - 19

F.Y.B.Sc.

PSYCHOLOGY

General Psychology

(2013 Pattern) (Paper - I)

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.

[16]

- a) What is neurotransmitter?
- b) State the types of nervous system.
- c) Define motivation
- d) What is Frustration?
- e) Define learning.
- f) What is forgetting?
- g) Define thinking
- h) What is IQ and DQ?

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

[16]

- a) What is cognitive approach?
- b) State the structure and function of neuron
- c) Explain sources of frustration

P.T.O.

- d) Describe Lazarus's theory of emotion.
- e) What is trial and error?
- d) Explain the types of thinking.

Q3) Answer in 150 words (4 out of 6)

[16]

- a) State structuralism.
- b) Explain types of conflicts.
- c) What is humanistic approach?
- d) Explain basic emotions.
- e) State creative thinking.
- f) Describe WAIS.

Q4) Answer in 300 words (2 out of 4)

[16]

- a) Explain methods of psychology.
- b) Describe function of glandular system.
- c) Explain 3 theories of emotion.
- d) Describe various concepts related to classical conditioning.

Q5) Answer in 500 words (any one)

[16]

- a) Define perception. Explain gestalt principles.
- b) What is personality. Describe 16 PF.



Total No. of Questions : 5]

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SEAT No. :

[Total No. of Pages : 2

[5215]-20

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

[16]

- a) Define threshold.
- b) What is psychophysics?
- c) Define thinking
- d) What is mental image?
- e) What is psychological test?
- f) State the characteristic of good psychological test.
- g) Define intelligence.
- h) State the originator of 16 PF.

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

[16]

- a) Explain the importance of problem in experimentation.
- b) State the method of limits in psychophysics.
- c) Describe the role of language in thinking.
- d) Explain the determinants of reaction time.
- e) What are the types of psychological tests?
- f) Explain the nature of aptitude test.

P.T.O.

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

- a) State the types of reaction time.
- b) Which are the basic concepts in psychophysics?
- c) What is Weber's law?
- d) Explain the types of variables.
- e) What is ethical implication of psychological test?
- f) Explain applications of psychological test?

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

- a) Explain the measurement and applications of RT.
- b) State the approaches of problem solving.
- c) Explain Stanford-Binet intelligence scale.
- d) State the evaluation of experimental method.

Q5) Answer in 500 words (any one) **[16]**

- a) What is experiment? Describe goals of experimental psychology.
- b) Define learning. Explain the contribution of Pavlov in classical conditioning.



Total No. of Questions :5]

SEAT No. :

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[Total No. of Pages :4

[5215] - 23

F.Y.B.Sc.

ELECTRONIC SCIENCE

EL - 101: Principles of Analog Electronics

(2013 New Pattern) (Paper - I)

Time : 3 Hours]

[Max. Marks :80

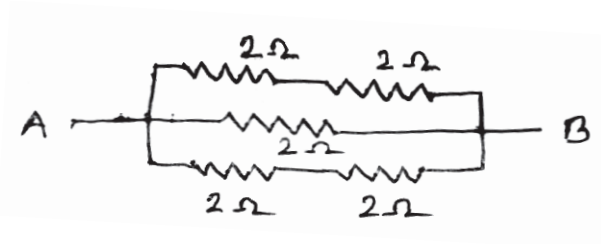
Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicates full marks.
- 3) Draw neat labelled diagrams & symbols wherever necessary.
- 4) Use of log tables and calculators is allowed

Q1) Answer the following questions in brief.

[16]

- a) Find equivalent resistance between terminals AB in the following circuit.



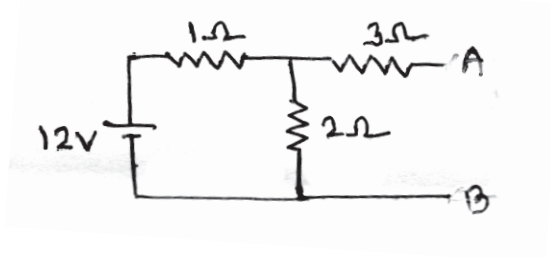
- b) Distinguish between ideal Voltage & current sources.
- c) Give circuit symbols of photodiode & varactor diode.
- d) 'Current leads voltage in capacitive circuit' comment.
- e) Draw circuit diagram of CB configuration of BJT.
- f) Define Q point & load line of a transistor.
- g) Sketch circuit symbol of UJT & p. Channel FET.
- h) Explain in brief any two parameters of opamp.

P.T.O.

Q2) Attempt any four of the following questions.

[16]

- a)
 - i) Draw circuit symbols of gang condenser & variable capacitor.
 - ii) Define inductive reactance of a coil & give its frequency response.
- b) Nortonize the following circuit.



- c) Explain construction & working of Zener diode.
- d) Compare CB, CC & CE configurations of a transistor.
- e) Draw I.V characteristics of UJT & explain different regions.
- f) Describe use of opamp on subtractor.

Q3) Attempt any four of the following questions.

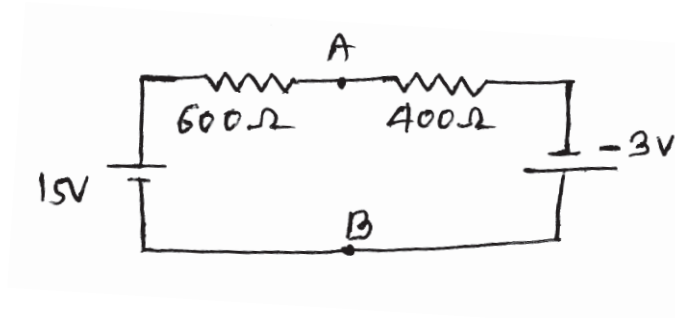
[16]

- a)
 - i) Explain in brief working principle of a transformer.
 - ii) State ideal characteristics of a switch.
- b) In a series LCR circuit $L=1$ mH, $C=0.01 \mu\text{F}$ & $R = 1\text{k}\Omega$ determine resonant frequency.
- c) Write a short note on clamper circuits.
- d) State different types of transistor biasing. Which of them is widely used. Why?
- e) Explain construction & working of p - channel FET.
- f) Obtain an expression for gain of non - inverting opamp.

Q4) Attempt any four of the following questions.

[16]

- a)
 - i) Draw circuit symbol of a fuse & give its important specification.
 - ii) Give circuit symbol of e.m. relay & state one application.
- b) Use superposition theorem to calculate voltage across AB terminals in the following circuit.



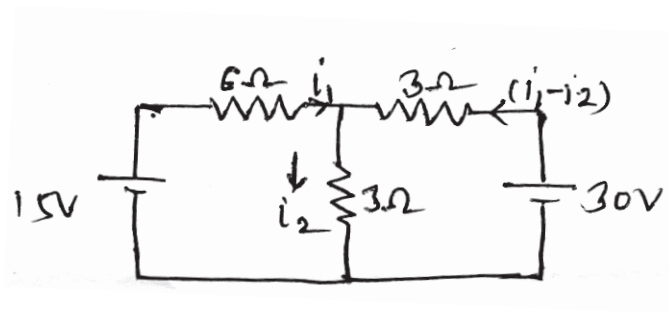
- c) Draw circuit diagram of Bridge rectifier & explain its working.
- d) Explain BJT on switch.
- e) Give circuit symbols of P - channel & n - channel enhancement & depletion type of MOSFETs.
- f) Draw block diagram of opamp & explain function of each block.

Q5) Attempt any four of the following questions.

[16]

- a)
 - i) Give chemical reaction involved in lead acid accumulator.
 - ii) Draw a labelled diagram of optical fiber cable.
- b)
 - i) State maximum power transfer theorem & Thevenine theorem.
 - ii) Draw circuit diagrams of RC integrator & differentiator.

- c) Use KVL to find current I_2 in the following circuit.



- d) Explain construction & working of p.n.p transistor.
- e) i) Describe use of FET on VVR.
ii) Define α & β of BJT.
- f) Explain use of opamp on comparator.



Total No. of Questions :5]

SEAT No. :

[Total No. of Pages :2

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[5215] -24

F.Y.B.Sc.

ELECTRONIC SCIENCE

EL-102: Principles of Digital Electronics

(2013 Pattern) (Paper - II)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

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

Q1) Answer the following questions:

[16]

- a) What is Excess-3 code? Give one example.
- b) Convert following binary number to decimal number :
(110101)₂.
- c) What is the use of K-map?
- d) Define Half adder?
- e) What is multiplexer circuit?
- f) Define the term Decoder.
- g) List different type of flip flops.
- h) What is CMOS?

Q2) Attempt any Four:

[16]

- a) Explain parity generator with proper circuit.
- b) State and verify De Morgan theorem - $\overline{A \cdot B} = \bar{A} \cdot \bar{B}$.
- c) Draw the logic symbol of full adder. Write its truth table.
- d) What is demultiplexer? Explain 1:2 demultiplexer with proper circuit.
- e) Explain different type of shift registers.
- f) Write short note on logic families.

P.T.O.

Q3) Attempt any Four: [16]

- a) What is logic gate? Draw symbols of any two gates & write truth tables.
- b) Explain 4 bit parallel adder with proper circuit.
- c) Simplify logic expression using K-map-
$$Y = \bar{A} \bar{B} \bar{C} + \bar{A} B \bar{C} + A B \bar{C} + A \bar{B} \bar{C} .$$
- d) Explain Decimal to BCD encoder.
- e) Draw circuit of three-bit asynchronous counter & explain.
- f) Explain CMOS inverter with proper circuit.

Q4) Attempt any Four: [16]

- a) What is parity? Explain EVEN & ODD parity systems.
- b) Convert in standard SOP form - $AB + A\bar{C} + BC .$
- c) Perform subtraction using 1's complement
 - i) 98-32
 - ii) 61-39
- d) Compare decoder with demultiplexer.
- e) What is decade counter? Draw circuit of decade counter.
- f)
 - i) Describe different type of seven segment display.
 - ii) What is tristate logic?

Q5) Attempt any Four: [16]

- a)
 - i) Convert Decimal to binary - $(92)_{10}, (53)_{10} .$
 - ii) Convert Hex to octal - $(4E)_{16}, (92)_{16} .$
- b) Draw the logic circuit for the expression - $Y = AB + \bar{A}B + ABC .$
- c) How to construct 4:1 MUX using two 2:1 MUX?
- d) Explain 3 bit UP/DOWN counter with proper circuit.
- e) Explain 2's complement method to perform subtraction with suitable examples.
- f) What is universal shift register? Explain left shift operation using it.

EEE

Total No. of Questions :4]

SEAT No. :

[Total No. of Pages :2

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[5215] - 25

F.Y.B.Sc.

DEFENCE AND STRATEGIC STUDIES

Evolution of Strategic Thoughts

(2013 Pattern) (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 the “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”.

P.T.O.

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?

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 “Guerrilla 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. Mahan.
- d) Highlight on “Impact of American civil war”.



Total No. of Questions : 4]

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SEAT No. :

[Total No. of Pages : 2

[5215]-26

F.Y. B.Sc.

DEFENCE & STRATEGIC STUDIES

**Indias National Security
(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) Answer in 20 words (Any Ten)

[20]

- a) Define "Civil Defence".
- b) What do you mean by "Internal Security"?
- c) State the meaning of Low Intensity Conflict.
- d) Write about location of India.
- e) State the issues between India & China.
- f) Write any two values of Indias Nuclear Centres.
- g) What do you mean by LOC?
- h) State the meaning of N.D.F.B.
- i) What do you know about "Sir Crick Channel"?
- j) Write the names of Indias immediate neighbours.
- k) State the location of Andaman-Nicobar Islands of India.
- l) What do you mean by "Maritime Security"?
- m) State the meaning of "Frontiers".

P.T.O.

Q2) Answer in 50 words (Any Two): **[10]**

- a) Distinguish between Defence & Security.
- b) Write few lines on “Siachen Glacier”.
- c) Explain the concept of “Para Military Forces”.
- d) Write in brief significance of “Civil Defence”.

Q3) Answer in 150 words (Any Two): **[20]**

- a) Discuss the non-military challenges to Indias National Security.
- b) Write essay on Indias Nuclear Programme.
- c) Explain the nature of “Kashmir Problem” in the context of Indo-Pak relations.
- d) Write a note on D.R.D.O.

Q4) Answer in 300 words (Any Two): **[30]**

- a) Explain the “Civil Military Relations” in India.
- b) Evaluate the Indias defence policy since 2010.
- c) Write an essay on “Indias Maritime Security” with special reference to the strategic environment in Indian Ocean.
- d) Highlight on India-China relations with special reference to the long standing “Border Issue”.



Total No. of Questions :4]

SEAT No. :

[Total No. of Pages :2

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[5215] - 27

F.Y.B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 3 : International Security

(2013 Pattern) (Paper-III)

Time :3 Hours]

[Max. Marks :80

Instructions to the candidates:

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

Q1) Answer in 20 Words (Any Ten)

[10×2=20]

- a) Write any two characteristics of Nation
- b) Define collective security
- c) Define diplomacy
- d) Define Neutrality
- e) Define Non- alignment
- f) Define nationalism
- g) Define Balance of Power
- h) Define national security
- i) Define war
- j) Write any two methods of pacific settlement
- k) Define national power.
- l) Define arms control.
- m) Define equal security.

P.T.O.

Q2) Answer in 50 Words (Any Two)

[2×5=10]

- a) Explain India' s freedom struggle movement
- b) Discuss key concept of security
- c) Explain basic features of Neutrality

Q3) Answer in 150 Words (Any Two)

[2×10=20]

- a) Explain techniques of Balance of power
- b) Discuss problems and prospects of Disarmament
- c) Explain achievements of Non- alignments movement (NAM)

Q4) Answer in 300 Words (Any Two)

[2×15=30]

- a) Discuss Role of U.N.O in maintaining world peace
- b) Explain nature and scope of peace studies
- c) Discuss India' s role in SAARC

& & &

Total No. of Questions :5]

SEAT No. :

[Total No. of Pages :2

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[5215] - 28

F.Y.B.Sc.

ENVIRONMENTAL SCIENCE

ENV-101: Fundamentals of Environmental Chemistry &

Environmental Biology (Paper - I)

(2013 Pattern) (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) Attempt the following in not more than 5 lines:

[16]

- a) Define Biology. Enlist any four branches of biology.
- b) What are climatic Barriers.
- c) Enlist the stages of reproduction in viruses.
- d) Draw tree diagram of classification of plant Kingdom.
- e) Give chemical reactions of Sulphur in atmosphere.
- f) What are unusual physical properties of water.
- g) Give four examples of Flavouring agents.
- h) Define Normality & Molarity.

Q2) Answer any FOUR of the following:

[16]

- a) Explain the concept livestock rareing.
- b) Write a note on life forms occurred in aquatic ecosystem.
- c) Explain the concept geological time scale.
- d) Describe the term continental Drift.
- e) Explain chemical reactions or Atmosphere.
- f) Draw neat labeled diagram of Atmosphere.

P.T.O.

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

- a) Characteristics of Vertebrates
- b) Concept of speciation
- c) Techniques used in preservation of food.
- d) Microbial Transformation of phosphorus.
- e) Traditional Methods used for extraction of Resources.
- f) Health effects associated with Mercury.

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

- a) Explain in detail Biodiversity in India.
- b) Explain in detail principle & working of pH meter.
- c) What are the principals of Taxonomy, write a note on objectives & hierarchy of Taxonomy.
- d) Explain with example Biogeochemical cycle.

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

- a) Define Environmental Biology. Explain in details its importance in today's contest from environmental point of view.
- b) Define Adulteration. Give brief account on properties or adulterant with their effects.



Total No. of Questions :5]

SEAT No. :

P370

[Total No. of Pages :2

[5215] - 29

F.Y.B.Sc.

ENVIRONMENTAL SCIENCE

ENV - 102 : Fundamentals of Environmental Geosciences &

Environmental Pollution

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

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

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

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

[16]

- a) What are Igneous rocks? Give two examples.
- b) State the difference between Macro and Micronutrients.
- c) Define : Hydrological cycle.
- d) Who proposed Continental Drift Theory? and in which year?
- e) Write the difference between Primary and Secondary Pollutants.
- f) What are Biofertilizers? give two examples.
- g) Write any two effects of Ozone Layer Depletion.
- h) Define : Thermal Pollution and give its two sources.

Q2) Answer any FOUR of the following:

[16]

- a) What is Temperature Inversion? Explain its two types.
- b) Explain any four factors regulating Atmospheric temperature.
- c) Write about any four Rock forming minerals.
- d) What are Auditory and Non - auditory effects of noise pollution on Man.
- e) Write effects of heavy metals Pb(Lead) & Hg (Mercury).
- f) Define - Pollutant and explain its various sources.

P.T.O.

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

- a) Describe any four physical properties of soil.
- b) Define : Precipitation and explain various forms of precipitation. (atleast four)
- c) Discuss the significance of Solar energy.
- d) Define water pollution and discuss a case study of Minamata disease.
- e) Write the effects of Air pollution on Plants & human being.
- f) Enumerate the advantages and disadvantages of organic farming.

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

- a) Define : Evaporation and explain factors affecting on it.
- b) Write Sources and effects of Pesticide pollution.
- c) What is Atmospheric Pressure. explain factors affecting on it.
- d) Explain the effects of Thermal pollution on Biological Systems.

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

- a) Describe in detail Internal structure of Earth & Draw suitable diagram.
- b) Discuss the causes, effects and Control measures for Global warming.



Total No. of Questions : 4]

SEAT No. :

P371

[5215]-30

[Total No. of Pages : 2

F.Y.B.Sc.

FOUNDATION COURSE (Restructuring)

'A' Component

(2013 Pattern) (New)

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 concepts in 50 words each (Any Two): **[10]**

- a) Women Empowerment.
- b) Gender Disparity.
- c) Co-operative Movements.
- d) Research.

Q2) Write the following short notes in 100 words each (Any Four): **[20]**

- a) Society concept.
- b) Privatization.
- c) Importance of Research.
- d) Religion.
- e) State concept.
- f) Globalization.

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

- a) State the problem of urbanization.
- b) Write the social work of Raja Rammohan Roy.
- c) Give an account of social values in India.
- d) Explain the types of economy.
- e) State the effects of growing population in India.

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

- a) Explain the merits and demerits of Indian Democracy.
- b) Give an account of various Religion in India.



P.T.O.

Total No. of Questions : 4]

P371

[5215]-30

प्रथम वर्ष विज्ञान

पायाभूत अभ्यासक्रम

(2013 पैटर्न)

वेळ: 3 तास]

[एकूण गुण : 80

- सुचना: 1) सर्व प्रश्न सोडविणे आवश्यक आहे.
2) उजवीकडील अंक पूर्ण गुण दर्शवितात.

Q1) पुढील संकल्पना 50 शब्दांत स्पष्ट करा. (फक्त दोन) [10]

- अ) महीला सबलीकरण ब) लैंगिक विषमता
क) सहकार चळवळ ड) संशोधन

Q2) पुढील टिपा प्रत्येकी 100 शब्दांत लिहा. (फक्त चार) [20]

- अ) समाज संकल्पना ब) खाजगीकरण
क) संशोधनाचे महत्व ड) धर्म
इ) राज्य-संकल्पना ई) जागतिकीकरण

Q3) पुढील प्रश्नांची उत्तरे 200 ते 250 शब्दांत लिहा. (फक्त तीन) [30]

- अ) शहरीकरणाच्या समस्या सांगा.
ब) राजा राममोहन रॉय यांचे सामाजिक कार्य लिहा.
क) भारतातील सामाजिक मूल्यांवर चर्चा करा.
ड) अर्थव्यवस्थेचे प्रकार स्पष्ट करा.
इ) भारतातील लोकसंख्या वाढीचे परीणाम सांगा.

Q4) पुढीलपैकी एका प्रश्नाचे उत्तर 500 शब्दांत लिहा. [20]

- अ) भारतीय लोकशाहीचे गुण दोष स्पष्ट करा.
ब) भारतातील विविध धर्मांचा आढावा घ्या.



Total No. of Questions :10]

SEAT No. :

[Total No. of Pages :3

P372

[5215] - 31

F.Y.B.Sc. (Vocational)

INDUSTRIAL CHEMISTRY

Surface Chemistry and Catalysis

(2013 Pattern) (New) (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 terms:

[8]

- a) Dialysis.
- b) Sol.
- c) Brownian movement.
- d) Micelles.

Q2) Answer any two of the following:

[8]

- a) Distinguish between emulsion and gel.
- b) Explain auto catalysis with suitable example.
- c) Write a short note on application of catalysis.

P.T.O.

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

- a) Explain the term catalytic poisoning.
- b) Explain condensation method for preparation of sol.
- c) State and explain Tyndall effect.

Q4) Answer any one of the following: [8]

- a) Define gel and explain its types. Give its properties.
- b) What is heterogeneous catalysis and explain its types with suitable examples.

Q5) Answer any two of the following: [8]

- a) Explain intermediate compound formation theory.
- b) Explain the characteristics of catalytic reactions.
- c) Give the ultrafiltration method for purification of sol.

SECTION-II

Q6) Answer the following: [8]

- a) Define mole fraction.
- b) Write in SI unit of the following terms:
 - i) Electric charge
 - ii) Frequency
 - iii) Power
 - iv) Electric resistance
- c) State and explain heat capacity.
- d) Define the term 'yield'.

Q7) Answer any two of the following: [8]

- Explain the terms steady state and unsteady state operation with suitable examples.
- Give the generalised approach for solving material balance problems involving chemical reaction. Give classification of material balance problem.
- Write a note on recycling and by-passing operations.

Q8) Answer any two of the following: [8]

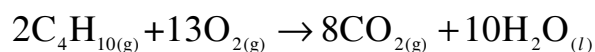
- Give the aspects of process flow sheet.
- Write a short note on material balance in evaporation.
- Write a short note on percent excess.

Q9) Answer any one of the following: [8]

- State and explain Raoult's law and Henry's law.
- Explain the enthalpy change for pure substance and for mixture of gases.

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

- What is the strength of Na_2CO_3 solution in gms/litre. If 10 g of Na_2CO_3 is dissolved in 200 ml solution?
- Calculate enthalpy change for the following reaction in which 65 g mole CO_2 is produced at 25°C .



Given

Component	ΔH_f° kcal / g mole
$\text{C}_4\text{H}_{10}(\text{g})$	-30.14
$\text{CO}_2(\text{g})$	-94.051
H_2O	-68.315

- 9.8 g of H_2SO_4 is dissolved to make 100 ml of solution. Find the normality and molarity of the solution.

EEE

Total No. of Questions :6]

SEAT No. :

[Total No. of Pages :3

P373

[5215] - 32

F.Y.B.Sc. (Vocational)

BIOTECHNOLOGY

VOC-Biotech.-101:Biochemistry and Microbiology (Paper - I)

(2013 Pattern)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

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

SECTION-I

(Biochemistry)

Q1) Answer the following in short:

[8]

- a) Define proteins. Give any one example.
- b) What is a nucleoside? Give any one example.
- c) Define is anabolism? Name any one catabolic pathway.
- d) Mention any two non-protein enzymes.

Q2) Answer any four of the following:

[16]

- a) Explain the structure of t-RNA with the help of neat and well labelled diagram.
- b) Explain the effect of temperature on enzyme activity.
- c) Differentiate between saturated fatty acids and unsaturated fatty acids.
- d) What are the functions of carbohydrates?
- e) Classify amino acids on the basis of nutrition.

P.T.O.

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

- a) Give classification of enzymes with examples. Mention the role of carbohydrate metabolizing enzymes.
- b) Explain β -oxidation of fatty acids in brief. Give the energetics and features of β -oxidation of fatty acids.
- c) Explain the features and energetics of TCA cycle.

SECTION-II

(Microbiology)

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

- a) Give example of any two Gram negative organisms.
- b) What are viruses? Give a suitable example.
- c) Define coliforms.
- d) Name any two extremophiles.

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

- a) Enlist pure culture techniques. Explain any one in detail.
- b) Comment on flagella staining.
- c) Describe enrichment culture technique for phosphate solubilizing organism.
- d) Why Gram staining is considered as differential staining. Justify.
- e) Give detail classification of media on the basis of application and function.

Q6) Answer any two of the following:

[16]

- a) Describe the MPN index in detail.
- b) Write in detail morphological structure of viruses with suitable example.
- c) Give the detailed account of steps used in cell wall staining.

EEE

Total No. of Questions :5]

SEAT No. :

P374

[Total No. of Pages :2

[5215] - 33

F.Y.B.Sc. (Vocational)

PHOTOGRAPHY AND AUDIO-VISUAL PRODUCTION

Basic Photography and Appreciation of Media (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 the following:

[16]

- a) Draw a diagram and explain the difference between specular reflection and diffuse reflection of light.
- b) What is iris diaphragm? How is it useful in a camera?
- c) What is the purpose of the white balance setting in a DSLR camera?
- d) What is ISO? How is it useful in digital photography?
- e) Explain the difference between an unsharp image and a blurred image.
- f) What is the function of the mirror in a DSLR camera?
- g) What pixel? How is it important in digital photography?
- h) What do you mean by pixel? How is it important in digital photography.

P.T.O.

Q2) Answer ANY FOUR of the following: [16]

- a) What do you mean by f number? Write down the f number scale. What is a full stop, half stop and intermediate stop?
- b) Draw a diagram and show the different types of distortions produced by a lens. How are these removed?
- c) How is a photographic image analyzed technically?
- d) Draw suitable diagrams and explain the rule of thirds and the rule of golden points. How are these useful in photographic composition?
- e) Draw a suitable diagram and describe a box camera. What are the merits and demerits of this camera?

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

- a) Explain the term 'amateur photographer'.
- b) Compare the focal plane shutter and the leaf shutter.
- c) Discuss your rights / privileges as a press photographer.
- d) What is the difference between a 'hard news' and a 'soft news'? How do you prepare for both types of news?
- e) How is a photographic image analyzed technically?

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

- a) Discuss application areas of photography.
- b) How would you analyze photography as a medium of mass communication?
- c) Discuss the importance of a photographic image in the print media.

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

- a) Discuss any four elements of composition. Draw suitable sketches for supporting your discussion.
- b) Explain the different parts of a DSLR camera and their functions.
- c) Discuss the ethical norms a photojournalist should observe.

EEE

Total No. of Questions :5]

SEAT No. :

P375

[Total No. of Pages :2

[5215] - 34

F.Y.B.Sc. (Vocational)

ELECTRONIC EQUIPMENT AND MAINTENANCE

Maintenance Concepts, Instruments and Appliances (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 diagrams wherever necessary.*

Q1) Attempt all of the following:

[16]

- a) What is MTBF & MTF of instruments?
- b) How to convert PMMC meter into multirange voltmeter?
- c) What is 10:1 probe of CRO?
- d) What is precision & accuracy?
- e) What are different parameters of pulse?
- f) State different faults in hearing aid.
- g) What is fuzzy logic in automatic washing machine?
- h) What is loading effect?

Q2) Attempt any four of the following:

[16]

- a) What is the term redundancy? What are their types? Explain any one.
- b) Write a note on series type ohmmeter.
- c) Write a note on single trace CRO.
- d) Explain the working of linear power supply with its block diagram.
- e) Write a note on: Electronic ignition system.

P.T.O.

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

- a) What is megger? Explain it's working with a neat diagram.
- b) What are advantages of DSO? Explain working of DSO with its block diagram.
- c) Write a short note on: AF signal generator.
- d) What are applications of function generator?
- e) Explain the working of digital clock.

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

- a)
 - i) Explain the working of multirange ammeter.
 - ii) what is current probe of CRO?
- b) Explain the working of RF signal generator.
- c) Explain the working of ON line UPS & OFF line UPS.

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

- a)
 - i) Explain front panel controls of CRO.
 - ii) If $I_m = 1\text{mA}$, $R_m = 50\Omega$, convert PMMC meter into 0-5V, 0-10V & 0-15V voltmeter.
- b) Explain the working of pulse generator.
- c) What is circuit breaker? Explain its working with the help of circuit arrangement.



Total No. of Questions :5]

SEAT No. :

[Total No. of Pages :2

P376

[5215] - 35

F.Y.B.Sc. (Vocational)

INDUSTRIAL MICROBIOLOGY

**Microorganism and Systems for Fermentation Processes (Paper - I)
(2013 Pattern) (Theory)**

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 labelled diagrams wherever necessary.*
- 5) *A calculator is allowed.*

Q1) Answer each sub-question in one or two lines; Fill in the blanks: **[16]**

- a) Define 'Precision'.
- b) What is a process flow diagram?
- c) Why Reynolds number is dimensionless quantity?
- d) What is crippled strain?
- e) Streptomyces are important fungi employed in fermentation industry to produce antibiotic streptomycin. (True/False).
- f) State use of specific gravity in the fermentation industry.
- g) What is enrichment culture?
- h) Define, 'Yield'.

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

- a) Give an account of aseptic and non-aseptic fermentations.
- b) Justify "Under certain circumstances it may be prudent not to patent invention at all, but to maintain the discovery as a trade secret".

P.T.O.

- c) Draw a detailed flowchart for the production process in a typical industrial microbiology establishment.
- d) What is strain improvement? What are the two strategies for strain improvement?
- e) List five names of microorganisms and fermentation product produced by them.
- f) The radius of the given fermenter is 16 inches and length is 184 inches. Calculate the aspect ratio and volume of the fermenter. (Given $\Pi = 3.14$)

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

- a) Temperature scales.
- b) Actinomycetes.
- c) Use of Term 'Fermentations'.
- d) Upstream process.
- e) Dimensional homogeneity of equation.
- f) Error types.

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

- a) Describe the process of development of pharmaceutical product.
- b) Explain the WHO's classification of microorganisms on the basis of hazards and containment levels.
- c) Describe the culture collection with respect to types, handling and methods of preservation of microorganisms.
- d) Find the mean, standard deviation and variance for fermentation product yield in mg/L: 10.5; 15.5; 17.5; 19.5; 20.5; 13.5; 12.5; 10.5; 16.6; 22.5.

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

- a) Explain the components of a modeling and process of choosing control region for modeling purpose.
- b) Describe the linear and non linear models of data analysis.

EEE

Total No. of Questions :5]

SEAT No. :

[Total No. of Pages :2

P377

[5215] - 36

F.Y.B.Sc. (Vocational)

COMPUTER HARDWARE AND NETWORK ADMINISTRATION

Essentials of Computer

(2013 Pattern) (Paper - I) (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) Write notes on motherboard.
- b) Explain working of MOUSE.
- c) What is flash memory?
- d) Write the full forms of SIMM, BCD, MICR & CAD.
- e) Write notes on MODEM.
- f) Define add on card.
- g) Write notes on web camera.
- h) Write notes on LCD panel.

Q2) Attempt any four

[16]

- a) Write notes on SMPS.
- b) Explain working of Inkjet printer.
- c) Explain BVS structure of computer.
- d) Write notes on scanner.
- e) What is instruction prefetch?
- f) What is DMA?

P.T.O.

Q3) Attempt any four:

[16]

- a) Write notes on LASER printer.
- b) Explain control unit of computer.
- c) Write notes on note book & tablet.
- d) Write notes on HDD.
- e) Explain working of DOT Matrix Printer.
- f) Write notes on CD ROM.

Q4) Attempt any two:

[16]

- a) Explain RAM in detail.
- b) Write notes on computer generation.
- c) Write notes on
 - i) bluetooth
 - ii) plotler

Q5) Attempt any two:

[16]

- a) Define software, explain different types of software in detail.
- b) Write notes on off-line & on-line UPS.
- c) Write notes on
 - i) BIOS
 - ii) Input & Output devices.



Total No. of Questions :5]

SEAT No. :

[Total No. of Pages :2

P378

[5215] - 37

F.Y.B.Sc. (Vocational)

SEED TECHNOLOGY

Morphology, Plant Breeding and Testing for Cultivar Genuineness

(2013 Pattern) (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 labeled diagrams wherever necessary.*

Q1) Answer in two lines (Any eight)

[8 × 2 = 16]

- a) Enlist the essential whorls of a typical flower.
- b) Give an example of berry type of fruit (Any two).
- c) What is vegetative propagation?
- d) Give any two objectives of plant breeding.
- e) Define plant introduction.
- f) Give any two differences between seed and Grain.
- g) What are mutagens?
- h) What is a grow out test?
- i) Define anther culture.

Q2) Attempt any four of the following:

[4 × 4 = 16]

- a) Explain okra flower in detail.
- b) Discuss any one method of artificial vegetative propagation in plants.
- c) Give the advantages and disadvantages in cross pollination.
- d) Comment on multiplication activity in plant breeding.
- e) Describe any two types of mutations.

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) Types of endosperm (any one)
- d) Important achievements of plant introduction.
- e) Peroxidase test.

Q4) Attempt any two of the following:

[16]

- a) Define fertilization comment on the process of fertilization in angiosperms.
- b) Describe capsule and legume type of fruits with suitable examples and diagrams.
- c) What is hybridization? Give the objectives and difficulties in it.

Q5) Write the diagnostic characters, floral formula, and floral diagram of families fabaceae and asteraceae.

[16]

OR

What is mass selection? Write procedure, advantages, disadvantages and achievements of mass selection.



Total No. of Questions : 10]

SEAT No. :

P379

[5215]-38

[Total No. of Pages : 3

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

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidate:

- 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: **[8]**

- a) Catalytic cracking.
- b) Calorific value.
- c) Flash point of a fuel
- d) Petrochemicals.

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

- a) Describe in brief properties and uses of coke.
- b) Give the classification of industrial fuels.
- c) Write a short note on gasoline.

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

- a) Define Intrinsic ash and Fixed carbon.
- b) What is natural gas? Give its uses.
- c) Explain what is octane number? What are the methods that are used for increasing the octane number.

P.T.O.

Q4) Answer any one of the following: [8]

- a) Give an account of composition of petroleum. Mention any one theory of origin of petroleum.
- b) Give different methods by which coal can be analysed.

Q5) Answer any two of the following: [8]

- a) Define and explain what is meant by Ignition temperature, flame temperature and five point.
- b) What are properties of a good fuel?
- c) What is coal-tar? Enlist fractions obtained from it.

SECTION-II

Q6) Answer the following: [8]

- a) What is liquefaction? Give examples.
- b) Define metallurgy. Give it's divisions.
- c) What is a flux? Give the types of fluxes.
- d) Give the names of two varieties of mica and list it's uses.

Q7) Answer any two of the following: [8]

- a) What is an ore? Explain the composition of different types of ores.
- b) Discuss the process of Roasting. Enlist the types of roasting.
- c) Explain the principles of Hydrometallurgy with suitable examples.

Q8) Answer any two of the following. [8]

- a) What are zeolites? Give a brief account of their structure and applications.
- b) Differentiate between orthosilicates and metasilicates.
- c) Write a brief account of allotropes of carbon.

Q9) Answer any one of the following: [8]

- a) What is refining? Discuss different processes of refining in detail.
- b) Discuss the principles of extraction of metals from their sulphide ores.

Q10) Answer any two of the following: [8]

- a) What is activated charcoal? Discuss its applications.
- b) Differentiate between calcination and roasting.
- c) Discuss in brief extraction of an ore by froth-floatation process.



Total No. of Questions : 6]

SEAT No. :

P380

[5215]-39

[Total No. of Pages : 3

F.Y. B.Sc. (Vocational)

BIOTECHNOLOGY

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

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidate:

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

SECTION-I

(Biophysics and Instrumentation)

Q1) Answer the following in short:

[8]

- a) State the Beer's law.
- b) What is density gradient?
- c) Define is electrophoresis?
- d) What is meaning of Rf? Give its formula.

Q2) Answer any four of the following:

[16]

- a) Describe the principle and applications of paper chromatography.
- b) Differentiate between colorimeter and spectrophotometer.
- c) Write a short note on fluorescence microscopy.
- d) Explain the role of radioisotopes in biological sciences.
- e) Give brief description of liquid scintillation counting.

P.T.O.

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

- a) Explain the principle of ion exchange chromatography. Add a note on its applications.
- b) Describe the principle and working of spectrophotometer.
- c) Explain the principle agarose gel electrophoresis. Describe the technique of agarose gel electrophoresis.

SECTION-II

(Mathematics, Statistics and Computer for Biologists)

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

- a) If $y = e^{\sin x^2}$, find $\frac{dy}{dx}$.
- b) Evaluate $\lim_{x \rightarrow 2} \frac{x^2 - 5x + 6}{x - 2}$.
- c) Mention any two input devices.
- d) What is an experiment?

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

- a) Evaluate $\int_0^1 \frac{3x^2 + 5x}{x^3 + \frac{5}{2}x^2 + 7} dx$.
- b) If $f(x) = \begin{cases} \frac{x^2 - 5}{x - \sqrt{5}} & \text{if } x \neq \sqrt{5} \\ 1 & \text{if } x = \sqrt{5} \end{cases}$, find $\lim_{x \rightarrow \sqrt{5}} f(x)$. Is $\lim_{x \rightarrow \sqrt{5}} f(x) = f(\sqrt{5})$?
- c) Give applications of computer in industry.
- d) Write a note on binomial distribution.
- e) What is Correlation? Explain +ve correlation with suitable example.

Q6) Answer any two the following:

[16]

- a) i) Find the limit of the sequence $\left\{ \frac{3n+5}{2n+7} \right\}_{n=0}^{\infty}$.
- ii) Discuss the convergence of the series: $\sum_{n=1}^{\infty} \frac{2^n + 3^n}{2^n - 3^n}$.
- b) i) Evaluate $\int_0^{\frac{\pi}{2}} \cos^3 x dx$.
- ii) If $y = \log \left[\frac{1+e^{x^2}}{\sqrt{x}} \right]$, find $\frac{dy}{dx}$.
- c) Explain in detail experimental design.
- d) Describe the chi-square test with suitable example.



Total No. of Questions : 5]

SEAT No. :

P381

[5215]-40

[Total No. of Pages : 2

F.Y. B.Sc. (Vocational)

PHOTOGRAPHY AND 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 labelled diagrams wherever necessary.*

Q1) Attempt any two of the following

[16]

- a) Illustrate the different barriers in communication.
- b) Write about the different ways in which communication impacts an audience.
- c) You are asked to interview the topper of a UPSC examination. What questions would you ask him/her for a youth magazine?

Q2) Attempt any four of the following:

[16]

- a) Explain the difference between verbal and non-verbal communication.
- b) Write a short note on Aristotle's model of communication.
- c) Today audience has become a customer. Comment.
- d) Write a short note on 'mass culture'.
- e) Illustrate the three stages in interpersonal communication.

P.T.O.

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

- a) Explain, with suitable examples, the definition of ‘communication’.
- b) Explain the meaning of ‘inverted pyramid’ in the context of news writing.
- c) With examples explain the problems of using words in communication.
- d) ‘Kyunki Saas Bhi Kabhi Bahu Thi’ lead to several firsts on Indian television. Explain with examples.
- e) Write a short note on Community Radio.

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

- a) Draw the block diagram of the Shannon and Weaver model. Explain the function of each of blocks.
- b) Write a news report of about 100 words on the visit of a celebrity actor for the inauguration of the cultural festival of your college.
- c) What are the merits and demerits of television as a medium of mass communication?

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

- a) Explain the characteristics of mass communication.
- b) Write short notes on:
 - i) Five Ws and one H
 - ii) Reality shows on television
- c) If you were to build a news related website, illustrate the different content elements it would include.



Total No. of Questions : 5]

SEAT No. :

P382

[5215]-41

[Total No. of Pages : 2

F.Y. B.Sc. (Vocational)

ELECTRONIC EQUIPMENT AND MAINTENANCE

**Electronic Components Circuit and Equipment Assembly
(2013 Pattern) (Paper-II) (New)**

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Attempt the following

[16]

- a) Name common faults that occur in resistances.
- b) Name common faults that occur in capacitors.
- c) Explain the term NEMA.
- d) State different types of Resistors.
- e) Name different types of dielectric material used in capacitors.
- f) Explain importance of flux.
- g) Explain the use of sheilding cable.
- h) State the adavantages of surface mount technology.

Q2) Attempt any four:

[16]

- a) State the difference between good solder joint and bad solder joint.
- b) Enlist tools required for soldering.
- c) Write a note on applications of Resistors in Electronic circuits.
- d) Write a note on applications of capacitors in Electronic circuits.
- e) Inductor is a wattless component comment.

P.T.O.

Q3) Attempt any four:

[16]

- a) Draw different circuit symbols used in Electronics any Eight.
- b) With the help of a neat diagram write a note on soldering Iron.
- c) Name tools used for servicing any eight.
- d) State information do you get from circuit diagram.
- e) Name different types of transformers used in Electronic Industry.

Q4) Attempt any two:

[16]

- a) Explain the working of ELCB also state the importance of ELCB.
- b) With the help of a neat diagram explain the working of a tube light.
- c) Explain different types of PCB and state its advantages.

Q5) Attempt any two:

[16]

- a) With the help of a neat diagram write a note on ultrasonic soldering.
- b) Write a note on precautions to be taken during soldering and desoldering.
- c) Write a note on applications of inductors in Electronic industry.



Total No. of Questions : 5]

SEAT No. :

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[5215]-42

[Total No. of Pages : 2

F.Y. B.Sc. (Vocational)
INDUSTRIAL MICROBIOLOGY
Industrial Processes and Products
(2013 Pattern) (Paper-II) (Theory)

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 labelled diagrams wherever necessary.*
- 5) *Scientific calculators are allowed.*

Q1) Answer the following:

[16]

- a) What is seed investment?
- b) Write role of restriction enzymes in recombinant DNA technology.
- c) Name any two industrial fermentation products and their respective producer organisms.
- d) Define precursor.
- e) Write elemental formula of microbial cell.
- f) Name any two complex media used in fermentation industry.
- g) Define Del factor.
- h) Explain the term venture capitalists.

Q2) Attempt any four of the following:

[16]

- a) Discuss the applications of biotechnology in food industry.
- b) Draw neat and labelled diagram of continuous stirred tank reactor.
- c) With the help of suitable examples explain the concept of competitive intelligence.

P.T.O.

- d) Explain the process of industrial ethanol production with reference to substrates & organisms involved in it.
- e) Enlist various factors which are considered while designing a fermentation medium.
- f) Explain objectives of process economics.

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

- a) Solid state fermentation.
- b) Metabolic engineering.
- c) Applications of monoclonal antibodies.
- d) Recombinant therapeutic proteins.
- e) Strain improvement
- f) Composting

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

- a) Discuss the role of CEO in a biotechnology based company.
- b) Differentiate between primary and secondary screening process.
- c) Discuss the use of microbial enzymes in textile industries.
- d) Explain the factors affecting choice of fermentation medium.

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

- a) Discuss the need of construction of business plan and the stages of construction of business plan.
- b) With the help of suitable examples discuss the industrial production of chemicals by bioprocesses.



Total No. of Questions : 5]

SEAT No. :

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[5215]-43

[Total No. of Pages : 2

F.Y. B.Sc. (Vocational)

COMPUTER HARDWARE AND NETWORK ADMINISTRATION

Computer Organisation

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

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 USB?
- b) Write notes on BIOS.
- c) Define HDMI.
- d) Explain Assembler.
- e) Write notes on bluetooth devices.
- f) What is Compiler?
- g) Write notes on Hardware.
- h) What is debugger?

Q2) Attempt any four:

[16]

- a) Explain any two Arithmetical instructions of 8086.
- b) What is multimedia?
- c) Define simulator and emulator.
- d) Write notes on flow chart.
- e) Define math co processor.
- f) Write notes on tristate buffer.

P.T.O.

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

- a) Write notes on control panel of Window Operating System.
- b) Explain different Registers of 8086.
- c) Write notes on Network Operating System.
- d) Write notes on Internet.
- e) Explain the main functions of Operating System.
- f) Define:
 - i) POST.
 - ii) Device driver

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

- a) Explain different types of Softwares in detail.
- b) Write notes on ANDROID Operating System.
- c) Write notes on:
 - i) Firmware
 - ii) RS - 232

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

- a) Explain Architecture of 8086 with block diagram.
- b) List different network topologies explain any one in detail.
- c) Explain:
 - i) Any two data transfer instructions of 8086.
 - ii) Wi-Fi System.



Total No. of Questions : 5]

SEAT No. :

P385

[5215]-44

[Total No. of Pages : 2

F.Y. B.Sc. (Vocational)

SEED TECHNOLOGY

Seed Physiology and Seed Production

(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 labeled diagrams wherever necessary.*

Q1) Answer in two lines (Any eight):

[8 × 2 = 16]

- a) Define seed deterioration.
- b) What is seed ageing?
- c) Enlist types of seed germination.
- d) What are artificial seeds?
- e) Comment on land preparation.
- f) Enlist different types of nursery beds.
- g) What are certified seeds?
- h) Define roughing.
- i) Enlist biotic causes of crop diseases.

Q2) Attempt any Four of the following:

[4 × 4 = 16]

- a) Give composition of seed storage.
- b) Describe various types of dormancy.
- c) Comment on short term and long term storage.
- d) Explain different methods of sowing.
- e) Comment on national seed corporation and its objectives.

P.T.O.

Q3) Write notes on any Four of the following:

[4 × 4 = 16]

- a) Physiology of seed dormancy.
- b) Seedling abnormalities and its causes.
- c) Seed vigour.
- d) Importance of drainage.
- e) Precaution during crossing program.

Q4) Attempt any two of the following:

[2 × 8 = 16]

- a) Explain various factors affecting seed longevity.
- b) Define genetic purity. Explain various steps involved in maintenance of genetic purity.
- c) Explain different methods of irrigation. Add a note on losses due to excessive irrigation.

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

OR

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

