

Total No. of Questions : 5]

SEAT No :

P504

[Total No. of Pages : 2

[4917] - 107

F.Y. B.Sc.

BOTANY

BO - 111 : Fundamentals of Botany (Plant Diversity)

(Plant Morphology and Anatomy)

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

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Attempt the following:

[16]

- a) Define Algae.
- b) Name any two types of Lichen.
- c) Give any two examples of Bryophytes.
- d) Give any two characters of Angiosperms.
- e) Define Anatomy.
- f) What is Inflorescence?
- g) Define Flower.
- h) Name any two elements of phloem.

Q2) Attempt any four of the following:

[16]

- a) Write the process of conidia formation in cystopus (Albugo).
- b) Describe Foliose lichen.
- c) Explain the structure and Functions of hydathode of Nephrolepis.
- d) Describe types of root with examples.
- e) Describe any two types of Racemose inflorescence.
- f) Define Morphology and give it's scope.

P.T.O.

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

- a) Mode of nutrition in Albugo (cystopus).
- b) Characters of pteridophytes.
- c) Causes of evolutionary success of Angiosperms.
- d) Corm.
- e) Agents of seed dispersal.
- f) Tuber.

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

- a) Describe cell structure in spirogira.
- b) Describe the structure of sporophyte of Riccia.
- c) Describe the types of aestivation.
- d) Explain structure and functions of sclerenchyma and collenchyma.

Q5) a) Describe external structure of cycas sporophyte. Add a note on internal structure of cycas leaf let.

- b) Describe internal structure of monocot stem and leaf.

[16]



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SEAT No. :

P505

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[Total No. of Pages : 2

F.Y. B.Sc.

BOTANY

BO - 112 : Industrial Botany-I & II

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

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Attempt the following:

[16]

- a) Enlist any two important floricultural crops.
- b) What is gum?
- c) What is plant tissue culture?
- d) Give any two plant resources of fodder.
- e) Define biofertilizer.
- f) What is biofuel?
- g) Define canning.
- h) Give names of any two fungi used in industry.

Q2) Attempt Any Four of the following:

[16]

- a) Give the advantages of green house technology.
- b) Explain the technique of inoculation.
- c) Write the uses of mushroom.
- d) Give the advantages of biofuel.
- e) Explain the importance of biopesticides.
- f) Give the need of biofertilizers.

P.T.O.

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

- a) Organic farming.
- b) Hardening.
- c) Spawn production.
- d) Integrated Pest Management (IPM).
- e) Blue Green Algal biofertilizers.
- f) Need of biofuels.

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

- a) Give an account of cultivation practices in Gerbera.
- b) Explain in brief seed processing and production in cotton.
- c) Describe in detail products & applications of Trichoderma.
- d) What is fruit processing? Describe the process of jam preparation.

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

OR

Give the botanical source, active principles and medicinal uses of Adhatoda and add a note on nutraceuticals.



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SEAT No. :

P506

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[Total No. of Pages : 2

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) Conjugation.
- b) Monera.
- c) Flagella.
- d) Typhlosole.
- e) Tympanum.
- f) Hemichordata.
- g) Nuptial pads.
- h) Tunicata.

Q2) Write short notes on (Any Four):

[16]

- a) State the structure and function of Trichocyst.
- b) Explain the general characters of Kingdom Animalia.
- c) Describe the five kingdom classification system.
- d) Write the salient features of Cephalochordata.
- e) Axolotal larva.
- f) Describe the functions of blood of frog.

P.T.O.

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

- a) With a suitable diagram describe the structure of contractile vacuoles in paramecium.
- b) State the general characters of class Hydrozoa.
- c) Describe the structure of septal nephridia in earthworm.
- d) Explain amphidromous migration in fishes.
- e) Discuss parental care in Anura with any two examples.
- f) Sketch and label the internal structure of heart of frog.

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

- a) State the distinguishing characters of phylum porifera. Give names of classes with examples each.
- b) External characters of Earthworm.
- c) With suitable diagram describe structure and functions of eye of frog.
- d) Give the general characters of bony fishes with suitable example.

Q5) Describe the digestive system of the Earthworm. Add a note on physiology of digestion. [16]

OR

Describe the male reproductive system of Frog.



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SEAT No. :

P507

[4917]-110

[Total No. of Pages : 2

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 side indicate full marks.*

Q1) Define / Explain the following:

[16]

- a) Eukaryotic cell.
- b) Cytoplasm.
- c) Glyoxysomes.
- d) Nucleolus.
- e) Lethal genes.
- f) Kappa particles.
- g) Down's syndrome.
- h) Autosomes.

Q2) Write short notes on (Any Four):

[16]

- a) Leptotene and Zygotene.
- b) Scope of cell biology.
- c) Fluid Mosaic model of plasma membrane.
- d) Inhibitory factor (13:3 ratio).
- e) Law of segregation.
- f) Negative eugenics.

P.T.O.

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

- a) Draw a neat labelled diagram of Prokaryotic cell.
- b) Write a note on vital stain with any two examples.
- c) Write note on nuclear pore complex.
- d) What is colourblindness? Explain the genetic basis of colourblindness.
- e) What is genetic engineering? Give its applications.
- f) Write note on Turner's syndrome.

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

- a) Describe in brief process of mitosis.
- b) Describe in detail various functions of plasma membrane.
- c) What is Gynandromorphism? Explain its types with suitable examples.
- d) What is multiple alleles? Explain with suitable example.

Q5) Describe the structure and functions of endoplasmic reticulum and golgi complex. **[16]**

OR

Describe the generalized structure of the chromosome. Add a note on different types of chromosomes on the basis of position of centromere.



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SEAT No. :

P498

[Total No. of Pages : 4

[4917]-101

F.Y. B.Sc.

MATHEMATICS

MT - 101 : Algebra and Geometry
(2013 Pattern) (Paper-I)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Attempt Any Eight of the following:

[16]

- a) Let $A = \{0, 1, 2, 3\}$ and R be a relation given by
 $R = \{(0, 0), (1, 1), (2, 2), (3, 3), (1, 2), (2, 1), (3, 2), (2, 3), (1, 3), (3, 1)\}$
Is R symmetric and transitive? Justify.
- b) Let a, b and c be integers. If $a|b$ and $a|c$ then show that $a|b+c$.
- c) State division algorithm for two polynomials in $R[x]$.
- d) Find eigenvector of $A = \begin{bmatrix} 3 & -1 \\ 1 & 1 \end{bmatrix}$ corresponding to eigenvalue 2.
- e) Define Euler's ϕ function and hence find $\phi(12)$.
- f) Shift the origin to the point $(-1, 2)$ and transform the equation
 $x^2 - y^2 + 2x + 4y = 0$.
- g) Find the equation of the plane passing through the point $(2, 3, 5)$ and perpendicular to the line whose d.r.s. are $3, -2, 6$.
- h) Find K , so that the lines $\frac{x-1}{-3} = \frac{y-1}{2k} = \frac{z-3}{2}$ and $\frac{x-1}{3k} = \frac{y-5}{1} = \frac{z-6}{-5}$ are perpendicular to each other.

P.T.O.

- i) Define cone and generator of a cone.
- j) Find the equation of the sphere whose centre is at $(-1, 2, 1)$ and radius 3.

Q2) Attempt Any Four of the following:

[16]

- a) Using principle of mathematical induction prove that $3|n^3 + 2n$, where n is a positive integer.
- b) If p is a prime and $a_1, a_2, a_3, \dots, a_n$ are integers such that $p|a_1 a_2 a_3 \dots a_n$ then show that $p|a_i$ for some $i, 1 \leq i \leq n$.
- c) Solve $x^3 - 12x^2 + 39x - 28 = 0$, the roots being in A.P.
- d) By using Euclidean algorithm, find g.c.d. of 2378 and 1769. Also express the g.c.d. as the linear combination of the given numbers.
- e) Verify Cayley Hamilton theorem for the matrix $A = \begin{bmatrix} 1 & 2 \\ 3 & 2 \end{bmatrix}$.
- f) Let a, b, c, d be integers and $m > 0$ be an integer. If $a \equiv b \pmod{m}$ and $c \equiv d \pmod{m}$ then prove that $ac \equiv bd \pmod{m}$.

Q3) Attempt Any Two of the following:

[16]

- a) Prove that for any two non-zero integers a and b have a unique positive g.c.d. $d = (a, b)$ and can be expressed in the form $d = (a, b) = ma + nb$, for some integers m, n .
- b) i) Show that any two equivalence classes are either disjoint or identical.
ii) Prepare multiplication table for Z_6 . Also find multiplicative inverse of element in Z_6 if exist.

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- c) i) If $p(x), q(x), r(x)$ are polynomials in $R[x]$ with $p(x) \neq 0$. If $p(x)|q(x)$ and $p(x)|r(x)$ then show that $p(x)|m(x)q(x)+n(x)r(x)$, where $m(x), n(x)$ are polynomials in $R[x]$.
- ii) Solve the following system of linear equations by using Gauss elimination method.

$$x - 4y + 5z = -1$$

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

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

Q4) Attempt Any Four of the following:

[16]

- a) Shift the origin to a suitable point so that $x^2 + 4x - 8y + 12 = 0$ will be in the form $x^2 = 4by$. State the value of b .
- b) With usual notation prove that $\cos^2 \alpha + \cos^2 \beta + \cos^2 \gamma = 1$.
- c) Find the angle between line $\frac{x-x_1}{l} = \frac{y-y_1}{m} = \frac{z-z_1}{n}$, where l, m, n are d.c.s. of a line and the plane $ax + by + cz + d = 0$.
- d) Find the length of the intercept made by the line $\frac{x-7}{2} = \frac{y-6}{1} = \frac{z+5}{-1}$ with the sphere $x^2 + y^2 + z^2 - 2x + 3y - 5z - 31 = 0$.
- e) Find the equation of a cylinder whose generators are parallel to the line $6x = -3y = 2z$ and whose guiding curve is an ellipse $x^2 + 2y^2 = 1, z = 3$.
- f) Find the equations of the planes bisecting the angles between the planes $x + 2y + 2z = 9$ and $4x - 3y + 12z + 13 = 0$. Also specify the one which bisects the acute angle.

Q5) Attempt Any Two of the following:

[16]

- a) Reduce the equation $5x^2 + 6xy + 5y^2 - 4x + 4y - 4 = 0$ to the standard form and name the conic.

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- b) i) Prove that every section of a right circular cone by a plane perpendicular to its axis is a circle.
- ii) Find the equations of the line of shortest distance between the skew lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-4}{4}$ and $\frac{x-2}{3} = \frac{y-4}{4} = \frac{z-5}{5}$.
- c) i) Derive the condition under which the plane $lx + my + nz = p$ is tangent plane to the standard sphere $x^2 + y^2 + z^2 = a^2$. Also find the point of contact.
- ii) Find equation of the sphere passing through the circle $x^2 + y^2 + z^2 = 9$, $2x + 3y + 4z - 5 = 0$ and the point $(1, 2, 3)$.



Total No. of Questions : 5]

SEAT No. :

P499

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[4917]-102

F. Y. B. Sc.

MATHEMATICS

MT - 102 : Calculus and Differential Equations
(2013 Pattern) (Paper - II)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Attempt any EIGHT of the following:

[16]

- a) Solve the inequality : $|3x + 4| < |x + 2|$.
- b) Evaluate: $\lim_{x \rightarrow 4} \frac{4 - \sqrt{x+12}}{x-4}$.
- c) Find the real numbers x for which of the following function is continuous.
$$f(x) = \frac{x^2 + x + 1}{x^2 + 3x - 10}$$
- d) Find the derivative of the function $f(x) = \sqrt{x} + \sqrt{x}$ with respect to x .
- e) State Maclaurin's theorem with Lagrange's form of remainder.
- f) Evaluate: $\int_0^{\pi/2} \sin^8 x \, dx$.
- g) Define homogeneous differential equation of first degree and first order.
- h) Solve the differential equation $(1 + y^2) dx - x^2 dy = 0$.
- i) Find the orthogonal trajectories of the family of curves $y^2 = mx$ where m is a parameter.

j) Solve: $y = px + \tan^{-1} \left(\frac{p}{\sqrt{1+p^2}} \right)$,

where $p = \frac{dy}{dx}$.

P.T.O.

Q2) Attempt any FOUR of the following:

[16]

- a) Prove that for any $x, y \in \mathbb{R}$, $|x + y| \leq |x| + |y|$.
- b) Evaluate : $\lim_{x \rightarrow 0} (1 + x)^{\frac{1}{x}}$.
- c) Find the value of K for which the following function $f(x)$ is continuous.

$$f(x) = \begin{cases} x^2 - 2, & x < 1 \\ Kx - 4, & x \geq 1 \end{cases}$$

- d) Prove that : $|\sin x - \sin y| \leq |x - y|, \forall x, y \in \mathbb{R}$.
- e) State and prove Cauchy's mean value theorem.
- f) Expand $\sin x$ in ascending powers of $\left(x - \frac{\pi}{2}\right)$.

Q3) Attempt any TWO of the following:

[16]

- a) i) If $f(x) = (x-3)\log x$ then show that the equation $x \log x = 3 - x$ is satisfied by $c \in (1, 3)$.
- ii) If $y = \frac{x+1}{x^2-4}$ then find y_n .
- b) i) If $y = \sin^{-1}x$ then show that $(1-x^2)y_{n+2} - 2(n+1)xy_{n+1} - n^2y_n = 0$.

ii) Discuss the continuity of the function $f(x) = \begin{cases} \frac{x-6}{x-3}, & x < 0 \\ 2, & x = 0 \\ +\sqrt{x^2+4}, & x > 0 \end{cases}$

- c) Let f be continuous function on closed and bounded interval $[a, b]$, such that $f(a) < 0 < f(b)$. Prove that there is at least one c in (a, b) such that $f(c) = 0$.

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Q4) Attempt any FOUR of the following:

[16]

- a) Evaluate: $\int \frac{x^2}{(x-1)(x+1)(x-3)} dx$.
- b) If the differential equation $M(x, y)dx + N(x, y)dy = 0$ where M and N are homogeneous functions of same degree is not exact, then prove that $\frac{1}{Mx + Ny}$ is an integrating factor, provided $Mx + Ny \neq 0$.
- c) Solve: $y^2 + x^2 \frac{dy}{dx} = xy \frac{dy}{dx}$.
- d) Show that $y^2 = 4a(x+a)$ is self orthogonal.
- e) Solve: $\frac{dy}{dx} = \frac{x+y+1}{x+y-1}$.
- f) Explain the method of solving differential equation $f(x, y, p) = 0$ which is solvable for x.

Q5) Attempt any two of the following:

[16]

- a) If $I_n = \int \cos^n x dx, n \geq 2$ then prove that $I_n = \frac{\sin x \cos^{n-1} x}{n} + \frac{(n-1)}{n} I_{n-2}$.
Hence evaluate $\int_0^{\pi/2} \cos^5 x dx$.
- b) State and prove necessary and sufficient condition for the differential equation $Mdx + Ndy = 0$ to be exact.
- c) i) Solve the differential equation $(x^2 + y^2 + x)dx + xy dy = 0$.
ii) Solve: $x^2 p^2 + xyp - 6y^2 = 0$ where $\frac{dy}{dx} = p$.



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Total No. of Questions : 5]

SEAT No. :

P500

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F. Y. B. Sc.

PHYSICS - I

Mechanics, Heat and Thermodynamics

(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) *Use of log table and calculator is allowed.*
- 4) *Neat diagrams must be drawn wherever necessary.*

Q1) Attempt all of the following:

[16]

- a) State and explain Newton's first law of motion.
- b) Define kinetic energy of a body. Give its S.I. unit.
- c) Define the term steady flow.
- d) A uniform metal wire has length of 4 m and a diameter of 4mm. When it is stretched by 0.5 mm, its diameter decrease by 0.15 μm . Find the Poisson's ratio for the metal of the wire.
- e) What is equation of state? Give equation of state for perfect gas.
- f) State and explain zeroth law of thermodynamics.
- g) State the advantages of mercury thermometer.
- h) A reversible heat engine working between 273°K and 373°K absorbs 800J of heat from the source. Calculate workdone.

P.T.O.

Q2) Attempt any four of the following:

[16]

- a) Explain in brief basic forces of nature.
- b) Explain the term workdone. Calculate the workdone by a varying force.
- c) Discuss various applications of surface tension.
- d) A body of mass 60 gram is thrown vertically upwards with a speed of 10m/s. Find the workdone by the force of gravity during the time the body goes vertically up.
- e) Show that the workdone of a body during the longitudinal strain is $\frac{1}{2} \times$ Longitudinal stress \times Longitudinal strain.
- f) Water flowing in a horizontal pipe has a speed 40cm/s at one end point and 30cm/s at another point. Determine the pressure drop between two points. [Given $\rho_{\text{water}} = 1\text{gm/cm}^3$].

Q3) Attempt any four of the following:

[16]

- a) Describe Amagat's experiment.
- b) Derive an expression for workdone during an isothermal process.
- c) Derive the second Tds equation.
- d) A two litre of hydrogen at 127°C and 10^6 dyne cm^{-2} pressure expands isothermally, when pressure reduces to 5×10^5 dyne cm^{-2} . Find the volume of the gas after expansion.
- e) Calculate the change in entropy when 2mole of an idel gas is allowed to expand from a volume of 1 litre to a volume of 10 litres at 27°C.
- f) On a certain day the temperature is 12°C. What will be the temperature in Fahrenheit and Reaumur scale?

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Q4) Attempt any two of the following:

[16]

- a) What is critical velocity of liquid? Obtain an expression for Reynold's number. Give its physical significance.
- b)
 - i) A rectangular metal bar is supported at its two ends on knife edges and a load is applied at the middle point. Obtain the Young's modulus of the bar.
 - ii) A man pulls a suitcase of mass 10.4 kg with a force of 25 N inclined to the horizontal at an angle of 30°. As a result the suitcase accelerates horizontally. What is the magnitude of acceleration?
- c)
 - i) Poisson's ratio cannot be greater than 0.5. Explain.
 - ii) Calculate the workdone in blowing a soap bubble of 1.3cm radius if the surface tension of soap solution is 0.030 N/m.

Q5) Attempt any two of the following:

[16]

- a) Explain Otto cycle with an indicator diagram and obtain an expression for the efficiency of the Otto engine.
- b)
 - i) State and explain the principle of air conditioning.
 - ii) Show that for a gas obeying Van der Waal's equation
$$\frac{RT_c}{P_c V_c} = \frac{8}{3} = 2.67.$$
- c)
 - i) Explain construction and working of liquid filled thermometer.
 - ii) Calculate the change in the melting point of ice at 273°K, when pressure is increased by 1 atmosphere. The latent heat of fusion is 80 kcal/kg. The specific volume of ice at 273°K is $1.09 \times 10^{-3} \text{ m}^3/\text{kg}$ and that of water at the same temperature is $1.00 \times 10^{-3} \text{ m}^3/\text{kg}$.



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SEAT No. :

P501

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F.Y.B.Sc.

PHYSICS

**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 calculators is allowed.*
- 4) *Neat diagram must be drawn wherever necessary.*

Q1) Attempt ALL of the following:

[16]

- a) State Biot Savart's law.
- b) Define terms - electric dipole and dipole moment.
- c) Give relation between \vec{B} , \vec{M} & \vec{H} .
- d) Explain Polar and Non-Polar molecules.
- e) What do you meant by stimulated emission?
- f) What do you mean by photon?
- g) Give the equation of wavelength in Paschen series of hydrogen atom.
- h) Calculate the electric field intensity due to a point charge 2×10^{-10} C at a distance of 1 m away from it [Given - $\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2 / \text{N-m}^2$]

Q2) Attempt any FOUR of the following:

[16]

- a) Explain Laser action using three level energy system.
- b) Explain the working of solar cell with schematic diagram.

P.T.O.

- c) What is meant by covalent bonding? Give properties of covalent crystals.
- d) The input power of solar cell is 1.25W and it has $I_{sc} = 300 \text{ mA}$, $V_{oc} = 0.5\text{V}$ and $FF = 0.6$. Calculate the efficiency of solar cell.
- e) A microwave radiation has a frequency of 12GHz. What would be the energy of the photon corresponding to this radiation?
[Given - $h = 6.626 \times 10^{-34} \text{ Js}$]
- f) Find the wave number of second line of the Paschen series
[Given - $R = 1.097 \times 10^7 \text{ m}^{-1}$]

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

- a) Obtain an expression for torque on a dipole placed in an uniform electric field.
- b) Distinguish between paramagnetic and ferromagnetic materials.
- c) State and prove Gauss's Law in dielectrics.
- d) A solenoid of 300 turns/m is carrying a current of 4 Amp. If the core is made of iron, which has a relative permeability of 5000, determine the magnetic intensity H, magnetization M and magnetic induction B inside the core. [Given - $\mu_0 = 4\pi \times 10^{-7} \text{ Wb/A-m}$]
- e) Calculate the force between two balls each having a charge of $16\mu\text{C}$ and are 10 cm apart. (Given - $\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2/\text{N-m}^2$]
- f) The electric field intensity at a point at a distance of 1m from the centre of a charged sphere of radius 30 cm is 10^4 N/C . Find surface charge density on the surface of sphere. The sphere is placed in air.
[Given- $\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2/\text{N-m}^2$]

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

- a) What is X-ray radiography? State its applications.
- b)
 - i) Give physical properties of ionic compounds.
 - ii) The series limit wavelength for Balmer series of hydrogen spectrum is 3645 \AA . Calculate the value of Rydberg constant.
- c)
 - i) Explain Rutherford's atomic model and give its limitations.
 - ii) The lowest vibrational states of the NaCl molecule are 0.063 eV apart. Find approximate force constant of this molecule.

[Given - Mass of Na = $3.82 \times 10^{-26} \text{ kg}$

Mass of Cl = $5.81 \times 10^{-26} \text{ kg}$]

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

- a) Obtain an expression for electric field intensity on the axis of charged disc.
- b)
 - i) Define electric polarization vector. Obtain an expression for polarization vector in homogeneous isotropic dielectric.
 - ii) An aluminium wire of diameter 0.3 cm carries a current of 15 amp . Find the magnetic field on the surface of the wire.
[Give - $\mu_0 = 4\pi \times 10^{-7} \text{ Wb/A-m}$]
- c)
 - i) Obtain an expression for \vec{B} on the axis of a current carrying circular loop.
 - ii) A bar magnet made of iron has magnetic moment 3.0 A-m^2 and mass $3 \times 10^{-3} \text{ kg}$. If the density of iron is $6 \times 10^3 \text{ kg/m}^3$, find the intensity of magnetization.

EEE

Total No. of Questions : 5]

SEAT No. :

P502

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F. Y. B. Sc.

CHEMISTRY

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 right indicate full marks.*
- 4) *Use of logtable and calculator is allowed.*

Q1) Answer the following Questions:

[16]

- a) Give the rule of differentiation for product of two functions.
- b) Explain thermotropic liquid crystal.
- c) Define :
 - i) dispersed phase
 - ii) dispersion medium
- d) Explain Heisenberg's uncertainty principle.
- e) Identify the following processes as spontaneous and nonspontaneous process.
 - i) Uphill flow of water
 - ii) Diffusion of gases.
- f) Define: i) Primary standard ii) Oxidation number.
- g) Explain in brief formation of co-valent bond with suitable example.
- h) How many moles are present in 49 grams of H_2SO_4 ?

P.T.O.

Q2) Attempt any four of the following:

[16]

- a) Describe the nature of liquid according to kinetic molecular model.
- b) Explain physical or Vander Waal's adsorption.
- c) Write the equation of the line passing through a point
 - i) $(-4, 0)$ and having slope -3 . &
 - ii) $(-2, 0)$ & slope $-\frac{1}{3}$.
- d) Explain de-Broglies hypothesis and derive the expression for wavelength in terms of kinetic energy of particle.
- e) Explain the importance of Carnot's cycle in terms of
 - i) determination of efficiency.
 - ii) thermodynamic scale of temperature.
- f) Give assumptions and limitations of Bohr's theory.

Q3) Answer any four of the following:

[16]

- a)
 - i) If $Y = \frac{1-x^2}{1+x^2}$, find $\frac{dy}{dx}$.
 - ii) Solve the integral $\int (2x)^{\frac{3}{2}} \cdot dx$

[4917]-105

2

- b) Describe the influence of frequency and intensity of incident radiation on the current in photoelectric effect.
- c) What are gels? How are they classified? Give any two differences between gel and emulsion?
- d) Give different statements of second law of thermodynamics.
- e) Define viscosity of a liquid. Give its unit. Discuss the method to measure viscosity of liquid.
- f) Derive an equation for the radius of n^{th} orbit on the basis of Bohr's theory.

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

- a) What is hybridization? Explain the formation of CH_4 molecule.
- b) What is primary and secondary standard? Explain with examples.
- c) Balance the following equation by oxidation number method.

$$\text{FeSO}_4 + \text{H}_2\text{SO}_4 + \text{Cl}_2 \rightarrow \text{Fe}_2(\text{SO}_4)_3 + \text{HCl}$$
- d) What are the assumptions of VSEPR theory?
- e) State the assumptions of Pauling - Slater theory.
- f) Explain the formation of F_2 molecule on the basis of atomic orbital overlap.

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

- a) Molecular weight of compound is 119.88. What will be the volume displaced by 0.146 g of the compound at 22°C and pressure 755 mm of Hg?

(Aq. tension at $22^\circ\text{C} = 20 \text{ mm}$)

[4917]-105

3

- b) 10 ml of the solution of NaOH containing 2 grams of the alkali per liter is exactly neutralized by 15 ml solution a solution of H_2SO_4 and 30 ml HCl solution separately. Calculate strengths of acids in grams per liter.
- c) Viscosity measurement of water and other liquid was carried out by Ostwald's viscometer. Water took 40seconds to travel between the two marks A and B. The other liquid with density 1400 g dm^{-3} at the same temperature took 60 seconds. If density of water at the same temperature is 995 g dm^{-3} . Calculate the viscosity of other liquid.

(Given : Viscosity of water = 0.01002 poise).

- d) The pressure and temperature of one mole of an ideal gas are changed simultaneously from 293 K and $1.01325 \times 10^5 \text{ Nm}^{-2}$ to 363 K and $4.06625 \times 10^5 \text{ Nm}^{-2}$. Calculate the change in entropy.

(Given : $R = 8.314 \text{ J (mole-k)}^{-1}$; $C_p = \frac{5}{2} R$)

- e) Calculate the velocity of an electron having energy 827 eV and mass $9.1 \times 10^{-31} \text{ kg}$. (Given: $1\text{eV} = 1.6 \times 10^{-19} \text{ J}$)
- f) A heat engine operates between 10°C and 110°C . It absorbs 35.46 Kcal of heat from the source. Calculate the maximum work done by the engine. (Given : $1\text{cal} = 4.184\text{J}$).



Total No. of Questions : 5]

SEAT No. :

P503

[Total No. of Pages : 5

[4917]-106

F.Y. B.Sc.

CHEMISTRY

**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) Chirality
 - ii) Specific rotation
- b) What is bond angle? Explain with suitable examples.
- c) Draw zig - zag structures for the following compounds
 - i) Butanal
 - ii) Glycine
- d) Carbontetrachloride is nonpolar molecule.Explain.
- e) M.P and B.P. of amines are lower than those of alcohol of comparable molecular weight.Explain.
- f) Alkali metals show +1 oxidation state. Explain.
- g) Write the names and electronic configuration of group III A elements.
- h) What are metalloids?

P.T.O.

Q2) Attempt any four of the following:

[16]

- a) What is inductive effect? Explain why chloroacetic acid is stronger acid than acetic acid.
- b) What are carboxylic acids? What is the action of following reagents on acetic acid?
 - i) $\text{C}_2\text{H}_5\text{OH}/\text{H}^+$
 - ii) NH_3/Δ
- c) What is conformational isomerism? Discuss conformational isomerism in propane with energy profile diagram.
- d) What are alcohols? Give classification of alcohols. How will you prepare ethyl alcohol from acetaldehyde?
- e) What are aromatic compounds? Discuss Huckel's Rule of aromaticity with examples.
- f) What are alkanes? How will you prepare propane from.
 - i) 2-bromo propane
 - ii) propene

Q3) Attempt any four of the following:

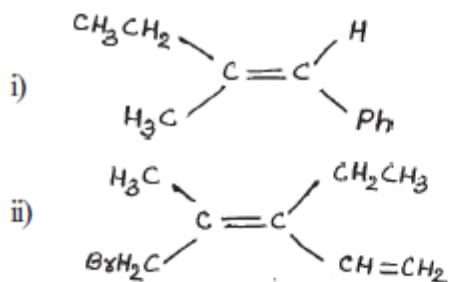
[16]

- a) What are amines? How are they classified? How will you prepare ethyl amine from acetonitrile.
- b) What are alkyl halides? How will you prepare ethyl bromide from-
 - i) ethanol
 - ii) ethylene

[4917]-106

2

c) Assign E and Z configuration of the following compounds.



d) What are alkenes? How will you prepare ethylene from

- ethanol
- ethyl bromide

e) How will you prepare acetone from 2- propanol?

what is the action of following reagents on acetone?

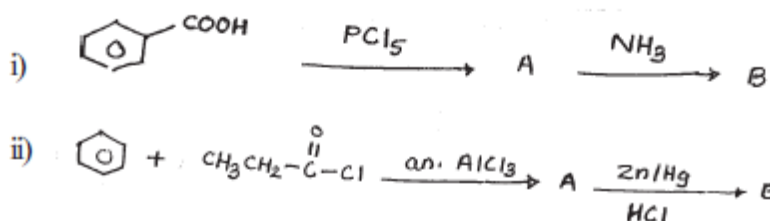
- methyl magnesium bromide
- NaOH/I_2

f) What is hybridisation? Discuss formation of acetylene molecule using the concept of hybridisation.

Q4) Attempt any four of the following :

[16]

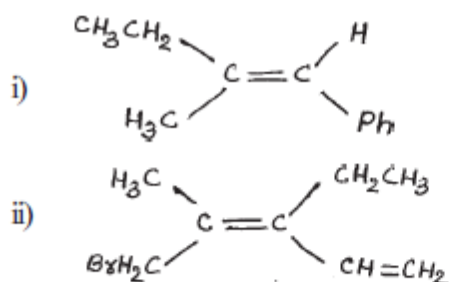
a) Identify the products A and B and rewrite the reactions(any two).



[4917]-106

3

c) Assign E and Z configuration of the following compounds.



d) What are alkenes? How will you prepare ethylene from

- ethanol
- ethyl bromide

e) How will you prepare acetone from 2- propanol?

what is the action of following reagents on acetone?

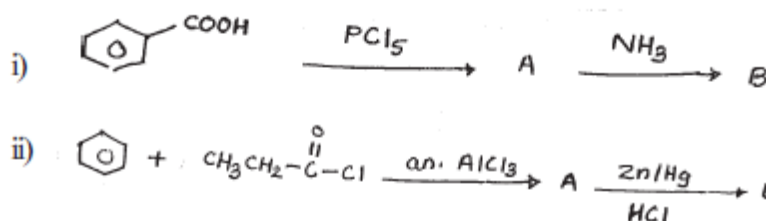
- methyl magnesium bromide
- NaOH/I_2

f) What is hybridisation? Discuss formation of acetylene molecule using the concept of hybridisation.

Q4) Attempt any four of the following :

[16]

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



[4917]-106

3

Q5) Attempt any four of the following:

[16]

- a) Explain anomalous behaviour of oxygen in group VI A elements.
- b) Explain bonding and shape of ClF_3 molecule.
- c) Name the elements of nitrogen family, write their electronic configuration and discuss the trends in the atomic size and electronegativity.
- d) Explain periodicity in properties of alkali metals with respect to ionization energy and oxidation states.
- e) Give different applications of alkaline earth metals and their compounds.
- f) Explain the diagonal relationship between beryllium and aluminium.



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Total No. of Questions : 5]

SEAT No. :

P510

[4917]-113

[Total No. of Pages : 4

F. Y. B. Sc.

STATISTICS/STATISTICAL TECHNIQUES

**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 indicate full marks.*
- 3) *Use of Statistical table and calculator is allowed.*
- 4) *Symbols have their usual meanings.*

Q1) Attempt each of the following:

- A) a) Define “discrete variable” with one real life example. [1]
- b) State any two requisites of good measure of dispersion [1]
- c) Suggest an appropriate sampling method giving reason for the following situation. [1]

A sample of 1000 units is to be selected to find daily total requirement of electricity consumption out of 3000 houses, 500 offices and 600 shops.

- d) Define “Positively correlated variables” with one illustration. [1]

B) Choose the correct alternative for the following: [1 each]

a) Mean deviation is minimum if the deviations are taken from:

- | | |
|-----------|------------------------|
| i) Mean | ii) Median |
| iii) Mode | iv) The first quartile |

b) If $\text{Var}(2X + 3) = 36$, then $\text{Var}(X)$ is equal to:

- | | |
|---------|--------|
| i) 36 | ii) 18 |
| iii) 33 | iv) 9 |

P.T.O.

- c) If $N = 100$, $(A) = (B) = 20$, $(AB) = 5$, then attributes A and B are:
- Positively associated
 - Positively correlated
 - negatively associated
 - negatively correlated
- d) If regression coefficient Y on X is equal to 2, we can conclude that variables X and Y are
- perfectly positively correlated
 - perfectly negatively correlated
 - positively correlated
 - negatively correlated
- C) a) If $\text{Min} = 10$, $Q_1 = 25$, $Q_2 = 38$, $Q_3 = 60$, $\text{Max} = 90$, comment on skewness, give justification. [2]
- b) State Yule's coefficient of association, comment if its value is zero. [2]
- c) Find variance of data having the values $-4, -2, 0, 2, 4$. [2]
- d) Using the method of dot operator in case of three variables, express $(\alpha\beta C)$ in terms of positive class frequencies. [2]

Q2) Attempt any Four of the following:

[4 each]

- a) Compute Fisher's price index number for the following data:

Commodity	2011		2012	
	Price	Quantity	Price	Quantity
A	10	8	15	6
B	15	15	12	20
C	12	10	18	8

[4917]-113

2

- b) Compute first four central moments if

$$\mu'_1 = 25, \mu'_2 = 725, \gamma_1 = 20, \gamma_2 = 500$$

- c) Find number of pairs (n) for the following data:

$$r = -0.7, \Sigma x_i = 20, \Sigma x_i^2 = 90, \Sigma y_i = 20, \Sigma y_i^2 = 90, \Sigma x_i y_i = 73.$$

- d) Average salary of an employee in certain company is Rs. 9,000/-. Find ratio of male and female employees, if their average salary is Rs. 12,000/- and Rs. 7,500/- respectively.
- e) What is correlation? Using scatter diagram explain various types of correlation.
- f) Define r^{th} order central moment. Express 4th order central moment in terms of raw moments.

Q3) Attempt any four of the following:

[4 each]

- a) With usual notation prove that

$$\mu'_3 = 3\mu'_2\mu'_1 - 2\mu_1^3, \text{ for symmetric distribution.}$$

- b) Given the following information:

$$N = 100, (AB) = 25, (A\bar{B}) = 15, (\bar{A}B) = 25$$

Comment on the association between two attributes A and B.

- c) Size of two groups are in ratio 3:4, their means are 20 and 40 respectively whereas their variance are 10 and 5. Compute combined standard deviation.
- d) Define SRSWR and SRSWOR. Give one real life example of each.
- e) For two observations a and b , arithmetic mean and geometric mean are 6.5 and 6 respectively. Find a , b ; also find harmonic mean.
- f) Define dispersion. Explain relative measure of dispersion and state its utility.

Q4) Attempt any two of the following:

- a) i) Compute rank correlation coefficient for the following data: [6]

Marks by judge I	81	72	60	33	29	11	56	42
Marks by judge II	75	56	42	15	30	20	60	80

- ii) Define the following terms: [2]
- 1) Nominal scale.
 - 2) Population.
- b) Derive the formula for median using graphical method for a continuous frequency distribution. [8]
- c) i) Show that Yule's coefficient of association lies between -1 and $+1$. [4]
- ii) If $Q_{AB} = 0$, prove that $(AB)N = (A)(B)$. [4]
- d) Explain the procedure of fitting second degree curve $Y = a + bX + cX^2$ for bivariate data. [8]

Q5) Attempt any one of the following:

- a) i) Show that $\beta_2 \geq 1$. [4]
- ii) Define "Skewness". Explain the types of skewness using Box-plot. [4]
- iii) Show that $-1 \leq \rho(X,Y) \leq 1$ [8]
- b) i) Mean and variance for certain data of 100 observations are 10 and 45 respectively. At the time of rechecking it is found that observation 40 was misread as 14. Calculate correct arithmetic mean and variance. [6]
- ii) For a set of 100 observations [6]
- $$\sum x_i = 25, \sum y_i = 68, \sum x_i^2 = 167, \sum y_i^2 = 162, \sum x_i y_i = 130$$
- 1) Compute correlation coefficient.
 - 2) Find regression line of Y on X.
 - 3) Estimate Y for X = 0
- iii) Define "Kurtosis". Explain different types of Kurtosis. [4]



Total No. of Questions : 5]

SEAT No. :

P511

[4917]-114

[Total No. of Pages : 4

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:

- a) Give one real life situation where geometric distribution can be applied. **[1]**
- b) Write the sample space of a random experiment of tossing 3 coins. **[1]**
- c) State moment generating function (m.g.f.) of a binomial distribution with parameters n and p . **[1]**
- d) If A and B are independent events with $P(A)=0.6$ and $P(B)=0.5$, find $P(A \cap B)$. **[1]**

B) Choose correct alternative for the following: **[1 each]**

- a) If $P(A \cap B)=0$, then the two events A and B are
 - i) Exhaustive events
 - ii) Dependent events
 - iii) Mutually exclusive events
 - iv) Independent events
- b) If X and Y are independent random variables with m.g.f. $M_X(t)$ and $M_Y(t)$ respectively then, $M_{X+Y}(t)$ is :
 - i) $M_X(t) + M_Y(t)$
 - ii) $M_X(t) - M_Y(t)$
 - iii) $M_X(t) / M_Y(t)$
 - iv) $M_X(t) * M_Y(t)$

PTO.

- Find
- i) $E(Y|X = 0)$ and [4]
 - ii) $V(Y|X = 0)$. [4]
- b) i) Obtain variance of a linear combination of two variables X and Y;
 $V(aX + bY)$. [6]
- ii) What do you mean by a deterministic model? State one example of it. [2]
- c) State and prove binomial approximation to hypergeometric distribution. [8]
- d) For a certain probability distribution if mean = 5, Variance = 2, coefficient of skewness = +1 and coefficient of kurtosis = +1, find first four raw moments of the distribution. [8]

Q5) Attempt any one of the following:

- a) i) The joint p.m.f. of (X,Y) is given by,
- $$P(x,y) = c(x^2+y^2) \quad ; \quad c > 0, \quad x = -1, 1,$$
- $$y = -2, 2,$$
- $$= 0 \quad ; \text{otherwise.}$$
- Obtain
- I) c
 - II) Marginal p.m.f.'s of X and Y
 - III) Are X and Y independent? Justify. [8]
- ii) Let X and Y be two independent Poisson random variables with mean 3 and 2 respectively. Find: [8]
- I) $P(X=4|X+Y=5)$
 - II) $E(X|X+Y=5)$
- b) i) If the probability that a certain test yields a positive reaction is equal to 0.4. What is the probability that less than 5 negative reactions occur before the first positive one? [5]
- ii) State the p.m.f. of hypergeometric distribution. Find mean and variance of the distribution. [8]
- iii) What is the probability that a non-leap year should have fifty three Sundays? [3]



Total No. of Questions :5]

SEAT No. :

P512

[Total No. of Pages :2

[4917]-115

F.Y.B.Sc.

GEOGRAPHY

Gg-110: Geomorphology - I

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

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

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

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

[16]

- a) What is mantle?
- b) What is Geological time scale?
- c) What is Ring of fire?
- d) What are 'S' Waves?
- e) What is a minor plate?
- f) How are sedimentary rocks formed?
- g) How is weathering different than erosion?
- h) What is a delta?
- i) What is an arete?
- j) What are ventifacts?

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

[16]

- a) Divisions of the Mesozoic era.
- b) Density variation in the interior of the earth.
- c) Criticisms of the Wegner's continental drift theory.
- d) Physical weathering.
- e) Meaning of mass movement and major types.
- f) Longitudinal profile of a river.

P.T.O.

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

- a) What is Isostatic equilibrium? Discuss in brief.
- b) What is block mountain? How is it formed.
- c) Discuss the different types of volcanic cones.
- d) Difference between rocks and minerals.
- e) List and explain different types of dunes in brief.
- f) What is a Lagoon? How is it formed?

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

- a) Explain the nature and scope of Geomorphology.
- b) What is folding? Explain the different types of folds.
- c) Explain the process of biological weathering. What is the impact of human induced weathering?
- d) Discuss the major depositional landforms formed by sea waves.

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

Explain the continental drift theory with supporting evidences.

OR

Explain river deposition and discuss any four depositional features with diagrams.

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[4917]-115

2

Total No. of Questions : 5]

SEAT No. :

P513

[Total No. of Pages : 2

[4917]-116

F.Y. B.Sc.

GEOGRAPHY-II

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

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

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

[16]

- a) Define climate.
- b) What is Ozonosphere?
- c) Define Earth's Albedo.
- d) Give types of planetary winds.
- e) What do you mean by high clouds?
- f) Define oceanography.
- g) Give the examples submerged coast.
- h) Define salinity.
- i) Define Wavelength.
- j) What do you mean by Tsunami?

P.T.O.

Q2) Explain the following in 150 words (Any Four): **[16]**

- a) Formation of pressure belts.
- b) Lapse rate.
- c) Mountain and valley winds.
- d) Emerged coast.
- e) Effects of ocean currents.
- f) Salinity of dead sea.

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

- a) Mechanism of monsoon winds.
- b) Causes of Global warming.
- c) Scope of climatology.
- d) Relief of Indian ocean.
- e) Ria coast.
- f) Types of tides.

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

- a) Importance of climatology.
- b) Vertical distribution of temperature.
- c) Causes of salinity.
- d) Explain in detail types of ocean currents.

Q5) Define precipitation, explain the forms of precipitation. **[16]**

OR

Explain with a neat diagram general idea of ocean relief.

●●●●●

[4917]-116

2

Total No. of Questions : 5]

SEAT No. :

P514

[Total No. of Pages : 3

[4917] - 117
F.Y.B.Sc.
MICROBIOLOGY
Introduction To Microbiology
(2013 Pattern) (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 indicate full marks.*

Q1) Attempt the following:

[16]

- a) What is an acid? Give two examples.
- b) Name any two diseases caused by protozoa.
- c) Define - Atom.
- d) Name any two motile bacteria.
- e) Give any two functions of cell wall.
- f) Match the following:
 - i) Anaerobic life a) Watson & Crick
 - ii) Animalcules b) Louis Pasteur
 - iii) Structure of DNA
- g) Fill in the blanks:
 - i) Two amino acids are linked by _____ bond in a protein molecule.
 - ii) _____ is known as the father of surgical antisepsis.

P.T.O.

- h) State true or false:
- i) Rickettsia are obligate intracellular parasites.
 - ii) Plasmids are double stranded RNA Molecules.

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

- a) Discovery of Microscope.
- b) Distribution & Significance of Normal Flora.
- c) Functions of Capsule.
- d) Starch and glycogen.
- e) Spontaneous generation theory.
- f) PHB granules.

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

- a) Write a brief account on Agricultural Microbiology.
- b) Give the significance of probiotic cultures.
- c) Explain applications of Biotechnology.
- d) Give the general characters of Fungi
- e) State Koch's postulates.
- f) Give structure and function of endospore in bacteria.

Q4) Answer Any Two of the following:

[16]

- a) Give the general characters of Algae. Add a note on their economic importance.
- b) Explain Tyndall's experiment with a neat labelled diagram.
- c) What are Ribosomes? Describe their structure and function.
- d) Give structure and function of Haemoglobin and Immunoglobulin.

Q5) Attempt any one of the following:

[16]

- a) Enlist the contributions of Louis Pasteur in the development of Microbiology?
- b) What are Nucleic Acids? Give structure and function of different types of Nucleic acids.



Total No. of Questions :5]

SEAT No. :

P515

[4917]-118

[Total No. of Pages :2

F.Y.B.Sc.

MICROBIOLOGY

**Basic Techniques in Microbiology
(2013 Pattern) (New Course) (Paper - II)**

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

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

Q1) Answer the following.

[16]

- a) Define: Numerical Aperture.
- b) Name any two decolorizers used in staining.
- c) Fill in the blanks.
 - i) _____ is used as biological indicator of sterilization.
 - ii) Membrane filter with _____ pore size is used for sterilization by filtration.
- d) Name any two culture collection centres.
- e) Define – Growth rate.
- f) What is an Oligodynamic action.
- g) Define diauxic growth curve.
- h) Name two methods of counting of total viable count of bacteria.

Q2) Write short notes on any four.

[16]

- a) Use of autoclave for sterilization.
- b) Spherical aberrations.
- c) Fixatives.

P.T.O.

- d) Role of peptone in media.
- e) Chemoautotrophs.
- f) Exponential phase.

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

- a) what is synchronous culture? Explain any one method of obtaining synchronous culture.
- b) What are extremophiles? Give suitable examples.
- c) Explain principle and significance of negative staining.
- d) Diagrammatically represent principle of dark field microscopy.
- e) Write characteristics of an 'Ideal disinfectant'.
- f) Comment on use of oil immersion objective.

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

- a) What are differential media? Explain any one in detail.
- b) Explain mechanism and significance of acid fast staining.
- c) Describe different methods of maintenance of bacterial culture.
- d) What is phenol coefficient? Explain any one method to determine it.

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

- a) Enlist different methods of enumeration of bacteria. Explain any two methods.
- b) Explain the principle, construction and working of bright field compound microscopy.

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[4917]-118

2

Total No. of Questions : 5]

SEAT No. :

P518

[4917] - 123

[Total No. of Pages : 4

F.Y.B.Sc.

ELECTRONIC SCIENCE

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

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Answer the following questions in brief:

[16]

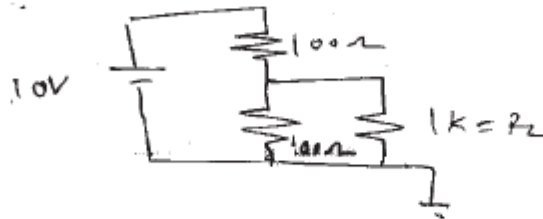
- a) Give the color code format for
 - i) 470Ω with 20% tolerance.
 - ii) 470Ω with 5% tolerance.
- b) What is ideal voltage source? Compare it with practical voltage source.
- c) Define the parameters frequency, period, phase rms value for ac signal.
- d) What is zener diode? Draw it's characteristics. Also draw its circuit symbol.
- e) Give the circuit symbol for PNP transistor and n-channel FET.
- f) Sketch the output characteristics of a transistor showing different regions.
- g) What is intrinsic standoff ratio for UJT? Give its typical value.
- h) What is operational Amplifier?

P.T.O.

Q2) Attempt any four of the following:

[16]

- a)
 - i) Draw the circuit symbols for Non-polar, polar, variable and Trimmer capacitors.
 - ii) What is effective value of two capacitors if they are connected in series and in parallel?
- b) State Thevenin's theorem, use it for the following circuit.

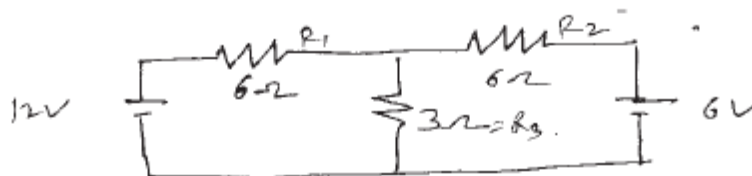


- c) What is Rectifier? Draw the circuit diagram for full wave rectifier using bridge. Also explain its working.
- d) Explain the concept of amplification. Draw its circuit diagram using transistor. Explain the role of all components in it.
- e) Draw the diagram showing construction of JFET. Explain its working.
- f) Write at least 4 parameters of op-amp. Give their ideal and practical values.

Q3) Attempt any four of the following:

[16]

- a)
 - i) What is inductance? If two inductors of value 10mH each are connected in parallel, then what is effective inductance?
 - ii) What is transformer? State its types.
- b) What is superposition theorem? Using it calculate current through 3Ω resistance in following circuit.



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- c) Draw the block diagram of p/s (power supply). Explain the function of each block in it.
- d) Explain the working of transistor as switch.
- e) Draw the circuit symbols for n-channel and p-channel MOSFETs. Explain the working of any one of them.
- f) Draw the circuit diagram for operational amplifier as voltage follower. Derive its o/p expression.

Q4) Attempt any four of the following:

[16]

- a) i) What is switch? Give at least 2 types of switches.
- ii) Explain the role of fuse in circuit. How cartridge fuse works?
- b) What is maximum power transfer theorem. Verify it for the circuit.



- c) What is photodiode? Explain its working principle. Give its one application.
- d) Draw the CC configuration of transistor where is it used? Why is it called EF (Emitter follower)?
- e) What is VVR? How to obtain it?
- f) What is virtual ground? Using it derive the expression for the inverter using op-amp.

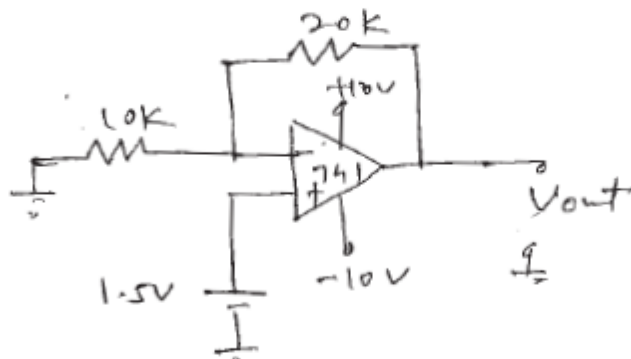
[4917]-123

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Q5) Attempt any four of the following:

[16]

- a)
 - i) What is relay? Explain its working principle.
 - ii) What is BNC and FRC connector?
- b) What is series resonance? Derive the expression for its resonant frequency.
- c)
 - i) What is phase difference?
 - ii) What is barrier potential for p-n junction diode.
- d) What is frequency response? Draw it for RC coupled amplifier. How to find BW?
- e)
 - i) Compare BJT with JFET.
 - ii) For a transistor $\alpha = 0.9$. Find β .
- f) Find the o/p voltage for the following circuit.



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Total No. of Questions :5]

SEAT No. :

P519

[4917]-124

[Total No. of Pages :3

F.Y.B.Sc.

ELECTRONIC SCIENCE

EL-102: Principles of Digital Electronics

(New-2013 Pattern) (Paper - II)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

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

Q1) Answer the following questions in brief:

[16]

- a) What is sequential circuit? Give its examples.
- b) Distinguish between binary and BCD codes.
- c) What is digital comparator?
- d) Draw logic circuit of 1:2 demultiplexer. Write its truth table.
- e) Draw logic symbols and truth tables of OR gate and NAND gate.
- f) Convert following numbers into 2's complement:
 - i) 101101,
 - ii) 111101
- g) What is Fan out of logic families?
- h) State advantages of MOS family over bipolar family.

Q2) Answer any FOUR of the following:

[16]

- a) Explain AND gate circuit using diode logic.
- b) Convert given nonstandard SOP expression into standard SOP expression: $AB+A\bar{C}+BC$
- c) Perform subtraction using 2's complement:
 - i) $(45)_{10} - (29)_{10}$,
 - ii) $(78)_{10} - (49)_{10}$

P.T.O.

- d) Construct 4:1 multiplexer using two 2:1 multiplexers and give its function table.
- e) Explain working of J-K flip flop constructed with only NAND gates.
- f) Explain 2 input TTL NAND gate with proper circuit.

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

- a) Explain EXOR gate as parity generator.
- b) Simplify the following logic expression using K-map:

$$Y = \bar{A}\bar{B}\bar{C}D + A\bar{B}\bar{C}D + ABC\bar{D} + A\bar{B}C\bar{D}$$

- c) Perform subtraction using 1's complement method.
 - i) $(69)_{10} - (32)_{10}$
 - ii) $(27)_{10} - (15)_{10}$
- d) Describe BCD to seven segment decoder.
- e) Draw the circuit of 3 bit Asynchronous UP counter. Write its truth table.
- f) Write short note on tristate logic.

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

- a) Explain gray code system with suitable example.
- b) Use only NAND gates to design OR gate.
- c) Draw logic symbol of Half adder. Write its truth table.
- d) What is seven segment display? Explain types of seven segment displays? Write its application.
- e) Explain MOD 6 counter with proper logic circuit and truth table.
- f) Explain different types of shift registers.

Q5) Answer any FOUR of the following:

[16]

- a) Perform the following:
 - i) $(23.85)_{10} = (\dots)_2$
 - ii) $(E8DC)_{16} = (\dots)_8$
- b) Draw logic symbols and truth tables of basic logic gates - OR and NAND.
- c) Explain 4-bit parallel adder with proper circuit.
- d) What is difference between decoder and demultiplexer?
- e) Explain 1:4 demultiplexer with suitable circuit.
- f) Explain T-Flip Flop with proper logic diagram.

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Total No. of Questions : 5]

SEAT No. :

P529

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[Total No. of Pages : 2

F. Y. B. Sc. (Vocational)

COMPUTER HARDWARE AND NETWORK ADMINISTRATION

Essentials of Computer

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

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

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

Q1) Attempt the following:

[16]

- a) Define flash memory.
- b) Explain nested interrupts.
- c) What is BIOS?
- d) Write the full forms of CAD, BCD, SIMM & MICR.
- e) Write short notes on HDD.
- f) Write short notes on History of Computers.
- g) Define Web Camera.
- h) Explain the working of MOUSE.

Q2) Attempt any four:

[16]

- a) Define DMA.
- b) Explain the working of LASER printer.
- c) Define plotter.
- d) Write short notes on Bus structure of computer.
- e) Explain Motherboard.
- f) Define device controller.

P.T.O.

Q3) Attempt any four:

[16]

- a) Explain Instruction prefetch.
- b) Write notes on notebook and tablet.
- c) Explain front and rear panel of computer.
- d) Write notes on bluetooth.
- e) Explain working of scanner.
- f) Write notes on DOT matrix printer.

Q4) Attempt any two:

[16]

- a) Write short notes on off-line and on-line UPS.
- b) Explain the different types of computer memory.
- c) Explain computer system architecture with functional block diagram.

Q5) Attempt any two:

[16]

- a) Explain control unit of computer.
- b) Explain different types of software.
- c) Write short notes on:
 - i) Memory mapping.
 - ii) Digitizer.



Total No. of Questions :5]

SEAT No. :

P534

[Total No. of Pages :2

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F.Y.B.Sc. (Vocational)

COMPUTER HARDWARE AND NETWORK ADMINISTRATION

Computer Organisation

(Hardware & Software Aspects)

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

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

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

Q1) Attempt the following:

[16]

- a) What is POST?
- b) Define USB.
- c) Define Software package.
- d) What is HDMI?
- e) Define Hardware.
- f) Write notes on i-series microprocessor.
- g) Define Assembler.
- h) What is compiler?

Q2) Attempt any four:

[16]

- a) Explain any two data transfer instructions of 8086.
- b) Explain Math Co-processor.
- c) Explain control panel of window.
- d) Write notes on Tristate buffer.
- e) Define RS - 232.
- f) Write short notes on bluetooth devices.

P.T.O.

Q3) Attempt any four: [16]

- a) Explain Wi - Fi System.
- b) Explain different network topologies.
- c) Explain any two Arithmatical instructions of 8086.
- d) Write notes on operating system.
- e) Define Multimedia.
- f) Explain ANDROID operating system.

Q4) Attempt any two: [16]

- a) Explain flow chart with example.
- b) Explain architecture of 8086.
- c) Write notes on network operating system.

Q5) Attempt any two: [16]

- a) What is algorithm? Explain with example.
- b) Explain the types of software with example.
- c) Define:
 - i) firmware
 - ii) flag register of 8086.

