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F.Y. B.Sc.

MATHEMATICS

Algebra and Geometry

(Paper - I)(2008 Pattern) (41110)

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 all the subquestions. **[16]**

a) Define - equivalence relation on a set A. An equivalence relation R on Z is defined as, $R = \{(a,b) \in Z \times Z / 2 \text{ divides } a-b\}$. Find the equivalence class of 0 i.e. [0].

b) Find the values of $\phi(7)$, $\phi(746)$.

c) Express $2 - 2i$ in polar form with principal argument.

d) Find remainder when $x^4 + 16x^3 + 17x^2 + 64x - 100$ is divided by $x - 1$.

e) Find the centre of the conic

$xy - 2x + y - 2 = 0$

f) A straight line makes angles 45° and 60° with the positive x and y axes respectively. Find the angle made by the line with z - axis.

g) Show that the plane $2x - 2y + z + 16 = 0$ touches the sphere $x^2 + y^2 + z^2 + 2x - 4y + 2z - 3 = 0$.

h) Reduce the matrix $A = \begin{bmatrix} 1 & 1 \\ 2 & 3 \end{bmatrix}$ to it's echelon form. Hence find it's rank.

P.T.O

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

a) Let A = B = C = R. Define $f : A \to B,\ g : B \to C$ by $f(x) = 2x$ and $g(x) = 3x^2 - 1$.
Find formulae for functions *gof* and *fog*.

b) For integers a,b,c if a|bc and gcd (a, b) = 1 then prove that a|c.

c) If $z = 2 + 3i$, find the real and imaginary parts of $\frac{\bar{z}}{z^2}$.

d) Find, 7, 7th roots of 2

e) Find the condition that the equation $x^3 - px^2 + qx - r = 0$ may have three equal roots.

f) Find the remainder when 8^{401} is divided by 13.

Q3) Attempt any <u>two</u> of the following **[16]**

a) State and prove De Moivre's theorem.

b) Find the greatest common divisor of 243 and 198 and find integers *x* and *y* such that gcd (243, 198) = 243*x* + 198*y*.

c) i) Let A = R^2. Let R be the relation on A such that (a, b) R(a_1, b_1) if and only if $a^2 + b^2 = a_1^2 + b_1^2$. Show that R is an equivalence relation. What is [(1, 1)]?

ii) Let $z_1, z_2, z_3 \in C$ such that $z_1 + z_2 + z_3 = 0$ and $|z_1| = |z_2| = |z_3|$. Show that $\frac{1}{z_1} + \frac{1}{z_2} + \frac{1}{z_3} = 0$.

d) i) Find the quotient and remainder when $3x^5 - 8x^4 - 5x^3 + 26x^2 - 33x + 26$ is divided by $x^3 - 2x^2 - 4x + 8$.

ii) Solve the equation $x^3 - 5x^2 - 16x + 80 = 0$, the sum of two of it's roots being equal to 0.

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

a) The equation $ux + vy$ becomes $u'x' + v'y'$ after rotating the axes through an angle θ. Prove that $u^2 + v^2 = u'^2 + v'^2$.

b) Derive the normal form of the equation of plane.

c) Find the points of intersection of the line $\frac{x-8}{4} = y = -(z-1)$ and the sphere $x^2 + y^2 + z^2 - 4x + 6y - 2z + 5 = 0$.

d) Obtain the equation of the circle lying on the sphere $x^2 + y^2 + z^2 - 2x + 2y - 4z + 3 = 0$ and having its centre (2, 2, –3).

e) Find the equation of the plane through the points (2, 3, 2), (4, –5, –3) and parallel to the line $\frac{x-4}{5} = \frac{y+5}{-6} = \frac{z-1}{-2}$.

f) Reduce the matrix $\begin{bmatrix} 1 & -2 & 1 & -4 \\ 1 & 3 & 7 & 2 \\ 1 & -12 & -11 & -16 \end{bmatrix}$ to echelon form. Find it's rank.

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

a) Find the angle between the lines whose direction cosines are l_1, m_1,n_1, and l_2, m_2,n_2. Hence obtain the condition for perpendicularity.

b) Reduce the equation $5x^2 + 4xy + 8y^2 - 12x - 12y = 0$ to it's simplest form. Find also eccentricity of the conic.

c) Find λ, if the system of equations

$4x + y + (\lambda^2 - 14)\, z = \lambda + 2,$

$x + 2y - 3z = 4,$

$3x - y + 5z = 2$

have infinitely many solutions. Find one of them.

d) i) Find the shortest distance between the lines

$$\frac{x-3}{3} = \frac{y-8}{-1} = \frac{z-3}{1} \text{ and } \frac{x+3}{-3} = \frac{y+7}{2} = \frac{z-6}{4}$$

ii) Find the equation of a sphere having the circle, $x^2 + y^2 + z^2 + 10y - 4z - 8 = 0$, $x + y + z = 3$; as a great circle.

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F.Y. B.Sc.

MATHEMATICS (Calculus)

(Paper - II) (2008 Pattern) (41120)

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 each of the following. **[16]**

a) Prove that $\sqrt{3}+\sqrt{2}$ is an irrational number.

b) Find the solution set of $|x^2| = |x|$.

c) Find the sum of convergent series $\sum_{n=1}^{\infty} \frac{1}{n(n+1)}$.

d) Find the smallest positive integer k satisfying $\left|\frac{1}{n} - \frac{1}{n+1}\right| < 0.01$.

e) Find $\lim_{x\to 1+} \frac{|x^2-1|}{x-1}$ if exists.

f) Discuss the continuity of the function

$$f(x) = \frac{x+1}{x^2+3x+2} \text{ in } [1, 2]$$

g) State Rolle's theorem.

h) Evaluate $\lim_{x\to 0} \frac{\log(\sin x)}{\cot x}$

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

a) Prove that $\| x | - | y \| \leq | x - y |$ for all $x, y \in \mathrm{R}$.

b) Prove that every convergent sequence of real numbers is bounded. Is the converse true? Justify.

P.T.O

c) If $x_1 = k > 0$, and $x_{n+1} = \frac{3+2x_n}{2+x_n}, n \geq 1$, then show that the sequence $\{x_n\}_{n=1}^{\infty}$ converges to $\sqrt{3}$.

d) If $x_1 = 2, x_{n+1} = 3 + \frac{1}{2x_n}, n \geq 1$ then show that $\{x_n\}_{n=1}^{\infty}$ is contractive sequence. Find its limit.

e) Show that $\lim_{x \to 1} \left[\frac{x^2 - x + 5|x-1|}{2x - 3|x-1| - 2} \right]$ does not exist

f) Discuss the convergence of the series
5 – 5 + 5 – 5 + _ _ _ _ _

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

a) Show that the series $\sum_{n=1}^{\infty} \frac{1}{n^p}$ is convergent if p > 1.

b) Show that the sequence $\{x_n\}_{n=1}^{\infty}$ where $x_n = 1 + \frac{1}{2} + \frac{1}{3} + ... + \frac{1}{n}$ is properly divergent.

c) i) If $\lim_{x \to c} f(x)$ exist then prove that $f(x)$ is bounded in a deleted neighbourhood of *c*.

ii) Show that the series $\sum_{n=1}^{\infty} \frac{\sin n}{n^2}$ is convergent.

d) i) Find the solution set of $|x| + |x+1| < 3$.

ii) Show that $\lim_{x \to 0} \frac{1}{x}$ does not exist.

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

a) State and prove Cauchy's mean value theorem.

b) Discuss the continuity of the function $f(x)$ at $x = 0$.

where $f(x) = \frac{e^{1/x^2}}{1 - e^{1/x^2}} : x \neq 0$

$= 0 \qquad x = 0$

c) Verify Lagrange mean value theorem for the function $f(x) = \sin x + \cos x$ in $[0, 2\pi]$

d) Find the series expansion of $\log(1 + x + x^2 + x^3)$.

e) Prove that $\frac{x-1}{x} < \log x < x - 1$ for $x > 1$

f) Find 'a' and value of the limit if it exist $\lim_{x \to 0}\left[\frac{a\tan 2x + \tan x}{x^3}\right]$.

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

a) i) If $y = e^{ax}\sin(bx + c)$ then prove that

$$y_n = (a^2 + b^2)^{n/2}\, e^{ax}\sin\left(bx + c + n\tan^{-1}\frac{b}{a}\right).$$

ii) Find 5th derivative of $\cos^2 x$

b) If $y = e^{\tan^{-1}x}$ then prove that

$$(1 + x^2)y_{n+2} + [2(n+1)x - 1]y_{n+1} + n(n+1)y_n = 0$$

c) Show that 'θ' which occurs in the Lagrange mean value theorem tends to limit ½ as $h \to 0$ provided that f' is continuous.

d) Discuss the continuity of the function at $x = 0, 1, 2,$

where $f(x) = \begin{cases} -x^2 & x \le 0 \\ 5x - 4 & 0 < x \le 1 \\ 4x^2 - 3x & 1 < x < 2 \\ 3x + 4 & x \ge 2 \end{cases}$

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F.Y. B.Sc.

PHYSICS - I

Mechanics, Heat and Thermodynamics

(Paper - I) (2008 Pattern) (41210)

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 :

a) State and explain Newton's third law of motion. **[2]**

b) The initial velocity of a body is 16 m/s. What is its velocity after 2.5 sec if it accelerate uniformly at 4.5 m/s^2. **[2]**

c) State two factors which affect the surface tension. **[2]**

d) Give the statement of Bernoulli's theorem. **[2]**

e) State first law of thermodynamics. **[2]**

f) A reversible refrigerator works between 0°C and 27°C. Calculate the coefficient of performance. **[2]**

g) What are the advantages of mercury thermometer. **[2]**

h) Explain the reversible process. **[2]**

Q2) Attempt any four of the following

a) Describe the Jaeger's method to determine surface tension of a liquid. **[4]**

b) What is average velocity? Interpreat the average velocity using x - t graph. **[4]**

c) What is pseudo force? Illustrate with example. **[4]**

d) Two bodies of mass 20 kg and 30 kg are tied together by light string and are placed on frictionless horizontal surface. when first mass is pulled by a force F an acceleration 10 m/s^2 is produced in both masses. Calculate

i) The magnitude of the force

ii) Tension in the string. **[4]**

P.T.O

e) Water flowing in a horizontal pipe has a speed 40 cm/s at one end point and 30 cm/s at another point. Determine the pressure drop between two points. **[4]**

f) A body of mass 20 gm is thrown vertically upwards with a speed of 20 m/s. Find the workdone by the force of gravity during the time the body goes vertically up. **[4]**

Q3) Attempt any Four of the following :

a) Derive an expression for workdone during an adiabatic process. **[4]**

b) Show that the entropy remains constant during a reversible cyclic change. **[4]**

c) Give the difference between real gases and ideal gases. **[4]**

d) Find the temperature in Fahrenheit scale, Kelvin scale and Reaumur scale corresponding to 45°C. **[4]**

e) If the compression ratio for Otto engine is 10 and ratio of principal specific heats for the working substance is 1.4, find efficiency of the engine. **[4]**

f) A reversible engine converts $\frac{1}{8}^{th}$ of heat into work. when the temperature of the sink is decreased by 62° K, its efficiency is doubled. Find the temperature of the source. **[4]**

Q4) Attempt any two of the following :

a) State the working principle of venturimeter and discuss in detail the working of venturimeter. **[8]**

b) i) A position of a car on a straight road with time is given by the following function of time, $x(t) = 10 + 20t + 5t^2$ in meter when t is in seconds. Find the instantaneous velocities at **[4]**

1) $t = 1$ *sec* and

2 $t = 6$ *sec*.

ii) Derive the expression for the height of capillary rise in the space between two parallel plates dipping in a liquid. **[4]**

c) i) Calculate the workdone in moving a particle along a vector $\vec{r} = (3\bar{i} - \bar{j} + 6\bar{k})$ meter, if the applied force is $\bar{F} = (\bar{i} + 3\bar{j} + 2\bar{k})$ newton. **[4]**

ii) Obtain the equation of continuity. **[4]**

Q5) Attempt any <u>two</u> of the following :

a) What is principle of refrigeration? Describe vapour - compression refrigerator. Give the applications of refrigeration. **[8]**

b) i) Calculate the workdone when a gram molecule of a gas expands isothermally at 37°C to double its original volume. (R = 8.3 joules/ degree/ mole) **[4]**

ii) Derive reduced equation of state from Van-der - waal's equation of state. **[4]**

c) i) Determine the critical temperature for Helium from the following data : **[4]**
$a = 3.44\ Jm^3\ kmole^{-2}$, $b = 0.0234\ m^3\ kmole^{-1}$ and $R = 8.31\ Jmole^{-1}\ k^{-1}$.

ii) What are essential requisites of good thermometer? **[4]**

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F.Y. B.Sc.

PHYSICS - II

Emerging Physics and Electricity and Magnetism

(2008 Pattern) (41220) (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) ***Draw neat diagrams and sketches wherever necessary.***

Q1) Attempt all of the followings :

a) What is Dark Age? **[2]**

b) Define the term Positive Temperature Coefficient (PTC) **[2]**

c) Give any two uses of He - Ne laser beam. **[2]**

d) Calculate band gap of 7 silicon atoms if energy gap of silicon is 1.1 eV. **[2]**

e) State superposition principle in electrostatics. **[2]**

f) What is transient current? **[2]**

g) Define polar and non - polar molecule. **[2]**

h) A solenoid of 300 turns/m is carrying a current of 3A. Determine the magnitude of magnetic intensity H. **[2]**

Q2) Attempt any four of the following :

a) Write a short note on contribution of Indian Scientist Saha and chandrasekhar in development of Physics. **[4]**

b) Explain construction and working of photomultiplier tube. **[4]**

c) What is optical pumping? Explain the three level pumping scheme. **[4]**

d) If a nanoparticle with drift velocity 1.5×10^3 m/s experiences a scattering after 5 picosecond. What will be the mean free path of that particle. **[4]**

e) The resistance of platinum wire at 0° C is 6.5 Ω and at t° C it is 8.5 Ω find the temperature of the wire. [Given temp. coefficient for platinum $\alpha = 0.0039$ /°C] **[4]**

f) Find the relative population of two states in a ruby laser that produces a light beam of wavelength 6943° A at 300°K. **[4]**
[Given n = 6.626×10^{-34} Js, K = 8.61×10^{-5} eV/K]

P.T.O

Q3) Attempt any Four of the followings :

a) Obtain an expression for the electric intensity at any point due to a line charge using Gauss's law. **[4]**

b) Using Ampere's circuital law obtain expression for magnetic field inside the toroid. **[4]**

c) Distinguish between diamagnetic and paramagnetic substances. **[4]**

d) The parallel plate capacitor of plate area 0.04 m^2 is filled with dielectric of dielectric constant 4. It has been charged to 50 volts, acquires a charge 10^{-8} Coloumb. Find electric intensity in the dielectric (Given $\in_0 = 8.85 \times 10^{-12}$ C^2/Nm^2). **[4]**

e) A steady current is flowing through coil of resistance 30 Ω and inductance 0.2 henry. Find the time taken by the current to fall to 50% of its maximum value. **[4]**

f) Calculate the force between two charged bodies having a charge 10 μC and 20 μC and 4 cm a part. [Given $\in_0 = 8.85 \times 10^{-12}$ $C^2/N\text{-}m^2$] **[4]**

Q4) Attempt any two of the followings :

a) What is ECG? Draw ECG curve and interprete it. **[8]**

b) i) Define Nanotechnology. State its applications in various disciplines. **[4]**

ii) Amount of radiant energy received by the detector of pyrometer per unit time is 15 J from a hot body. If emissivity is 4.5×10^{-3}, then find the temperature of hot body.
[Given : stefan constant $\sigma = 5.72 \times 10^{-8}$ W/m^2K^4] **[4]**

c) i) Elaborate major development in physics in 20^{th} century. **[4]**

ii) The nernst potential for K^+ ions is –82.07 mV. If intracellular K^+ concentration of a group of cells averages 160×10^{-6} moles /cm^3. Find extracellular concentration of K^+ ions. **[4]**

Q5) Attempt any two of the followings :

a) State Biot - Savart law. Obtain an expression for $\vec{B}$ on the axis of a current carrying circular loop. **[8]**

b) i) Obtain an expression for electric potential at any point due to an electric dipole. **[4]**

ii) An ideal solenoid of a aluminium core, have 20 turns/cm and a current 4 A. Calculate magnetization M developed in the core.
(Given $\chi_{\text{aluminium}} = 2.3 \times 10^{-5}$) **[4]**

c) i) Obtain an expression for growth of charge in RC circuit. **[4]**

ii) The three charges, q, $-3q$ and $5q$ are placed at the corners of an equilateral triangle having length of each side 50 cm. Calculate the potential energy of the structure. [$q = 1 \times 10^{-6}$ coloumb] **[4]**

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F.Y. B.Sc.

CHEMISTRY - I

Physical and Inorganic Chemistry

(Paper - I) (2008 Pattern) (Theory) (41310)

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

Instructions to the candidates:-

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

Q1) Attempt the following questions : **[16]**

a) Define pOH and calculate pOH of 0.002 N NaOH solution.

b) State the units of viscosity and surface tension.

c) What is autocatalysis? Give one example of it.

d) Define entropy. Give its physical significance.

e) State any two assumptions of Bohr's theory.

f) What is atomic orbital overlap? Give factors affecting it.

g) Calculate the molarity of 250 ml. solution of NaOH containing 5 gm. of NaOH. (At.Wts. Na = 23, O = 16, H = 1)

h) P - nitrophenol is more soluble than O - nitrophenol. Why?

Q2) a) Attempt any <u>four</u> of the following **[8]**

i) Calculate the value of x in the equation $10^x = 33.48$.

ii) Find the value of $(0.0057)^3$ using log - table.

iii) What is the slope and intercept if the equation of line is $5x + \frac{7}{2}y - 11 = 0$.

iv) What is the equation of line which makes an intercept 5 and perpendicular to the line $y = 2x + 3$.

v) If $y = (x^5 + 8)^3$, find $\frac{dy}{dx}$.

P.T.O

vi) Calculate $\frac{dy}{dx}$, if $y = x^{7/2}$.

vii) $\int_2^8 \frac{x^3}{2}\, dx = ?$

viii) Integrate w.r.t. $x \int (x^2 + 3)^2 dx$.

b) Define surface tension. Give it's units. How it is determined by capillary method? **[4]**

c) Attempt <u>any one</u> of the following **[4]**

i) Calculate the entropy change in a reversible isothermal process at 30° C, when 3 moles of a gas changes it's volume from 20 liters to 10 liters.

ii) A liquid of density 0.956 g/cm^3 is observed to rise 11.5 mm in a tube of radius of 0.5 mm. Calculate surface tension of liquid.

Q3) a) Attempt <u>any three</u> of the following : **[12]**

i) Give at least four properties of cathode rays.

ii) Discuss the importance of carnot cycle.

iii) What is compressibility factor? Discuss the variation of it with pressure of gas.

iv) What is enzyme catalysis? Explain its characteristics.

b) Attempt <u>any one</u> of the following : **[4]**

i) What are the drawback's of Ruther ford's atomic model?

ii) Calculate the velocity and kinetic energy of an electron, revolving in the first orbit of hydrogen atom. (Given : radius (r) = 0.529×10^{-8}cm; $m_e = 9.11 \times 10^{-28}$g. h = 6.626×10^{-27} ergs).

Q4) a) Attempt <u>any three</u> of the following **[12]**

i) What is electrophoresis? Give it's applications.

ii) State and explain Aufbau principle.

iii) Explain Acid - Base catalysis with suitable example.

iv) Give the properties and applications of emulsions.

v) Give the significance of Azimuthal quantum number and magnetic quantum number.

b) Attempt <u>any one</u> of the following. **[4]**

i) State the postulates of Heitler - London theory.

ii) What is hybridization? Explain the formation of C – H bond in CH_4 molecule.

Q5) a) Attempt <u>any two</u> of the following : **[6]**

i) Mention various isotopes of hydrogen. How is heavy hydrogen prepared?

ii) Explain the bonding and shape of BeF_2 molecule.

iii) 10 ml of the solution of NaOH containing 2 gm of NaOH per liter is neutralised by 20 ml of a solution of H_2SO_4 and 25 ml of HCl solution separately. Calculate strength of acids in g/lit.

b) Attempt <u>any two</u> of the following. **[10]**

i) What is atomic orbital overlap? What are the different types of overlap between s and p orbitals give one example of each.

ii) Explain the bonding and shape of NH_3 and ICl_2^- on the basis of VSEPR theory.

iii) How will you prepare 0.25 N, 500 ml HCl solution from concentrated HCl solution whose specific gravity is 1.18 and contains 35% HCl by weight?

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F.Y.B.Sc.

CHEMISTRY - II

Organic and Inorganic Chemistry

(2008 Pattern)(Theory) (41320) (Paper - II)

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 questions : **[16]**

a) Explain the following terms

i) Chiral centre

ii) Specific rotation.

b) Give unique properties of organic compounds

c) Draw zig - zag structures of,

i) 1- aminobutane

ii) 2- pentanone

d) n - butane has higher b.p. than isobutane. Explain.

e) Ethyl alcohol is water soluble but n - butyl alcohol is water insoluble.

f) What is the oxidation number of,

i) P in $(P_2O_7)^{4-}$

ii) Cr in $K_2Cr_2O_7$.

g) Write electronic configuration of elements having atomic number 25 and 10.

h) Draw the structures of following.

i) XeO_2F_2

ii) XeF_4

P.T.O

Q2) a) Attempt <u>any two</u> of the following **[8]**

i) Phenols does not give effervescence with $NaHCO_3$ but dissolves in NaOH solution; Explain.

ii) Discuss conformational isomerism in n - butane with energy profile diagram.

iii) What is resonance effect? Give necessary conditions for it.

b) Attempt <u>any two</u> of the following **[8]**

i) What are alcohols? How will you prepare ethyl alcohol from

1) Ethylene

2) Acetaldehyde.

ii) What is F.C. alkylation? How is it carried out by using different alkylating agents?

iii) What are alkanes? How will you prepare n-butane from

1) Ethyl chloride

2) 1 - butene.

Q3) a) Answer <u>any two</u> of the following **[8]**

i) What is iodoform test? Which of the following compounds will give positive iodoform test.

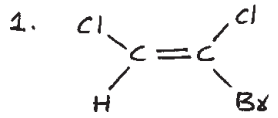
1) Ethanol

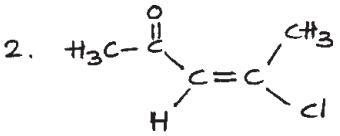
2) Methanol

3) 2 - pentanol

ii) What is steric effect? Explain with suitable example.

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

1. 

2. 

iv) Write the products of ozonolysis of following alkenes.

1) $CH_3 - CH_2 - CH = \overset{\overset{CH_3}{|}}{C} - CH_3$

2) $CH_3 - CH_2 - CH = CH_2$

b) Attempt <u>any two</u> of the following **[8]**

i) What is hybridisation? Discuss the formation of methane molecule with the help of orbital picture diagram.

ii) Give two methods of preparation of ethyl bromide. What is the action of the following reagents on ethyl bromide?

1) alcoholic KoH

2) AgCN in alcohol.

iii) Write short notes on

1) Hydroboration - oxidation.

2) Homologous series.

Q4) a) Attempt <u>any three</u> of the following **[6]**

i) Draw all possible isomers of the compounds having molecular formula C_3H_7Cl.

ii) Define the following :

1) Hydrogen bonding

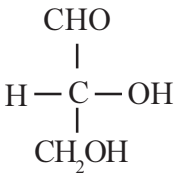
2) Enantiomers.

iii) Draw the structures of the following compounds.

1) 1 - bromo 2 - methyl propane

2) 3 - methyl 2 - butanol.

iv) Assign R or S configuration of following



b) Identify the products A and B and rewrite the reaction [any two] **[4]**

i) $CH_3-\underset{\underset{Br}{|}}{CH}-CH_3 \xrightarrow[\Delta]{AlC.KoH} A \xrightarrow{HI} B.$

ii)  $+ CH_3-CH_2-\underset{\underset{O}{\|}}{C}-Cl \xrightarrow{AlCl_3} A \xrightarrow[HCl]{Zn-Hg} B.$

iii)  $\xrightarrow{NaOH} A \xrightarrow{CH_3-Br} B.$

iv) $CH_3-CH_2-Br \xrightarrow[ether]{Mg} A \xrightarrow{H_2O} B.$

c) Attempt <u>any one</u> of the following **[6]**

i) What is modern periodic law? Explain different blocks in the periodic table.

ii) Beryllium shows anomalous behaviour in the family of alkaline earth metals; Explain.

Q5) a) Attempt <u>any two</u> of the following : **[6]**

i) Define term electronegativity. Discuss the trends of it across the periods and within the groups in the periodic table.

ii) Explain any two applications of alkaline earth metals in biology, industry and agriculture.

iii) Calculate the screening constant of the valence electron in chlorine (Z = 17).

b) Attempt <u>any two</u> of the following. **[10]**

i) Discuss the bonding and shape of,

1) XeF_2.

2) XeO_4.

ii) Draw the shapes of S, P and D - orbitals.

iii) How are crown ethers useful in separating alkali metals?

♦♦♦♦

Total No. of Questions : 5]

SEAT No. :

P195

[Total No. of Pages : 2

[4117] - 7

F.Y. B.Sc.

BOTANY - I

Plant Diversity

(2008 Pattern) (Paper - I) (41410)

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 are biannuals?

b) Give any two types of colonial forms of algal thallus.

c) Define parasitic fungi.

d) Give any two methods of sexual reproduction in lichens.

e) Write any two characters of Hornworts (Anthocerotae).

f) What is heterosporae?

g) Give leaf dimorphism in gymnosperms.

h) Name any two forms of corolla in angiosperms.

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

a) Describe habitat diversity in higher plants.

b) Describe ultrastructure of fungal cell.

c) Explain habitat diversity in algae

d) Give the methods of vegetative reproduction in bryophytes.

e) Define inflorescence. Describe any two types of cymose inflorescence.

f) Describe external morphology of selaginella sporophyte.

P.T.O

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

a) Sporophyte diversity in coniferales and gnetales.

b) Importance of Botanical gardens with respect to conservation of plant diversity.

c) Any two simple fruits.

d) Fruticose lichens.

e) T.S of Riccia thallus.

f) Male cone of coniferales.

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

a) Describe the diversity in sexual reproduction in fungi.

b) Explain the diversity in sexual reproduction in algae.

c) Describe the life cycle pattern in Gymnosperms.

d) What is corolla? Describe various forms of corolla.

Q5) Describe in detail life cycle pattern of Riccia. **[16]**

OR

Sketch, label and describe internal structure of monocot stem and monocot root.

♦♦♦♦

Total No. of Questions : 5]

SEAT No. :

P196

[Total No. of Pages : 2

[4117] - 8

F.Y. B.Sc.

BOTANY

Plant Resources - Management and Utilization

(Paper - II) (2008 Pattern) (41420)

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) Give two sources of rubber.

b) Define weed.

c) Write constituents of honey.

d) Give two limitations of green house.

e) Give any two principles of flower arrangement.

f) Define phytoremediation.

g) Enlist biochemical resources obtained from fungi.

h) What is biocontrol?

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

a) Give steps in collection of seed.

b) Write preparation of Jam.

c) Describe any two cultural practices used in a nursery.

d) Describe use of sea weeds as food.

e) Write source and uses of gum.

f) Explain “Biocontrol as agrobusiness”.

P.T.O

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

a) Timber

b) Bioenergy.

c) Rhizome.

d) Phytoextraction

e) Dyes and pigments.

f) Advantages of green house technology.

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

a) What is layering? Describe two types of layering.

b) Describe physical methods of weed control.

c) Describe source, preparation and uses of pyrethrins.

d) Describe methods of vase life improvement in flower arrangement.

Q5) What is post harvest technology? Describe grading, processing, storage and packing methods used for the medicinal plants. **[16]**

OR

Describe part used, products and uses of Henna, Lemon grass and Turmeric.

♦♦♦♦

Total No. of Questions : 6] **SEAT No. :**

P197 **[Total No. of Pages : 3**

[4117] - 9

F.Y. B.Sc.

ZOOLOGY

ZY - 101 : Non Chordates and Chordates

(2008 Pattern) (Theory) (41510) (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.***

SECTION - I

(Non Chordates)

Q1) Define / Explain (Any Ten) : **[10]**

a) Polyp
b) Entomology
c) Pellicle
d) Bioluminescence
e) Coral reef
f) Phylum
g) Radial Symmetry.
h) Nomenclature
i) Conjugation
j) Monera
k) Platyhelminthes
l) Alternation of generation

Q2) Write short notes on (Any Three) : **[15]**

a) Biotechnology.
b) Binary fission in Paramoecium.
c) General characters of porifera
d) Regeneration in Planaria.
e) Mullerian mimicry in butterflies.

P.T.O.

Q3) Attempt the following : **[15]**

a) Mention the general characters of Arthropoda.

b) Describe the process of pearl formation in mollusca.

c) Give the general characters of protista.

OR

Mention the distinguishing characters and classification of phylum annelida. Give suitable examples and characters of each class.

SECTION - II
(Chordates)

Q4) Define / Explain (Any Ten) : **[10]**

a) Gnathostomata.

b) Urochordata.

c) Oceanodromous migration.

d) Marsupial mammals.

e) Squatting posture in frog.

f) Aestivation.

g) Camouflage.

h) Nuptial pad.

i) Erythrocytes.

j) Isin glass.

k) Portal system.

l) Brow spot.

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

a) Anadromous migration.

b) Terrestrial adaptations in reptiles.

c) Diversity in placental mammals in terrestrial habitat.

d) Sexual dimorphism in frog.

e) Echidna.

Q6) Attempt the following : **[15]**

a) Give general characters of subphylum cephalochordata.

b) Sketch and label female reproductive system of frog.

c) Describe the habit and habitat of Petromyzon.

OR

Describe the digestive system of frog and add a note on food, feeding and physiology of digestion.

♦♦♦♦

Total No. of Questions : 6]

SEAT No. : ____

P198

[Total No. of Pages : 3

[4117] - 10

F.Y. B.Sc.

ZOOLOGY

ZY 102 : Genetics and Parasitology

(Paper - II) (Theory) (41520) (2008 Pattern)

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.***

SECTION - I

(Genetics)

Q1) Define / Explain the following (Any Ten) : **[10]**

a) Allele.
b) Law of segregation.
c) Dominant epistasis.
d) Chromatid.
e) Metacentric chromosome.
f) Hypertrichosis.
g) Genotype.
h) Pleiotropy.
i) Plasmagenes.
j) DNA.
k) Heredity.
l) Restriction endonuclease.

Q2) Write short notes on (Any Three) : **[15]**

a) Lethal genes.
b) Gynandromorphs.
c) Down's syndrome.
d) Phenylketonuria.
e) Transgenic animals.

P.T.O.

Q3) Attempt the following : **[15]**

a) Explain with suitable example the geneinteraction in the 9 :7 ratio.

b) What is sex determination? Explain the ZZ-ZW mechanism with a suitable example.

c) A man has six fingers on each hand and six toes on each foot. His wife and his daughter have normal number of digits. Extra digit is a dominant trait due to gene 'D'.

i) Work out the genotype of the father, mother and daughter.

ii) Comment upon the type of cross.

OR

Explain the concept of multiple alleles with the example of ABO blood group system in man.

SECTION - II

(Parasitology)

Q4) Define / Explain the following (Any Ten) : **[10]**

a) Medical Helminthology.

b) Definitive host.

c) Zoonoses.

d) Sanguivorous.

e) Bioterrorism.

f) Pediculosis.

g) Scabies.

h) Insect vector.

i) Rabies.

j) Pathogenicity.

k) Hermaphroditism.

l) Prophylaxis.

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

a) Control measures of mite.

b) External morphology of head louse.

c) Pathogenicity of Entamoeba histolytica.

d) Commensalism

e) Pathogenicity of Ascaris lumbricoides.

Q6) Attempt the following : **[15]**

a) What is Parasite? Describe any two parasites with suitable examples.

b) What is host specificity? Describe structural and physiological host specificity with examples.

c) Mention the parasitic adaptations in Taenia solium.

OR

Describe the life cycle of Plasmodium vivax in man. Add a note on the symptoms of malaria.

♦♦♦♦

Total No. of Questions : 5]

SEAT No. :

P199

[Total No. of Pages : 2

[4117] - 11

F.Y. B.Sc.

GEOLOGY

Mineralogy and Petrology

(Paper - I) (2008 Pattern) (41610)

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

a) What is metamorphic rock?

b) Define hardness.

c) What is Polymorphism?

d) Define twinkling.

e) What is laterite?

f) Define gemmology.

g) What is siderophile?

h) Define rock.

Q2) Answer the following questions : (Any Four) **[16]**

a) Explain Ionic bonding in minerals with suitable examples.

b) Describe the phyllosilicate structure with suitable examples.

c) Give an account of minerals used in glass industry.

d) Explain the magnetic properties of minerals.

e) Describe the sublimation and metamorphic process of mineral formation.

f) What is twinning? Explain various types of twinning with suitable examples.

P.T.O

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

a) What is magma? Give the composition of magma.

b) Describe the rudaceous sedimentary rocks.

c) Give the classification of Igneous rocks based on colour index and felspar content.

d) Explain the uncordant and discordant bedding structures in sedimentary rocks.

e) What is petrology, petrography, petrogenesis and lithology.

f) Explain the schistose structure in metamorphic rocks.

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

a) Give the silicate structure, chemical composition, physical and optical properties of 'Augite'.

b) Explain the various parts of a petrological microscope.

c) What are the agents of metamorphism? Describe cataclastic metamorphism with suitable examples.

d) How sedimentary rocks are formed? Explain clastic texture in sedimentary rocks.

Q5) Give the crystallographic axes, elements of symmetry, definition with indices of various forms present in orthorhombic system, type Baryte. **[16]**

OR

a) State the different physical properties of minerals. Explain cleavage and fracture with suitable examples.

b) Explain the following discordant intrusive forms.

i) Dyke

ii) Batholith

♦♦♦♦

Total No. of Questions : 5]

SEAT No. :

P200

[Total No. of Pages : 2

[4117] - 12

F.Y. B.Sc.

GEOLOGY - II

General Geology and Palaeontology

(Paper - II) (2008 Pattern) (41620)

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

a) Define Weathering.

b) Give the temperature and Radius of the Earth.

c) Define Petrification.

d) Define Geology.

e) Draw a neat labelled diagram of Apical disc in Regular Echinoids.

f) Describe Isodont and Heterodont hinge in lamellibranchs.

g) Give the names of major tectonic plates of the Earth.

h) Draw a neat diagram of Mesa and Butte.

Q2) Answer Any Four questions from the following : **[16]**

a) Define Earthquake. Explain the terms Focus, Epicentre, and Isoseismal line.

b) Describe the types of brachial skeleton in Brachiopods.

c) Describe the structure of a typical central type of volcano.

d) Describe the hard part morphology of Head of Trilobite.

e) Describe the hydrosphere and Biosphere of the Earth.

f) Explain the concept of continental drift theory.

P.T.O.

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

a) Describe Mushroom Rock and Yardangs formed by the action of wind.

b) Explain the various seismic waves.

c) Describe carbonisation and Imprints mode of preservation of fossils.

d) Describe the ಟ/ಣmethod of age determination.

e) Describe the corona in Regular Echinoids.

f) Define fossil. Describe the various branches of palaeontology.

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

a) Explain with the help of diagram the internal structure of the Earth.

b) Describe the various type of Mountains.

c) Describe with the help of neat labelled diagram the morphology of Gastropod shell.

d) Describe the conditions necessary for fossilization.

Q5) Describe the various depositional land forms formed by the action of sea. **[16]**

OR

a) Differentiate between a lamellibranch and Brachiopod shell. **[8]**

b) Describe the different types of suture lines in Ammonoids. **[8]**

♦♦♦♦

Total No. of Questions : 5] **SEAT No. :**

P201 **[Total No. of Pages : 4**

[4117] - 13

F.Y. B.Sc.

STATISTICS / STATISTICAL TECHNIQUES

Descriptive Statistics

(Paper - I) (2008 Pattern) (42110) (41710)

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.***
5) ***Graph papers will be supplied on request.***

Q1) Attempt the following:

a) Choose correct alternative for the following : **[4 × 1 = 4]**

i) Statistical method is treated as a branch of science which deals with

A) Collection and Presentation of data

B) Analysis of data

C) Interpretation of data

D) All the above

ii) For a cultural programme, four students are selected from each class to work as volunteers. The sampling scheme used in this situation is

A) Stratified sampling

B) Systematic sampling

C) Cluster sampling

D) Two stage sampling

iii) In case of two attributes A and B, the class frequency ($A\beta$) interms of other class frequencies can be expressed as

A) (AB) – (B) B) N – (AB)

C) (A) – (AB) D) (AB) – (A)

iv) If n = 10, $\sum X = 120$, var $(x) = 9$ then coefficient of variation (C.V.) is equal to

A) 12% B) 30%

C) 25% D) 40%

P.T.O.

b) State whether the following statements are true or false : **[4 × 1 = 4]**

i) Mode can be obtained by graphical method.

ii) The first order central moment is always zero.

iii) Bowley's coefficient of skewness can not be calculated for open end class.

iv) If the correlation coefficient is ± 1 then the regression lines are perpendicular to each other.

c) Define population and sample. **[2]**

d) Define negative correlation with illustration. **[2]**

e) Examine whether the following data are consistent : **[2]**
N = 100, (A) = 30, (B) = 80, (AB) = 40

f) A distribution has mean 30, coefficient of variation 20% and coefficient of skewness 0.3, find its mode. **[2]**

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

a) Describe the utility and scope of statistics in industry.

b) Explain stratified random sampling with illustration.

c) Explain the following terms with illustration.

i) Attribute

ii) Discrete variable

d) State merits and demerits of mode.

e) Show that the sum of squares of deviations of all observations taken from arithmetic mean is minimum.

f) The following are the marks obtained by 40 students in a class :
9, 50, 47, 34, 34, 19, 21, 24, 22, 23, 13, 37, 33, 36, 28, 33, 32, 26, 8, 12, 37, 31, 41, 2, 38, 12, 22, 29, 15, 17, 15, 32, 21, 31, 48, 17, 22, 49, 33, 28.
Construct the stem and leaf diagram.

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

a) What is dispersion? Explain relative measure of dispersion and state its utility.

b) Define central moments. Show that the central moments are invariant to the change of origin.

c) State any four properties of regression coefficients.

d) With usual notations, prove that $\beta_2 \geq 1$.

e) Compute standard deviation and coefficient of variation for the following data : 36, 15, 25, 10, 14

f) Compute Laspeyre's and paasche's price index numbers for the following data :

Commodity	Year 2005		Year 2010	
	Price	Quantity	Price	Quantity
A	5	4	13	5
B	9	5	17	4
C	13	2	19	3

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

a) Explain the following terms :

i) Dichotomy

ii) Positive association between two attributes

iii) Coefficient of determination

iv) Coefficient of skewness.

b) Derive the formula of median for a continuous frequency distribution.

c) i) Prove that $-1 \leq \text{Corr}(x, y) \leq 1$.

ii) Spearman's rank correlation coefficient between the scores in two tests is 0.5. If the sum of squares of the difference between ranks is 42, assuming that no rank is repeated, find the number of pairs in the group.

d) i) Show that S.D. $\geq$ M.D. about arithmetic mean.

ii) In a group of 300 students, 150 like English; 180 like marathi; 100 do not like English and Marathi. Find the number of students who like

I) Only Marathi

II) Only one of the two language.

Q5) Attempt any <u>two</u> of the following : **[2 × 8 = 16]**

a) Derive the expression for regression line of y on x.

b) i) Write a short note on skewness and kurtosis.

ii) Explain the procedure of fitting the exponential curve $y = ab^x$.

c) i) Write a short note on scatter diagram.

ii) Define Index numbers and state its uses.

d) i) A group of 50 items have mean and S.D. 61 and 8 respectively. Another group of 100 items have mean and S.D. 70 and 9 respectively. Find mean and S.D. of combined group.

ii) The first four moments of a distribution about the value 5 are 2, 20, 40 and 200 respectively. Find the first four central moments.

♦♦♦♦

Total No. of Questions : 5] **SEAT No. :**

P202 **[Total No. of Pages : 4**

[4117] - 14
F.Y. B.Sc.
STATISTICS / STATISTICAL TECHNIQUES
Discrete Probability and Probability Distributions
(Paper - II)(2008 Pattern) (42120) (41720)

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) Choose correct alternative for the following : **[4 × 1 = 4]**

i) If A and B are two independent events defined on a sample space Ω such that, P(A) = 0.2, P(B) = 0.8, then $P(A \cap B)$ is equal to;

a) 0 b) 0.16 c) 1.0 d) 0.6

ii) A number is selected at random from the set of numbers {11, 12, 13, ..., 99}. What is the probability that the selected number contains the digit 9;

a) $\frac{19}{89}$ b) $\frac{11}{100}$ c) $\frac{18}{89}$ d) $\frac{1}{10}$

iii) For a binomial distribution,

a) Mean < Variance b) Mean > Variance

c) Mean = Variance d) None.

iv) Given the following probability distribution of a discrete random variable (*r. v.*) X,

X	–3	–2	–1	0	1
P(X = *x*)	0.1	0.2	0.3	0.25	0.15

The mode of X is,

a) –3 b) 0 c) –1 d) 0.3

b) State whether following statements are true or false. **[4 × 1 = 4]**

i) Weight of a student is a discrete random variable.

ii) Variance is independent of change of origin.

iii) A discrete r.v. cannot take negative values.

iv) If A and B are two mutually exclusive events defined on Ω, then $P(A \cup B) = P(A) + P(B)$.

P.T.O.

c) State the p.m.f. of Binomial distribution. **[2]**

d) Define mutually exhaustive events. **[2]**

e) State the additive property of poisson distribution. **[2]**

f) If the correlation coefficient between X and Y is 0.5, find the correlation coefficient between (3 – X) and (5 – 3Y). **[2]**

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

a) Define the following terms;

i) Sample space

ii) Event

iii) Mutually exclusive events.

iv) Compliment of an event.

b) Give the classical definition of probability and state its limitations.

c) If $P(A) = \frac{1}{4}$, $P(B) = \frac{2}{3}$ and $P(A \cup B) = \frac{3}{4}$ find.

i) $P(A \cap B)$

ii) P (exactly one of A and B occur)

d) Define partition of a sample space. State Baye's theorem.

e) Given the following distribution function of X;

X	–3	–1	0	1	2	3	4
F(x)	0.1	0.3	0.45	0.65	0.75	0.95	1.00

Find

i) The p.m.f. of X.

ii) Median of X.

iii) P (X = odd number)

iv) P(X < 0).

f) Following is p.m.f. of a discrete r.v.X;

X	0	1	2	3	4	5
$P(X = x)$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{16}$	$\frac{4}{16}$	$\frac{1}{16}$

Find

i) E(X)

ii) Var (X).

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

a) Define

i) Joint probability distribution of (X, Y).

ii) Marginal probability distributions of X and Y.

b) If A and B are any two events defined on Ω, then prove that;

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

c) A bag contains 4 White and 2 Black balls. Another bag contains 3 White and 3 Black balls. One ball is drawn from each bag at random. What is the probability that they are of different colours?

d) The p.m.f. of a r.v. X is,

$$P(X = x) = \frac{2x}{n(n+1)}, \quad x = 1,2,....,n.$$
$$= 0, \qquad \text{otherwise}$$

Find

i) E (X)

ii) Var (X).

e) If A and B are any two events defined on Ω, then show that,

$$P(A' \mid B) = 1 - P(A \mid B), P(B) > 0$$

f) Consider following sample space,

$$\Omega = \{a,b,c,d,e,f,g,h\}$$

Let A = {a, b, c}, B = {c, d, e, f}, C = {g, h}

List the elements of the following events.

i) $A \cap B$ ii) $A' \cap B$ iii) $B \cup C$ iv) $A' \cap B \cup C$

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

a) Two fair dice are thrown. Let X denote the absolute difference between the scores and Y denote the maximum of the two scores.

i) Obtain the joint probability distribution of (X, Y).

ii) Obtain the marginal probability distributions of X and Y.

b) Let . $X \rightarrow B(n, p)$

obtain mean and variance of X.

c) i) Let $X \rightarrow P(m)$

and P(X = 1) = 0.03, P(X = 2) = 0.2.

Find P(X = 0) and P(X = 3).

ii) State the Axioms of probability.

d) Let (X, Y) be a bivariate r.v. with the following joint probability distribution.

Y \ X	0	1
−1	$\frac{2}{25}$	$\frac{8}{25}$
1	$\frac{3}{25}$	$\frac{12}{25}$

Compute

i) Marginal distributions of X and Y.

ii) Are X and Y independent.

iii) E(X|Y = 1)

iv) Var (X|Y = 1)

Q5) Attempt any two of the following : **[2 × 8 = 16]**

a) Prove that under certain conditions to be stated, binomial distribution tends to poisson distribution.

b) For the following joint probability distribution of (X,Y), compute correlation coefficient between X and Y.

X \ Y	0	2	4
–2	$\frac{1}{6}$	0	$\frac{1}{12}$
2	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{6}$

c) i) If X and Y are independent discrete r.v.s. such that, var (X) = 4 and var (Y) = 3, compute,

1) Var $(2x + 5y)$

2) Var $(3x - 5y - 10)$

ii) Out of 100 people in a certain village 40 always tell the truth and the remaining always lie. A sample of 10 persons is drawn from these people. Calculate the probability that the sample will contain

1) no lier

2) 3 liers.

d) i) Define hypergeometric distribution. Give one real life situation where it can be used.

ii) In a group of equal number of men and women, 10% men and 45% women are unemployed. What is the probability that a person selected at random is employed?

♦♦♦♦

Total No. of Questions : 5]

SEAT No. :

P203

[Total No. of Pages : 2

[4117] - 15

F.Y. B.Sc.

GEOGRAPHY - I

Gg - 110 : Physical Geography

(41810) (Paper - I) (2008 Pattern)

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 stencils is allowed.***

Q1) Answer the following in 2 - 4 sentences :

a) What is SIAL?

b) What are Igneous rocks?

c) What are crustal movements?

d) What are 'P' waves?

e) What are Levees?

f) What is wave cut platform?

g) What is a meander?

h) What is a hanging valley?

Q2) Explain the following in brief (any four) :

a) Eras of geological time scale.

b) Characteristics of sedimentary rocks.

c) Give the major branches of Physical Geography.

d) Types of moraines.

e) Biological weathering.

f) Glacial erosion.

P.T.O

Q3) Answer the following (any four) :

a) What is the difference between rocks and minerals?

b) Discuss the interior of the Earth.

c) What is the difference between corrosion and corrasion.

d) What are the elements of physical weathering?

e) Discuss the concept of rejuvenation.

f) Discuss the types of plate margins.

Q4) Answer the following (any two) :

a) What are river flood plains?

b) Discuss the features of coastal erosion.

c) Give the evidences in support of continental drift theory.

d) Explain the process of erosion.

Q5) Explain the concept and development of the theory of Isostacy.

OR

Explain the process of wind erosion and resulting erosional features.

♦♦♦♦

Total No. of Questions : 5]

SEAT No. :

P204

[Total No. of Pages : 2

[4117]-16
F.Y. B.Sc.
GEOGRAPHY - II
Gg-120: Geography of Atmosphere and Hydrosphere
(Paper - II) (2008 Pattern) (41820)

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

Instructions to the candidates:

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

Q1) Answer the following questions in two or four sentences :

a) Define Climatology.

b) Give types of low clouds.

c) What do you mean by El-Nino?

d) Types of Lapse rate.

e) Define salinity.

f) What is Tsunami?

g) Define Oceanography.

h) What do you mean by tides?

Q2) Explain the following in brief (Any Four) :

a) Mountain and Valley winds.

b) Absolute humidity.

c) Effects of Global Warming.

d) Causes of Tsunami.

e) Submerged Coast.

f) Salinity of Indian Ocean.

P.T.O.

Q3) Answer the following (Any Four) :

a) Middle clouds.

b) Weather conditions associated with anticyclones.

c) Fronts & Frontal zones.

d) Dalmatian Coast.

e) Nature of Oceanography.

f) Causes of Salinity.

Q4) Answer the following (Any Two) :

a) Formation of pressure belts on earth surface.

b) Heat budget of the earth.

c) Equilibrium theory of tides.

d) Ocean currents of the Atlantic Ocean.

Q5) Explain composition and structure of atmosphere.

OR

Give an account of general Ocean relief with a neat diagram.

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Total No. of Questions : 5]

SEAT No. :

P205

[Total No. of Pages : 2

[4117]-17
F.Y. B.Sc.
MICROBIOLOGY
Introduction to Microbiology
(Paper - I) (2008 Pattern) (41910)

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

Instructions to the candidates:

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

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

a) Write two examples of animal viruses.

b) Match the following and rewrite.

i)	Lophotrichous	– flagella on both poles
ii)	Amphitrichous	– single flagellum on one pole
iii)	Peritrichous	– many flagella on one pole
iv)	Monotrichous	– flagella all over the cell

c) Name any two proteins.

d) Name chemical unique to bacterial endospore

e) State True or False.

i) S.typhi causes typhoid.
ii) Plasmodium needs two hosts for completion of its life cycle.

f) Write the role of buffer.

g) Name enzyme present in carboxysome.

h) The double helix model of DNA was proposed by _____ and _____.

Q2) Write short notes on ANY FOUR : **[16]**

a) Metachromatic granules.

b) Types of chemical reaction.

c) Bacterial ribosome.

P.T.O.

d) Antony von Leeuwenhoek.

e) Penicillium.

f) Locomotion of protozoa.

Q3) Attempt ANY FOUR of the following : **[16]**

a) Diagrammatically represent Life cycle of Polio virus.

b) Describe developments in field of vaccination.

c) Compare DNA and RNA in tabular form.

d) Enlist economic importance of algae.

e) Explain functions of capsule.

f) Write about role of staphylococcus in human health.

Q4) Explain ANY TWO of following : **[16]**

a) Koch's Postulates.

b) General characters of Rickettsia.

c) Pili.

d) Role of Carbohydrate.

Q5) Attempt ANY ONE of following : **[16]**

a) Describe contributions of Pasteur in field of microbiology.

b) Give structure of peptidoglycan. Compare cell wall of Gram positive and Gram negative bacteria.

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Total No. of Questions : 5]

SEAT No. :

P206

[Total No. of Pages : 2

[4117]-18
F.Y. B.Sc.
MICROBIOLOGY
Basic Techniques in Microbiology
(Paper - II) (2008 Pattern) (41920)

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) Give two examples of fluorescent dyes.

b) Define accentuaters. Give one example.

c) Match the following and rewrite.

a)	Capsule	i)	Dorner's method.
b)	Endospore	ii)	Albert's staining.
		iii)	Maneval's solution.

d) Define pure culture. Mention any two methods to obtain pure culture.

e) Name any two photosynthetic bacteria.

f) Define - Generation time.

g) State whether True or False.
The unstained specimens can be visualized by phase contrast microscope.

h) What are chemolithotrophs? Give one example.

Q2) Write short notes on <u>any Four</u> : **[16]**

a) Disposal of Microbiology Lab Waste.

b) Chromatic Aberrations.

c) Mordents.

d) Cultivation of Thermophiles.

e) Culture collection centres.

f) Diauxic growth.

P.T.O.

Q3) Attempt <u>any Four</u> of the following : **[16]**

a) Justify - Mac Conkey's agar is selective as well as differential medium.

b) What is resolving power of microscope? How can it be increased?

c) Comment on the use of alcohol and heavy metals as disinfecting agents.

d) Explain different growth phases in a liquid batch culture.

e) Differentiate (in tabuler form) between synthetic and nonsynthetic media.

f) Diagramatically represent working of chemostat.

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

a) Write the principle and significance of monochrome and negative staining.

b) What are different methods used for maintenance of bacterial cultures?

c) Enlist different methods for enumeration of bacteria. Describe any two in detail.

d) What are the characteristics of ideal disinfectant? Give mode of action of any two chemical disinfectants.

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

a) Explain different physical methods of sterilization.

b) With proper ray diagram, discuss the principle, working and applications of Transmission Electron Microscope.

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Total No. of Questions : 5]

SEAT No. :

P207

[Total No. of Pages : 2

[4117]-19
F.Y. B.Sc.
EXPERIMENTAL PSYCHOLOGY
General Psychology
(Paper - I) (2008 Pattern) (42010)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Draw the figures and diagrams wherever necessary.***
3) ***All questions carry equal marks.***

Q1) Answer the following questions in two to four sentences : **[16]**

a) What is short term memory?

b) What is neurotransmitter?

c) State the full name of P.E.T. scan.

d) Define conditioning.

e) What is subliminal perception?

f) What is spontaneous recovery?

g) What is motivated forgetting?

h) Define Perception.

Q2) Attempt any Four questions in six to eight sentences : **[16]**

a) Illustrate Big Five model of personality.

b) Write short note on geometrical perceptual illusion.

c) Describe schedules of reinforcement.

d) Explain in brief long term memory.

e) Explain concepts in measurement of intelligence.

f) Write short note on 'Giftedness'.

P.T.O.

Q3) Attempt any Four questions in six to eight sentences : **[16]**

a) Explain decay theory of forgetting.

b) Write short note on method of loci.

c) Explain causes of mental retardation.

d) Explain Sternberg's theory of intelligence.

e) Illustrate TAT as a projective technique in measurement of personality.

f) Describe the functions of spinal cord.

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

a) Illustrate Thorndik's Laws of learning.

b) Describe psychoanalytical theory of Sigmund freud.

c) Explain the structure and function of neuron.

d) Explain Gestalt principles of perception.

Q5) Define psychology and describe modern perspectives of psychology. **[16]**

OR

State the definition of motivation. Describe various types of physiological motivation.

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Total No. of Questions : 5]

SEAT No. :

P208

[Total No. of Pages : 2

[4117]-20
F.Y. B.Sc.
EXP. PSYCHOLOGY
Experimental Psychology and Psychological Testing
(Paper - II) (2008 Pattern) (42020)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Draw the figures and diagrams wherever necessary.***
3) ***All questions carry equal marks.***

Q1) Answer the following questions in two to four sentences : **[16]**

a) Define Psychophysics.

b) What is R.T.?

c) Define reliability.

d) State any two applications of reaction time.

e) What is intelligence?

f) What is Point of Subjective Equality (PSE)?

g) What is Cronbach alpha?

h) What is aptitude?

Q2) Attempt any Four questions in six to eight sentences : **[16]**

a) Explain types of psychological test?

b) Explain GATB in brief.

c) Describe Weschler's Intelligence Scale for Children (WISC).

d) Explain types of reaction time.

e) Explain the definition and nature of personality.

f) Describe TAT as a projective test.

P.T.O.

Q3) Attempt any Four questions in six to eight sentences : **[16]**

a) State Weber's Law in psychophysics.

b) Explain various uses of psychological tests.

c) Explain test-retest method of reliability.

d) State basic assumptions about aptitudes.

e) Explain any two interest inventories.

f) Describe any one self report inventory.

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

a) Illustrate method of limits.

b) Explain determinants of reaction time.

c) Describe the characteristics of a good psychological test.

d) Explain meaning and types of validity.

Q5) Define Variable. Describe various types of Variables. **[16]**

OR

What is insight behaviour in problem solving? Explain various stages in problem solving.

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Total No. of Questions : 5]

SEAT No. :

P209

[Total No. of Pages : 3

[4117]-21
F.Y. B.Sc.
ELECTRONIC - SCIENCE
EL1-T1 - Principles of Analog Elecrtronics
(Paper - I) (2008 Pattern) (42210)

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

Instructions to the candidates:

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

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

a) Four resistors marked R47 are connected in series, what is their equivalent resistance.

b) Define reactance of a capacitor. Give necessary formula.

c) Draw circuit symbol of
   i) Continuous adjustable Inductor
   ii) Fuse.

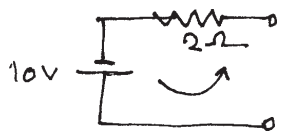
d) Define
   i) CMRR
   ii) Slew Rate of OPAMP.

e) Draw circuit symbols of LED & photodiode.

f) The arms of π network has following values $R_a = 60\Omega$ $R_b = 20\Omega$ $R_c = 20\Omega$ find equivalent T Network.

g) Sketch CB & CE configurations of a transistor.

h) Convert following voltage source into current source



P.T.O.

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

a) Explain in brief :
   i) Chemical reactions involved in lead acid accumulator.
   ii) Isolation transformer.

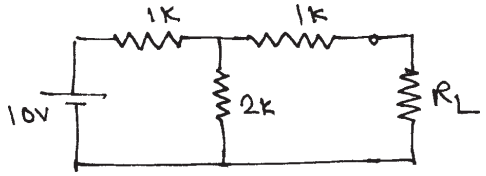
b) Write a short note on step response of RC circuit.

c) Show that in inductive circuit current lags behind the applied voltage.

d) Describe construction, working & I-V characteristics of Zener diode.

e) Draw circuit diagram of CE amplifier. Explain the circuit elements & their function.

f) Obtain Thevenine equivalent of the following circuit.



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

a) Draw construction of :
   i) Slide switch
   ii) Reed Relay.

b) Explain how RC low pass filter circuit works as integrator.

c) State & prove maximum power transfer theorem.

d) Explain construction, working & I-V characteristics of *n*-channel JFET.

e) Differentiate between DIAC & TRIAC with reference to circuit symbol, construction, I-V characteristics, applications.

f) What is biasing of a transistor? Explain voltage divider bias method.

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

a) Give full forms of :
   i) BNC
   ii) STP
   iii) PTH PCB
   iv) SMD.

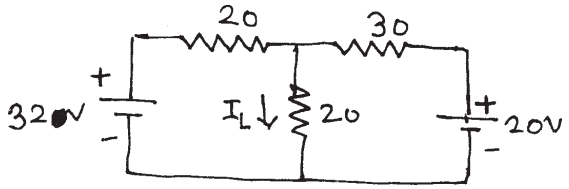
b) Show that RC has dimensions of time.

c) Draw circuit diagram of full wave rectifier, explain its working with input & output waveforms.

d) Explain in brief :
   i) Series +ve clipper.
   ii) Negative clamper.

e) Describe construction & working of rectifying diode.

f) Use superposition theorem to calculate current I_L flowing in the following circuit.



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

a) Explain how RC circuit can be used as high pass filter.

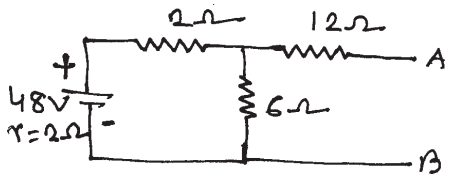
b) Describe construction & working of n-p.n transistor.

c) Write a short note on UJT as relaxation oscillator.

d) With the help of neat diagram explain construction & working of n-channel MOSFET. (Depletion mode).

e) Explain action of OPAMP as adder.

f) Obtain Norton equivalent of the following circuit.



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Total No. of Questions : 5]

SEAT No. :

P210

[Total No. of Pages : 3

[4117]-22
F.Y. B.Sc.
ELECTRONIC SCIENCE
EL1-T2: Principles of Digital Electronics
(Paper - II) (2008 Pattern) (42220)

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) ***Use of calculator & log table is allowed.***
4) ***Figures to the right indicate full marks.***

Q1) Answer the following questions in brief : **[16]**

a) Convert
$(123.746)_{10} = (?)_8$.

b) What is positive and negative logic level?

c) Simplify the following equation using laws of Boolean algebra.

$Y = ABCD + ABC + AB + A\overline{B}$

d) State the difference between half adder circuit and full adder circuit?

e) What is the function of strobe in Multiplexer?

f) Draw logic diagram and write truth for T flip-flop.

g) State the difference between Bipolar logic families and saturated Bipolar logic families.

h) Define the following term associated with memory:

i) Address line.

ii) Data line.

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

a) i) Convert decimal number 37.2 into binary number.

ii) Convert
$(E4)_{16} = (?)_8$.

P.T.O.

b) Explain with neat diagram, how Ex-OR gate can be used as parity generator?

c) Construct OR gate and NOT gate using NAND gates.

d) Draw logic diagram for 4 bit universal adder. Explain the action with suitable example.

e) What is decoder? Write short note on BCD to seven segment decoder?

f) How will you get D and T flip flops from J.K flip flop? Draw logic diagram and truth table of each.

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

a) Minimise the following expression using K-map

$$ABC + \overline{A}B\overline{C} + B$$

and draw its simplified logic diagram.

b) Draw logic diagram of half sub tractor. Write its truth table, explain.

c) What do you mean by code converter? Explain encoder and decoder with suitable example.

d) What is a decade counter? Which IC's can be used as decode counter?

e) Draw the circuit of CMOS- NOR gate, explain its action.

f) Explain the working of dynamic memory cell. Write the advantage and disadvantages of dynamic memory cell over static memory cell.

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

a) Construct logic circuit using AND, OR and NOT gate for the following Boolean expressions

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

ii) $Y = (A + B)\cdot(\overline{C} + \overline{D})\cdot(\overline{A} + C)$

b) Explain Keyboard encoder with suitable diagram.

c) Explain the working of parallel in serial out shift register?

d) Define the terms the noise immunity and noise margin, Explain in brief.

e) List the performance characteristics of digital integrated circuit. Explain worst case input output voltages.

f) Explain the structural organization of memory chip with suitable example.

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

a) i) What is excess-3 code?
   ii) Draw logic diagram of 2 input OR gate using diode.

b) i) State any two applications of shift register.
   ii) Draw circuit of S-R flip-flop using two input logic gate. What are limitations of S-R flip-flop.

c) i) Give the relation between number of output and select lines in multiplexer. Explain with example.
   ii) What are types of seven segment display? Show internal connections of them?

d) i) Why synchronous counters are faster in operation?
   ii) State the function of IC's
      A) IC 7447
      B) IC 74153.

e) i) CMOS logic family is better than bipolar family-comment.
   ii) State the advantage of schottky TTL over TTL.

f) i) Define terms Fan In and Fan Out.
   ii) What is unipolar logic family? What are drawbacks of CMOS family?

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Total No. of Questions : 4]

SEAT No. :

P212

[Total No. of Pages : 2

[4117] - 24

F.Y.B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 2 : Defence Mechanism and Military Career in India

(Paper - II) (42320) (2008 Pattern)

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

Instructions to the candidates:

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

Q1) Answer in 20 words (Any Ten): **[10 x 2 = 20]**

a) Define the concept of career options in Military organization.

b) State any two powers of the supreme commander of the armed forces in India.

c) Write the meaning of civil Defence.

d) Write any two functions of the Home Guards.

e) Define counter Intelligence.

f) State the concept of infantry.

g) Write the meaning of supporting arms.

h) State the meaning of Administrative services in Military organization.

i) What do you mean by military technology?

j) State the meaning of Elements of National Defence.

k) State any two functions of C.R.P.F.

l) Write any two functions of Territorial Army.

m) Write any two responsibilities of Mechanical Engineers.

n) Write any two functions of Defence committee of the cabinet.

P.T.O.

Q2) Answer in 50 words each (any two): **[10]**

a) Explain principles of Defence organization.

b) Discuss organization of Indian Army.

c) Explain functions of Ministry of Defence.

d) Discuss role and functions of Administrative services in peace and war.

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

a) Explain role of Army Service corps in India's national Defence.

b) Discuss various types of Battleships in Indian Navy.

c) Explain role Air-Power in contemporary warfare.

d) Explain role and limitations of signal corps.

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

a) Write a note on Border Security Force.

b) Discuss career options in Para military Forces in India.

c) Explain role of Territorial Army in maintaining India's internal Security.

d) Write a note on career options in India's Armed Forces.

Total No. of Questions : 4]

SEAT No. :

P213

[Total No. of Pages : 2

[4117] - 25

F.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS. No. - III : Evolution of Defence Science & Technology

(Paper - III) (42330) (2008 Pattern)

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

Instructions to the candidates:

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

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

a) What do you mean by Science?

b) How you would like to define "Technology"?

c) What do you understand by L.I.C.?

d) Define Duel Technology.

e) State any four names of conventional energy resources.

f) When & by whom the Blitez Kriege Tactics was introduced?

g) When & by whom the "TANK" it was invented?

h) State the duration of World War - I.

i) Write the long form of "R.M.A".

j) What do you understand by "Nuclear Doctrine"?

k) What do you mean by I.T.?

l) When & where the first Nuclear Bomb it was dropped?

m) Define "Total War".

P.T.O

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

a) Write a few lines on "CATAPULT".

b) Explain in brief a concept of Professional Army.

c) Distinguish between Natural resources & raw material.

d) Write in brief An invention of U-Boats by Germany.

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

a) Explain in brief the causes for emergence of "General Staff".

b) Why the "Total War" came into existence?

c) Highlight on "Military reforms introduced by Gustavas Adolphus .

d) How you would like to establish the relationship between Energy Security and National Security?

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

a) Explain the role of tank during World War Second.

b) Write a note on "Emergence of New Technologies".

c) Explain the L.I.C. in Indias North - East region.

d) What do you mean by Missile? Explain the various types of Missiles.

Total No. of Questions : 5]

SEAT No. :

P214

[Total No. of Pages : 2

[4117] - 26

F.Y.B.Sc.

ENVIRONMENTAL SCIENCE - I

ENV - 101 : Life Sciences : Basic Biology & Natural Resources

(Paper - I) (42410) (2008 Pattern)

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) Define fossil.

b) What is bionomial nomenclature?

c) What is mass extinction?

d) Define Species.

e) Give any two animal resources.

f) What are life form?

g) Enlist abiotic components.

h) Give any two importance of natural resources.

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

a) Give any two paleontological evidances of past life.

b) Explain factors responsible for distribution of life on the earth.

c) Give an objectives of Taxonomy.

d) Enlist types of mineral resources.

e) Write about world food problem.

f) Explain interactions between man and natural resources.

P.T.O.

Q3) Write a short note on <u>any four</u> of following: **[16]**

a) Life in water.

b) Classification of Plants.

c) Mesophytes.

d) Energy Consumption.

e) Live - stock resources.

f) Floods.

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

a) Describe evolution of life on earth.

b) Explain effects of modern agriculture on environment.

c) Describe importance & scope of biology in environmental science.

d) Explain wild life resources.

Q5) What are energy resources? Explain different types of energy resources you have studied. **[16]**

OR

What are adaptations? Explain different ecological adaptations in hydrophytes.

Total No. of Questions : 5]

SEAT No. :

P215

[Total No. of Pages : 2

[4117] - 27

F.Y.B.Sc.

ENVIRONMENTAL SCIENCE - II

ENV - 102 : Earth Sciences : Environmental Chemistry & Basic Geosciences

(Paper - II) (42420) (2008 Pattern)

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) Define Atmosphere.

b) Give any two sources of Hydrocarbons.

c) What is Stoichiometry?

d) Give any two examples of carcinogens.

e) Enlist different types of soil.

f) What are igneous rocks?

g) Enlist factors affecting on wind.

h) What is Inversion of temperature?

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

a) Explain hydrogen bonding in water.

b) Give the harmful impacts of pesticide on Environment.

c) Discuss the process of hydrocarbon decay.

d) Explain in brief process of soil formation.

e) Describe stratification of atmosphere with suitable diagram.

f) Describe process of oceanic crust formation.

P.T.O.

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

a) Acid halides.

b) Global warming.

c) Solubility product.

d) Soil profile.

e) Types of Rock.

f) Hydrological cycle.

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

a) Describe soil classification. Add a note on macro and micro plant nutrients in soil.

b) Enlist the chemical properties of water. Discuss changes in water properties by addition of solute.

c) Discuss impacts of mercury pollution.

d) Explain in brief plate tectonic and process of lithosphere formation.

Q5) Define surfactant with suitable examples. Describe Environmental effects of detergents. **[16]**

OR

Define Lapse rate. Discuss types of lapse rate. Add a note on atmospheric stability.

Total No. of Questions : 10]

SEAT No. :

P217

[Total No. of Pages : 3

[4117]-29
F.Y. B.Sc. (Vocational)
INDUSTRIAL CHEMISTRY - I
(Paper - I) (Theory) (2008 Pattern) (45610)

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 books.***
3) ***Figures to the right indicate full marks.***
4) ***All questions carry equal marks.***
5) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***

SECTION - I

Q1) Answer the following : **[8]**

a) Define Emulsions.

b) What is the effect of temperature on adsorption of gases on solids?

c) What are active centers?

d) Define catalyst and catalysis.

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

a) Differentiate between homogeneous and heterogeneous catalysis with example.

b) Describe characteristics of catalytic reaction.

c) Explain mechanism of Adsorption theory of catalysis.

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

a) What are gels? Give their classification with examples.

b) Explain Brownian Movement.

c) What are aerosols? Explain with examples.

P.T.O.

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

a) Define enzymes. Explain mechanism and characteristics of enzyme catalysis in detail.

b) Define adsorption isotherm. Write the assumptions of Langmuir adsorption isotherm and derive the equation pertaining it.

Q5) Write a short notes on any two of the following : **[8]**

a) Chemisorption.

b) Surtactants.

c) Negative catalysis.

SECTION - II

Q6) Define and explain the following terms : **[8]**

a) Power.

b) Latent heat of vaporisation.

c) Selectivity.

d) Mean molal heat capacity.

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

a) Explain the terms Stoichiometric equation and Stoichiometric coefficients involved in chemical reactions.

b) Describe different forms of energy.

c) Describe the material balance involved in crystallisation.

Q8) Write short notes on any two of the following : **[8]**

a) Energy balance in closed system.

b) Material balance involved in drying.

c) Combined feed ratio.

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

a) State and explain Gibbs phase rule. How it is applicable to water system?

b) Define and explain average molecular weight of gaseous mixture. Derive $P_{mix} = PM_{avg}/RT$.

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

a) A mixture of Nitrogen and Carbondioxide at 25ºC and 1 atm. Pressure has an average molecular weight of 31. Calculate the partial pressure of Nitrogen.

b) Calculate the enthalpy change for the following reaction which will generate 60 gmole of CO_2.

$2C_4H_{10}(g) + 13\ O_2(g) \rightarrow 8CO_2(g) + 10\ H_2O(l)$.

Component	$\Delta H^0 f$ Kcal/gmole
$C_4H_{10}(g)$	– 30.14.
$CO_2(g)$	– 94.051.
H_2O	– 68.315.

c) Carbon monoxide is reacted with hydrogen to produce methanol. Calculate for the reaction

i) Stoichiometric ratio of H_2/CO.
ii) kgmole of CH_3OH produced per kgmole CO reacted.
iii) Weight ratio of CO to H_2 fed to the reactor.
iv) Quantity of CO required to produce 1000 kg of CH_3OH.

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Total No. of Questions : 6]

SEAT No. :

P218

[Total No. of Pages : 2

[4117]-30
F.Y. B.Sc. (Vocational)
BIOTECHNOLOGY
Biochemistry, Biophysics and Instrumentation
(Paper - I) (2008 Pattern) (45710)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Draw neat and labelled diagrams wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use separate answer books for Section I and II.***

SECTION - I

(Biochemistry)

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

a) Define Polysaccharides.

b) What are lipids?

c) Write two examples of hydrophilic and hydrophobic amino acids each.

d) Explain the term "activators of enzymes".

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

a) What are the functions of proteins?

b) How P^H affect the activity of an enzyme?

c) Write a note on glycolysis.

d) Differentiate between DNA and RNA.

e) Enlist the properties of lipids.

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

a) What are carbohydrates? Classify them and give one example of each type.

b) Describe the pentose phosphate pathway in detail.

c) Discuss the role of coenzymes in the biological systems.

P.T.O.

SECTION - II

(Biophysics and Instrumentation)

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

a) What is density gradient?

b) Define Dark Field Microscopy.

c) State Lambert and Beer's law.

d) What is the role of buffer?

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

a) Explain the working of a spectrophotometer.

b) Write a note on gas chromatography.

c) Describe phase contrast microscope.

d) Differentiate between turbidometry and nephalometry.

e) Draw and explain Calomel reference electrode.

Q6) Attempt any two of the following : **[16]**

a) Explain affinity chromatography. Add a note on its applications.

b) Comment on use of radio isotopes in biological sciences.

c) Describe IR spectroscopy. Give its applications in biology.

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Total No. of Questions : 5]

SEAT No. :

P219

[Total No. of Pages : 2

[4117]-31

F.Y. B.Sc. (Vocational)

PHOTOGRAPHY AND AUDIO-VISUAL PRODUCTION

Basic Photography and Appreciation of Media

(Paper - I) (2008 Pattern) (48010)

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

Instructions to the candidates:

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

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

a) How important is the ISO setting in a DSLR camera?

b) What are equivalent exposures? Give two examples.

c) Explain the concept of *pixel* in digital photography.

d) What is the use of the viewfinder of a DSLR?

e) What is the function of the mirror used in a DSLR camera?

f) Why do you need to set appropriate white balance?

g) Explain the difference between an unsharp image and a blurred image.

h) Draw a diagram and explain the concept of total internal reflection of light.

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

a) Discuss the advantages and disadvantages of a leaf shutter.

b) Discuss what it is to be a professional photographer.

c) Discuss the features of an ideal shutter.

d) What is life size magnification? When do you achieve it?

e) Mention four different technical qualities of a photographic image.

P.T.O.

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

a) Draw a diagram and show the working of a focal plane shutter at slow shutter speeds.

b) Draw a diagram and explain what do you mean by the 'distortions' produced by a simple lens. How are the distortions reduced?

c) What do you mean by f number? Write down the f number scale. What is a full stop, half stop and intermediate stop?

d) Give suitable examples and differentiate between a 'news' and a 'photo news'.

e) Give suitable examples and differentiate between a 'public place' and a 'private place' as understood by a photographer.

Q4) Answer the following : **[16]**

a) Give suitable examples and discuss various application areas of photography.

OR

a) Discuss the role of photography as a medium of mass communication. Give suitable examples.

b) Discuss the role of a photographic image in the print media.

OR

b) Compare photography and painting as medium of expression.

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

a) What is Pictorial Composition? What are the different elements of composition? Discuss the importance of these elements with the help of suitable sketches.

b) Draw a neat and labeled diagram and describe the construction and working of a DSLR camera.

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Total No. of Questions : 5]

SEAT No. :

P220

[Total No. of Pages : 2

[4117] - 32

F.Y. B.Sc. (Vocational)

ELECTRONIC EQUIPMENT MAINTENANCE

Test and Measuring Instruments & Consumer Products

(Paper - I) (48110) (2008 Pattern)

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

Instructions to the candidates:

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

Q1) Attempt the following:

a) What is resolution and sensitivity? **[2]**

b) What is Shielding? **[2]**

c) What is function of delay line in CRO? **[2]**

d) Fill in the blanks :

i) A PMMC meter requires ..... resistor for dc ammeter. **[1]**

ii) Battery in PMMC meter is used for the measurement of ..... **[1]**

iii) Gain of amplifier is normally represented in ..... units. **[1]**

iv) Electronic voltmeter uses ..... amplifier circuit to give high input impedance. **[1]**

e) How to measure voltage with CRO? **[2]**

f) List different types of Circuit Breakers. **[2]**

g) What is function of thermostat in automatic iron? **[2]**

Q2) Answer any Four of the following:

a) Compare between analog and digital meters. **[4]**

b) Explain the concept of automatic ranging in instruments. **[4]**

c) How PMMC current meter can be used to measure resistance? **[4]**

d) What are applications of frequency counter? **[4]**

e) Explain common faults in UPS. **[4]**

P.T.O

Q3) Attempt any Four of the following:

a) Explain working of Maxwell Bridge. **[4]**

b) What is meggar? Explain. **[4]**

c) What is loading effect? Explain. **[4]**

d) Explain DTMF / Pulse dialing. **[4]**

e) Write a short note on hearing aid. **[4]**

Q4) Attempt any Two of the following:

a) Solve the following:

i) The meter resistance is 1000 Ω & it can pass maximum 1mA current. What will be the value of R_{SH} to allow the meter to read 100 mA? If the same meter is required to measure 1A, what resistance will be needed to shunt the meter? **[4]**

ii) Draw the internal structure of CRT. **[4]**

b) Explain : Electronic Ignition System. **[8]**

c) Write a note on : microwave oven. **[8]**

Q5) Attempt any Two of the following:

a) What are different types of oscilloscope probes? Explain. **[8]**

b) Describe the working of digital clock. **[8]**

c) What are precautions and remedial measures to eliminate HF noise pick up? **[8]**

Total No. of Questions : 10]

SEAT No. :

P221

[Total No. of Pages : 3

[4117]-33
F.Y. B.Sc. (Vocational)
INDUSTRIAL MICROBIOLOGY
Instrumentation and Materials & Design
(Theory) (Paper - I) (2008 Pattern) (48210)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***All questions are compulsory.***
3) ***All questions carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Neat diagrams must be drawn wherever necessary. Use of graph paper is allowed.***
6) ***Use of logarithmic tables, slide rule, mollier charts, electronic pocket calculator and steam tables is allowed.***
7) ***Assume suitable data, if necessary.***

SECTION - I
(Instrumentation)

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

a) Define Partition coefficient.

b) Name any two sources of light in spectrophotometer.

c) Give two microbial applications of Chromatography.

d) List any 2 centrifugation methods applied in biology.

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

a) Describe the principle of adsorption chromatography.

b) What is centrifugal force? Describe relationship between r.p.m. and r.c.f

c) Give applications of applications of gel filtration chromatography.

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

a) State Beer and Lambert's law with the mathematical expression.

b) What is cation exchanger? Give details with example.

c) Diagrammatically explain the instrumentation of HPLC.

P.T.O.

Q4) **Answer *any two* of the following** : **[8]**

a) Describe density gradient centrifugation.

b) Define a) sensitivity, b) detection limit, c) precision, d) accuracy.

c) List important applications of analytical centrifugation in biology.

Q5) **Answer *any one* of the following** : **[8]**

a) Describe the application of UV spectrum in quantitative analysis and the components of UV-spectrophotometer.

b) Describe the principle and method of affinity chromatography. Supplement your answer with appropriate examples.

SECTION - II
(Materials & Design)

Q6) **Attempt the following** : **[8]**

a) Name any two materials used for construction of bioreactors. Name the parts of the bioreactor they are used for.

b) Name any two thermostable polymers used in construction of parts of bioreactors.

c) Define the term 'oligodynamic action' of metals.

d) What is the nuisance caused by biofouling in operation of fermentation systems.

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

a) Name the parts of a fermenter in which borosilicate glass is used. Explain why it is used in those parts.

b) State the reasons why there are specific dimensional ratios used in designing and construction of bioreactors.

c) State those properties of Teflon that make it compatible for use in fermenter construction.

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

a) List the properties that should be present in any material that is used in construction of bioreactor vessels. Explain the most important of these properties.

b) Illustrate the use of two types of lines used in engineering drawings.

c) What is a 'mold'? Explain its use in construction of articles.

Q9) **Answer *any two* of the following :** **[8]**

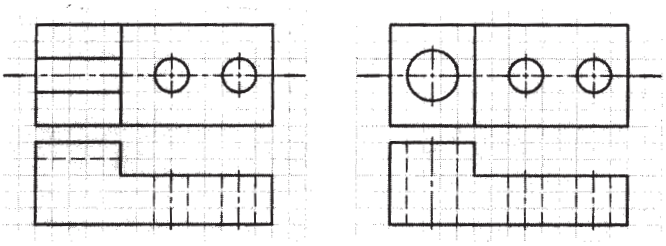
a) How is butyl rubber different from natural rubber? Explain the use and advantages of using butyl rubber in construction of parts of bioreactors.

b) Explain the mechanism of corrosion. State why it has a nuisance value in fermentation process.

c) State the properties of polypropylene that make it useful in constructing parts of bioreactors.

Q10) **Answer the following :** **[8]**

Given below are two objects in their top and side views. Using the glassbox approach, draw all the other views for any one object. Use a graph paper for the drawing. (1 small square in the background is 6 inches by 6 inches).



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Total No. of Questions : 5]

SEAT No. :

P222

[Total No. of Pages : 2

[4117] - 34

F.Y.B.Sc. (Vocational)

COMPUTER HARDWARE & NETWORK ADMINISTRATION

Essentials of Computers

(Paper - I) (2008 Pattern) (48710)

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 instruction prefetch?

b) If MAR is 16 bit register what is Maximum Memory Capacity.

c) Write full forms of : UPC, EBCDIC, ALU, MODEM.

d) What is flash memory?

e) What is LQ/NLQ in printer?

f) What is BIOS?

g) Why Hard disc drive is a fixed disc kind of a drive?

h) What is USB?

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

a) Write a short note on: MICR Scanner.

b) Give details of the components connected to motherboard.

c) What is SIMM/DIMM? Explain their need.

d) Write in short about Computer Generations.

e) Distinguish between Dot Matrix / Inkjet printer.

f) Draw and explain block diagram of microprocessor based computer system.

P.T.O

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

a) What is formatting? What are different utility tools in computer?

b) What is Clock? How it is obtained in computer?

c) Write a short note on LASER printer.

d) Explain bus structure in computer.

e) What is packing of microprocessor? How the cooling is achieved?

f) How RAM and ROM differs from each other?

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

a) Explain in brief power supply for computer. Write in short about stabiliser, home protector and UPS.

b) Write a note on Memory for computer giving details of Auxillary and Main Memory.

c) i) What is digitizer?

ii) Write a short note on DMA.

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

a) Explain different types of interrupts generated in computer. Also give details of ISR.

b) Write a note on Displays. What is VDU?

c) i) Comment on characteristics of computer.

ii) How sound is generated for the computer to be produced from mike?

Total No. of Questions : 5]

SEAT No. :

P223

[Total No. of Pages : 2

[4117] - 35

F.Y. B.Sc. (Vocational)

SEED TECHNOLOGY

Morphology, Seed Development and Testing for Cultivar Genuineness and Plant, Breeding for Crops Improvement

(Paper - I) (48910) (2008 Pattern)

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

Instructions to the candidates:

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

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

a) Describe any one type of dehiscent fruit.

b) Define autogamy.

c) What is polyembryony?

d) What do you mean by DUS system?

e) Define tissue culture.

f) Enlist any one method of disease resistance.

g) Define inbred lines.

h) What is a clone?

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

a) Give the difference between seed and grain.

b) What is endosperm? Describe cellular type of endosperm.

c) Explain the biochemical tests used for testing cultivar genuineness.

d) Give scope and objectives of plant breeding.

e) Define introduction. Explain the procedure for plant introduction.

f) What is mass selection? Describe its characters.

P.T.O

Q3) Write notes on any four of the following: **[4 x 4 = 16]**

a) T.S. of typical anther.

b) Distinguishing characters of family Solanaceae.

c) Grow out test in cotton.

d) Heterosis in self pollinated crops.

e) Development of single cross hybrid.

f) Mutagens.

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

a) Describe in brief the process of fertilization in angiosperms.

b) What is megasporangium? Describe the L.S. of ovule.

c) State and explain the law of dominance with a suitable example.

d) Describe any two modes of artificial vegetative propagation.

Q5) Give the distinguishing characters, floral formula and floral diagram of family Malvaceae and Asteraceae. **[16]**

OR

What is pure-line selection? Give the procedure for mass selection and add a note on its merits.

Total No. of Questions : 10]

SEAT No. :

P224

[Total No. of Pages : 3

[4117] - 36

F.Y. B.Sc. (Vocational)

INDUSTRIAL CHEMISTRY - II

(Paper - II) (2008 Pattern) (45620)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***All questions carry equal marks.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagrams must be drawn wherever necessary.***
5) ***Answers to the two sections should be written in separate answer books.***
6) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***

SECTION - I

Q1) Answer the following: **[8]**

a) List any two advantages of gaseous fuels.

b) What is water gas?

c) How is coal tar obtained from coal?

d) List the types of propellants.

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

a) Write a short note on Catalytic Cracking.

b) Write a comparative account of coal-gas and coke-oven gas.

c) Give a brief account of rocket fuels.

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

a) What is octane number and cetane number? Explain giving examples.

b) Give an account of petrochemicals derived from alkenes.

c) Write a short note on analysis of fuel gases.

P.T.O.

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

a) What are natural solid fuels? How are they classified?

b) Write a descriptive account on thermodynamics of roasting.

Q5) Answer any one of the following: **[8]**

a) i) The following data were obtained in a gas Calorimeter experiment volume of gas used 0.1 m^3 at NTP; weight of water heated is 25 kg;

Temperature of inlet and outlet water are $20^{\circ}C$ and $33^{\circ}C$; and weight of steam condensed = 0.025 kg. Calculate the higher and lower Calorific value per m^3 at NTP. Heat liberated in condensing water vapour and cooling the condensate is 580 k cal/kg.

ii) Give an account of proximate analysis of coal.

b) What is coal-tar? Discuss different products obtained from it and their refining.

SECTION - II

Q6) Answer the following: **[8]**

a) Define Slag. Give examples.

b) Define Hydrometallurgy and give an example.

c) What is meant by calcination?

d) List types of silicates.

Q7) Attempt any two of the following: **[8]**

a) Describe the Process of magnetic concentration of an ore.

b) What is Roasting? Give different types of roasting.

c) Write a short note on zeolites.

Q8) Attempt any two of the following: **[8]**

a) Discuss in brief ion exchange methods in metallurgy.

b) With a suitable diagram describe the Blast furnace used in metallurgy of iron

c) Write a short note on alumina.

Q9) Answer <u>any one</u> of the following: **[8]**

a) What is meant by refining? Discuss different methods of refining used in metallurgy.

b) Discuss the principles of extraction of metals from oxide ores.

Q10) Answer <u>any one</u> of the following: **[8]**

a) What is activated Charcoal? Discuss it's applications in detail.

b) Discuss the interaction between sulphides and oxides of the same metal and it's physico-chemical principles.

Total No. of Questions : 6]

SEAT No. :

P225

[Total No. of Pages : 2

[4117]-37
F.Y. B.Sc. (Vocational)
BIOTECHNOLOGY
Microbiology and Mathematics, Statistics and Computer for Biologists
(Paper - II) (2008 Pattern) (45720)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Draw neat and labelled diagrams wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use separate answer books for Section I and II.***

SECTION - I
(Microbiology)

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

a) Enlist the gradients of nutrient broth.

b) What are pathogens? Give two examples.

c) Define coliforms.

d) What is the difference between obligate aerobes and obligate anaerobes.

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

a) Explain the fire kingdom system of classification.

b) Write a note on contributions laid by Louis Pasteur to microbiology.

c) Why is Gram-staining considered as differential staining.

d) Describe the classification of viruses giving examples.

e) How is sterilization carried out by using moist heat?

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

a) Enlist the steps involved in the tests for coliforms. Describe the presumptive test.

b) Give the method of cultivation of thermophiles and acidophiles in laboratory.

c) Enlist the methods of endospore staining of bacteria. Explain any one method in detail.

P.T.O.

SECTION - II

(Mathematics, Statistics and Computer for Biologists)

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

a) If $y = \dfrac{\log(x^2+5)}{e^x}$, Find $\dfrac{dy}{dx}$

b) Evaluate $\lim\limits_{x\to 1} x^{\left(\frac{1}{1-x}\right)}$

c) What is random sampling?

d) Define database. Give example of biological database.

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

a) Find limit of the sequence $\left\{\dfrac{3n^2+4n}{5n^2-2}\right\}_{n=1}^{\infty}$

b) Evaluate $\int x^5\, e^{2x}\, dx.$

c) Prove that $\sin^2\theta + \cos^2\theta = 1$

d) Write a note on normal distribution.

e) What is correlation? Describe negative correlation with suitable example.

Q6) Attempt <u>any two</u> of the following : **[16]**

a) i) If $f(x) = \left(x^{5/6} + \sqrt{x}\right)^{11}$. Find $\dfrac{df}{dx}$.

ii) If $x_1 = 2,\ x_{n+1} = \dfrac{1}{2}\left(x_n + \dfrac{2}{x_n}\right),\ n \geq 1,$ then find x_2 and x_3.

b) i) Evaluate $\int \dfrac{1}{(x+1)(x+2)(x+3)}\, dx$

ii) Evaluate $\lim\limits_{x\to 2} \dfrac{x^4 - 2x^3 + 2x^2 - 3x - 2}{x-2}$

c) Describe various steps involved in experiment design.

d) Draw histogram to represent the following data.
12, 29, 52, 49, 40, 15, 31, 24, 32, 58, 54, 28, 51, 36, 48, 46, 30, 45, 35, 11, 42, 45, 36, 37, 38, 32, 33, 23.

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Total No. of Questions : 5]

SEAT No. :

P226

[Total No. of Pages : 2

[4117] - 38

F.Y.B.Sc. (Vocational)

PHOTOGRAPHY AND AUDIO-VISUAL PRODUCTION

Introduction to Mass Communication and Media Scene in India

(Paper - II) (2008 Pattern) (48020)

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

Instructions to the candidates:

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

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

a) Illustrate the different barriers in communication.

b) 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.

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.

P.T.O.

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 Amruta Khanwilkar and Adinath Kothare for the opening of FotoSync event.

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]

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F.Y.B.Sc. (Vocational)

ELECTRONICS EQUIPMENT & MAINTENANCE (EEM)

Maintenance Concepts & Assembly Methods

(48120) (Paper - II) (2008 Pattern)

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

Instructions to the candidates:

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

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

a) "Inductor is a wattless component". Comment.

b) Explain efficiancy of a transformer.

c) Explain the term absolute maximum rating.

d) Explain the difference between fixed and variable resistors.

e) Explain Mean time to repair (MTR).

f) Explain PTH P.C.B.

g) Explain the function of flux in soldering.

h) Explain the factors on which capacitance of a capacitor depends.

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

a) With the help of a neat diagram explain internal connections of bread board.

b) Explain the importance of information printed on body of devices.

c) Write a note on precautions to be taken during desoldering.

d) Explain the use of AF Transformers.

e) Explain the Importance of Service Manual.

P.T.O.

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

a) Write a note on causes and indications of failure.

b) Write a note on tools used for soldering.

c) With the help of a neat diagram explain the working of soldering Iron.

d) Explain the importance of earthing and explain how it is done.

e) Explain different precautions to be taken while handling electrical gadgets.

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

a) With the help of a neat diagram explain the working of a M.C.B.

b) Explain the causes & remedies of dry solder and cold solder joints.

c) With the help of a neat diagram explain IFT and what does tuning of IFT means.

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

a) Explain & draw wiring of tube light explain the function of a choke.

b) Write a note on manufacturing process of a P.C.B.

c) Write a note on different wire harnassing technique.

Total No. of Questions : 10]

SEAT No. :

P228

[Total No. of Pages : 3

[4117]-40
F.Y. B.Sc. (Vocational)
INDUSTRIAL MICROBIOLOGY
Microbial Diversity & Cultural Methods and Mathematics & Statistics for Biologists
(Paper - II) (2008 Pattern) (48220) (Theory)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***All questions are compulsory.***
3) ***All questions carry equal marks.***
4) ***Figures to the right indicate full marks.***
5) ***Neat diagrams must be drawn wherever necessary.***
6) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
7) ***Assume suitable data, if necessary.***

SECTION - I
Microbial Diversity & Cultural Methods

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

a) Define the term "chemolithotroph" and give names of two chemolithotrophic microorganisms.

b) Name any two selective media used for isolation of bacteria.

c) Name any two Culture Collections.

d) List any two media used for cultivation of cyanobacteria.

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

a) What is a differential cultivation medium? Name any one such medium and explain its use.

b) What is an extremophile? Give two applications of any type of extremophile.

c) List the conditions that are used to simulate the growth conditions of sulfate reducing bacteria when they are cultivated in the laboratory.

P.T.O.

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

a) Describe the enrichment method used during isolation of halophiles.

b) List the ingredients of a selective medium for actinomycetes. Explain why these ingredients make the medium selective.

c) List at least four applications/uses of a Microbial Culture Collection.

Q4) Answer ***any two*** of the following : **[8]**

a) Give a protocol for isolation of nitrogen fixing bacteria.

b) Explain the difference between lyophilization and cryophilization, as a method of preservation of bacteria.

c) Name any two methods by which fungal cultures are preserved. State the pros and cons of each method.

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

a) List four types of extremophiles and give one example of each.

b) What are oligophiles? Explain how they can be cultivated.

c) State the differences between enriched medium and enrichment medium.

SECTION - II
Mathematics and Statistics for Biologists

Q6) Answer ***any four*** of the following : **[8]**

a) Define Z distribution and variance.

b) The traffic police recorded an average of 3 accidents per week. The number of accidents are distributed according to Poisson distribution. Calculate the probability of exactly 2 accidents per week.

c) Explain central tendencies of Normal distribution.

d) Choose the correct option and complete the sentence.

_____ is an example of Non-random sampling.

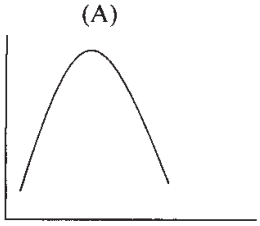
i) Purposive
ii) Systemic
iii) Simple random
iv) Stratified.

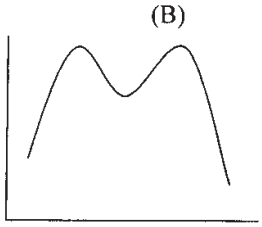
e) If a coin is tossed 10 times what is the probability of getting combination of 6 Heads and 4 Tails.

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

a) Write a note on measure of spread of distribution giving examples.

b) Explain the difference between the two (A and B) distributions represented below :





c) Using suitable examples elaborate on addition and multiplication rules of probability.

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

a) Measurements of heights (inches) of brother and sister were made in each of 15 two child families, with the following results. Calculate the correlation coefficient between the two heights.

Family	1	2	3	4	5	6
Brother, x	73	70	74	68	70	67
Sister, y	69	67	63	66	67	64

b) Explain the Chi-square test and degree of freedom.

c) Write a note on regression line and its uses.

Q9) Answer ***any two*** of the following : **[8]**

a) Explain the importance and limitations of Hardy-Weinberg equilibrium in population genetics studies.

b) Give detailed concepts of Hypothesis, Null Hypothesis, Type I error and type II error in statistics.

c) Explain the following terms :

i) Population and gene pool.

ii) Variable and statistic.

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

a) Write a note on probability distribution.

b) If the birth rate is half times more that the death rate of a population, will the population attain equilibrium? Justify your answer.

c) Explain the use and assumptions applied in ANOVA.

✷ ✷ ✷

Total No. of Questions : 5]

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F.Y.B.Sc. (Vocational)

COMPUTER HARDWARE AND NETWORK ADMINISTRATION

Computer Organisation

(2008 Pattern) (Paper - II) (48720)

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) Explain any two arithmatical instructions of 8086.

b) Define UART.

c) What is Algorithm?

d) Define Firmware.

e) What is POST?

f) What is Editor?

g) Define USB.

h) What is LAN?

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

a) Define:

i) Simulator.

ii) Emulator.

b) Explain features of 80386.

c) Define Math Co-Processor.

d) State the functions of DOS.

e) What is Multimedia?

f) Define Network Operating System.

P.T.O

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

a) Define:

i) Debugger.

ii) Device driver.

b) Explain data transfer instructions of 8086.

c) State the advantages of Window Operating System.

d) Explain Flag register of 8086.

e) List different network topologies.

f) What is control panel of Window Operating System?

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

a) Explain flow chart with example.

b) Compare Hardware, Software & Firmware.

c) Explain FDC with block diagram.

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

a) Explain logical system architecture of computer with diagram.

b) Define different types of software.

c) Write short notes on:

i) Internet.

ii) Window Operating System.

Total No. of Questions : 5]

SEAT No. :

P230

[Total No. of Pages : 2

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F.Y. B.Sc. (Vocational)

SEED TECHNOLOGY

Seed Physiology and Seed Production

(Paper - II) (48920) (2008 Pattern)

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

Instructions to the candidates:-

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

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

a) What is invigoration treatment?

b) Give types of seed germination.

c) What is seed deterioration?

d) Define Seed.

e) What are nucleus seeds?

f) Define genetic purity of seed.

g) What are basal doses?

h) Comment on previous crop effect.

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

a) Describe factors affecting seed dormancy.

b) Explain different measurements used to measure crop productivity.

c) Give chemical composition of seed.

d) Describe methods of sowing for straight varieties.

e) Explain seed village concept.

f) Comment on plant protection of seedling in nursery.

P.T.O

Q3) Write notes on any four : **[16]**

a) Synthetic seeds.

b) Seedling abnormalities and its causes.

c) Invigoration treatment to improve seedling establishment.

d) Land preparation for cotton.

e) Seedling age for transplanting.

f) Soil types.

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

a) What is seed dormancy? Explain various methods to break seed dormancy.

b) Comment on orthodox and recalcitrant seeds.

c) Explain role of agronomic management in high value seed production.

d) Distinguish between seed and grain.

Q5) Define seed germination. Explain factors affecting seed germination and add a note on seedling abnormalities. **[16]**

OR

Explain systems and methods of production of nucleus, breeders, foundation and certified seeds.