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F.Y.B.Sc.

MATHEMATICS

MT - 101 : Algebra and Geometry

(2013 Pattern) (Paper - I)

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

Instructions to the candidates:

　1) 　*All questions are compulsory.*

　2) 　*Figures to right indicate full marks.*

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

　a) 　Let $a,b,c \in Z$. If $a|b$ and $b|c$, then show that $a|c$.

　b) 　Let X=$\{a,b,c\}$. Is R=$\{(a,a), (b,b), (a,b), (b,a)\}$ an equivalence relation on X? Give reason.

　c) 　If $(x-\alpha)$ is a factor of polynomial equation $f(x) =0$, then prove that α is root of $f(x) =0$.

　d) 　Find the eigen values of the matrix $A=\begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$.

　e) 　Reduce the matrix $A=\begin{bmatrix} 1 & -2 & 3 \\ 3 & -6 & 9 \\ 4 & -8 & 12 \end{bmatrix}$ in row echelon form. Hence find rank of A.

　f) 　Find the centre of conic $x^2-4xy-2y^2+10x+4y=0$.

　g) 　Find the equation of plane passing through the point $(1,-3,-4)$ and parallel to the plane $6x+2y-3z=5$.

　h) 　Find the angle between the lines whose d.r.s. are given $2,-2,1$ and $2,1,-2$.

　i) 　Find the equation of the sphere whose centre is at $(2,-3,4)$ and radius 5.

　j) 　Define right circular cone.

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

a) Using the principle of mathematical induction prove that 3 divides n^3+2n, $\forall n \in N$.

b) If p is a prime and $a,b \in Z$ such that $p|ab$, then prove that either $p|a$ or $p|b$.

c) Let $f(x)$ be a polynomial of degree $n \geq 1$. If $f(x)$ is divided by $(x-\alpha)$, where α is any constant, then prove that $f(\alpha)$ is remainder.

d) Solve the following system of linear equations by using Gauss elimination method:

$x+y+2z=8$

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

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

e) Find the greatest common divisor of 595 and 252. Also find x and y such that $(595,252) = 595x+252y$ for some $x,y \in Z$.

f) Verify the Cayley-Hamilton theorem for the matrix $A=\begin{bmatrix} 3 & -2 \\ -1 & 2 \end{bmatrix}$. Hence find A^{-1}.

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

a) i) Let $a,b,c,d \in Z$. If $a \equiv b \pmod{m}$ and $c \equiv d \pmod{m}$ then prove that $(a+c) \equiv (b+d) \pmod{m}$.

   ii) Let a,b be any two integers and $m \in N$. Show that $a \equiv b \pmod{m}$ if and only if a and b leave the same remainder when divided by m.

b) i) Solve the system of equations

   $x+3y-2z = 0$

   $2x-y+4z = 0$

   $x-11y+14z = 0$

   ii) Find greatest common divisor of the polynomials $f(x)=x^4-x^3-2x+2$ and $g(x)=x^3+x-2$.

c) Find the eigen values and eigen vectors of the matrix $A=\begin{bmatrix} 2 & 1 & 1 \\ 2 & 3 & 2 \\ 3 & 3 & 4 \end{bmatrix}$.

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

a) By rotating the axes, origin being unchanged, the expression $ux+vy$ becomes $u'x'+v'y'$, then show that $u^2+v^2={u'}^2+{v'}^2$

b) Prove that every equation of the form $ax+by+cz+d=0$ represents a plane.

c) Find the perpendicular distance of a point $(6,6,-1)$ from the line $\dfrac{x-2}{1}=\dfrac{y-1}{2}=\dfrac{z+3}{-1}$. Also find the coordinates of foot of the perpendicular.

d) Find the equation of sphere passing through the circle
$x^2+y^2+z^2+2x-2y-2z-1=0$; $2x-2y+z-1=0$ and passing through the point $(3,-1,1)$.

e) Find the condition that the plane $lx + my + nz = p$ is a tangent plane to the sphere $x^2+y^2+z^2=a^2$. Also find the point of contact.

f) Find the equation of right circular cylinder whose axis is $x = 2y = -z$ and radius is 4.

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

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

b) i) If l,m,n are direction cosines of a line, then prove that $l^2+m^2+n^2=1$.

   ii) Show that the lines $\dfrac{x+3}{2}=\dfrac{y+5}{3}=\dfrac{z-7}{-3}$ and $\dfrac{x+1}{4}=\dfrac{y+1}{5}=\dfrac{z+1}{-1}$ are coplaner and find the equation of the plane containing them.

c) i) Find the equation of the plane which is perpendicular to the plane $5x+3y+6z+8=0$ and which contains the line of intersection of the planes $x+2y+3z-4=0$, $2x+y-z+5=0$.

   ii) Show that every section of a right circular cone by a plane perpendicular to it's axis is a circle.

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F.Y.B.Sc.

MATHEMATICS

MT - 102 : Calculus and Differential Equations

(2013 Pattern) (Paper - II)

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

Instructions to the candidates:

　　1)　All questions are compulsory.

　　2)　Figures to the right indicate full marks.

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

　　a)　Find the Supremum and Infimum of the set $S = \left\{ \left. \dfrac{n-1}{n} \right| n \in N \right\}$ if they exists.

　　b)　Evaluate : $\lim\limits_{x \to \infty} \dfrac{\sqrt{x} - x}{\sqrt{x} + x}$, for $x > 0$.

　　c)　State Leibnitz theorem for the nth derivative of product of two functions.

　　d)　Show that $f(x) = |x|$ is not differentiable at $x = 0$.

　　e)　State Taylor's theorem with lagrange's form of remainder.

　　f)　Evaluate : $\displaystyle\int_{0}^{\pi/2} \sin^6 x\, dx$.

　　g)　Solve : $\sec^2 x \tan y + \sec^2 y \tan x \dfrac{dy}{dx} = 0$.

　　h)　Define Integrating Factor (I.F.) of the differential equation.

　　i)　Find the orthogonal trajectories of family of curves $xy = c$, c being a parameter.

　　j)　Solve : $(1 + p^2)(y - px) = 3p$ where $p = \dfrac{dy}{dx}$.

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

a) If x is positive real number, then prove that for any real number y there exists a natural number n such that $nx > y$.

b) Discuss the continuity of the function $f : R \rightarrow R$ defined by

$$f(x) = x \sin\left(\frac{1}{x}\right), \quad x \neq 0$$

$$= 0, \qquad x = 0.$$

c) If $y = \sin(m \sin^{-1}x)$ then show that $(1-x^2)y_{n+2} - (2n+1)xy_{n+1} - (n^2 - m^2) \ y_n = 0$.

d) Evaluate : $\lim\limits_{x \to 0}\left(\dfrac{1}{\sin x} - \dfrac{1}{x}\right)$.

e) State and prove Lagrange's mean value theorem.

f) Using Maclaurin's series expansion prove that $e^{\sin x} = 1 + x + \dfrac{x^2}{2} - \dfrac{x^4}{8} + - - -$.

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

a) i) Prove that for $x, y \in R$

$$\left\| x \right| - \left| y \right\| \leq \left| x + y \right|$$

ii) If $y = \log(ax + b)$ then find the nth derivative of y.

b) i) Separate the intervals in which the polynomial $2x^3 - 15x^2 + 36x + 1$ is increasing or decreasing.

ii) If in Cauchy's mean value theorem $f(x) = \sqrt{x}$ and $g(x) = \dfrac{1}{\sqrt{x}}$ in $[a, b]$ show that the number c is geometric mean between a and b.

c) i) Find number α & β if the function f is continuous at every point in $(-2, 2)$ where

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

ii) If $\lim\limits_{x \to a} f(x)$ exists, then prove that f is bounded in some deleted neighbourhood of a point a.

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

a) Evaluate $\int \dfrac{3x^2 + x + 2}{(x+1)(x^2 +1)} \, dx$.

b) Explain the method of solving the differential equation

$$\frac{dy}{dx} = \frac{a_1 x + b_1 y + c_1}{a_2 x + b_2 y + c_2}, \quad \text{when} \quad \frac{a_1}{a_2} = \frac{b_1}{b_2}.$$

c) By finding the integrating factor solve the differential equation

$$y(x + y + 1) \, dx + x \, (x + 3y + z) \, dy = 0.$$

d) Solve the homogeneous differential equation $\dfrac{dy}{dx} = \dfrac{x - y}{x + y}$.

e) Show that the family $y^2 = 4a\,(x + a)$ is self orthogonal, where a is a parameter.

f) Explain the method of solving differential equation $f(x, y, p) = 0$ which is solvable for x, where $p = \dfrac{dy}{dx}$.

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

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

Hence evaluate $\displaystyle\int_0^{\pi/2} \cos^7 x \, dx$.

b) Solve the following differential equation:

i) $[2x + y\cos(xy)] \, dx + x\cos(xy) \, dy = 0$.

ii) $\dfrac{dy}{dx} = \tan^2 (x + y)$.

c) i) Solve : $p^3 x + p^2 y - p^2 x - py = 0$

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

ii) Define linear differential equation of first order and first degree and explain the method of solving it.

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F.Y.B.Sc.

PHYSICS - I

Mechanics, Heat and Thermodynamics

(New - 2013 Pattern) (Paper - I)

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

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

Q1) Attempt <u>ALL</u> of the following: **[16]**

   a)   State and explain Newton's second law.

   b)   State work-energy theorem.

   c)   State Pascal's law.

   d)   Calculate Poisson's ratio for aluminium, if Young's modulus of aluminium is $7.5 \times 10^{10} N/m^2$ and modulus of rigidity is $2.5 \times 10^{10} N/m^2$.

   e)   Define critical temperature and critical pressure of the gas.

   f)   State and explain first law of thermodynamics.

   g)   Give principle of resistance thermometer.

   h)   Find the coefficient of performance of Carnot's refrigerator working between the temperatures 227ºC and 27ºC.

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

   a)   What is gravitational force? Give the properties.

   b)   Explain the term work done. Calculate the work-done by a constant force.

   c)   What is surface tension? Give its units and dimensions.

d) Find the workdone in moving a particle along a vector $\vec{r} = \left(5\vec{i} - 2\vec{j} + 6\vec{k}\right)$ meter, if the applied force is $\vec{F} = \left(2\vec{i} + 2\vec{j} + 2\vec{k}\right)$ newton.

e) Show that the workdone during the longitudinal strain is $\frac{1}{2} \times$ longitudinal stress $\times$ longitudinal strain.

f) A body floats with $\frac{2}{3}$ of its volume above the surface of water. Calculate the density of material of the body.

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

a) Describe Andrew's experiment on carbon dioxide.

b) Distinguish between reversible and irreversible process.

c) What is Carnot's cycle? Explain it with suitable diagram.

d) A definite mass of a perfect gas compressed adiabatically to half of its original volume. Determine the resultant pressure if the initial pressure was one atmosphere. (γ=1.4 and $2^{1.4}$=2.64)

e) Calculate the change in entropy when 10 gram of ice at 0°C is converted into water at the same temperature. (Latent heat of ice = 80 cal/gram).

f) Determine what temperature on the centigrade scale is represented by the same number on the Fahrenheit Scale?

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

a) Discuss in detail the working of venturimeter and obtain an expression for the rate of flow of water in a pipe.

b) i) Describe the method of measurement of rigidity by torsional oscillations. Derive the necessary formula.

ii) What force is required to accelerate 1500 kg. car from 5m/s to 20m/s in time of 3 sec?

c) i) Show that the value of Poisson's ratio lies between –1 and 0.5.

ii) A glass capillary tube of diameter 0.2mm is immersed in a liquid of density 10^3kg/m^3. If surface tension of the liquid is 0.0235 N/m, find the height to which the liquid will rise in the capillary tube. Angle of contact is 20°.

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

a) What is a heat engine? Explain Diesel cycle with an indicator diagram. Obtain an expression for the efficiency of the Diesel engine.

b) i) What is the principle of refrigeration? Give the schematic representation of refrigerator.

ii) Van der Waal's constants are: a=0.360Nm^{4}mole^{-2}, b=4.20×10^{-5}m^{3}mole^{-1}. Calculate the critical volume and critical temperature of the gas.

c) i) Explain construction and working of gas filled thermometer.

ii) Find the increase in boiling point of water at 100°C when pressure is increased by one atmosphere, where 1 gm of water vapour occupies volume 2160cm^3. Latent heat of fusion is 540 cal/gm.

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F.Y.B.Sc.
PHYSICS - II
Physics Principles and Applications and Electromagnetics
(New Course) (2013 Pattern) (Paper - II)

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

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

a) What is electromagnetic radiations?

b) What do you mean by spontaneous emission?

c) What are the types of Covalent bonds?

d) The efficiency of solar cell is 10% and it has I_{sc}=500mA, V_{oc}=0.5V and F.F.=0.7. Calculate input power.

e) State Coloumb's law in electrostatics.

f) State Ampere's circuital law.

g) Give the relation between $\vec{E}, \vec{D}$ and $\vec{P}$.

h) An electric dipole consisting of two opposite charges of magnitude 4.00µC is separated by a distance 0.02m. Calculate the magnitude of dipole moment.

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

a) What are advantages of Bohr's Model?

b) Explain the working of RADAR with schematic diagram.

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c) Explain ionic bonding in NaCl.

d) Given the energy level of 6.625×10^{-18}J imparted to an electron stream by x-ray device. Calculate frequency in MHz and wavelength. [Given: h=6.625×10^{-34}Js, C=3×10^8m/s]

e) CO molecule absorbs infrared radiations of frequency 6.42×10^{13}Hz. What is the force constant of the bond in CO molecule? [Given: μ=1.14×10^{-26}kg].

f) The series limit wavelength for Balmer series of hydrogen spectrum is 3645 $\overset{o}{A}$. Calculate the value of Rydberg constant.

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

a) Obtain an expression for electric potential due to an electric dipole.

b) Obtain an expression for the electric intensity at any point due to line charge using Gauss's theorem.

c) State and explain Biot-Savart's law.

d) The maximum value of the permeability of some metal is 0.15T–m/A. Find the value of maximum relative permeability and susceptibility. [Given: μ_0=$4\pi\times10^{-7}$T–m/A]

e) An ideal solenoid of a aluminium core have 3000 turns per meter and a current 1.5A. Calculate magnetization 'M' developed in the core and magnetic field at the centre. [Given: $\chi_{aluminium}$ = 2.3×10^{-5}]

f) The electric field at a point due to point charge 0.25m away is 10N/C. What is the magnitude of charge. [Given: $\in_o$=8.85×10^{-12}C^2/N–m^2]

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

a) What is optical pumping? Explain three level pumping scheme.

b) i) What is meant by metallic bonding? Give the properties of metallic crystals.

ii) Find the linear and angular velocity in the first orbit of hydrogen atom. [Given: $e=1.6\times10^{-19}C$, $\epsilon_o=8.85\times10^{-12}C^2/Nm^2$ $h=6.625\times10^{-34}Js$, Radius of Bohr's First orbit is $0.52\,\overset{\circ}{A}$]

c) i) State the general properties of electromagnetic radiations.

ii) The vibrational frequency for a diatomic molecule HF is $1.24\times10^{14}Hz$. Find the energies in ground state and first excited state. [Given: $h=6.625\times10^{-34}Js$]

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

a) Obtain an expression for the magnetic field on the axis of solenoid.

b) i) Define polar and non-polar molecule. Explain the effect of electric field on them.

ii) A charge of 9 nano Coulomb is situated inside a cube. Calculate the electric flux through one of the faces of the cube. [Given: $\epsilon_o=8.85\times10^{-12}C^2/Nm^2$]

c) i) What is hysteresis? Explain the terms retentivity and correctivity using hysteresis curve.

ii) An electric dipole consisting of two opposite charges each of magnitude 3 µC is separated by distance 1.5cm. The dipole is placed in an external field of intensity $2\times10^5N/C$. Calculate the maximum torque on the dipole.

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CHEMISTRY - I

Physical and Inorganic Chemistry

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

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

Instructions to the candidates:

   1)   *All questions are compulsory.*

   2)   *Draw neat diagrams wherever necessary.*

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

   4)   *Use of logtable and calculator is allowed.*

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

   a)   What is meant by negative catalysis? Give one example of it.

   b)   Give the rule of differentiation of a quotient of two functions.

   c)   Define the terms:

       i)   Wavelength.

       ii)   Wavenumber.

   d)   State the first law of thermodynamics and give its mathematical equation.

   e)   What is the effect of temperature on viscosity?

   f)   Define: i)   Oxidation number   ii)   Valency.

   g)   How many atoms are present in 142 grams of chlorine?

   h)   Explain in brief formation of covalent bond with suitable example.

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

   a)   Explain the causes for deviation of real gases from ideal behaviour.

   b)   What is adsorption isotherm? Give postulates of Langmuir's adsorption isotherm.

   c)   Draw the graph of linear function and find the expression for the following.

       i)   Linear function passing through (1,3) and (2,3).

       ii)   Linear function when slope is 2 and passing through point (2,2).

d) State de-Broglie's Hypothesis. Derive the expression for de-Broglie's wavelength interms of kinetic energy of a particle.

e) Explain spontan eous and Non-spontaneous process with help of suitable examples.

f) Derive vander Waals equation of state for real gases.

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

a) i) If Y=(3x+2) (x+5), find $\dfrac{dy}{dx}$.

ii) Solve the integral $\int (x^2 + 4)^2 dx$.

b) Write down Schrodinger equation and explain the term in it.

c) Obtain the expression for entropy change of an ideal gas when its pressure and temperature are changed simultaneously.

d) What is gel. Distinguish between Emulsion and Gel.

e) Define efficiency of heat engine. Derive the expression for efficiency of heat engine.

f) What is vapour pressure of liquid? Describe isoteniscope method for measurement of vapour pressure.

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

a) Calculate the oxidation number of the following:

i) S in $Na_2S_2O_3$

ii) Cr in $K_2Cr_2O_7$

iii) Mn in MnO_2

iv) P in H_3PO_4

b) What is SP^2 hybridisation? Explain the formation of BF_3 molecule.

c) Explain the primary and secondary standard substance with suitable example.

d) Define atomic orbital overlap? Give factor's affecting it.

e) Draw the structures of

    i) BrF_3

    ii) $TeCl_4$

    iii) XeO_3

    iv) IF_7

f) Define the terms

    i)   Co-ordinate bond.

    ii)   Sigma bond.

    iii) Octet rule.

    iv) Metallic bond.

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

a) What volume of nitric acid solution having specific gravity 1.31 and 50% by weight will be required to neutralise 20ml 1.05 N solution of NaOH?

b) In an experiment, 500 mL of a gas at 27°C and 655 mm pressure weighed 0.560 gms. Calculate molecular weight of the gas.

c) Calculate the entropy change, when 10 moles of an ideal gas expand so that its temperature and volume change from 27°C and 8 litre to 65°C and 80 litre. [Given R=8.314J(mole.k)$^{-1}$, Cv=$\frac{3}{2}$×R J.mole^{-1}].

d) Calculate the wavelength and momentum of a α-particle moving with a speed of 10^5cm.s^{-1}.

e) The densities of toluene and water are 860 and 992 gm.dm^{-3} at 20°C respectively. The time of flow of toluene and water through Ostwald's viscometer are 70 and 100 seconds respectively. Calculate the viscosity of toluene. [Given: Viscosity of water 0.010 poise]

f) Calculate the wavenumber and wavelength of the first line in the Lyman series. [Given R=109677.6 cm^{-1}]

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CHEMISTRY - II
Organic and Inorganic Chemistry
(2013 Pattern) (Theory) (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: **[16]**

a) Hexane is soluble in benzene while ethyl alcohol is soluble in water; Explain.

b) Explain following terms

   i)   Bond energy.   ii)   Bond length.

c) Draw zig-zag structure for the following compounds:

   i)   3-buten-1-01.   ii)   n-hexane.

d) Explain intermolecular forces with suitable example.

e) How will you prepare diazonium salt from aniline?

f) Alkali metals do not show +2 oxidation state; Explain.

g) What are metalloids?

h) Write the electronic configuration of Cr(Z=24) and Cu(Z=29).

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

a) What is resonance effect? Give necessary conditions for resonance. Draw resonance structures of phenoxide ion.

b) Discuss conformational isomerism in ethane with energy profile diagram.

c) What is dehydrohalogenation reaction? How will you prepare propene and 2-butene by this reaction.

d) What are ethers? How are they classified? How will you prepare diethyl ether by Williamson's Synthesis.

e) Discuss Hell-Volhard-Zelinsky reaction with suitable example.

f) What is electrophilic substitution reaction? Explain nitration in benzene.

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

a) What are amines? How will you prepare ethylamine from,

    i) Nitroethane.

    ii) Methyl cyanide

b) Assign 'E' or 'Z' configuration of the following compounds.
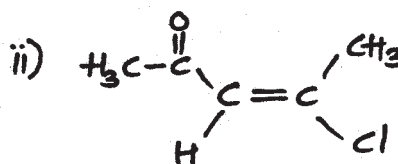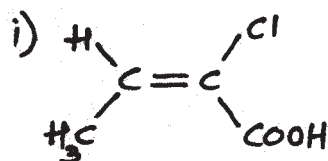
c) What are alkyl halides? Give its classification. What is the action of sodium methoxide on methyl bromide?

d) Explain Aldol condensation with suitable example.

e) What are alkynes? How will you prepare alkynes from,

    i) Vicinal dihalides.

    ii) Calcium carbide.

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

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

a) Identify the products A and B and rewrite the reactions

(Any Two)

i) C_6H_5-C(=O)-OH $\xrightarrow{PCl_5}$ (A) $\xrightarrow{NH_3}$ (B)

ii) C_6H_5-NH_2 $\xrightarrow{NaNO_2/HCl}$ (A) $\xrightarrow{CuBr}$ (B)

iii) H_3C-CH(Br)-CH_3 $\xrightarrow[\Delta]{alc. KOH}$ (A) $\xrightarrow[ii) Zn/H_2O]{i) O_3}$ (B)
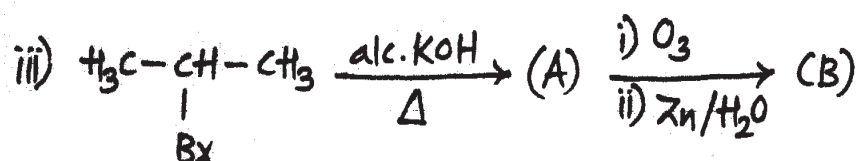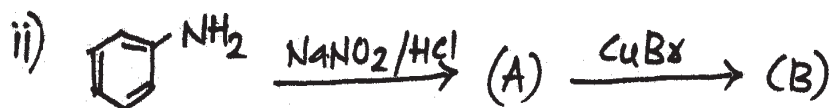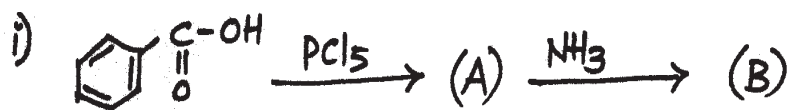
b) Assign 'R' or 'S' configuration of the following compounds.

i)
$$H_3C \overset{OH}{\underset{CH_2Br}{\underset{|}{\overset{|}{-}}}} H$$

ii)
$$H \overset{CH_3}{\underset{OCH_3}{\underset{|}{\overset{|}{-}}}} OH$$
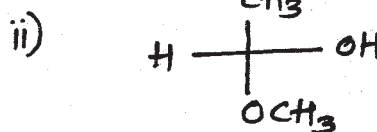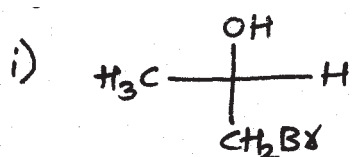
c) What is hybridisation? Discuss formation of ethylene molecule using the concept of hybridization.

d) Write short notes on,

i) Kolbe synthesis.

ii) Haloform reaction.

e) What are the similarities of hydrogen with alkali metals?

f) Explain anomalous behaviour of carbon in group IV A elements.

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

a) Give the names and write electronic configuration of Group I A elements.

b) Explain the family relationship of alkaline earth metals with reference to

    i) Size of atoms and ions.

    ii) Ionization energy.

c) Define crown ethers. Draw the structures of,

    i) 12-crown-4.   ii) 15-crown-5.

d) Explain the family relationship of Group V A elements with respect to,

    i) Ionization energy.   ii) Oxidation state.

e) Explain bonding and structure of Al_2Br_6.

f) Write a note on interhalogen compounds.

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[5115]-7

F.Y.B.Sc.

BOTANY

BO-111: FUNDAMENTALS OF BOTANY

(Plant Diversity, Plant Morphology and Anatomy)

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

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

Instructions to the candidates:

1) *All questions are compulsory.*

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

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

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

a) Define Plant Diversity.

b) Give any two characters of Bryophytes.

c) Mention any two divisions of Algae according to G.M. Smith (1955).

d) Mention any two economic importance of Lichens.

e) Give any two characters of Angiosperms.

f) Define Morphology.

g) What is flower ?

h) What is Anatomy ?

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

a) Describe female sex organ in <u>Albugo</u> (<u>cystopus</u>).

b) Describe fruticose lichen .

c) Describe the Sporophyte of <u>Nephrolepis</u>.

d) Give importance of morphology in nomenclature.

e) Describe any two modifications of roots with example.

f) Define meristem. Write characters of meristematic tissues.

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

    a)   Indirect germination of conidia in <u>Albugo (Cytopus)</u>.

    b)   Structure of Sporangium in <u>Nephrolepis</u>.

    c)   Characters of Dicotyledons.

    d)   Rhizome.

    e)   Tendril.

    f)   Parts of carpel.

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

    a)   Describe scalariform conjugation in <u>Spirogyra</u>.

    b)   Describe internal structure of thallus in <u>Riccia</u>.

    c)   Describe any two types of racemase inflorescence.

    d)   What is tissue ? Give components and functions of epidermal tissue.

Q5) Give an account on structure of male cone and megasporophyll with structure of ovule in <u>Cycas</u>. **[16]**

OR

Describe internal structure of Dicotyledon stem and root.

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[5115]-8
F.Y.B.Sc.
BOTANY
BO-112: Industrial Botany -I&II (New Syllabus)
(2013 Pattern) (71420) (Theory Paper -II)

Time : 3 Hours]   *[Max. Marks : 80*
Instructions to the candidates:
   1)   All questions are compulsory.
   2)   Draw neat labeled diagrams wherever necessary.
   3)   Figures to the right indicate full marks.

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

   a)   What is tannin ?

   b)   Give any two advantages of green house technology.

   c)   What is vegetative propagation ?

   d)   What is inoculation in plant tissue culture ?

   e)   What are biofuels ?

   f)   Enlist types of biopesticides.

   g)   Give any two applications of <u>Aspergillus</u>.

   h)   What is Squash ?

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

   a)   What is green house technology ? Enlist important floricultural crops.

   b)   What is artificial nutrient medium ? Write composition of any one nutrient medium.

   c)   Write the steps involved in mushroom cultivation.

   d)   Write the commercial significance of biopesticides.

   e)   Write the applications of <u>Trichoderma.</u>

   f)   Write the process of jam preparation.

P.T.O.

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

    a)   Fruit plant nursery.

    b)   Hardening in plant tissue culture.

    c)   Value added products of mushroom.

    d)   Need of biofuels.

    e)   Concept of biocontrol.

    f)   Integrated Pest Management(IPM).

Q4) Attempt **Any two** of the following : [16]
    a)   Describe the cultivation practices in Tuberose.
    b)   What is Stem cutting ? Describe in detail Stem cuttings.
    c)   What are biofertilizers ? Comment on phosphate solubilizing biofertilizers.
    d)   What is fruit processing ? Add a note on preparation of pickle.

Q5) What is organic farming ? Explain it's need. Write in details the advantages and limitations of organic forming. [16]

OR

Write commercial significance of Amla (Avala) and <u>Aloe.</u> Add a note on cosmeceuticals.

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[5115]-9

F.Y.B.Sc.

ZOOLOGY

ZY-101: Animal Systematics and Diversity-I & II

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

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

Instructions to the candidates:

1) *All questions are compulsory.*

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

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

Q1) Define / Explain :   **[16]**

   a)   Trichocysts

   b)   Ciliata

   c)   Typhlosole

   d)   Species

   e)   Hemichordata

   f)   Camouflage

   g)   Urodela

   h)   Nuptial pad

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

   a)   Cyclosis in Paramoecium.

   b)   Distinguishing characters of phylum porifera. Give names of any two classes with suitable examples.

   c)   General characters of class Hydrozoa.

   d)   General characters of cartilaginous fishes.

   e)   Bucco- pharyngeal cavity of frog.

   f)   General characters of Cephalochordata.

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

a) Give the distinctive characters of phylum Annelida.

b) Sketch and label T.S. of earthworm passing through gizzard.

c) Give diagnostic features of Monera.

d) Give an account of catadromous migration.

e) Describe the general characters of Urochordata.

f) Describe functions of liver of frog.

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

a) Describe the structure and working of contractile vacuoles in Paramoecium.

b) With the help of neat labeled diagram describe the structure of septal nephridium of Earthworm.

c) Define Nesteny. Give an account of nesteny in Amphibia.

d) With the help of labeled diagram describe the eye-ball muscles of Frog.

Q5) Give an account of the reproductive system of earthworm. **[16]**

OR

Describe the structure and functions of brain of Frog.

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[5115]-10

F.Y.B.Sc

ZOOLOGY

ZY-102: Fundamentals of Cell Biology and Genetics

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

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

Instructions to the candidates:

1) *All questions are compulsory.*

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

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

Q1) Define / Explain :   **[16]**

a)   Lethal Genes

b)   Heterozygous

c)   Kappa particles

d)   Parthenogenesis

e)   Lysosomes

f)   Endoplasmic reticulum

g)   Chromatin

h)   Golgi complex

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

a)   Gynandromorphism.

b)   Albinism in human being.

c)   Define Eugenics ? Explain different methods of positive eugenics.

d)   Give an account of cytoplasmic stain with suitable example.

e)   Distinguish between peroxisomes and glyoxysomes.

f)   Give an account of mitochondrian.

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

   a)   Dihybrid ratio .

   b)   Klinefelter's syndrome

   c)   Explain color blindness with examples.

   d)   Give an account of "composition of cytoplasm".

   e)   Give the distinguishing features of Prokaryotic and Eukaryotic Cells.

   f)   Write a short note on nuclear stain with suitable examples.

Q4) Attempt   the following (Any Two) :   **[16]**
   a)   What is chromosomal aberration ? Describe any two structural
        aberrations of chromosome.
   b)   Give an account of multiple alleles with reference to ABO blood
        group system in man.
   c)   Give an account of structure of plasma membrane. Add a note on
        it's functions.
   d)   Explain the structure of nucleus and give its functions.

Q5) What is gene interaction ? Explain the gene interaction with the help of inhibitory
      factors (13:3 ratio) and Supplementary factors (9:3:4 ratio).   **[16]**

OR

What is Meiosis ? Describe in brief the process of meiosis .

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[5115]-11
F.Y.B.Sc
GEOLOGY
Mineralogy and Petrology
(2013 Course)(Paper - I)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

1) *All questions are compulsory.*

2) *Draw neat labelled diagrams wherever necessary.*

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

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

   a) Define sublimation process.

   b) Define the term faces and form.

   c) Define Petrology and Petrography.

   d) Define the forms - Dome and Pyramid.

   e) Define magma and lava.

   f) State the names of metallic minerals formed by magmatic crystallisation.

   g) Give the systematic classification of igneous rocks based on colour.

   h) Define Columnar joints.

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

   a) Explain measurement of Interfacial angle.

   b) Explain Clastic and Non clastic textures.

   c) Describe Isomorphism and Polymorphism.

   d) Describe the Graded bedding and Current bedding.

   e) Describe the Covalent and Ionic bonds.

   f) Describe the types of unconformities.

P.T.O.

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

    a)   Give the list of minerals used in following industries.

        i)   Ceramic

        ii)   Glass

        iii)   Cement

        iv) Paint

    b)   Define texture. State the factors controlling textures of igneous rocks.

    c)   Describe the term isotropism and anisotropism.

    d)   Describe the following terms with neat diagrams

        i)   Normal fault

        ii)   Reverse fault.

    e)   Give the major elements constituting minerals.

    f)   Describe the following rocks

        i)   Marble

        ii)   Quartzite

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

    a)   Define Mineralogy. Give its branches. Add a note on its importance.

    b)   Give the elements of symmetry, crystallographic axes and forms present with indices of Tetragonal system (Zircon Type).

    c)   Define fold. Describe the various parts of fold with neat labelled diagram.

    d)   Describe how sedimentary rocks are formed ? Describe conglomerate, Breccia and laterite rocks.

Q5) Describe the physical properties of the mineral. [16]

OR

a) Describe rock cycle. [8]

b) Define Metamorphism. Give its agent and describe various kinds of metamorphism. [8]

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[5115]-12

F.Y.B.Sc.

GEOLOGY

Physical Geology and Palaeontology

(2013 Pattern) (Paper -II)

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

Instructions to the candidates:

　　1)　*All questions are compulsory.*

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

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

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

　　a)　What are Fold mountains ?

　　b)　What are Belemnites ?

　　c)　Describe any two branches of Geology.

　　d)　Mention all the branches of palaeontology.

　　e)　Give the shape and average density of the Earth.

　　f)　Explain dextral coiling in Gastropods.

　　g)　Define a volcano.

　　h)　What is Sampling ?

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

　　a)　Explain the concept of Plate Tectonic theory.

　　b)　Describe the various septa seen in corals.

　　c)　Explain how earthquakes are recorded.

　　d)　Describe the life during Palaeozoic Era.

　　e)　Describe the various suturelines in Ammonoids.

　　f)　Describe i) Moraines   ii) Mushroom Rock

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

a)　Explain Pratt's model of Isostacy.

b)　Give the systematic position and Ornamentation in Lamellibranch.

c)　What are Glaciers ? Explain Crevasses.

d)　Describe any four forms shown by Gastropod shells.

e)　Explain the tidal theory for the origin of the Solar System.

f)　Explain the conditions necessary for fossilization.

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

a)　Describe the processes of chemical weathering.

b)　Define a fossil. Describe Casts and Moulds and Petrification modes of preservation of fossils.

c)　What are disasters ? Explain the types and effects of disasters.

d)　Describe the hard part morphology of a Trilobite.

Q5) Give the systematic position and describe the morphology of the hard parts of a typical Brachiopod shell. Add a note on Brachial skeleton.　**[16]**

OR

a)　What is Geological Time Scale ? Give the tabular classification of the Phanerozoic Eon.　　　　　　　　　　　　　　　　　　　　**[8]**

b)　Describe the Lithosphere and Biosphere of the Earth.　　　　**[8]**

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[5115]-13

F.Y. B.Sc.

STATISTICS / STATISTICAL TECHNIQUES

Descriptive Statistics

(2013 Pattern) (Paper - I)

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

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

Q1) Attempt each of the following:

    a)   i)   Define the term variable.

        ii)   Define the term positive attribute.

        iii) Define the term average.

        iv) State any 2 demerits of mean.

                                                                              [4 × 1]

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

        i)   Mode is the

           A)   Most frequent value   B)   Minimum value

           C)   Maximum value   D)   Middle most value

        ii)   Karl Pearson's coefficient of correlation lies between:

           A)   0 to 1   B)   −1 to 1

           C)   0 to ∞ D) $-\infty$ to ∞

        iii) Standard deviation is invariant to the change of

           A)   Origin   B)   Scale

           C)   Origin and Scale   D)   Neither origin nor scale

        iv) Given (A) = 150, (Aβ) = 50, (B) = 180, (AB) = 100 and N = 270, the class frequency (αB) is equal to:

           A)   80   B)   90

           C)   40   D)   120

c) i) Is the following data consistent? Justify. **[2]**

$\mu_2 = 16$ and $\mu_4 = 164$.

ii) Find median of the following data: **[2]**

12, 16, 3, 14, 7, 9, 5, 10, 11.

iii) Find the frequency of $(A\beta\gamma)$ in terms of positive class frequencies using method of dot operator in case of three attributes A, B, C. **[2]**

iv) What is Kurtosis, mention different types. **[2]**

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

a) Define SRSWR and SRSWOR, How does one differ from the other.

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

c) You are given the following information about two variables x and y.

$n = 10,\ \Sigma x^2 = 385, \Sigma y^2 = 192, \bar{x} = 5.5, \bar{y} = 4,\ \Sigma xy = 185.$

Find regression line of y on x.

d) Calculate Price index number using Fisher's method for the following data:

Item	Base year		Current year	
	Price	Quantity	Price	Quantity
Cheese	18	2	24	1.5
Bread	12	30	15	15
Eggs	20	15	30	15
Milk	10	30	19	25

e) Spearman's rank correlation between the marks in English and marks in Statistics for a group of students is 0.5. If the sum of squares of differences between ranks is 42, find the number of students in the group. Assume no rank is repeated.

f) State any 2 merits and demerits of standard deviation each.

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

a) Show that correlation coefficient is independent of change of origin.

b) Calculate geometric mean from the following data:

6.5, 169, 11, 112.5, 14.2, 75, 35.5, 215.

c) Define raw moments and central moments of a frequency distribution and express fourth central moment in terms of raw moments.

d) Two samples of sizes 40 and 50 have the same means and standard deviations 20 and 10 respectively. Find variance of combined group.

e) In a survey conducted for 5000 citizens the following information was revealed:

4000 read Marathi newspaper, 2500 read English newspaper, 2000 read both the types of newspapers. Find the number of citizens who read

i) at least one type of newspaper.

ii) newspaper in only one language.

iii) no newspaper.

f) If X and Y are uncorrelated, then show that $V(X+Y) = V(X-Y)$.

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

a) i) What is meant by association of two attributes? How it is measured and interpreted.

ii) Given that $(AB) = 256$, $(\alpha B) = 768$, $(A\beta) = 48$, $(\alpha\beta) = 144$. Find out whether A and B are associated or independent?

b) i) Show that S.D. ≥ M.D. about arithmetic mean for a given set of observations.

ii) The first 4 moments of a distribution about the value 5 are 2, 20, 40 and 200 respectively. Find the first 4 central moments.

c) i) What is correlation? Explain its different types with real life examples.

ii) Given that $\beta_2 = 2.6$, $\beta_1 = 0.19$, $\mu_2 = 1.2$. Find μ_3 and μ_4.

d) Explain the terms:

i) Order of a class.

ii) Positive attribute and positive classes.

iii) Negative attribute and negative classes.

iv) Ultimate class frequency.

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

    a)   i)   Let (X_i, Y_i), i = 1, 2, ...*n* are *n* observations on a bivariate random variable (X, Y). Derive the equation of line of regression of Y on X. **[8]**

          ii)   Define index numbers and state its uses. **[4]**

          iii)   Explain the term skewness using suitable diagrams. Explain the different types of skewness. **[4]**

    b)   i)   Karl Pearson's coefficient of correlation between X and Y obtained from 10 pairs of items is 0.5. Means of X and Y are 12 and 15 respectively. Standard deviations of X and Y are 3 and 4 respectively. While checking it is noticed that one of the item was wrongly entered as 16 instead of 26 for X series and as 9 instead of 18 for Y series. Calculate the correct coefficient of correlation. **[8]**

          ii)   Show that $\beta_2 \geq 1$. **[4]**

          iii)   Show that $-1 \leq Q_{AB} \leq 1$. **[4]**

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[5115]-14

F.Y. B.Sc.

STATISTICS / STATISTICAL TECHNIQUES

Discrete Probability and Probability Distributions

(2013 Pattern) (Paper - II)

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

Instructions to the candidates:

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

Q1) Attempt each of the following:

     a)   i)   Nine seeds are planted and total number of seeds germinated are recorded after a week. Write down the sample space, for this experiment. Also, state the nature of the sample space. **[1]**

            ii)   If $X \sim B(n, p)$ with $n = 20$, $E(X) = 8$, find parameter p and var (X). **[1]**

            iii)   Give one real-life situation where hypergeometric distribution can be applied. **[1]**

            iv)   If X and Y denote the points obtained when two six faced unbiased dice are thrown, find $P[X = Y]$. **[1]**

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

            i)   The classical approach to probability assumes that all possible outcomes of an experiment are

                A)   independent   B)   equally likely

                C)   dependent   D)   mutually exclusive

            ii)   Which of the following statement is true?

                A)   A and Ω form partition of Ω.

                B)   A and A' do not form partition of Ω.

                C)   A and A' form partition of Ω.

                D)   Only two events can not form a partition of Ω.

iii) If X is a discrete r.v., then

    A) $E(X^2) = [E(X)]^2$ B) $E(X^2) \geq [E(X)]^2$

    C) $E(X^2) \leq [E(X)]^2$ D) $E(X^2) = 2E(X)$

iv) If X and Y are two random variables with means $E(X)$ and $E(Y)$ respectively, then the expression

$E[(X - E(X))(Y - E(Y))]$ is called

    A)   Variance of X

    B)   Variance of Y

    C)   Covariance between X and Y

    D)   Correlation coefficient between X and Y

c) i)   Let $X \sim B\left(7, \dfrac{1}{2}\right)$, find mode of X.   **[2]**

   ii)   Define independence of two events.   **[2]**

   iii)   State the additive property of Poisson distribution.   **[2]**

   iv)   Determine k such that the following function is probability mass function: **[2]**

$$P[X = x] \;\; = k\frac{x}{5}, \quad x = 1, 2, 3, 4, 5$$

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

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

  a)   Explain with one illustration each of the following:

    i)   Complement of an event.

    ii)   Mutually exclusive events.

  b)   An integer is chosen at random from 1 to 100. What is the probability that the chosen integer is divisible by 13? What is the probability that the chosen integer is divisible by 13 but not divisible by 7?

  c)   Define:

    i)   conditional probability of an event.

    ii)   random experiment.

d) The probability distribution of a discrete r.v. X is as follows:

X	0	1	2	3
P[X = x]	0.20	0.25	0.35	0.20

   i) Obtain cumulative distribution function of X.

   ii) Obtain median and mode of X.

e) A discrete r.v. X has the following p.m.f;

$$P[X = x] \quad = \frac{x}{6} \quad , \quad x = 1, 2, 3$$

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

   Find $E[2X]$ and $E[X^2]$.

f) Define moment generating function (m.g.f.) of a r.v. X. State the uniqueness property of m.g.f.

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

a) Define Bernoulli distribution with parameter p. Obtain μ_3' for a Bernoulli r.v.

b) Let $\Omega = \{c, d, e, f, g, h, i, j, k\}$

   Let A = $\{c, e, g\}$, B = $\{d, e, h, i\}$, C = $\{e, f, g\}$.

   List the elements of the following events:

   i) B'   ii) $(A \cup B)'$

   iii) $(A \cap B)' \cup C$ iv) $(A \cup B) \cap C'$

c) Define a degenerate distribution and find its variance.

d) Find recurrence relation between the successive probabilities of binomial distribution with parameters n and p.

e) State and prove the multiplication theorem for two events A and B defined on a sample space Ω. Also state its generalisation for three events A, B and C.

f) A r.v. (X, Y) has joint probability distribution as follows:

Y \ X	−1	2	3
0	$\frac{1}{18}$	$\frac{2}{18}$	$\frac{3}{18}$
1	$\frac{2}{18}$	$\frac{3}{18}$	$\frac{1}{18}$
2	$\frac{1}{18}$	$\frac{2}{18}$	$\frac{3}{18}$

Find:

i) Marginal probability distribution of X.

ii) Marginal probability distribution of Y.

iii) $P[X + Y \le 3]$.

Q4) Attempt <u>any two</u> of the following:

a) i) Define cumulant generating function (c.g.f.) of a r.v. Explain how the second cumulant is obtained using c.g.f. **[4]**

ii) Define: **[4]**

A) a two-dimensional discrete r.v.

B) correlation coefficient between two r.vs.

b) Given the following cumulative distribution function of a discrete r.v. X:

X	1	2	3	4	5
F(x)	0.10	0.26	0.52	0.78	1.0

Find:

A) the probability distribution of r.v. X **[2]**

B) $P[X \le 3]$. **[2]**

C) $P[X > 3]$. **[1]**

D) $P[X = 4 \mid X \ge 3]$. **[3]**

c) i) Define conditional expectation and conditional variance of X|Y=y for a bivariate r.v. (X, Y). **[5]**

ii) Define Hypergeometric distribution and state its mean. **[3]**

d) i) If X and Y are two independent r.vs. with $\sigma_X = 3$ and var $(2X + 3Y) = 72$, compute σ_Y. **[4]**

ii) Define a binomial distribution and find its mean. **[4]**

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

a) i) State and prove Bayes' theorem. **[5]**

ii) Given that $P(A_1) = P(A_2) = P(A_3) = \dfrac{1}{3}$ and $P(B/A_1) = \dfrac{2}{7}$,

$P(B/A_2) = \dfrac{4}{9}$, $P(B/A_3) = \dfrac{1}{5}$. Find $P(A_2/B)$. **[3]**

iii) Events A, B, C forms a partition of a sample space Ω. If $3P(A) = 2P(B) = P(C)$, find $P(A \cup B)$. **[3]**

iv) A lot contains 10 items of which 3 are defective. Two items are drawn at random from the lot one after other without replacement. Find the probability that both items are non-defective. **[5]**

b) i) State the p.m.f. of a H(N, M, n) variable. Obtain its mean. **[4]**

ii) If the probability that a certain test yields a positive reaction is equal to 0.3. What is the probability that less than 3 negative reactions occur before the first positive one. **[4]**

iii) The probability distribution of a discrete r.v. X is a given below:

X	−2	0	1	2
P[X = x]	$\dfrac{1}{3}$	$\dfrac{1}{6}$	$\dfrac{1}{3}$	$\dfrac{1}{6}$

Find third central moment μ_3. Also comment on the nature of the distribution. **[6]**

iv) State the additive property of binomial distribution. **[2]**

[5115]-15

F.Y. (B.Sc.)

GEOGRAPHY - I

Gg - 110 : Geomorphology

(2013 Pattern) (Paper - I)

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

Instructions to the candidates:

1) *All questions are compulsory.*
2) *All questions carry equal marks.*
3) *Neat diagrams must be drawn whenever necessary.*
4) *Use of Map Stencils is allowed.*

Q1) Answer the following in Twenty words (Any Eight):   **[16]**

 a) Define Geomorphololgy.

 b) What are diastrophic Movements.

 c) Define earthquake.

 d) Define faults.

 e) What is meant by symmetrical folds?

 f) What is meant by Metamorphism?

 g) State the agents of biological weathering.

 h) What is meant by soil creep?

 i) What is Barchan?

 j) Define Moraine.

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

 a) Importance of Geomorphology.

 b) Geological Time-Scale.

 c) Causes of Earthquake.

 d) Davisian Cycle of Erosion.

 e) Characteristics of Sedimentary rocks.

 f) Flood Plains and Levees.

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

a) Explain the scope of Geomorphology.

b) Evidences in support to the continental Drift Theory.

c) Explain the formation of Rift Valley.

d) Explain types mass movement.

e) Explain Pot-holes with neat diagram.

f) Explain the formation of Sea Cliff.

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

a) Explain types of Folds with neat diagrams.

b) Explain types of Volcanoes and associated land forms.

c) Explain the Igneous rocks in detail.

d) Explain the processes of Mechanical Weathering.

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

Explain the Interior of the Earth with neat diagram.

OR

Describe the land forms associated with erosional work of wind.

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[5115]-16

F.Y. B.Sc.

GEOGRAPHY

Gg - 120 : Climatology and Oceanography

(2013 Pattern) (Paper - II)

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

Instructions to the candidates:
 1) *All questions are compulsory.*
 2) *All questions carry equal marks.*
 3) *Draw neat diagrams wherever necessary.*
 4) *Use of Map Stencils is allowed.*

Q1) Answer the following in Twenty words (Any Eight):   **[16]**

  a)   Define Weather.

  b)   Define Water cycle.

  c)   Any two importance of water vapour.

  d)   Define global warming.

  e)   What is meant by westerlies?

  f)   Give branches of Oceanography.

  g)   Define Oceanography.

  h)   Give types of ocean currents.

  i)   What do you mean by gulf stream.

  j)   Define Salinity.

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

  a)   Differentiate between weather and climate.

  b)   Lapse rate.

  c)   Land and sea breezes.

  d)   Salinity of Dead Sea.

  e)   Characteristics of sea waves.

  f)   North-East Monsoon Drift.

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

    a)   Hydrological cycle.

    b)   Albedo.

    c)   Formation of hail.

    d)   Haff Nehrung coast.

    e)   Salinity of Black Sea.

    f)   Causes of tides.

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

    a)   Describe inversion of temperature.

    b)   Explain elements of weather.

    c)   Explain submerged coast.

    d)   Explain causes of Tsunami.

Q5) Explain formation of Atmospheric pressure belts with neat diagram. [16]

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

With neat diagram, explain the structure of Indian ocean floor.

<div align="center">☛ ☛ ☛</div>

[5115]-17

F.Y. B.Sc.

MICROBIOLOGY

Introduction to Microbiology

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

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

Instructions to the candidates:

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

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

a) Match the following:

   i) Louis Pasteur   1) Animal cules

   ii) Joseph Lister   2) Pasteurization

                          3) Surgical Antisepsis

b) Name two Gram negative bacteria.

c) Define-Base. Give two examples.

d) Write two functions of pili in bacteria.

e) Name any two aminoacids in proteins.

f) State true or false:

   i) Glucose is a diasaccharide.

   ii) Phosphodiester bonds are present in carbohydrates.

g) Fill in the blanks:

   i) _____ is a normal flora of human body

      1) Rhizobium   2) E.coli

      3) Pseudomonas   4) None of the above

   ii) _____ was the first to introduce the process of immunization.

      1) Robert Hook   2) Fransisco Redi

      3) Edward Jenner   4) None of the above

h) Name any two human diseases caused by viruses.

Q2) Write Short Notes on <u>Any Four</u> of the following: **[16]**

   a)   Germ theory of disease.

   b)   Plasmids.

   c)   Covalent bonds.

   d)   Food & Dairy Microbiology.

   e)   pH & Buffers.

   f)   Chemotherapy.

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

   a)   What is abiogenesis? Explain spontaneous generation theory.

   b)   What are cell inclusions? Explain metachromatic granules.

   c)   Write functions of polysaccharides.

   d)   Explain the structure of triglycerides.

   e)   Write about discovery of microscope.

   f)   Write general characters of fungi.

Q4) Attempt <u>Any Two</u> of the following: **[16]**

   a)   Explain the contribution of Louis Pasteur in Microbiology.

   b)   Give the morphological characters of algae & add a note on their economic importance.

   c)   What are bio-inoculants? Discuss the role of various microorganisms in agriculture.

   d)   With a neat labelled diagram, explain Redi's three jar experiment.

Q5) Attempt <u>Any One</u> of the following: **[16]**

   a)   With a neat labelled diagram explain composition, structure and functions of bacterial flagella.

   b)   What are nucleic acids? Explain in detail structure, types of functions of RNA.

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[5115]-18

F.Y. B.Sc.

MICROBIOLOGY

Basic Techniques in Microbiology

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

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

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *Draw neat labelled diagrams wherever necessary.*

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

Q1) Answer the following: [16]

    a)   Define specific growth rate.

    b)   1 μ Lit = _____ mL = _____ Lit.

    c)   Vitamin solution can be sterilized by _____.

    d)   Define - diauxic growth.

    e)   A medium can be enriched by addition of _____ and _____.

    f)   Resolving power = $\dfrac{-----}{-----}$.

    g)   Write two examples of anaerobic microorganisms.

    h)   Phenol coefficient = $\dfrac{-----}{-----}$.

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

    a)   Accentuators in staining methods.

    b)   Halogens as disinfectants.

    c)   Maintenance of fungal cultures.

    d)   Synchronous culture.

    e)   Objective lenses in microscope.

    f)   Cultivation of chemolithotrophic bacteria.

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

   a) Differentiate between Thermophiles and psychrophites.

   b) Justify the role of sodium chloride in a nutrient agar.

   c) Derive the equation for bacterial growth rate.

   d) Explain the effect of heavy metals on bacterial growth.

   e) Describe the role of chemical indicators to check efficiency of sterilization.

   f) Why are culture collections important? Give examples of any two.

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

   a) What is relief staining? Explain capsule staining as a method of relief staining.

   b) Describe various methods used for preservation of bacterial cultures.

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

   d) What are aberrations in lenses? Describe spherical aberrations and astigmatism.

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

   a) Enlist various physical agents used for sterilization. Describe use of moist heat and filtration as methods of sterilization.

   b) With appropriate ray diagram, describe principle and applications of fluorescence microscope.

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[5115]-19

F.Y. B.Sc.

EXPERIMENTAL PSYCHOLOGY

General Psychology

(2013 Pattern) (Paper - I)

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

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

Q1) Answer in 20 words (8 out of 10)   **[16]**

     a)   What is observation?

     b)   State the full form of GABA.

     c)   Define attention.

     d)   What is humanism?

     e)   Define emotion.

     f)   Define learning.

     g)   What is personality?

     h)   Define intelligence.

     i)   State the full form of WISC.

     j)   What is Conflict?

Q2) Answer in 50 words (4 out of 6):   **[16]**

     a)   Explain the method of introspection.

     b)   State the importance of need for achievement.

     c)   Explain the sources of frustration.

     d)   Explain the James-Lange theory of emotion.

     e)   Explain the Eysenk's PEN model.

     f)   State the characteristics of Gifted people.

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

    a) Explain the developmental Psychology.

    b) State the span of attention.

    c) Explain the arousal theory of motivation.

    d) State the importance of Emotional Quotient(EQ).

    e) Explain Thematic Apperception Test (TAT).

    f) Explain the Big Five model of McCrae and Costa.

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

    a) Explain the goals of psychology.

    b) Discuss the principles of perceptual organization.

    c) Describe the basic types of emotion.

    d) Explain the types of mentally challenged.

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

    a) Explain the structure and Function of brain.

    b) What is operant conditioning? Describe the Pavlov's experiment on classical conditioning and it's characteristics.

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F.Y. B.Sc.

PSYCHOLOGY

Experimental Psychology

(2013 Pattern) (Paper - II)

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

Instructions to the candidates:

    1)   *All questions are compulsory.*

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

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

Q1) Answer in 20 words (8 out of 10)   **[16]**

    a)   What is Experiment?

    b)   Define Dependent Variable.

    c)   Define sensitivity.

    d)   What is thinking?

    e)   What is problem solving?

    f)   What is classical conditioning?

    g)   Define Reaction Time.

    h)   What is Psychological Test?

    i)   Define Personality.

    j)   State the Full form of SPM.

Q2) Answer in 50 words (4 out of 6):   **[16]**

    a)   Explain the Application of Industrial Psychology.

    b)   State the evaluation of Experimental Method.

    c)   State the nature of variable.

    d)   State the importance of reaction time.

    e)   Explain the application of psychological tests.

    f)   Write short note on Stanford-binet Scale of intelligence.

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

    a) Explain the goals of experimental Psychology.

    b) State the independent variable.

    c) State the nature of Mental image.

    d) Explain the Performance test.

    e) Describe in brief the test of WAIS.

    f) Write short note on TAT.

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

    a) Explain the history of experimental Psychology.

    b) Describe the areas related with language.

    c) State the comparison of individual and group test.

    d) Explain the types of reaction time.

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

    a) What is learning? Explain the types of learning.

    b) What is Psychophysics? Calculate PSE by the Method of Average Error.

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[5115]-23

F.Y. B.Sc.

ELECTRONIC SCIENCE

EL - 101 : Principles of Analog Electronics

(2013 New Pattern) (Paper - I)

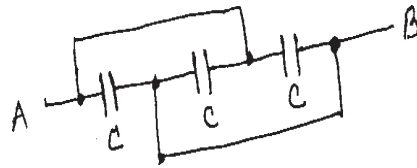*Time : 3 Hours]*   *[Max. Marks : 80*

Instructions to the candidates:

1)   All questions are compulsory.

2)   Draw neat labelled diagrams & symbols wherever necessary.

3)   Use of log table & calculator is allowed.

4)   Figures to the right indicate full marks.

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

a)   Find equivalent capacitance of the following circuit.

b)   Draw sine & square wave signal showing amplitude & period on the wave form.

c)   Distinguish between ideal voltage & current sources.

d)   Give circuit symbols of LED & Zener diode.

e)   BJT is called as current controlled device comment.

f)   Draw circuit diagram of transistor as switch.

g)   Sketch circuit symbols of *n* channel depletion & p-channel enhancement type MOSFET.

h)   Define:

i)   Slew rate &

ii)   CMRR of opamp.

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

a)   i)   Find equivalent resistance of the following:
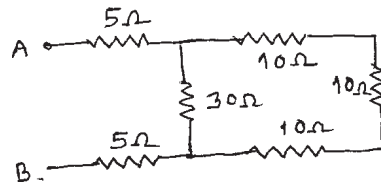
    ii)   Draw circuit symbols for iron & ferrite core inductor.

b)   Obtain an expression for voltage across a capacitor when step signal is applied to RC circuit.

c)   Explain full wave rectifier with input output waveforms.

d)   Draw circuit diagram to study I-V-characteristics of n-p-n transistor in CE mode.

e)   With the help of equivalent circuit explain working of UJT.

f)   Write a short note on opamp as an Adder.

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

a)   i)   A transformer converts 200V A.C. to 2000 V A.C. If the no. of turns of secondary is 2000 then what will be no.of turns of primary.

    ii)   Give full forms of DPST & SPDT.

b)   Explain working of series LCR circuit.

c)   Draw block diagram of power supply & Explain function of each block.

d)   Explain construction & working of p.n.p. transistor.

e)   Draw circuit diagram to find I-V characteristics of FET. (n-channel).

f)   Find the input resistance of opamp with feedback whose output is -12V with input of 120 mV. The feedback resistance is 10MΩ.

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

a)   i)   'Fuse is called as safety device' comment.

    ii)   Draw construction of general purpose e.m. relay.

b)   State & prove maximum power transfer theorem.

c)   Draw circuit diagrams of series negative clipper & shunt positive clamper.

[5115]-23

d) Explain working of voltage divider bias circuit.

e) Write a short note on FET as VVR.

f) Describe use of opamp as schmitt trigger.

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

a) i) Distinguish between primary & secondary cells.

   ii) Give full forms of BNC & FRC.

b) Use Thevenine's theorem to calculate voltage across $5\,\Omega$ resistor in the following circuit.
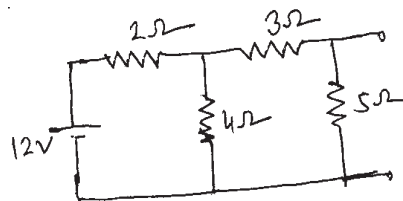
c) i) State superposition theorem & Norton theorem.

   ii) Draw circuit symbol of optocoupler & varactor diode.

d) Obtain relation $\beta = \dfrac{\alpha}{1-\alpha}$ for a transistor, where symbols have their usual meanings.

e) i) Draw practical circuit of transistor as amplifier.

   ii) Give construction of n-channel MOSFET.

f) Obtain an expression for gain of opamp in non-inverting mode.

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F.Y. B.Sc.
ELECTRONIC SCIENCE
EL - 102 : Principles of Digital Electronics
(New 2013 Pattern) (Paper - II)

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

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

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

a)   Draw the symbol of logic OR gate and write its truth table.

b)   What is priority encoder?

c)   What is positive and negative logic?

d)   Draw the state diagram for T flip-flop and D Flip-flop.

e)   What is 1's complement and 2's complement of a binary number.

f)   What is multiplexer? Draw the block diagram for it.

g)   Prove:

   i) $A + A \cdot B = A$

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

h)   Draw the logic symbol for clocked SR flip-flop and give its truth table.

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

a)   Explain SISO shift register with neat logic diagram.

b)   Compare TTL and CMOS logic family.

c)   Make the conversion:

   i)   25.6 decimal to binary number.

   ii)   B2.39 hexadecimal to decimal number.

d)   State and prove DeMorgan's first and second theorem.

e)   Explain 4:1 multiplexer with neat diagram.

f)   Explain half adder with neat logic diagram and truth table.

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

a)   i)   What is common anode display? Draw the arrangement of LEDs in common anode display.

      ii)   How to get DFF using JK FF.

b)   Explain the action of -2-input TTL NAND gate with neat diagram.

c)   Minimize the expression using K-map.

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

d)   Explain four bit parallel adder with neat diagram.

e)   Explain decimal to BCD encoder using OR gates.

f)   Compare synchronous and asynchronous counters.

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

a)   Explain transistorized AND gate circuit with neat diagram.

b)   Explain decade counter with neat logic diagram.

c)   What is tristate logic? What are the applications of tristate buffer?

d)   Explain SOP and POS expression with example.

e)   What is comparator? Draw the logic diagram for 2-bit comparator.

f)   With neat diagram, explain the action of keyboard encoder.

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

a)   With logic diagram and truth table, explain 1:2 demultiplexer.

b)   Explain EXOR gate as a parity checker.

c) Explain 2's complement method of subtraction.

Subtract $(1101)_2$ from $(1111)_2$ using 2's complement method.

d) Simplify using Boolean laws and draw logic diagram for expression:

$$Y = \overline{A}\overline{B}\overline{C} + \overline{A}B\overline{C} + A\overline{B}\overline{C} + AB\overline{C}$$

e) Explain CMOS inverter with neat logic diagram.

f) Draw the logic diagram for four bit ring counter and explain it.

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[5115]-25

F.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS.I - Evolution of Strategic Thoughts

(2013 Pattern) (Paper - I)

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

Instructions to the candidates:

    1)   All questions are compulsory.

    2)   Figures to the right indicate full marks.

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

    a)   State the meaning of "Nationalism".

    b)   Define "Strategy".

    c)   Who is the author of "on war".

    d)   Define 'Air Power".

    e)   Write any two causes of war.

    f)   Which theory was introduced by Douhet?

    g)   What do you mean by Geopolitics?

    h)   Define "Sea Power".

    i)   Who was Sun-tzu?

    j)   What do you know about Gustavas Adolphus?

    k)   State the meaning of civil war.

    l)   What do you know about Machiavelli?

    m)   Write any two names of strategic thinker.

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

    a)   What do you know about Adam Smith?

    b)   Write few lines on "Industrial Revolution".

    c)   Explain the concept of "Guerrilla warfare".

    d)   Write in brief Geopolitics.

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

 a) Write a note on "Kautilya as a strategic thinker".

 b) Explain the views of Mao-Tse-Tung, on "Guerrilla warfare".

 c) Discuss the concept of "Total War".

 d) Highlight, on the impact of American Civil War".

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

 a) Discuss the elements of sea power as per A.T.Mahan.

 b) Evaluate the geopolitical thoughts of Haushofer.

 c) Explain the views of Prof. Mackinder on "Heartland".

 d) Highlights on thoughts of Karl Von Clausewitz.

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F.Y. B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS.NO. II - Indias National Security
(2013 Pattern) (Paper - II)

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

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

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

     a)   Define "National Security".

     b)   State any two non-military threats to Indias Security.

     c)   What do you mean by P.N.E. of 1974?

     d)   State any two names of Para Military Force.

     e)   Write the names of immediate neighbours of India.

     f)   What do you mean Border?

     g)   Write the long form of L.I.C.

     h)   What do you know the issues between India & Srilanka?

     i)   How you would like to define internal security?

     j)   What do you understand by Defence preparedness?

     k)   State the location of Andaman & Nicobar Islands.

     l)   Write the long form of D.R.D.O.

     m)   What do you know about Diego Garcia Islands?

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

     a)   Write few lines on settlement of Border Issue Between India-Bangladesh.

     b)   What do you know about "Indias Chicken Neck"?

     c)   Write few lines on "Mac-Mohan Line".

     d)   Explain in brief geographical set-up of Siachen Glacier.

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

   a)   Explain the "Civil -Military Relations" in India.

   b)   Write a note on "Civil Defence".

   c)   Analyse the nature India-China border dispute.

   d)   Write an essay on Operation Shakti of 1998".

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

   a)   Evaluate the strategic environment in Indian Ocean & its implications on Indias National Security.

   b)   "Kashmir issue is the backbone of hostality between India & Pakistan". Do you agree? Justify your answer.

   c)   Analyse the Indias Defence Preparedness since 1995 to onwards.

   d)   Highlight on "Non-Military Threats" to Indias National Security.

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F.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 3 : International Security

(2013 Pattern) (Paper - II)

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

Instructions to the candidates:

　　1)　All questions are compulsory.

　　2)　Figures to the right indicate full marks.

Q1) Answer in 20 Words (Any Ten)   **[10 × 2 = 20]**

　　a)　Define Balance of power (BOP).

　　b)　Write any two principles of Non-Alignment.

　　c)　Define disarmament.

　　d)　State the meaning of Regionalism .

　　e)　What are the India's core values?

　　f)　Define international law.

　　g)　Define national power.

　　h)　Define nationalism.

　　i)　Write the concept of peace studies.

　　j)　Define collective security.

　　k)　Define common security.

　　l)　Define Foreign policy.

　　m)　Define Diplomacy.

Q2) Answer in 50 words (Any Two):   **[2 × 5 = 10]**

　　a)　Explain advantages of Balance of Power (BOP).

　　b)　Describe India's freedom struggle.

　　c)　Explain elements of national power.

Q3) Answer in 150 words (Any Two):   **[2 × 10 = 20]**

    a)   Explain Advantages of Regional organization.

    b)   Discuss difficulties in arms-control.

    c)   Explain contribution of NAM in maintaining world peace.

Q4) Answer in 300 words (Any Two):   **[2 × 15 = 30]**

    a)   Discuss role of lnternational law in maintaining International peace.

    b)   Explain scope and nature of peace studies.

    c)   Discuss UN system of Pacific settlement of Disputes.

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F.Y. B.Sc.

ENVIRONMENTAL SCIENCE

ENV - 101 : Fundamentals of Environmental Chemistry & Environmental Biology

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

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

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *Neat and labeled diagrams must be drawn wherever necessary.*

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

Q1) Attempt the following in not more than 5 lines: **[16]**

    a)   Define Microbes, Viruses & Fungi with example.

    b)   What are the characteristic features of orthropods.

    c)   What do you meant by Survival of Fitest.

    d)   Explain the concept 'Invasive Spacies'.

    e)   Give reactions of Acid rain Formation by sulphure.

    f)   Write in short information about Minamata disease.

    g)   Give the principle of pH meter.

    h)   Explain the term equivalent weight.

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

    a)   Write a note on adaptation found in Hydrophites.

    b)   Give detailed characteristics of reptites & Birds.

    c)   Add a note on factors responsible for spaciation.

    d)   Give possible remedies of mass extinction.

    e)   Explain the process of Hydrogen bonding in water.

    f)   What are the interactions of Gases with water.

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

    a) Distinguish between moncots & dicots plants.

    b) Structure of Bacteria.

    c) Major Forest types of India.

    d) Anionic surfactants.

    e) Hooker system of classification.

    f) Scope of Environmental Chemistry.

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

    a) What are epiphytes & mesophytes give two examples of each.

    b) Define biogeochemical cycle. Explain in detail carbon cycle.

    c) Explain in detail methods used in Environmental Analysis.

    d) Define Biogeography. Explain Biographical profile of India.

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

    a) Define Bioresources. Explain in detail Fores & Agriculture as resource.

    b) Explain in detail food additives. Write a note on effects of additive on humans.

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[5115]-29

F.Y. B.Sc.

ENVIRONMENTAL SCIENCE

ENV - 102 : Fundamentals of Environmental Geosciences & Environmental Pollution

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

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

Instructions to the candidates:

1) All questions are compulsory.

2) Neat and labeled diagrams must be drawn wherever necessary.

3) Figures to the right indicate full marks.

Q1) Attempt the following in not more than 5 lines: **[16]**

a) What are Sedimentary rocks? Give two examples.

b) Mention any two properties of Atmosphere.

c) State the difference between Evaporation & Condensation.

d) Define: Weathering and write its types.

e) Write full form of OSHA and give examples of any two hazardous pollutants.

f) Define: Radioactive pollution and write sources of it.

g) What is Global warming?

h) Define: Marine pollution and write sources of it.

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

a) Explain soil profile with diagram.

b) What is a Landslide? Explain the causes of it.

c) Define: Lapse rate and explain its type.

d) Write sources and effects of Eutrophication.

e) Define: Radioactive pollution and mention its effects.

f) Discuss the sources & control measures of ground water pollution.

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

　　a)　What is Metamorphism? Discuss its types.

　　b)　What is an Earthquake? Mention its causes & effects.

　　c)　Write significance of Geothermal energy.

　　d)　Define: Solid Waste Pollution. Explain it with a local case study.

　　e)　Describe the effects of soil pollution on soil quality.

　　f)　Enlist any 4 major Air pollutants and discuss a case study of London Smog.

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

　　a)　What is Wind? Explain the factors affecting wind.

　　b)　Explain mitigation efforts for natural calamities.

　　c)　Discuss Surface Water Pollution with ref. to sources, effects and control measures.

　　d)　Classify various types of pollutants on the basis of physical environment & sources.

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

　　a)　Explain in detail Continental Drift Theory with ref. to objective, principles, basic concepts, evidences, objections, importance.

　　b)　Discuss Radioactive pollution with a case study of Hiroshima-Nagasaki.

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[5115] - 30

F.Y.B.Sc.

FOUNDATION COURSE (A COMPONENT) (Restructuring)

(2013 Pattern)

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

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

Q1) Explain the following concepts in 50 words each (any two)   **[10]**

   i)   Economy

   ii)   Hypothesis

   iii) Nation

   iv)   Equality

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

   i)   Religious value

   ii)   Globalization

   iii) National Integration

   iv)   Rule of law

   v)   Science

   vi)   Educational movements in India.

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

   i)   Describe the causes an consequences of growing population in India.

   ii)   Explain the Scientific methods.

   iii) State the characteristics of indian society.

iv)   Write the merits and demerits privatization.

v)   Write the causes of unemployment in India.

Q4) Write the answer any one of the following question in 500 words.   **[20]**

i)   What is democracy? Give an account on Indian Democracy

ii)   Give an account on indian religions

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[5115] - 30

F.Y. B.Sc.

FOUNDATION COURSE (A COMPONENT) (Restructiring)

पायाभूत अभ्यासक्रम

(2013 पॅटर्न)

(मराठी रूपांतर)

वेळ : 3 तास]   [एकूण गुण : 80

सूचना :– 1) सर्व प्रश्न सोडवीणे आवश्यक आहे.

2) उजवीकडील अंक पूर्ण गुण दर्शवितात.

3) संदर्भासाठी मूळ इंग्रजी प्रश्नपत्रिका पहावी.

प्र.1) पुढील संकल्पना 50 शब्दात स्पष्ट करा. (फक्त दोन)   [10]

i) अर्थव्यवस्था

ii) गृहितके

iii) राष्ट्र

iv) समता

प्र.2) पुढील टीपा 100 शब्दात लिहा (फक्त चार)   [20]

i) धार्मीक मूल्ये

ii) जागतिकीकरण

iii) राष्ट्रीय एकात्मता

iv) कायद्याचे अधिराज्य

v) विज्ञान

vi) भारतातील शैक्षणिक चळवळी

प्र.3) पुढील प्रश्नांची 200 ते 250 शब्दात उत्तरे लिहा. (फक्त तीन) **[30]**

      i)   भारतातील लोकसंख्या वाढीचे कारणे व परिणाम सांगा

      ii)   वैज्ञानिक पद्धती स्पष्ट करा.

      iii)   भारतीय समाजाची वैशिष्टे सांगा.

      iv)   खाजगीकरणाचे गुण दोष सांगा.

      v)   भारतीय बेरोजगाराची कारणे स्पष्ट करा.

प्र.4) पुढीलपैकी एका प्रश्नांचे उत्तर 500 शब्दात लिहा. **[20]**

      i)   लोकशाहीची व्याख्या देवून भारतीय लोकशाहीवर सविस्तर वृतांत लिहा.

      ii)   भारतातील प्रमुख धर्माविषयी सविस्तर माहिती द्या.

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F.Y. B.Sc. (Vocational)
INDUSTRIAL CHEMISTRY
Surface Chemistry and Catalysis
(Paper - I) (New) (2013 Pattern)

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

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

SECTION - I

Q1) Define and explain the following terms: **[8]**

    a)   Aerosol.

    b)   Gel.

    c)   Adsorbate.

    d)   Emulsion.

Q2) Answer <u>any two</u> of the following: **[8]**

    a)   Explain the ultrafiltration method for purification of sol.

    b)   State and explain Langmuir's adsorption isotherm.

    c)   Explain the characteristics of catalysis reactions.

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

    a)   Give a brief account of ion exchange adsorption.

    b)   Differentiate between physical and chemical adsorption.

    c)   Define negative catalysis with suitable example.

Q4) Answer <u>any one</u> of the following: **[8]**

    a)   Explain mechanical dispersion method using colloid mill for preparation of sol. Define Aerosols and micelles.

    b)   What are the different theories of catalysis? Explain the intermediate compound formation theory in detail.

Q5) Answer <u>any two</u> of the following: **[8]**

    a)   Explain the process of electrophoresis.

    b)   Where are the following catalysts used: Iron, Platinum-gauze, Nichel, $HgSO_4$?

    c)   Write a note on promotors.

SECTION - II

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

    a)   Define and explain the terms:

        i)   Equivalent weight.

        ii)   Fundamental quantities.

    b)   Define steady state with suitable example.

    c)   Define the term conversion.

    d)   State and explain specific heat capacity.

Q7) Answer <u>any two</u> of the following: **[8]**

    a)   Explain enthalpy change for pure substance.

    b)   Write a note on recycling and by passing operations.

    c)   Which are the different forms of energy?

Q8) Answer <u>any two</u> of the following: **[8]**

   a) State and explain excess reactant.

   b) Write a short note on material balance involved in extraction.

   c) Explain the terms stoichiometric equation and stoichiometric coefficients involved in chemical reactions.

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

   a) Derive the Gibb's phase rule and explain its application in one component system like water or sulphur.

   b) State and explain Hess's Law of constant heat summation.

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

   a) An aqueous solution of sodium chloride is prepared by dissolving 25g of NaCl in 100 gms water. Find:

      i)   Weight %

      ii)   Mole %

      iii) Composition (at. wt. of Na : 23, Cl = 35.5)

   b) The feed containing 60 mole % A, 30 mole % B and 10 mole % inerts enters a reactor. The product stream leaving the reactor is found to contain 2 mole % A. Reaction taking place is

      $$2A + B \rightarrow C$$

   c) A mixture of nitrogen and carbondioxide at 25ºC and one atmosphere pressure has an average molecular weight 31. What is the partial pressure of nitrogen.

F.Y. B.Sc. (Vocational)
BIOTECHNOLOGY
Voc. Bio-Tech. - 101 : Biochemistry and Microbiology
(2013 Pattern) (Paper - I)

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

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

SECTION - I
(Biochemistry)

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

a) What are polysaccharides? Give any one example.

b) Mention the components of a nucleotide.

c) Define catabolism? Name any one catabolic pathway.

d) What are phospholipids? Give an example.

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

a) What are lipoproteins? How they are further classified?

b) Explain the effect of pH on enzyme activity.

c) Differentiate between DNA and RNA.

d) Explain the features and energetic of β-oxidation of fatty acids.

e) Enlist various functions of proteins?

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

a) Give classification of carbohydrates with examples. Mention properties of monosaccharide.

b) Explain glycolysis in brief. Give the energetics and features of glycolysis.

c) Describe in detail the model of DNA proposed by Watson and Crick.

SECTION - II

(Microbiology)

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

a) Name any two dyes used in EMB agar.

b) Give two contributions of Louise Pasture in the field of microbiology.

c) What are phototrophs? Give one example.

d) Name any two capsulated organisms.

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

a) Why Gram staining is considered as differential staining? Explain.

b) Explain the method used for separation of antibiotic producers.

c) Write down the principle and method of staining endospores.

d) State Koch's postulates.

e) Explain spread plate technique.

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

a) Differentiate between enriched media and enrichment media with suitable example.

b) Explain it detail the steps involved in acid fast staining.

c) Give a detail account of media classification and mention importance of living media.

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[5115]-33

F.Y. B.Sc. (Vocational)
PHOTOGRAPHY AND AUDIO-VISUAL PRODUCTION
Basic Photography and Appreciation of Media
(Paper - I) (2013 Pattern)

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

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

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

    a) What is the use of the view finder in a DSLR camera?

    b) How important is the focal plane of a camera lens.

    c) What is the purpose of the white balance setting in a DSLR camera?

    d) A lighting condition gives an exposure of f8@1/125 sec for ISO 100. What will be the exposure for f 16 for the same ISO?

    e) What are blur lines? What does it indicate?

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

    g) What is the difference between refraction and diffraction of light?

    h) What do you mean by pixel? How is it important in digital photography?

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

    a) If you are a professional photographer how different you are than an amateur photographer?

    b) Draw a diagram and show the different types of distortions produced by a lens. How are these removed?

    c) Discuss the features of an ideal shutter.

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

    e) Draw a suitable diagram and explain the pin-hole image. What are the merits and demerits of this image?

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

a) Discuss your rights / privileges as a press photographer.

b) Discuss the importance of light and colour in photography.

c) Draw suitable diagrams and explain the rule of thirds and the rule of golden points. How are these useful in photographic composition?

d) What is the difference between a 'hard news' and a 'soft news'? How do you prepare for both types of news?

e) Discuss the importance of light and colour in photography.

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

a) Discuss application areas of photography.

b) How would you analyze photography as a medium of mass communication?

c) Discuss the importance of a photographic image in the print media.

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

a) Discuss any four elements of composition. Draw suitable sketches for supporting your discussion.

b) Explain the different parts of a DSLR camera and their functions.

c) Discuss the ethical norms a photojournalist should observe.

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[5115]-34

F.Y. B.Sc. (Vocational)
ELECTRONIC EQUIPMENT MAINTENANCE (EEM)
Maintenance Concepts, Instruments and Appliances
(Paper - I) (2013 Pattern)

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

Instructions to the candidates:

  1)   All questions are compulsory.

  2)   Figures to the right indicate full marks.

  3)   Draw neat diagrams wherever necessary.

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

  a)   Give significance of tolerance.

  b)   Draw dc voltmeter diagram with galvanometer.

  c)   What is MTBF and MTR?

  d)   Give color code of electrical wiring.

  e)   What are different failures of equipment?

  f)   What is redundancy term?

  g)   Enlist various protecting devices.

  h)   What are measurement errors?

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

  a)   Explain multirange ammeter with the help of diagram.

  b)   Draw block diagram of CRT.

  c)   Write short note on representation of data.

  d)   What is pulse generator? Explain in brief.

  e)   A dc voltmeter uses 150μA meter movement and having an internal resistance of 200Ω. Calculate value of the multiplier on the 50V range.

*Q3)* Answer any <u>four</u> of the following: [16]

   a)   What is Electronic Ignition system? Explain any one.

   b)   Explain uses of function generator.

   c)   What is spike protector? Explain in details.

   d)   Write short note on analog versus digital instruments.

   e)   Explain purpose of Megger with schematics.

Q4) Answer any <u>four</u> of the following: [16]

   a)   Give list of factors affects MTBF.

   b)   How to use signal generator for fault diagnosis.

   c)   What is loading effect?

   d)   What is autoranging and autotesting?

   e)   What are the safety precautions taken for Washing Machine.

Q5) Answer any <u>two</u> of the following: [16]

   a)   Draw neat diagram of Digital storage oscilloscope and explain all building blocks.

   b)   The voltmeter is connected across 50k resistor. If voltage across R_2 is to be measured by voltmeters having sensitivity of $12000\,\Omega/V$ and $15000\,\Omega/V$ with 50V range. Find which meter will read accurate voltage.
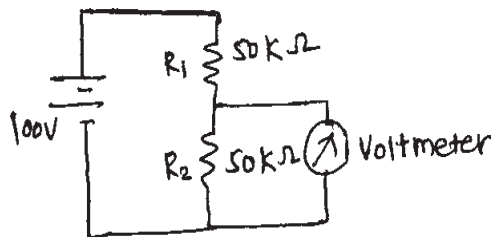
   c)   What is Digital clock? Draw block diagram of it and explain different sections in details.

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F.Y.B.Sc. (Vocational)

COMPUTER HARDWARE & NETWORK ADMINISTRATION

Essentials of Computers (Paper - I)

(2013 Pattern) (78710)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

1)   All questions are compulsory.

2)   Figures to the right indicate full marks.

3)   Draw neat diagrams wherever necessary.

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

    a)   Define bluetooth.

    b)   List different input devices of computer.

    c)   Write notes on Web camera.

    d)   Define micro SD card.

    e)   What is MODEM?

    f)   What is touch screen panel?

    g)   Define mother board.

    h)   Explain Instruction prefetch.

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

    a)   Write notes on RAM.

    b)   What is SMPS?

    c)   Write notes on HDD.

    d)   Explain working of inkjet printer.

    e)   Explain CPU with block diagram.

    f)   Define plotter.

Q3) Attempt any four: [16]

    a)   Explain working of barcode printer.

    b)   Explain generation of computer.

    c)   Write notes on front and rare panel of computer.

    d)   Explain various interrupts in computer.

    e)   Write a note on CPU cabinet.

    f)   How clock is obtained in computer.

Q4) Attempt any two: [16]

    a)   Explain different types of computer memory with examples.

    b)   Explain the working of online and off line UPS.

    c)   Define

         i)   Mouse

         ii)   Software

Q5) Attempt any two: [16]

    a)   Explain memory mapping.

    b)   Explain formatting and utility tools in computer.

    c)   Define

         i)   Digitizer.

         ii)   Touch screen panel.

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[5115] - 37

F.Y.B.Sc. (Vocational)
SEED TECHNOLOGY
Morphology, Plant Breeding and Testing for Cultivar Genuineness (Paper - I) (2013 Pattern)

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

Instructions to the candidates:

    1)   All questions are compulsory.

    2)   Figures to the right indicate full marks.

    3)   Draw neat labeled diagrams wherever necessary.

Q1) Answer in two lines (Any eight):   **[8×2=16]**

    a)   What is a Flower?

    b)   Give an example of capsule type of fruit. (Any two)

    c)   What is artificial vegetative reproduction?

    d)   What do you mean by selection activity in plant breeding?

    e)   Give any two demerits of plant introduction.

    f)   What is a Fruit?

    g)   Define mutagen.

    h)   What is peroxidase test?

    i)   Define tissue culture.

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

    a)   Describe male flower in wheat.

    b)   Explain any one method of natural vegetative propagation.

    c)   Write about the contrivances in cross pollination.

    d)   What is plant breeding? Write the scope and objectives of plant breeding?

    e)   Write application and limitations of mutation breeding.

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

   a)   Development of female gametophyte.

   b)   Development of megaspore.

   c)   Development of Dicot embryo.

   d)   Plant introduction.

   e)   Electrophoresis.

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

   a)   What is fertilization? Discuss process of double fertilization in angiosperms.

   b)   What is hybridization? Comment on intervarietal and distant hybridization.

   c)   Describe cypsella & caryopsis type of fruits with examples.

Q5) What is clonal selection? Write procedure, advantages, disadvantages and achievements of clonal selection. [16]

OR

Write the diagnostic characters, floral formula, floral diagram of the families solanaceae and liliaceae.

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[5115] - 38

F.Y.B.Sc. (Vocational)

INDUSTRIAL CHEMISTRY - II

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

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

Instructions to the candidates:

1) *All questions are compulsory.*

2) *Answers to the two sections should be written in separate answer books.*

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

4) *Draw neat diagrams wherever necessary.*

SECTION - I

Q1) Define and explain the following: **[8]**

a) Thermal cracking.

b) Octane number.

c) Water-gas.

d) Secondary fuels.

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

a) Give a brief account of destructive distillation of coal.

b) Give any one theory of origin of petroleum.

c) Describe the synthesis of bio-gas.

Q3) Attempt <u>any two</u> of the following: **[8]**

a) List advantages and disadvantages of solid fuel.

b) What are the properties of a good fuel.

c) Describe catalytic cracking giving suitable examples.

Q4) Attempt <u>any one</u> of the following: **[8]**

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

    b)   What is reforming? Describe the processes involved in it.

Q5) Answer <u>any two</u> of the following: **[8]**

    a)   Write a note on pulverised coal.

    b)   Give a comparative account of high and low temperature carbonisation.

    c)   Write a note on role of Sulphur and ash in coal.

SECTION - II

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

    a)   Define ore-dressing.

    b)   Give structural formula of talc.

    c)   Define pyrometallurgy. Give an example.

    d)   Define 'frother' and 'depressor' used in froth floatation process.

Q7) Answer <u>any two</u> of the following: **[8]**

    a)   Write a note on mica.

    b)   Differentiate between diamond and graphite.

    c)   What is metallurgy? Give it's divisions.

Q8) Answer <u>any two</u> of the following: [8]

    a)   Write a short note on alumina.

    b)   Explain the process of refining of metals, give any two processes of refining commonly used.

    c)   Compare metasilicates and pyrosilicates.

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

    a)   What is a furnace? List different types of furnaces used in metallurgy.

    b)   List the steps involved in the extraction of pure metals from their ores.

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

    a)   With suitable example explain the process of extraction of metals from their oxide ores.

    b)   What is a slag? Give the classification of silicate slags.

    c)   Write a short note on occurrence of metals.

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[5115] - 39

F.Y.B.Sc. (Vocational)
BIOTECHNOLOGY

Voc-Biotech: 102: Biophysics & Instrumentation, Mathematics, Statistics and Computers for Biologists
(2013 Pattern) (Paper - II)

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

Instructions to the candidates:

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

SECTION - I

(Biophysics and Instrumentation)

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

   a)   State the Lambert's law.

   b)   Give one application of density gradient centrifugation.

   c)   What are Isotopes? Give one example.

   d)   Give any two applications of SDS-PAGE.

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

   a)   Describe the principle and applications of thin layer chromatography.

   b)   Differentiate between nephelometry and turbidometry.

   c)   Write a short note on dark field microscopy.

   d)   Explain paper electrophoresis technique in detail.

   e)   Explain the calomel electrode with the help of neat labelled diagram.

P.T.O.

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

    a) Explain the principle of affinity chromatography. Add a note on its applications.

    b) Describe the principle and working of SEM.

    c) Discuss the role of radioisotopes in biological sciences.

SECTION - II

(Mathematics, Statistics and Computer for Biologists)

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

    a) If $f(x) = \cos(x^2 + 1)$, find $\dfrac{df}{dx}$.

    b) Evaluate $\lim\limits_{x \to \pi} \dfrac{\cos x}{1 - \cos x}$.

    c) What is search engine?

    d) Define mode.

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

    a) Evaluate $\displaystyle\int_0^1 \dfrac{3x+5}{x^2+x+1} dx$.

    b) If $f(x) = \begin{cases} \dfrac{x^3 - 4x}{x+2} & \text{if } x \neq -2 \\ 3 & \text{if } x = -2 \end{cases}$; find $\lim\limits_{x \to -2} f(x)$.

    c) Describe the test for goodness of fit with example.

d) What is correlation? Explain -ve correlation with suitable example.

e) Write a note on biological database.

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

a) i)   Find the limit of the sequence

$$\left\{ \frac{2^{n+1} + 3^{n+1}}{2^n + 3^n} \right\}_{n=0}^{\infty}.$$

ii) Discuss the convergence of the series

$$\sum_{n=0}^{\infty} \left(\frac{1}{2} \right)^n.$$

b) i)   If $y = \left(e^{x^2} - \sin (\log x) \right) \left(\sqrt{x^3 + 5} \right)$, find $\dfrac{dy}{dx}$.

ii) Evaluate $\displaystyle\int_{0}^{\pi/2} \sin^3 x \, dx.$

c) Explain the role and importance of computer in biological sciences.

d) What is mean? Calculate mean, mean deviation and standard deviation from the following data series:

24, 28, 32, 30, 23, 26, 27, 32, 30, 31, 32, 33, 26, 27, 29, 30, 31.

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[5115] - 40

F.Y.B.Sc. (Vocational)

PHOTOGRAPHY AND AUDIO - VISUAL PRODUCTION

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

(2013 Pattern)

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

Instructions to the candidates:

1) *All questions are compulsory.*

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

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

Q1) Attempt <u>any two</u> of the following: **[16]**

a) Give suitable examples and differentiate between verbal communication and non verbal communication.

b) Explain with suitable examples the definition of 'communication'.

c) Explain what is 'Inverted Pyramid'. How is it useful in a news report?

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

a) Explain Aristotle's model of communication.

b) Give suitable examples and compare 'intra-personal communication' and 'inter personal communication'.

c) You have to take an interview of a cricketer who has been declared as the Man of the Series. What questions will you ask him?

d) Explain the code of conduct applicable to the print media.

e) Explain the importance of language in communication.

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

a) What are the different content types? Give examples.

b) Explain with examples the importance of 5W and 1H questions in the context of news writing.

P.T.O.

c) Explain, with examples, the meaning of gate keepers.

d) Illustrate the Bharatshastra's model of communication.

e) What is the difference between group communication and mass communication?

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

a) Explain how communication impacts the audience.

b) Write a news report of about 100 words on inauguration of a five star hotel owned by a celebrity cricketer in your town. You can imagine the details and write.

c) What are the merits and demerits of radio as a medium of mass communication?

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

a) Explain the importance of photographs in newspapers and what precautions you would take while publishing the photographs.

b) Write short notes on

  i) Three stages of inter-personal communication

  ii) One-to-one communication

c) Draw the block diagram of Shanon and Weaver model of communication and explain each block.

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F.Y.B.Sc. (Vocational)

ELECTRONIC EQUIPMENT MAINTENANCE (EEM)

Electronic Components, Circuit and Equipment Assembly

(2013 Pattern) (Paper - II)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

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

Q1) Answer the following:

[16]

   a) Enlist the tools used for servicing by service engineer.

   b) What is difference between cell and battery?

   c) Explain use of breadboard.

   d) What is cold solderjoint?

   e) Explain use of MCB in electrical system.

   f) What are enclosure types of the equipments?

   g) What is data sheet?

   h) Give types of wires used for electrical wiring.

Q2) Attempt any four:

[16]

   a) What are different packages? Explain any one

   b) Explain the processes on PCB pattern transfer.

   c) Draw front panel diagram of signal generator.

   d) What are the common faults occured in Resistors?

   e) Draw electrical wiring diagram of tube light.

Q3) Attempt any <u>four</u>:   **[16]**

   a)   What is circuit board? Explain any one in brief.

   b)   Give applications of inductors and draw it's equivalent circuit.

   c)   What is Earthing? Give it's significance.

   d)   What are different sizes of cell?

   e)   What are advantages of ultrasonic soldering?

Q4) Attempt any <u>four</u>:   **[16]**

   a)   What is Electric shock? Give it's precautions.

   b)   What are CAD tools used for PCB design?

   c)   What are colour conventions in wires?

   d)   Explain any one standard of semiconductor numbering.

   e)   Describe losses in a capacitor and draw it's equivalent circuit.

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

   a)   How to use timer circuit for measurement of capacitor? Explain with the help of circuit diagram & Give it's formula.

   b)   Write down the special precautions to be taken while soldering IC. Give advantages of eutectic solder composition.

   c)   Enlist methods of Earthing and Explain plate earthing in details with diagram.

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

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

Instructions to the candidates:

1) All questions are compulsory.

2) Figures to the right indicate full marks.

3) All questions carry equal marks.

4) Draw neat and labeled diagrams wherever necessary.

5) Scientific calculators are allowed.

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

     a) What is seed investment?

     b) Enlist different criteria required for fulfillment of patent.

     c) Explain need of inoculum in fermentation process.

     d) Name any two products manufactured by using fermentation technology.

     e) Write examples of organisms which are considered as GRAS.

     f) Write any two examples of microbial culture collections.

     g) Explain the term 'Venture capitalists'.

     h) Name any two antibiotic producer microorganisms.

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

     a) Explain the concept of Biodeterioration with the help of suitable examples.

     b) Write role of 'marker' in recombinant DNA technology.

     c) Justify, 'successful biotechnology companies must combine scientific creativity with market need'.

P.T.O.

d) Explain the role of board of directors in managing Biotechnology Company.

e) Differentiate between batch fermentation process and continuous fermentation process.

f) Explain the concept of 'Secondary screening'.

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

a) Enzymes used in plant juice production.

b) Competitive intelligence.

c) Bioremediation.

d) Due diligence.

e) Bioinsecticide.

f) Capital cost.

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

a) Comment on starch processing enzymes.

b) Explain various factors affecting design and optimization of fermentation system.

c) Write a note on industrial nitrogen sources.

d) Justify the need of a business plan with the help of a suitable example.

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

a) Discuss in detail the targets of strain improvement program.

b) Discss the industrial applications of bulk microbial enzymes with the help of suitable examples.

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[5115] - 43

F.Y.B.Sc. (Vocational)

COMPUTER HARDWARE AND NETWORK ADMINISTRATION

Computer Organisation (Hardware & Software Aspects)

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

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

Instructions to the candidates:

1) *All questions are compulsory.*

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

3) *Draw neat diagrams wherever necessary.*

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

a) Define UART.

b) Define Firmware.

c) What is Editor?

d) Define USB.

e) What is LAN?

f) Explain any two arithmatical instructions of 8086.

g) What is Loader?

h) What is Compiler?

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

a) Define Math Co-Processor.

b) State the functions of DOS.

c) Define Network Operating system.

d) What is Multimedia?

e) Define:

i) Simulator

ii) Emulator

f) What is Algorithm?

P.T.O.

Q3) Attempt any FOUR: [16]

    a) Explain Flag register of 8086.

    b) List different network topologies.

    c) What is control panel of Window operating system?

    d) State the advantages of Window operating system?

    e) Explain data transfer instructions of 8086.

    f) Define Motherboard.

Q4) Attempt any TWO: [16]

    a) Define different types of software.

    b) Write short note on Window operating system.

    c) Explain logical system architecture of computer with diagram.

Q5) Attempt any TWO: [16]

    a) Explain FDC with block diagram.

    b) Define Tri-state buffer.

    c) Write short notes on:

        i) Hardware

        ii) Firmware.

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[5115] - 44

F.Y.B.Sc. (Vocational)
SEED TECHNOLOGY
Seed Physiology and Seed Production
(2013 Pattern) (Paper - II)

Time : 3 Hours]

[Max. Marks :80

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

Q1) Answer in two lines (Any eight):

[8×2=16]

   a) Define seed dormancy.

   b) What is seed deterioration?

   c) Enlist different methods of irrigation.

   d) Define seed viability.

   e) What are synthetic seeds?

   f) Enlist abiotic causes of plant diseases.

   g) Define genetic purity of seed.

   h) What are foundation seeds?

   i) Comment on roughing.

Q2) Attempt any FOUR of the following:

[4×4=16]

   a) Describe seed structure.

   b) Explain biochemical changes during seed germination.

P.T.O.

c) Describe various factors affecting seed dormancy.

d) Comment on land requirement and cultural practices in seed production.

e) Explain different methods of sowing.

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

a) Seed storage condition.

b) Seed pelleting.

c) National seed corporation.

d) Nursery beds.

e) Quality of irrigation water.

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

a) Comment on short term and long term storage.

b) Give an account of production of artificial seeds.

c) Describe various steps involved in maintenance of genetic purity.

Q5) Define seed vigour. Explain different factors affecting seed vigour. Add a note on importance of seed vigour. [16]

OR

Give an account of causal organism, symptom, disease cycle and control measures for early blight of tomato.

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