[4817]-2001

S.Y. B.Sc.

MATHEMATICS

MT-221 : Linear Algebra

(2013 Pattern) (Semester-II) (Paper-I)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

1)   *All questions are compulsory.*

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

Q1) Attempt <u>Any Five</u> of the following: **[10]**

a)   For which value of k will be the vector $\bar{v} = (1, -2, k)$ in $\mathbb{R}^3$ be a linear combination of the vectors $\bar{u} = (3, 0, -2)$ and $\bar{w} = (2, -1, -5)$?

b)   State by giving reasons, whether the set $w = \{(x, y, z) / x < y < z\}$ is a subspace of $\mathbb{R}^3$.

c)   Show that the set $\{1, e^x, e^{2x}\}$ forms a linearly independent set of vectors.

d)   Find the norm of the vectors $\bar{u} = (1, 1, -1)$ and $\bar{v} = (-1, 1, 0)$ in $\mathbb{R}^3$ with respect to the inner product defined by $<\bar{u}, \bar{v}> = u_1 v_1 + 2u_2 v_2 + 3u_3 v_3$ where $\bar{u} = (u_1, u_2, u_3)$ and $\bar{v} = (v_1, v_2, v_3)$.

e)   In an Euclidean inner product. Find the cosine of the angle between the vectors $\bar{u} = (1, -3), \bar{v} = (2, 4)$ of $\mathbb{R}^2$.

f)   State Cauchy - Schwartz's inequality.

g)   Let $T : \mathbb{R}^3 \to \mathbb{R}^3$ be the linear transformation given by

$$T(x, y, z) = (x + y - z, x - 2y + z, -2x - 2y + 2z).$$

Which of the following vectors are in Ker(T).

1)   (1, 2, 3)

2)   (1, 2, 1).

Q2) Attempt <u>Any Two</u> of the following: **[10]**

   a)   If W_1 and W_2 are two subspaces of a vector space V. Then prove that $W_1 + W_2$ is a subspace of vector space V.

   b)   If $\bar{u}, \bar{v}$ and $\bar{w}$ are vectors in inner product space, such that

$$\langle \bar{u}, \bar{v} \rangle = 2, \langle \bar{v}, \bar{w} \rangle = -3, \langle \bar{u}, \bar{w} \rangle = 5, \ \|\bar{u}\| = 1, \|\bar{v}\| = 2, \|\bar{w}\| = 7.$$

       Evaluate $\|\bar{u} - 2\bar{v} + 4\bar{w}\|$.

   c)   Find a linear transformation $T : \mathbb{R}^2 \to \mathbb{R}^2$, it is given that T(2, 3) = (3, 4) and T(1, 0) = (2, 0).

Q3) Attempt <u>Any Two</u> of the following: **[10]**

   a)   In any inner product space V and for $\bar{u}$ and $\bar{v}$ in V, show that

$$\langle \bar{u}, \bar{v} \rangle = 0 \Leftrightarrow \|\bar{u} + \bar{v}\| = \|\bar{u} - \bar{v}\|.$$

   b)   In $V = \mathbb{R}^3$. Let W = {(x, y, z) / x + y = z} prove that W is a subspace of vector space V.

   c)   Let $T : \mathbb{R}^3 \to \mathbb{R}^3$ be a linear transformation such that T(1, 0, 0) = (2, 4, –1), T(0, 1, 0) = (1, 3, –2), T(0, 0, 1) = (0, –2, 2) compute T(–2, 4, –1).

Q4) Attempt <u>Any One</u> of the following: **[10]**

   a)   Find the co-ordinate vector of (1, 2, 3) relative to basis $B = \{\bar{u}_1, \bar{u}_2, \bar{u}_3\}$, where $\bar{u}_1 = (1, 2, -3)$, $\bar{u}_2 = (1, -3, 2)$, $\bar{u}_3 = (2, -1, 5)$.

       Also find a vector whose co-ordinate vector relative to this basis is (3, 2, 1).

   b)   Let $\mathbb{R}^3$ have the Euclidean inner product. Use Gram - Schmidt's process to convert basis $B = \{\bar{u}_1, \bar{u}_2, \bar{u}_3\}$, where

       $\bar{u}_1 = (1, 0, 1), \bar{u}_2 = (-1, 1, 0), \bar{u}_3 = (-3, 2, 0)$ into an orthonormal basis.

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[4817]-2002

S.Y.B.Sc.

MATHEMATICS

MT-222 (A): Multivariable Calculus - II

(2013 Pattern) (Paper - II (A)) (Semester - II)

Time : 2 Hours] *[Max. Marks :40*

Instructions to the candidates:

 1) *All questions are compulsory.*

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

Q1) Attempt any <u>five</u> of the following: **[10]**

 a) If $\overline{f(t)} = \dfrac{\tan 3t}{t}\overline{i} + \dfrac{\log(1+t)}{t}\overline{j} + \dfrac{2^t -1}{t}\overline{k}$, if $t \neq 0$. Then find $\overline{f}(0)$ so that $\overline{f}$ is continuous at $t = 0$.

 b) Find unit tangent vector of the curve

 $\overline{r}(t) = (2+t)\overline{i} - (t-1)\overline{j} + t\overline{k}, 0 \leq t \leq 3$.

 c) Evaluate the line integral $\displaystyle\int_C (x - 3y^2 + z)ds$ from (0, 0, 0) to (1, 1, 1) along the line segment C.

 d) Find divergence and the curl of the vector field

 $\overline{f}(x,y,z) = x^2 y\overline{i} + 2y^3 z\overline{j} + 3z\overline{k}$.

 e) State Gauss's divergence theorem.

 f) Find the parametrization of the sphere $x^2 + y^2 + z^2 = a^2$.

 g) Prove $\displaystyle\int_C [(y+z)\overline{i} + (z+x)\overline{j} + (x+y)\overline{k}]\cdot d\overline{r} = 0$, where the line integral is taken along the closed curve C.

P.T.O.

Q2) Attempt any <u>two</u> of the following: **[10]**

a) If $\bar{f}(t) = f_1(t)\bar{i} + f_2(t)\bar{j} + f_3(t)\bar{k}$ is differentiable vector function of scalar variable t. Then show that $f_1(t), f_2(t), f_3(t)$ are differentiable scalar functions of scalar variable t.

b) Show that $\bar{f} = (e^x \cos y + yz)\bar{i} + (xz - e^x \sin y)\bar{j} + (xy + z)\bar{k}$ is conservative and find a potential function for it.

c) By using parametrization find the surface area of a sphere of radius a.

Q3) Attempt any <u>two</u> of the following: **[10]**

a) Find curvature for the helix $\bar{r}(t) = a\cos t\bar{i} + a\sin t\ \bar{j} + bt\bar{k}, a, b \geq 0$ and $a^2 + b^2 \neq 0$.

b) Find the work done by the force field $\bar{f}(x, y, z) = (x + y)\bar{i} + xy\bar{j} - z^2\bar{k}$ on a particle that moves along the line segment from $(1, 3, 1)$ to $(2, -1, 4)$.

c) Prove by using Stoke's theorem that $\int_C (\sin z\ dx - \cos x\ dy + \sin y\ dz) = 2$

where C is the boundary of the rectangle, $0 \leq x \leq \pi, 0 \leq y \leq 1; z=3$.

Q4) Attempt any <u>one</u> of the following: **[10]**

a) State and prove Green's theorem in a plane.

b) i) Evaluate $\iint_S (x\bar{i} + y\bar{j} + z^2\bar{k}) \cdot \hat{n}\ ds$ where s is the closed surface bounded by the cone $x^2 + y^2 = z^2$ and the plane $z = 1$.

ii) If $\dfrac{d\bar{u}}{dt} = \bar{w} \times \bar{u}$ and $\dfrac{d\bar{v}}{dt} = \bar{w} \times \bar{v}$ show that

$\dfrac{d}{dt} = (\bar{u} \times \bar{v}) = \bar{w} \times (\bar{u} \times \bar{v})$.

$\mathcal{EEE}$

[4817]-2003

S.Y.B.Sc.

PHYSICS

PH-221: Oscillations, Waves and Sound

(2013 Pattern) (Paper - I) (Semester - II)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:

    1)   *All questions are compulsory.*

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

    3)   *Draw neat diagrams wherever necessary.*

    4)   *Use of log tables and calculator is allowed.*

Q1) Attempt all the following: **[10]**

    a)   Define angular S.H.M.

    b)   What do you mean by unstable equilibrium?

    c)   Define quality factor (Q).

    d)   State the condition for overdamped harmonic motion.

    e)   List the forces involved in forced oscillations.

    f)   The velocity of transverse wave over a stretched string is 400 cm/sec. If its mass per unit length is 10 gm/cm, find the tension in string.

    g)   A spectral line of wavelength 6000 $\overset{o}{A}$ in the spectrum of star is found to be displaced from its normal position towards red end by 1 $\overset{o}{A}$. Calculate the velocity of star.

    h)   State Sabine's formula for reverberation time.

    i)   What is Doppler effect in sound?

    j)   What is violet shift?

Q2) Attempt <u>any two</u> of the following:

    a)   Define linear simple harmonic motion. Obtain an equation for period and frequency. **[5]**

    b)   Define the term log decrement (λ). Derive expression for it. **[5]**

    c)   Discuss the phenomenon of sharpness of resonance and show that how it depends upon damping factor (R). **[5]**

Q3) Attempt <u>any two</u> of the following:

    a)   The equation of forced oscillations of an oscillator is given as

$$4\left(\frac{d^2x}{dt^2}\right)+3\left(\frac{dx}{dt}\right)+36x=2.7\sin 3t,\text{ where all quantities are expressed in}$$

CGS unit. Determine the amplitude and phase difference between the periodic force. **[5]**

    b)   If $\phi=a\,e^{ik(x-ct)}$, show that it represent equation of wave motion. **[5]**

    c)   A person blowing a whistle is moving with a speed of 10m/s towards a rocky hill. Determine the apparent rise in frequency of echo heard by the person due to reflection from the hill. Assume air at rest, speed of sound is 330 m/s and frequency of whistle sound 200 Hz. **[5]**

Q4) a)   Attempt the following:

        i)   Electrons in an oscilloscope are deflected by two mutually perpendicular fields in such a manner that the displacement at any moment is given by $x = 4\sin(\omega t + 30°)$ and $y = 4\sin \omega t$. Find the nature and equation of path. **[4]**

        ii)   Describe Rayleigh disc method to determine intensity level of sound. **[4]**

OR

i) A capacitor of 2 μF, an inductor of 80 mH and the resistor are connected in series. What should be the value of resistance to make the circuit oscillatory? **[4]**

ii) Write a note on 'Seismic waves'. **[4]**

b) Attempt any <u>one</u>:

i) Distinguish between forced and damped oscillations. **[2]**

ii) The volume of the space in a hall is 1350 m^3. The total surface area of absorbers present is 135 m^2 (in open window units). Determine the reverberation time for the hall. **[2]**

$\mathcal{EEE}$

[4817]-2004

S.Y. B.Sc.

PHYSICS

PH - 222 : Optics

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

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

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

Q1) Attempt All of the following (One Mark Each): **[10]**

   a) Define power of the lens and state its unit.

   b) Two thin lenses of focal lengths 10cm & 6cm are placed co-axially at a certain distance apart. Calculate the distance between the lenses if these lenses form an achromatic combination.

   c) State the types of monochromatic obevrations.

   d) Define the magnifying power of compound microscope.

   e) Define the term diffraction of light.

   f) Define gratting element.

   g) State Malus law.

   h) What is double refraction?

   i) Calculate the magnifying power of a magnifying glass of 5cm focal length. Distance of distinct vision is 25cm.

   j) Define uniaxial crystal.

Q2) Attempt Any Two of the following: **[10]**

   a) What do you mean by achromatism? Derive the condition for the achromatism of two lenses in contact.

   b) Derive an expression for equivalens focal length of the two thin lenses in contact. Where the symbols have their usual meaning.

c) Obtain the condition $2\mu t \cos r = m\lambda$ for destructive interference in the refracted system of rays from a thin film.

Q3) Attempt Any Two of the following: **[10]**

a) Two thin converging lenses of focal lengths 15cm and 20cm are co-axially 10cm apart. An object is placed at a distance of 15cm from the first lens. Find:

   i) The position of the principle points &

   ii) The position of focal points.

b) A parallel beam of sodium light is allowed to incident normally on a plane grating having distance 0.20×10^{-5}m between its two corresponding points. A second order spectral line is observed to be deriated by 30°. Calculate the wavelength of the spectral line.

c) Find the polarising angles for light incident from water to glass and glass to water if refractive index of glass 4 water is 1.54 and 1.33 respectively.

Q4) a) Attempt the following:

   i) Derive the lens makers formula by using the equation of refraction at a single curved surface. **[4]**

   ii) Draw ray diagram of Ramsden exepiece and explain the principle points. **[4]**

OR

   i) Distinguish between Fraunhoffer's diffraction and Fresnel's diffraction. **[4]**

   ii) Describe the construction and working of Nicol prism. **[4]**

b) Attempt Any One of the following:

   i) State two differences between interference and diffraction. **[2]**

   ii) Two thin lenses of focal lengths 10cm and 6cm are placed co-axially at a certain distance apart. Calculate the distance between two lenses if the combination of lenses produces minimum spherical aberration. **[2]**

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[4817]-2005
S.Y. B.Sc.
CHEMISTRY
CH-221:Physical and Analytical Chemistry
(2013 Pattern) (Semester-II) (Paper-I)

Time : 2 Hours]   *[Max. Marks : 40*

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.*
  4) *Use of calculator is allowed.*
  5) *Answer to both sections should be written in separate answer sheet.*

SECTION-I

[Physical Chemistry]

Q1) Answer the following: **[5]**

  a)   What is mean by standard free energy of formation?

  b)   Give any two physical significance of free energy change.

  c)   State Raoult's law.

  d)   Define ideal and non-ideal solutions.

  e)   What is mean by mole fraction?

Q2) a) Attempt <u>any two</u> of the following.   **[6]**

  i)   Derive the relation between Kp and Kc.

  ii)   Explain the applications of Clapeyron's equation.

  iii) Discuss with the help of neat diagram, the effect of temperature on solubility of nicotine in water.

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

  i)   Define the term Gibb's free energy. Give its physical significance.

  ii)   What are P-N and T-N diagrams?

  iii) State Henry's law and give its applications.

P.T.O.

Q3) Solve <u>any two</u> of the following: **[5]**

a) Calculate the Gibb's free energy change when five moles of an ideal gas are compressed isothermally from 1atm to 100 atm at 25°C.
(Given: R = 8.314 Joule)

b) If the vapour pressure of water at 95°C and 100°C are 643 and 760mm respectively. Calculate heat of vaporization per mole for water.
(R =8.314 Joule)

c) In a mixture of X and Y, 0.7 molefraction of X and 0.3 mole fraction of Y are present. The vapour pressure of pure X is 2×10^2 N m^{-2} and the vapour pressure of pure Y is 3×10^2 Nm^{-2} at 25°C. Assuming that they form ideal solution. Calculate the total pressure and the partial pressure of X and Y of the solution at 25°C.

SECTION-II

[Analytical Chemistry]

Q4) Answer the following: **[5]**

a) Define the term Neutralization point.

b) How is iodine solution preserved?

c) What is complexometric titration?

d) What is iodometry?

e) Draw the structure of E.D.T.A. molecule.

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

i) Explain the titration curve of strong and strong base.

ii) Describe a method of standardisation of sodium thiosulphate with potassium dichromate.

iii) What are mixed indicators? Where are they used? Give preparation of any one mixed indicator.

b) Answer <u>any two</u> of the following: **[4]**

i) What is a primary standard? What are the requirements of a primary standard?

ii) Discuss the displacement titration with suitable example.

iii) What do you mean by end point and equivalence point in acid-base titrations.

Q6) Solve <u>any two</u> of the following: **[5]**

a)   Calculate the normality and strength of HNO_3 solution, when 23 ml of it react with 20ml 0.12N NaOH solution.(Given - Eq . Wt of $HNO_3 = 63$).

b)   What is the pH of solution after adding 5ml 0.1 N NaOH solution to 20ml 0.1N HCl solution?

c)   In a redox titration 60ml of 0.1N Ce^{+4} solution is added to a solution of 100ml 0.1M Fe^{2+} solution. Calculate E cell.

   (Given - $E°_{Fe^{+3}/Fe^{+2}} = 0.771$ volt)

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[4817]-2006

S.Y. B.Sc.

CHEMISTRY

CH - 222 : Organic and Inorganic Chemistry

(2013 Pattern) (Semester-II) (Paper-II)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

1) *Answers of the two sections should be written on separate answer books.*
2) *All questions are compulsory.*
3) *Neat diagrams must be drawn wherever necessary.*

SECTION-I

(Organic Chemistry)

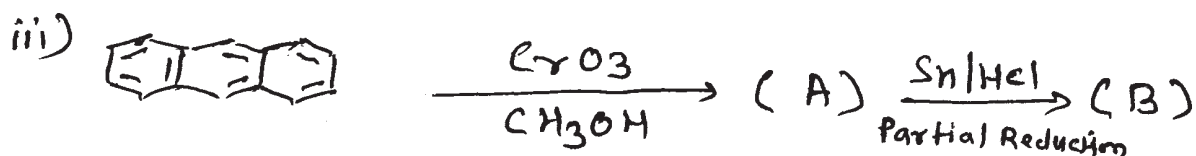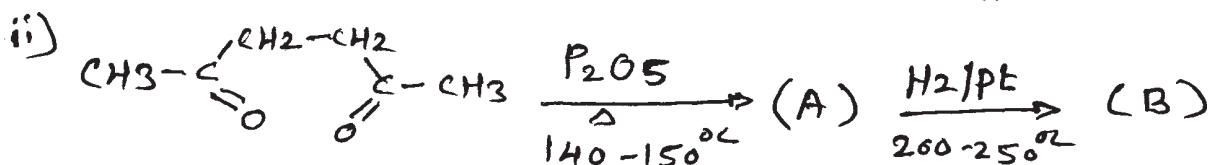*Q1)* Attempt the following: **[5]**

a)   What is Lindlar's catalyst? Give its important use.

b)   What is Huckel rule?

c)   Draw structure of sucrose.

d)   Define peptide bond.

e)   Which reagent is used to convert P-nitrobenzoyl chloride to P-nitrobenzaldehyde.

Q2) a)   Attempt Any Two of the following: **[6]**

i)   What is oxidation? Discuss cis-hydroxylation by Osmium tetroxide.

ii) Give synthesis of pyridine. What is the action of following on pyridine.

1) $KNO_3 \mid H_2SO_4$ 2) $H_2 \mid$ Pt at 25°C

iii) Explain with suitable examples Killiani - Fischer synthesis of carbohydrates.

b) Assign (A) and (B) of the following reaction (Any Two): [4]

i) $CH_3-CH_2-CH_2-OH \xrightarrow[PCC]{C_5H_5NH(CrO_3Cl)}$ (A) $\xrightarrow[H\oplus]{LiAlH_4}$ (B)

ii) $CH_3-C\underset{O}{\overset{CH_2-CH_2}{\langle}}\overset{O}{\underset{\parallel}{C}}-CH_3 \xrightarrow[140-150^\circ C]{P_2O_5 \atop \Delta}$ (A) $\xrightarrow[200-250^\circ C]{H_2/Pt}$ (B)

iii) [anthracene structure] $\xrightarrow[CH_3OH]{CrO_3}$ (A) $\xrightarrow[Partial\ Reduction]{Sn/HCl}$ (B)
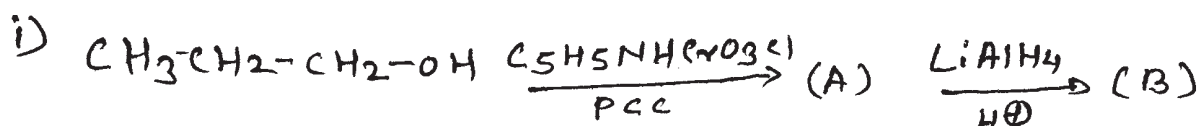
Q3) Attempt Any Two of the following: [5]

a) Distinguish between reducing agent $LiAlH_4$ and $NaBH_4$.

b) Discuss classification of α-amino acids, giving one example of each class.

c) Discuss α-helical structure of proteins.

SECTION-II

(Inorganic Chemistry)

Q4) Answer in One sentence: [5]

a) What is diamagnetism?

b) Define the term hydroformylation.

c) Define acids and bases on the basis of Arrhenius theory.

d) What is mean by Minamata?

e) What are oxyacids?

Q5) a)   Attempt Any Two of the following: **[6]**

   i)   What are transition elements? Comment on their properties
        1) Magnetic behaviour   2) Colour.

   ii) Define EAN rule. Findout the valence electrons in the following
        metal carbonyls

        1) $[Mo(CO)_6]$, and   2) $[Ni(CO)_4]$

        Atomic number of Mo = 42 and Ni = 28.

   iii) Explain the Lewis concept of acids and bases. Give its merits and
        demerits.

   b)   Attempt Any Two of the following: **[4]**

   i)   Explain biochemical methylation.

   ii) Why transition metals have ability to form co-ordination compounds?

   iii) Why $HClO_4$ is stronger acid than $HClO_3$?

Q6) Answer Any Two of the following: **[5]**

   a)   Write a note on Biochemical effect of Lead.

   b)   What is spin only formula? Calculate magnetic moment of Cr^{3+} and Co^{2+}
        (At. No. of Cr = 24 and Co = 27) by using spin only formula.

   c)   Draw the solid state structures of

        1) $Os(CO)_5$ 2) $Cr(CO)_6$

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[4817]-2007

S.Y. B.Sc.

BOTANY-I

BO-221:Plant Anatomy and Embryology

(2013 Pattern) (Semester-II) (Paper-I)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

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

Q1) Attempt the following: **[10]**

a)   Enlist the types of simple tissues.

b)   What is cambium?

c)   Define Inextensibility.

d)   What is non glandular hair?

e)   Give the function of lenticels.

f)   Enlist the types of tapetum.

g)   Give any two scope of plant embryology.

h)   What is triple fusion?

i)   Define mesogamy.

j)   What is nuclear endosperm?

Q2) Answer any Two of the following.   **[10]**

a)   Describe the distribution of mechanical tissues in monocot root.

b)   Give the structure and functions of phloem.

c)   Describe the structure of dicot seed.

Q3) Write notes on any two of the following. **[10]**

     a)   Structure of male gametophyte.

     b)   Double fertilization and its significance.

     c)   Types and functions of glandular hairs.

Q4) Describe the anomalous secondary growth in <u>Bignonia</u> stem. **[10]**

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

What is ovule? Enlist its various types and describe the structure of typical ovule.

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[4817]-2008

S.Y.B.Sc.

BOTANY

BO-222: Plant Biotechnology

(2013 Pattern) (Paper - II) (Semester - II)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:

    1)   *All questions are compulsory.*

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

    3)   *Draw neat labelled diagrams wherever necessary.*

Q1) Answer the following: **[10]**

    a)   What is biotechnology?

    b)   State any two industrial applications of enzymes.

    c)   Enlist states of fermentation.

    d)   Define SCP.

    e)   What is rhizofiltration?

    f)   What are plasmids?

    g)   Enlist any two examples of transgenic plants.

    h)   What is nanopesticide?

    i)   Enlist types of vectors used in gene cloning.

    j)   What are restriction enzymes?

Q2) Answer <u>any two</u> of the following: [10]

   a)   Describe biolistic method of gene transfer.

   b)   Explain the structure of T_1 plasmid.

   c)   Describe mass cultivation of <u>Spirulina</u> by using waste water system.

Q3) Write short notes on <u>any two</u> of the following: [10]

   a)   Phytostabilization.

   b)   Structure of DNA.

   c)   Application of genetic engineering in improving insect resistance.

Q4) What are enzymes? Describe various techniques of enzyme immobilization.**[10]**

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

What is bioreactor? Describe in detail tubular tower bioreactor.

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[4817]-2009

S.Y. B.Sc.

ZOOLOGY

ZY - 221 : Animal Systematics and Diversity-IV

(Revised) (2013 Pattern) (Semester-II) (Paper-I)

Time : 2 Hours]   *[Max. Marks : 40*

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) Attempt the following: **[10]**

a)   Give two examples of subclass theria.

b)   What is hemibranch?

c)   Write the names of any two digestive glands present in Scoliodon.

d)   What is the function of clasper?

e)   What is shagreen?

f)   Mention any two examples of fish catching beak.

g)   Write any two desert adaptations in reptiles.

h)   Give two examples of egg laying mammals.

i)   Enlist any two examples of poisonous snakes.

j)   Enlist any two names of cavities of brain in Scoliodon.

Q2) Write short notes on: (Any Two):   **[10]**

    a)   Latitudinal and longitudinal migration in birds.

    b)   Aquatic mammals.

    c)   Membranous Labyrinth.

Q3) Attempt the following (Any Two):   **[10]**

    a)   Explain raptorial and wading feet.

    b)   Write distinguishing characters of subclass neornithes.

    c)   Sketch and label-digestive system of Scoliodon.

Q4) Describe the structure and working of heart in Scoliodon.   **[10]**

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

Give general characters of class reptilia and distinguishing characters of subclass diapsida.

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[4817]-2010

S.Y. B.Sc.

ZOOLOGY

ZY - 222 : Applied Zoology - II

(Apiculture and Sericulture)

(51522) (2013 Pattern) (Semester - II) (Revised) (Paper - II)

Time : 2 Hours]   *[Max. Marks : 40*

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) Attempt the following: **[10]**

    a)   What is 'absconding'?

    b)   Give biological name of 'Muga Silk Worm'.

    c)   Enlist the uses of Hive tool.

    d)   What is stiffling?

    e)   Give biological name of garden bee.

    f)   What are mountages?

    g)   Mention two enemies of bees.

    h)   What is Pebrine?

    i)   Give uses of Royal Jelly.

    j)   Define: 'Non-hibernating egg'.

Q2) Write short notes on (Any Two):   **[10]**

    a)   Composition and uses of honey.

    b)   Hoffman type hive frame.

    c)   Bed cleaning methods in sericulture (any two):

Q3) Attempt the following (Any Two): **[10]**

   a)   Describe round dance in bees.

   b)   Explain rearing techniques in sericulture.

   c)   Describe <u>any two</u> non-mulberry silkworms.

Q4) What is polymorphism? Describe polymorphism and division of labour in honey bees. **[10]**

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

With neatly labelled diagram describe life cycle of mulberry silkworm.

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[4817]-2011

S.Y. B.Sc.

GEOLOGY

GL-221:Petrology

(2013 Pattern) (Semester-II) (Paper-I)

Time : 2 Hours]

[Max. Marks : 40

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

Q1) Answer the following questions

[10]

a) Crystallites and microlites.

b) Roundness of sediments.

c) Slaty cleavage

d) Holocrystalline texture.

e) Quartz arenite.

f) Pyrometamorphism.

g) Eutectic crystallization.

h) Intrastratal solution.

i) Mud cracks.

j) Mylonite.

Q2) Write notes on (any two)

[10]

a) Crystallization of unicomponent magma.

b) Thermal metamorphism of pure limestone.

c) Diagenesis of sediments.

Q3) Answer the following (any two): **[10]**

    a)   Biochemical deposits.

    b)   Porphyritic texture.

    c)   Stress and anti-stress minerals.

Q4) Name some primary sedimentary structures. Describe graded bedding and cross bedding with its significance. **[10]**

OR

What is the effect of pressure, temperature, viscosity on the magma?

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[4817]-2012
S.Y. B.Sc.
GEOLOGY
GL - 222 : Stratigraphy & Palaeontology
(Semester - II) (Paper - II) (2013 Pattern)

Time : 2 Hours]

[Max. Marks : 40

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

Q1) Answer the following questions:　　　　　　　　　　　　　　　　**[10]**

a) What is macroevolution?

b) What is nannopalaeontology?

c) What are Foraminifers?

d) What are Radiolarians?

e) What are Diatoms?

f) What are the three principles of stratigraphy?

g) What is the principle of faunal seccession?

h) Define 'Group' in lithostratigraphy.

i) What are the different members in chronostratigraphic units.

j) What are the factors responsible for stratification?

Q2) Write notes on (any two):　　　　　　　　　　　　　　　　　**[10]**

a) Biostratigraphic units.

b) Correlation by lateral continuily of strata.

c) Types of hinges in Ostracods.

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Q3) Explain the following (any two): [10]

    a)   Evolutionary trends in the glabella of trilobites.

    b)   Maceration technique.

    c)   Channel and spot sampling.

Q4) Explain the morphology of hard parts of Ostracods. [10]

OR

Describe the environmental classification of unconformities.

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[4817]-2013

S.Y. B.Sc.

STATISTICS

ST-221: Statistical Methods and Use of R-Software

(2013 Pattern) (Semester-II) (Paper-I)

Time : 2 Hours] *[Max. Marks : 40*

Instructions to the candidates:

1) All questions are compulsory.

2) Figures to the right indicate full marks.

3) Use of scientific calculator and statistical tables is allowed.

4) Symbols and abbreviations have their usual meanings.

Q1) Attempt each of the following: **[1 each]**

a) Choose the correct alternative in each of the following:

   i) The multiple correlation coefficient is invariant under the change of

   A) Origin

   B) Scale

   C) Origin and Scale

   D) Neither origin nor scale

   ii) Type I error is

   A) Accepting H_0 when it is false

   B) Rejecting H_0 when it is false

   C) Accepting H_0 when it is true

   D) Rejecting H_0 when it is true

   iii) The ratio of births to the total deaths in a year is called.

   A) Vital index

   B) Population death rate

   C) Total fertility rate

   D) Survival rate

b) State whether the given statement is true or false in each of the following. **[1 each]**

   i) Level of significance lies between 0 and 1.

   ii) The range in which multiple correlation coefficient lies is -1 to 1

   iii) If N.R.R > 1 then there is increase in population.

c) Define hypothesis. **[1]**

d) Define level of significance **[1]**

e) Write a command in R-software to draw a random sample of size 5 from a population of 50 units by SRSWR and store it into a vector. **[1]**

f) If $\lambda = 12$ per hour and $\mu = 15$ per hour in M/M/1 model then find average length of queue of the system. **[1]**

Q2) Attempt any two of the following: **[5 each]**

a) Define crude death rate and standardized death rate. Explain direct method of standardization.

b) A sample of 400 electric bulbs from company A, gave an average life of 1225 hours with a standard deviation 42 hours, where as sample of 200 electric bulbs from company B, gave an average life 1265 hours with a standard deviation 60 hours. Can we say that the two companies are producing electric bulbs of same average life? Use 5% level of significance.

c) With usual notations, prove that

$$b_{yx_2 \cdot x_3} = \frac{b_{yx_2} - b_{yx_3} b_{x_3 x_2}}{1 - b_{x_2 x_3} b_{x_3 x_2}} \quad \text{i.e.} \quad b_{12.3} = \frac{b_{12} - b_{13} b_{32}}{1 - b_{23} \cdot b_{32}} \quad (\text{where } 1 \equiv y, \ 2 \equiv x_2, 3 \equiv x_3)$$

Q3) Attempt any two of the following: **[5 each]**

a) Derive the expression for multiple correlation coefficient $R_{Y \cdot X_2 X_3}$ (i.e. $R_{1.23}$) in terms of total correlation coefficients.

b) Describe large sample test for testing H_0: $\mu = \mu_0$ against

   i) $H_1 : \mu \neq \mu_0$

   ii) $H_1 : \mu > \mu_0$

   iii) $H_1 : \mu < \mu_0$

   where μ is the population mean from which the sample is drawn, the population variance is known.

c) The time in minutes taken by two experts to respond the queries is as follows:

Expert I : 6 9 4 1 9 9 3 4 10

Expert II : 5 7 4 1 8 7 4 3 9

Write commands in R-software to carryout at 1% level of significance, whether the variability in time taken by expert I is greater than that of expert II.

Q4) Attempt any one of the following:

a) i) Derive the equation of regression plane of Y on X_1 and X_2 using the method of least squares. **[6]**

   ii) Explain how to construct 100 $(1-\alpha)$% confidence interval for population proportion. **[4]**

b) i) Describe large sample test procedure to test $H_0: P_1=P_2$ against $H_1: P_1 \neq P_2$ where P_1 and P_2 are population proportions. **[6]**

   ii) Customers arrive at a certain petrol pump in a Poisson process with an average time of 5 minutes between arrivals. The time interval between services at the petrol pump follow exponential distribution and the mean time taken to service a vehicle is 2 minutes.

   I) Find the probability that the pump is idle.

   II) What is the expected length of the system?

   III) What would be average waiting time in the queue?

   IV) Obtain average time spent by a customer in the system. **[4]**

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[4817]-2014

S.Y. B.Sc.

STATISTICS

ST - 222 : Sampling Distributions and Inference

(2013 Pattern) (Semester - II) (Paper - II)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

1)   All questions are compulsory.

2)   Figures to the right indicate full marks.

3)   Use of calculators and statistical tables is allowed.

4)   Symbols and abbreviations have their usual meaning.

Q1) Attempt each of the following:

a) Choose the correct alternative in each of the following: **[1 each]**

i) If a r.v. X follows χ^2 distribution with n d.f. then the variance of X is

A) $2n$ B) $4n$

C) n D) $n(n-1)$

ii) The standard error of a statistic (T) is

A) Mean (T)   B) Median (T)

C) Standard Deviation (T)   D) Variance (T)

iii) To test equality of two population means of two Normal Populations (with equal unknown σ^2), $H_0 : \mu_1 = \mu_2$ against $H_1 : \mu_1 \neq \mu_2$, the statistic (T) under H_0 follows a

A) F distribution with n_1, n_2 degrees of freedom

B) t distribution with $n_1 + n_2 - 2$ degrees of freedom

C) t distribution with n degrees of freedom

D) Chi-Square distribution with n degrees of freedom

b) State whether each of the following statements is true or false: **[1 each]**

   i) A statistic is a function of the parameter values.

   ii) If a r.v. T follows t distribution with n degrees of freedom then r.v. T^2 follows F Distribution with 1 and n degrees of freedom.

   iii) $(nS^2)/\sigma^2$ follows a Chi square distribution with $(n-1)$ degrees of freedom.

c) What is the value of coefficient of skewness (γ_1) for t distribution with n degrees of freedom? Give conclusion about the skewness of t distribution. **[1]**

d) State $100(1-\alpha)\%$ confidence interval for population mean μ, when variance σ^2 is unknown. **[1]**

e) State the test statistic of McNemar's test. **[1]**

f) A r.v. F~$F_{n,n}$ distribution. Give the value of its median. **[1]**

Q2) Attempt any two of the following: **[5 each]**

a) State and prove the additive property of χ^2 distribution.

b) If X_1, X_2, ..., X_n is a random sample from a normal population with mean μ and variance σ^2 (unknown) then explain the procedure to carry out appropriate test for $H_0 : \mu=\mu_0$ against $H_1 : \mu\neq\mu_0$.

c) If $\bar{x}$ and S^2 are the mean and variance of a random sample of size 25 from N($\mu = 3$, $\sigma^2 = 100$) distribution, evaluate P[$(0 < \bar{x} < 6)$ and $(55.2 < S^2 < 145.6)$].

Q3) Attempt any two of the following: **[5 each]**

a) If a r.v. T follows Student's t distribution with n degrees of freedom then prove that; as $n \rightarrow \infty$, the probability distribution of r.v. T tends to N(0, 1).

b) If X_1, X_2, ..., X_n is a random sample from a N(μ,σ^2) distribution then explain the test procedure to carry out appropriate test for $H_0 : \sigma^2=\sigma^2_0$ against $H_1 : \sigma^2\neq\sigma^2_0$.

c) The following information is on father's occupation and son's occupation:

	Father in Service	Father in Business
Son in Service	82	18
Son in Business	26	44

Carry out an appropriate test and give conclusions about independence of the two attributes. (Use l.o.s. $\alpha = 0.05$)

Q4) Attempt any one of the following:

a) i) Define Snedecore's F distribution. Derive its mean. **[5]**

   ii) A test in English was given to 30 boys and 20 girls. The average marks for boys is 70 with standard deviation 9 while average marks for girls is 80 with standard deviation 6. Carry out an appropriate test for testing $H_0 : \sigma_1^2 = \sigma_2^2$ against $H_1 : \sigma_1^2 > \sigma_2^2$.

   (Use l.o.s. $\alpha = 0.01$). **[5]**

b) i) Explain the paired t test for testing $H_0 : \mu_d = 0$ against $H_1 : \mu_d \neq 0$. Give a real life situation of it. **[5]**

   ii) If a r.v. $X \sim F_{m,n}$ distribution and r.v. $Y \sim F_{n,m,}$ show that $P[X \geq k] + P[Y \geq 1/k] = 1$, k>0. **[2]**

   iii) If X_1, X_2 are i.i.d $N(10, 1)$ random variables then evaluate $P[(X_1 - X_2)^2 < 2.2]$. **[3]**

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[4817]-2015

S. Y. B.Sc

GEOGRAPHY

Gg-211:Geography of Resources-II

(Semester-II) (Paper-I) (2013 Pattern)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

 1) All questions are compulsory.

 2) Figures to the right indicate full marks.

 3) Draw neat diagrams and sketches wherever necessary.

 4) Use of map stensils is allowed.

Q1) Answer the following questions in two to three sentences each (Any ten):**[10]**

 a)   Name any two bauxite producing countries in the world.

 b)   Name any two iron ore producing states in India

 c)   Name any two major coal producing countries in the world.

 d)   Write any two advantages of wind energy

 e)   Name any two nuclear power plants in India

 f)   Name the types of coal.

 g)   Name two natural gas producing countries in the world.

 h)   What is optimum population?

 i)   What is under population?

 j)   Name any two densely populated countries in the world.

 k)   Name any two sparsely populated states in India.

 l)   Write any two causes of overpopulation.

 m)   What is resource planning.

Q2) Write short notes on the following (any two): **[10]**

    a)   Bauxite production in India.

    b)   Significance of solar energy.

    c)   Effects of over population.

    d)   Need for resource planning.

Q3) Answer the following questions in 100 words each (any two). **[10]**

    a)   Distribution of petroleum resources in India.

    b)   Discuss population as a resource.

    c)   Explain the role of energy resources in economic development

    d)   Discuss, resource planning with reference to India.

Q4) Answer the following question in 200 words (any one): **[10]**

    a)   Explain the role of land resources in economic development

    b)   Discuss the world distribution and production of iron ore.

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[4817]-2016
S.Y.B.Sc.
GEOGRAPHY
Gg-212: Watershed Management -II
(2013 Pattern) (Paper - II) (Semester - II)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:

1)   All questions are compulsory.

2)   Figures to the right indicate full marks.

3)   Draw neat diagrams and sketches wherever necessary.

4)   Use of map stencils is allowed.

Q1) Answer the following questions in two or three sentences each (Any ten):**[10]**

a)   What is resource appraisal?

b)   Write any two watershed survey tasks.

c)   What is watershed planning?

d)   Write any two environmental benefits of watershed planning.

e)   Write any two objectives of watershed planning in production oriented sustainability.

f)   What is food security?

g)   What is capacity building?

h)   What is check dam?

i)   Write any two controlling measures for water conservation.

j)   What is watershed development programme?

k)   Write any two components of watershed development.

l)   Write any two purposes of watershed development programme.

m)   Give long form of DPAP.

Q2) Write short notes on the following (Any two):   **[10]**

    a)   Benefits of watershed survey.

    b)   Livelihood security.

    c)   Water harvesting techniques.

    d)   Watershed development programme in Maharashtra.

Q3) Answer the following questions in 100 words each (Any two):   **[10]**

    a)   Describe the processes of resource mapping.

    b)   Explain the watershed planning technology.

    c)   Discuss the plan for watershed planning.

    d)   Explain the role of forestation and plantation in watershed development.

Q4) Answer the following question in 200 words (Any one):   **[10]**

    a)   Explain the importance of watershed planning in national development.

    b)   Discuss the traditional methods of water harvesting.

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[4817]-2017

S.Y. B.Sc.

MICROBIOLOGY

MB-221: Bacterial Genetics

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

Time : 2 Hours] *[Max. Marks : 40*

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

Q1) Attempt the following: **[10]**

a) Bacterial DNA is in double stranded form T/F.

b) What is the function of DNA ligase.

c) What is mean by transversion mutation.

d) What is plasmid incompatibility

e) ------------------increases positive supercoiling of DNA.

f) Misense mutations are less harmful than transitional mutation T/F.

g) Gene mutations occurs at the time of ------------------
   i) DNA transcription   ii) DNA replication
   iii) Gene expression   iv) Gene activation.

h) Define "Gene"

i) Define "Codon"

j) Plasmids do not code essential genes T/F.

Q2) Attempt any two of the following: **[10]**

a) Diagrammatic representation of formation of initiation complex in translation.

b) Diagrammatic representation of Griffith experiment.

c) Describe role of bacteriophage(*λ*)as a mutagenic agent.

Q3) Answer any two of the following: **[10]**

    a)   Give comparative account of different forms of DNA.

    b)   Describe the structure and properties of plasmid.

    c)   What are base analogues. Explain mutations caused by base analogues with suitable example.

Q4) What are intercalating agents. Explain mutations caused by any two suitable examples of it. **[10]**

OR

What is DNA replication Enlist various models of DNA replication. Describe J-Cairn's experiment of DNA replication.

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[4817]-2018

S.Y. B.Sc.

MICROBIOLOGY

MB - 222 : Air and Water Microbiology

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

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

1)   All questions are compulsory.

2)   Figures to the right indicate full marks.

3)   Draw neat labelled diagram wherever necessary.

Q1) Answer the following: **[10]**

a)   Define Aerosols.

b)   Enlist any two agencies which governs bacteriological standards of potable water.

c)   Define Distilled water.

d)   Determination of total solids in waste water gives an idea about

   i)   Foulness of sewage

   ii)   pH of sewage

   iii) Temperature of sewage

   iv)   Color of sewage

e)   Potassium dichromate added in COD test is redox reagent - State True or False.

f)   Name any two bacterial air borne infections.

g)   Name any two sources of Nitrogen oxide in air.

h)   Typhoid disease is a water borne infection state true or false.

i)   Define Biomagnification.

j)   Enlist any two types of anaerobic digesters.

Q2) Attempt <u>any two</u> of the following: **[10]**

    a)   Describe sedimentation & Thermal precipitation method for air sampling.

    b)   Define BOD. Describe its significance in analysis of waste water.

    c)   Describe the significance of bacteriological indicators of fecal pollution of water.

Q3) Solve <u>any 2</u> of the following: **[10]**

    a)   Justify, "Air flora is transient".

    b)   Describe the advantages & disadvantages of trickling filters.

    c)   Describe Membrane Filter Technique to test potability of water.

Q4) Attempt <u>any one</u> of the following: **[10]**

    a)   Describe the activated sludge method in Secondary Treatment of effluent water.

    b)   Illustrate the 'Presumtive Coliform count test' for monitoring water for potability.

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[4817]-2019

S.Y. B.Sc.

PSYCHOLOGY

Health Psychology

(2013 Pattern) (Semester-II) (Paper-I)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

   1)   Attempt all questions.

   2)   Draw diagrams and figures wherever necessary.

   3)   Figures to the right indicate full marks.

Q1) Answer in <u>two</u> or <u>four</u> sentences   **[16]**

   a)   Who introduced Bio-psycho-social model of illness and Biomedical
        model of illness?

   b)   Define Burnout.

   c)   What is defensive coping?

   d)   Define habit

   e)   What is AIDS?

   f)   What is learned heplessness?

   g)   What is PTSD?

   h)   Define nutrition.

Q2) Attempt any two of the following in eight or ten sentences.   **[8]**

   a)   Explain mind and body connection.

   b)   Describe the effect of overeating on health.

   c)   Describe problem focused constructive coping.

Q3) Write short notes on <u>any two</u> of the following: **[8]**

    a)   Bio medical model of illness.

    b)   Giving up.

    c)   Appraisal focused constructive coping.

Q4) Define health psychology. Discuss the importance of psychology in health.**[8]**

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

Explain major types of stress in detail.

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[4817]-2020
S.Y. B.Sc.
PSYCHOLOGY
Psychological Testing and Assessment
(2013 Pattern) (Semester - II) (Paper - II)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:
1) *Attempt all questions.*
2) *Draw diagrams and figures wherever necessary.*
3) *Figures to the right indicate full marks.*

Q1) Answer in <u>two</u> or <u>four</u> sentences:

[16]

a) Define a Psychological test.

b) What is achievement?

c) Define a mental disorder.

d) What is DSM?

e) What is an aptitude?

f) Define attitude.

g) Define Personality.

h) What is a Neuropsychological test?

Q2) Answer any <u>two</u> of the following in eight or ten sentences.

[8]

a) Describe the difference between checklist and rating scales.

b) What is clinical interview? Explain types of clinical interview.

c) Describe any one type of test of General intellectual ability.

Q3) Write short notes on any <u>two</u> of the following: **[8]**

    a)   Work preference Inventory.

    b)   Forensic Psychological assessment.

    c)   Observation method.

Q4) Explain the Neuropsychological examination. **[8]**

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

Explain any two types of personality tests.

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[4817]-2023

S.Y. B.Sc.

ELECTRONIC SCIENCE

82212 : Electronic Instrumentation

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

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

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

Q1) Attempt All of the following:

   a)   Define the term sensitivity of the system.   **[1]**

   b)   State any two types of CRO probes.   **[1]**

   c)   What is techometer?   **[1]**

   d)   Define CVCC power supply.   **[1]**

   e)   "CRO can also be used for component testing". Comment.   **[2]**

   f)   "Initialization of pH measurement is at pH = 7", comment.   **[2]**

   g)   When V_{NL} = 10V and V_{FL} = 9.6V, calculate load regulation of power supply.   **[2]**

   h)   What will be read out of 330Ω resistor on 400Ω and 1kΩ scales.   **[2]**

Q2) Attempt Any Two of the following:

   a)   Draw schematic diagram and explain working of PMMC DC voltmeter.
                                                                                    [4]

   b)   Compare dual trace and dual beam CRO.   **[4]**

   c)   Explain working of DFM with neat diagram and state any two applications of it.   **[4]**

Q3) Attempt Any Two of the following:

    a)   Draw and explain block diagram of 'Digital storage oscilloscope'. **[4]**

    b)   What is pH meter? Draw block diagram of digital pH meter. **[4]**

    c)   Draw and explain block diagram of ONLINE UPS. **[4]**

Q4) Attempt All of the following:

    a) i)   Draw and explain block diagram of signal generator. **[4]**

        ii)   Write short note on A.C. Voltmeter. **[2]**

    b) i)   Draw and explain block diagram of DC to DC converter. **[4]**

        ii)   Draw block diagram of measurement system. **[2]**

OR

Attempt All of the following:

    a)   Design 0-30V range voltmeter with D'Arsonval moment. If full scale deflection is 50 μA and internal resistance of coil is 100Ω. Find the value of series resistance and draw diagram of it. **[4]**

    b)   What is regulation? Calculate line regulation if output voltage of power supply changes by 1V for 10V change in input volt. **[4]**

    c)   In potential divider circuit shown in the diagram LDR is having resistance 500Ω with light incident on it and changes to 100Ω with light incident. If V_{CC} is 10V given find the output voltage with light incident and without light incident on LDR. **[4]**
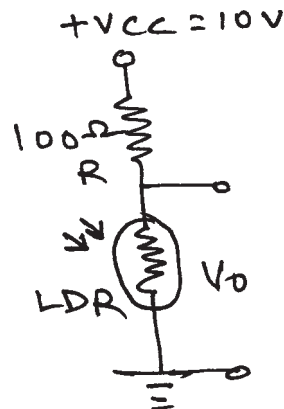
[4817]-2024

S.Y. B.Sc.

ELECTRONIC SCIENCE

EL - 222 : Communication Electronics

(82222) (Paper - II) (New Course) (2013 Pattern) (Semester - II)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

    1)   *All questions are compulsory.*

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

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

    4)   *Use of calculator is allowed.*

Q1) Attempt <u>all</u> of the following: **[12]**

    a)   What is simplex and duplex communication?   **[1]**

    b)   Define noise figure.   **[1]**

    c)   Define image frequency.   **[1]**

    d)   State the applications of FDM.   **[1]**

    e)   'FM exchanges bandwidth for quality'. Comment.   **[2]**

    f)   'Demodulation of PWM is very simple'. Comment.   **[2]**

    g)   An AM wave display on CRO has value of V_{max} = 3.6 divisions and V_{min} = 1 division. Calculate modulation index.   **[2]**

    h)   A baseband signal has maximum frequency f_{max} = 4kHz. What should be minimum sampling frequency so as to be able to recover original signal.**[2]**

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

    a)   Explain the block diagram of telephone handset.   **[4]**

    b)   Discuss the need of modulation. State various types of modulation. **[4]**

    c)   Describe the working of Foster - Seeley discriminator.   **[4]**

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

a) Explain the concept of TDM. **[4]**

b) Give comparison of AM and FM systems. **[4]**

c) Giving a block diagram explain a communication system. What is the importance of noise in its design? **[4]**

Q4) Attempt <u>all</u> of the following: **[12]**

a) Explain in detail characteristics of a radio receiver. **[6]**

b) Give the concept of MODEM. Discuss FSk and PSK in this regard. **[6]**

OR

a) A carrier with amplitude 10V and frequency 5MHz is amplitude modulated to 70% level with a modulating frequency of 1 KHz. Write down equation of the above wave. Sketch its frequency spectrum. **[4]**

b) Equation for an FM wave is

$e = 10 \sin (8 \times 10^8 t + 4 \sin 1500t)$

Find carrier frequency, modulating frequency, modulation index m_f and maximum deviation Δf. What power will this FM wave dissipate in a 10Ω resistive load? **[4]**

c) i) A receiver has input signal power of 1.2 μW. The noise power is 0.8 μW. Find S/N ratio in dB. **[2]**

ii) If the noise factor is 1.5 find the equivalent noise temperature. **[2]**

[4817]-2025

S.Y. B.Sc.
DEFENCE AND STRATEGIC STUDIES
DS - 201 : Conflict Management and Resolution
(New) (Semester - II) (2013 Pattern) (Paper - I)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

   1)   All questions are compulsory.

   2)   Figures to the right indicate full marks.

Q1) Answer in 2 or 4 Sentences each: **[16]**

   a)   Define global peace.

   b)   Define peace Research.

   c)   State the meaning of Law of treaties.

   d)   Define conflict resolution.

   e)   Define Disarmament.

   f)   What are the methods of pacific settlement?

   g)   Define International law.

   h)   Define Conflict management.

Q2) Answer in 8 to 10 Sentences each (any two):   **[8]**

   a)   Write a note on the role of U.N. in disarmament.

   b)   Explain hindrances in the working of U.N.

   c)   Discuss role of U.N. in Kashmir dispute.

   d)   What are the sources of International Law? Explain.

Q3) Write short notes on (any two): **[8]**

    a)   International Law and human rights.

    b)   New world order.

    c)   U.N. and specialized agencies.

    d)   Scope of International Law.

Q4) Answer in 18 to 20 sentences (Any one): **[8]**

    a)   Describe structures and functions of U.N.O.

    b)   Write a note on the achievements of U.N.O.

☛   ☛   ☛

[4817]-2026

S.Y. B.Sc.

Defence and Strategic Studies

DS-202:Geopolitics

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

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

1)   All questions are compulory

2)   Figures to the right indicate full marks.

Q1) Answer in <u>2</u> or <u>4</u> sentences each.   **[16]**

     a)   Define 'Nation'

     b)   What do you mean by " Geopolitics"

     c)   Define "E.E.Z"

     d)   State the meaning of "Land locked state"

     e)   What do you understand by"Line of Actual Control"

     f)   Where the maximum deposits of oil is located in the world?

     g)   Define " Buffer state"

     h)   State the limits of Territorial sea for sovereign state.

Q2) Answer in 8 or 10 sentences (any two)   **[8]**

     a)   Write a few lines on concept of "Maritime Boundaries"

     b)   Explain the "Organizing capacity" as a field of geopolitics

     c)   Highlight on the role of E.E.Z. for economic development of country

Q3) Write short notes on <u>any two.</u> [8]

    a)   Concept of line of actual control

    b)   Problems of Buffer states

    c)   Significance of natural gas.

Q4) Answer in 16 to 20 sentences (any one): [8]

    a)   Define "Strategic Minerals" and explain its various uses with examples.

    b)   Write a note on geostrategic importance of Siachen glacier.

❦❦❦

[4817]-2027

S.Y. B.Sc.

DEFENCE AND STRATEGIC STUDIES

DS - 203 : Contemporary World and Security

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

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

1)   *All questions are compulsory.*

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

Q1) Answer in 2 to 4 sentences each: **[16]**

a)   What is meant by World Politics?

b)   Why security is essential to a nation?

c)   Introduce Indo-Soviet 1971 Treaty.

d)   What is Denuclearization?

e)   What is meant by Energy Security?

f)   What is meant by Geopolitics?

g)   What is meant Blue Water Navy?

h)   Introduce National Aims.

Q2) Answer in 8 to 10 sentences each (any two):   **[8]**

a)   Write about Coercive presence of US in Asia.

b)   Explain about Environmental Issues in contemporary World.

c)   Discuss the role of state and non state actor in world politics.

P.T.O.

Q3) Write short notes on (any two): **[8]**

    a)   India and Europe.

    b)   Indo-US Relations.

    c)   Strategic situation in Indian Ocean.

Q4) Answer in 16 to 20 sentences (any one): **[8]**

    a)   Establish relationship amongst national values, aims, objectives and security in India's context.

    b)   Explain about the Terrorism and Insurgency in Asia.

☛   ☛   ☛

[4817]-2028
S.Y. B.Sc.
ENVIRONMENTAL SCIENCE
EVS - 201 : Biological Diversity & its Conservation
(2013 Pattern) (Semester-II) (Paper-I) (New Course)

Time : 2 Hours]   *[Max. Marks : 40*

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

Q1) Attempt the following in 1-2 lines each: **[10]**

a) Write full form for 'CITES'.

b) Define 'Endemism'.

c) What is meant by 'Transgenic Organism'?

d) Mention any two examples of classification of ecosystem.

e) What are 'Advanced Cultivars'?

f) Write any two benefits of genetically modified organisms.

g) Mention any two problems due to over-exploitation of resources.

h) Define the term 'In-situ' conservation.

i) What is meant by 'Mass Extinction'?

j) What are the objectives of 'Beej Bachao Andolan'?

Q2) Write short notes on the following (Any Two): **[10]**

    a)   Silent Valley Movement.

    b)   Western Ghats.

    c)   Factors Affecting Genetic Diversity.

Q3) Answer Any Two from the following: **[10]**

    a)   Discuss in detail about the problems involved biodiversity conservation.

    b)   Write an account on 'Centers of Diversity'.

    c)   What are the significances of biodiversity?

Q4) Attempt Any One of the following: **[10]**

    a)   Discuss in detail on international efforts to conserved biodiversity.

    b)   What are the benefits of public participation in biodiversity conservation? Also add a note on importance of traditional knowledge.

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[4817]-2029

S.Y.B.Sc.

ENVIRONMENTAL SCIENCE

Pollution Control & Environmental Technology

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

Time : 2 Hours] *[Max. Marks :40*

Instructions to the candidates:

  1) *All questions are compulsory.*

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

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

Q1) Attempt the following in 1-2 lines each: **[10]**

  a) Write the principle of absorption in controlling air pollution.

  b) Name any two primary waste water treatment process.

  c) Define Bioremediation.

  d) State the difference between vibration dumping & vibration isolation.

  e) What is meant by electrostatic precipitation?

  f) Name any two protective noise pollution control equipment.

  g) Define Nuclear pollution.

  h) What is organic farming?

  i) Write full form of 3R's.

  j) Name any two solid waste disposal methods.

Q2) Write a short note on (Any two):   **[10]**

    a)   Trickling Filter with diagram.

    b)   Ex-situ chemical method of soil pollution control.

    c)   Sanitory landfill with diagram.

Q3) Answer any two of the following: **[10]**

    a)   Explain how emission from automobiles can be controlled?

    b)   Discuss the control of noise pollution at receiver end.

    c)   Describe any two air pollution control technology.

Q4) Attempt any one of the following: **[10]**

    a)   Explain in detail any 5 biological methods of soil pollution control.

    b)   Enumerate any four methods for control of thermal pollution.

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[4817]-2030

S.Y. B.Sc.

ENGLISH (Optional)

(2013 Pattern) (Semester-II)

Time : 2 Hours]   *[Max. Marks : 40*

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

Q1) a) Attempt <u>any one</u> of the following in about 100 words: **[5]**

    i) 'Life changes for a girl, once she starts wearing the purdah'. How does the poem build this idea?

    ii) How is the poem 'A Psalm of Life' a sacred song to follow the path of righteousness?

  b) Attempt <u>any one</u> of the following in about 100 words: **[5]**

    i) 'Purdah' is literally and figuratively oppressive. How does the poem argue this point?

    ii) Longfellow in the poem 'A Psalm of Life' compares life to number of things. Identify and Discuss.

Q2) a) Attempt <u>any one</u> of the following in about 100 words: **[5]**

    i) Does the poem ' Ozymandias' prove that art survives? Illustrate your answer

    ii) Explain the significance of the title of the poem 'If'

  b) Attempt <u>any one </u>of the following in about 100 words: **[5]**

    i) In what sense does the fascinating scene of the golden daffodils become a source of joy for the poet?

    ii) The last line of the poem 'If'---'you'll be a Man, my son !'brings the reader a new realisation . What do you think?

Q3) Attempt <u>any two</u> of the following: **[10]**

   a)   John, Robert, Elizabeth and Mary are given the topic 'Is it a good idea to work briefly before enrolling for a post graduate course?' For a group discussion. Write the transcript of the discussion in a dialogue form.

   b)   You have applied for the post of sales Manager in a company and have been asked to attend an Interview. Think of five questions that you could be asked and write them down along with your possible responses.

   c)   Think of a product you want to promote in the market. It could be a mobile or a soft drink. Prepare a presentation consisting of five charts or slides.

   d)   Give <u>any five</u> guidelines for making effective presentation.

Q4) Attempt <u>any two</u> of the following: **[10]**

   a)   Write a paragraph on ' The Importance of English Language in Higher Education'.

   b)   Write an essay on 'The Role of Mass Media'.

   c)   Write a review of a restaurant that you have recently visited.

   d)   Write a brief newspaper report on 'A Railway Accident' that you have recently witnessed.

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[4817]-2031

S.Y. B. Sc. (Semester - II)

मराठी (Marathi)

व्यावहारिक मराठी (Vyavharik Marathi)

(नवा अभ्यासक्रम)

(2013 Pattern) (Theory)

वेळ : 2 तास]   *[एकूण गुण : 40*

सूचना : 1) सर्व प्रश्न सोडविणे आवश्यक आहेत.
          2) उजवीकडील अंक प्रश्नांचे पूर्ण गुण दर्शवितात.

Q1) अ) पुढील उताऱ्याचे मराठीत भाषांतर करा.   **[10]**

I was born into a middle-class Tamil family in the island town of Rameswaram in Madras state. My father, Jainulabdeen, possessed neither much formal education hor much wealth; despite these disadvantages, he possessed great innate wisdom and a true generosity of spirit. He had an ideal helpmate in my mother, Ashiamma. I do not recall the exact number of people she fed everyday, But I am quite certain that far more outsiders ate with us than all the members of our own family put together.

My parents were widely regarded as an ideal couple. My mother's lineage was regarded as the more distinguished one, one of her forebears having been bostowed with the title of 'Bahadur' by the British.

I was one of many children - a short boy with rather undistinguished looks, born to tall and handsome parents. We lived in our ancestral house, which was built in the middle of the 19th century. It was fairly large pucca house, made of limestone and brick, on the Mosque street of Rameswaram. My austere father used to avoid all inessential comforts and luxuries. However, all that was needed was provided for, in terms of food, medicine or clothes. In fact, I would say mine was a very secure childhood, both materially and emotionally.

ब) पुढील उताऱ्याचा एक तृतीयांश सारांश लिहून समर्पक शीर्षक द्या.   **[10]**

इंटरनेट हे कोळ्यानं विणलेल्या जाळ्यासारखं असतं, हे आपण जाणतोच. या जाळ्यात आपल्याला एकीकडून दुसरीकडे जाण्यासाठी लिंक्स असतात. या लिंक्सवर आपण जर माऊसनं क्लिक कलं तर आपल्याला त्या त्या विषयासंबंधीची आणखी माहिती मिळते. उदाहरणार्थ – बातम्यांच्या वेबसाइटवर 'भारताचा आजच्या सामन्यात विजय' अशी लिंक असेल आणि आपण त्यावर क्लिक केलं, तर आपल्याला त्या सामन्या विषयीची विस्तृत माहिती मिळेल. लॅरी पेज त्याच्या संशोधनासाठी इंटरनेटवरून माहिती गोळा करताना 'अल्टाव्हिस्टा' नावाचं सर्च इंजिन वापरे. तेव्हा त्याच्या लक्षात आलं, की आपण हुडकत असलेल्या माहिती बरोबरच त्या माहितीशी संबंधित असलेल्या अनेक लिंक्सपण आपल्याला दिसतात. उदा. आपण 'ओबामा' या शब्दावर सर्च केलं तर ओबामांशी संबंधित असलेल्या सगळ्या माहिती बरोबरच अमेरिकन निवडणुका, राजकारण अशा असंख्य प्रकारच्या लिंक्स आपल्याला दिसतील. यातल्या एका लिंकवर क्लिक करून दुसरीकडे, मग तिथल्या लिंकवर क्लिक करून तिसरीकडे, असं कुठवर होऊ शकतं आणि त्याचा वापर करून आपण चक्क आख्खं इंटरनेटच आपल्या संगणकावर डाऊनलोड करू शकू का या दृष्टीनं त्याचे प्रयत्न सुरू झाले, यानंतर एखाद्या वेबसाइटची किंवा वेब पेजची लोकप्रियता आणि म्हणूनच तिचं महत्त्व किंवा तिची 'किंमत' कशी ठरवता येईल या प्रश्नानं पेजला घेरलं, जगभरातल्या इतर सगळ्या वेब पेजेसवरून एखाद्या वेब पेजला जितक्या लिंक्स आलेल्या असतील त्यावरून त्याची लोकप्रियता ठरेल, असं मत त्यानं मांडलं, म्हणजेच जास्त लिंक्स असतील तर जास्त लोकप्रियता असा सोपा. हिशेब त्यानं मांडला. त्याहूनही ती लिंक कुठून येतीये यावरून त्या लिंकच्या लोकप्रियतेचं 'वजन' ठरवावं असा आणखी जास्त महत्त्वाचा निष्कर्ष त्यानं काढला. उदा. जर याहूच्या वेबसाइटच्या मुख्य वेब पेजमधून दुसऱ्या एखाद्या वेब पेजला लिंक असलेली असेल तर त्या लिंकचं 'वजन' जास्त आणि म्हणूनच त्या वेब पेजची लोकप्रियता जास्त समजायची. या संकल्पनेवर मग पेजनं ब्रिन आणि त्याचे तरुण प्राध्यापक सुनील मोटवानी यांच्यासह काम सुरू केलं.

(शब्दसंख्या 254)

Q2) पुढीलपैकी कोणत्याही दोन प्रश्नांची उत्तरे लिहा.   **[15]**

अ) 'वैज्ञानिक दृष्टिकोण' या विषयावर वृत्तपत्रासाठी 200 शब्दांपर्यंत लेख तयार करा.

ब) 'जलसंवर्धन' या विषयावर आकाशवाणीसाठी 200 शब्दांपर्यंत भाषण संहिता तयार करा.

ब) 'साथीचे आजार पसरू नयेत म्हणून घ्यावयाची काळजी' या विषयावर आरोग्य अधिकाऱ्याची निवेदकाने दूरदर्शनसाठी घेतलेली मुलाखत तयार करा. (वेळ पाच मिनिटे)

Q3) खालीलपैकी कोणत्याही पाच इंग्रजी संज्ञांना मराठी पारिभाषिक पर्याय लिहा.   [5]

    i)   Gate Pass

    ii)   Act

    iii)   Industrial Chemistry

    iv)   Pesticide

    v)   Cytology

    vi)   Mettalurgy

    vii) Home Science

    viii) Medical Report

    ix)   Project

    x)   Research

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[4817]-2032

S.Y. B.Sc. (Semester - II)

हिंदी (HINDI)

(2013 Pattern) (General)

पाठ्यपुस्तकें : 1. भारती गद्य – संग्रह

सं. डॉ. मधु धवन

2. कवितायन

सं. डॉ. भोलानाथ तिवारी

समय : 2 घंटे]   *[पूर्णांक : 40*

सूचनाएँ : 1) सभी प्रश्न अनिवार्य हैं।

2) दाहिनी ओर लिखे अंक प्रश्न के पूर्णांक हैं।

प्रश्न.1) अ) निम्नलिखित पारिभाषिक शब्दों में से किन्हीं आठ के हिंदी पर्याय लिखिए।   [8]

i) Audio - Visual

ii) Breeding

iii) Chemistry

iv) Energy

v) Fleet

vi) Landing

vii) Microwave

viii) Optics

ix) Radiologist

x) Vibration

आ) निम्नलिखित परिच्छेद का एक–तिहाई शब्दों में सार–लेखन कर उसे उचित शीर्षक दीजिए:[4]

आज भ्रष्टाचार हमारे उपर बुरी तरह हावी हो गया है। इसीकारण देश में सर्वत्र असत्य, अनाचार, काला बाजारी, रिश्वत, मुनाफखोरी आदि का खुलकर तांडव नृत्य हो रहा है। भला इस स्थिति में कोई देश कैसे उन्नति कर सकता है? भारत जैसे स्वतंत्र देश के लिए प्रशासन का भ्रष्टाचार एक अभिशाप है, कलंक है। राष्ट्र के इस प्रबल शत्रु को मारने के लिए क्रांतिकारी कदम उठाने की आवश्यकता हैं। लेकिन यह तभी संभव है, जब यहाँ के देशवासियों में नैतिक

और चरित्र – बल हो। इसकी पूर्ति के लिए जनता को स्वार्थपरता, नेताओं को कुर्सी का मोह, अपने–पराये, जातिवाद आदि की भावना को त्यागना होगा। अन्यथा भ्रष्टाचार की स्थिति में हमारी समस्त योजनाएँ और विकास कार्यक्रम भली–भाँती कार्यान्वित नहीं हो सकेंगे। यदि यह भ्रष्टाचार पनपता ही रहा, तो हमारी स्वतंत्रता खतरे में पड़ जाएगी।

प्रश्न.2) अ) निम्नलिखित गद्य अवतरण की ससंदर्भ व्याख्या कीजिए। [4]

''मेरे भीतर किसी ने कहा कि इस पहिए से जो प्रेरणा तुम लेते रहे हो, उसके लिए तुम्हे सेंट कैथरीन को धन्यवाद दिए बिना कैम्ब्रिज से नहीं जाना चाहिए।''

अथवा

''उस क्षुद्र कीट को कितना गौरव होगा जिसके थूक के ताने–बाने को जैविक विकास द्वारा उत्पन्न सर्वोन्नत प्राणी बड़ी शान व नखरे से पहनता है।''

आ) निम्नलिखित पद्य अवतरण की ससंदर्भ व्याख्या कीजिए। [4]

''पर – पीड़ा से पूर – पूर हो

अमर – धवल गिरि के शिखरों पर

प्रियवर ! तुम कब तक सोए थे।

रोया यक्ष कि तुम रोए थे?''

अथवा

''गिरी हुई पद – मर्दित पराजित विवशता को

बाँहो में उठाऊँगा।

इस समूह में

इन अनगिनत अचीन्ही आवाजों में

कैसा दर्द है।''

प्रश्न.3) अ) निम्नलिखित में से किन्ही दो प्रश्नों के उत्तर लिखिए। [10]

      i) फसलो को उन्नत करने की कौन – सी नई तकनीक है ?

      ii) विकिरणद्वारा परमाणु ऊर्जा एवं खाद्य – पदार्थ संरक्षण कैसे होता है ?

      iii) रामानुजन के कार्य को संक्षेप में लिखिए।

आ) निम्नलिखित में से किन्हीं दो प्रश्नों के उत्तर लिखिए। [10]

      i) अज्ञेय 'मुझे आज हँसना – चाहिए' द्वारा कौन – सा संदेश देना चाहते हैं ?

      ii) 'दैनिक' कविता द्वारा समाज की वास्तविकता का चित्रण किस प्रकार किया गया है ?

      iii) 'बृहन्नला' कविता का आशय अपने शब्दों में लिखिए।

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[4817] - 2033

S.Y. B.Sc. (Semester - II)

SANSKRIT (संस्कृत)

गीर्वाणभारती (Gīrvāṇabhāratī)

(2013 Pattern)

Time : 2 Hours]

[Max. Marks : 40

Q1) Write short answers in <u>2-4 lines</u> on the following questions. **[16]**

पुढील प्रश्नांची 2-4 ओळीत उत्तरे लिहा.

i) State the three names of scientist related to ज्योतिषशास्त्र

ज्योतिषशास्त्राशी संबंधित तीन शास्त्रांची नावे लिहा.

ii) Who has described the consciousness of the trees and when?

वृक्षांच्या चेतनत्वाचे वर्णन कोणी केले व कधी?

iii) Which are the अष्टाङ्ग of आयुर्वेद?

आयुर्वेदाची अष्टांगे कोणती?

iv) Which is the famous book of भास्कराचार्य?

भास्कराचार्यांचा प्रसिद्धग्रंथ कोणता?

v) Explain the meaning of 'भांवस्थिराणि जननान्तर सौहृदानि'

'भावस्थिराणि जननान्तर सौहृदानि' याचा अर्थ स्पष्ट करा.

vi) Explain the meaning of 'पुराणमित्येव न साधु सर्वम्'

'पुराणमित्येव न साधु सर्वम्' याचा अर्थ स्पष्ट करा.

vii) What is the कायचिकित्सा?

कायचिकित्सा म्हणजे काय?

viii) Who is the author of वैराग्यशतकम्?

'वैराग्यशतकम्' या ग्रंथाचा कर्ता कोण?

P.T.O.

Q2) Write short notes on <u>any two</u> of the following in <u>8-10 lines</u> : **[8]**

पुढीलपैकी कोणत्याही दोहोंवर 8-10 ओळींत संक्षिप्त टीपा लिहा.

   i)   पदार्थविज्ञानम्।

   ii)   ज्योतिषशास्त्रम्।

   iii)   यन्त्रम्।

Q3) Write short notes on <u>any two</u> of the following in <u>8-10 lines</u> : **[8]**

पुढीलपैकी कोणत्याही दोहोंवर 8-10 ओळींत संक्षिप्त टीपा लिहा.

   i)   Explain 'भद्रं तस्य सुमानुषस्य कथमप्येकं हि तत् प्रार्थ्यते।

         'भद्रं तस्य सुमानुषस्य कथमप्येकं हि तत् प्रार्थ्यते।', स्पष्ट करा.

   ii)   वैनायकम्.

   iii)   Types of friendship in नीतिशतकम्.

         नीतिशतकातील मैत्रीचे प्रकार.

Q4) Write <u>any one</u> of the following questions in <u>16-20 lines</u> : **[8]**

पुढीलपैकी कोणत्याही एका प्रश्नाचे उत्तर <u>16-20</u> ओळींत लिहा.

   i)   Explain वनस्पतिशास्त्रम् in detail.

         'वनस्पतिशास्त्रम्' यावर सविस्तर उत्तर लिहा.

   ii)   Explain the meaning & solve the following example.

         खाली दिलेल्या उदाहरणाचा अर्थ लिहून ते स्पष्ट करा.

            यातं हंसकुलस्य मूलदशकं मेघागमे मानसं

            प्रोड्डीय स्थलपद्मिनीवनमगादष्टाशको ऽम्भस्तटात्।

            बाले बालमृणालशालिनी जळे केलिक्रियालालसम्

            दृष्टं हंसयुगत्रयं च सकलां यूथस्य संख्यां वद॥

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[4817]-2035

S.Y. B.Sc.

BIOTECHNOLOGY

VOC. Biotech-221: Plant and Animal Tissue Culture
(2013 Pattern) (Semester-II) (Paper-I) (Vocational)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

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

Q1) Answer each of the following in 1-2 lines.   **[10]**

a)   Define finite life span cell lines.

b)   Give role of serum in ATC medium.

c)   Why cell scraping is not preferred over trypsinisation?

d)   During initiation of cell culture appropriate cell concentration is required why?

e)   Define micro propagation.

f)   Which component is essential for rooting in PTC medium?

g)   Enlist important applications of somatic embryogenesis.

h)   Flame sterilisation is used for metal tools in plant tissue culture why?

i)   Enlist two important applications plant tissue culture.

j)   Why laminar air flow cabinet is essential in plant and Animal tissue culture?

Q2) Attempt any two of the following.   **[10]**

a)   What is organogenesis? Give it's importance in plant tissue culture.

b)   Explain with the help of growth curve transformation of animal cells.

c)   What are plant growth hormones? Explain different types of plant growth hormones with suitable example.

P.T.O.

Q3) Write short notes on (Any Two) of the following. **[10]**

    a)   Macro and micro nutrients in plant tissue culture medium

    b)   Cell banks

    c)   Cell dissociation in Animal cell culture.

Q4) How woody plants can be propagated with the help of plant tissue culture? Explain in detail. **[10]**

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

Explain different methods of cell line characterisation. Add a note of it's importane in cell line maintenance.

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[4817]-2036

S. Y. B.Sc. (Vocational)
INDUSTRIAL CHEMISTRY
VOC-221:Unit Processes in Organic Chemical Industries
(Paper-I) (2013 Pattern) (Semester-II)

Time : 2 Hours]

[Max. Marks : 40

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

Q1) Give balanced chemical equations with necessary conditions for the following conversions. **[16]**

a)	Benzene	$\rightarrow$	Toluene
b)	Nitrobenzene	$\rightarrow$	M-Dinitrobenzene
c)	Acetanilide	$\rightarrow$	P-Bromoacetanilide
d)	Phenol	$\rightarrow$	O-Phenol sulphonic acid.
e)	Aniline	$\rightarrow$	P-Bromoaniline
f)	Ethanol	$\rightarrow$	Acetic acid.
g)	Benzene	$\rightarrow$	Acetophenone
h)	Acetic acid	$\rightarrow$	Ethylacetate

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

a) What is reduction? What is the role of $LiAlH_4$ in reduction of esters?

b) Write the mechanism of sulphonation of benzene.

c) Discuss the different types of allcylating agents.

P.T.O.

Q3) Write short notes on any two of the following: **[8]**

    a)   Ozonalysis.

    b)   Friedal Craft reactions.

    c)   Orientation effects in electrophilic substitution in chlorobenzene.

Q4) Discuss in detail the mechanism involved in esterification process. What is the role of mineral acid in the same? **[8]**

OR

Discuss the synthesis of vinylacetate from acetylene with the help of flow sheet diagram.

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[4817]-2037

S. Y. B. Sc. (Voc.)

PHOTOGRAPHY AND AUDIO-VISUAL PRODUCTION

VOC - PAUP - 221 : Colour Photography
(Semester - II) (Paper - I) (2013 Pattern)

Time : 2 Hours]   *[Max. Marks : 40*

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

Q1) Answer in short: **[16]**

     a)   What is the function of the rods on the retina of a human eye?

     b)   Explain the Purkunje shift.

     c)   Compare the CCD and the CMOS sensors.

     d)   The colour temperature of a light source is 3000 Kelvin. Convert it to Mired.

     e)   What are complementary colours? Give two examples.

     f)   What are the attributes of a colour?

     g)   State the law of transmission and absorption of light.

     h)   What is the use of 'histogram' in digital photography?

Q2) Attempt **ANY TWO** of the following: **[8]**

     a)   What do you mean by the mired shift? What is positive and negative Mired shift? How are these corrected?

     b)   Explain what is 'Black body radiation'? How is it used to define the colour temperature of a light source? Give suitable examples.

     c)   Explain the significance of RGB and the CMYK colour models in photography.

Q3) Write short notes on **ANY TWO** of the following: [8]

   a) Colour sensitivity of human eye.

   b) Sociology of colours.

   c) Use of different light sources in photography.

Q4) Attempt **ANY ONE** of the following: [8]

   a) Discuss the social importance of digital photography. What norms you should follow while processing a digital image?

   b) Draw a suitable diagram and explain the construction of a typical sensor used in a digital camera. Explain the purpose of each 'layer' of the sensor. Discuss the sequence of events taking place when the sensor is exposed to a 'scene'.

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[4817]-2038

S.Y. B.Sc.
ELECTRONIC EQUIPMENT MAINTENANCE
VOC. EEM-221: Troubleshooting Electronic Equipment-B
(New) (2013 Pattern) (Semester-II) (Paper-I) (Vocational)

Time : 2 Hours]   *[Max. Marks : 40*

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 the following:

   a)   State any two applications of flat pack.   **[1]**

   b)   What is hybrid circuit?   **[1]**

   c)   State the types of regulator.   **[1]**

   d)   What do you mean by COB?   **[1]**

   e)   List any four logic IC families   **[2]**

   f)   State the advantages of SMD over through hole components.   **[2]**

   g)   Explain how to test three pin regulatos.   **[2]**

   h)   What is logic pulsor?   **[2]**

Q2) Answer any two

   a)   What precautions must be taken while handling integrated circuits? **[4]**

   b)   Write a note on packaging of surface mount semiconductor devices. **[4]**

   c)   Discuss the problems with SMPS.   **[4]**

Q3) Answer any two

    a) List the features used for identification of integrated circuits. **[4]**

    b) Explain the terms ' Cylindrical Package', 'Flat packs & Quad packs'.**[4]**

    c) With a neat block diagram explain the working of base unit of cord less telephone. **[4]**

Q4) a) Discuss special considerations for fault dignosis in digital ckt. **[6]**

    b) List the steps to identify problems in oscilloscope. **[6]**

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

    a) Explain in detail removal of surface mount devices from the PCB. **[6]**

    b) Discuss in brief following.

       i) Test procedure for Tri-State buffers.

       ii) Rework Station.

       iii) Benefits of SMPS over linear power supplies & its applications.

    [6]

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[4817]-2039

S.Y. B.Sc. (Vocational)

COMPUTER HARDWARE & NETWORK ADMINISTRATION

Microprocessor & Interfacing Techniques

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

Time : 2 Hours] *[Max. Marks : 40*

Instructions to the candidates:

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

Q1) a) Attempt the following: **[4x1=4]**

   i) What is BIOS?

   ii) List the different ADD-ON cards that can be installed in a PC?

   iii) What is Android?

   iv) List various wireless protocols used in network systems.

   b) Attempt the following: **[4x2=8]**

   i) What is function of display adaptor?

   ii) State various output devices.

   iii) What is scanner? State types of scanner.

   iv) What is Network? What is advantage of network?

Q2) Attempt any two of the following. **[2x4=8]**

   a) What is a multimedia PC? State minimum requirement for multimedia PC.

   b) List various storage devices. Explain features of any one.

   c) Differentiate between asynchronous and synchronous communication.

Q3) Attempt any two of the following: [2x4=8]

   a)   Write a short note on embedded IO systems.

   b)   Explain concept of speech recognition.

   c)   Write a note on Green PC.

Q4) Attempt any two of the following: [2x6=12]

   a)   What is LAN? State differences between LAN, WAN and MAN.

   b)   State different types of device controllers used in PC. Explain any one in brief.

   c)   What are different types of printers available? State advantages and disadvantages of Matrix printer.

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[4817]-2040

S.Y. B.Sc. (Vocational)
SEED TECHNOLOGY
VOC-SETE-221:Vegetable Seed Production
(2013 Pattern) (Semester-II) (Paper-I)

Time : 2 Hours]

[Max. Marks : 40

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

Q1) Attempt the following:

[10x1=10]

a) Define roughing

b) Write the isolation distance for foundation seed production in Tomato.

c) Give different methods of classification for vegetable crops.

d) Define GMS.

e) Define apomixis.

f) Which type of nursery bed is required for growing seedlings in Brinjal?

g) Enlist methods of population improvement.

h) Give any two objectives of hybridization.

i) What do you mean by pollination?

j) Enlist any two objectives of vegetable seed production.

Q2) Attempt any two of the following.

[2x5=10]

a) Give an account of achievements of population improvement.

b) Describe in detail modes of pollination.

c) Explain in brief pedigree selection.

Q3) Write note on (Any two):   **[2x5=10]**

   a) Proudure for hybridization in vegetable crops.

   b) Megasporogenesis.

   c) Self in compatibility.

Q4) Describe stepwise procedure for seed production in Tomato. **[10]**

          OR

Explain in detail seed production procedure in Bitter gourd.

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[4817]-2041

S.Y. B.Sc. (Vocational)
INDUSTRIAL MICROBIOLOGY
VOC-IND-MIC-221:Fermentation Processes and Downstream Processing
(2013 Patteran) (Theory) (Semester-II) (Paper-I)

Time : 2 Hours]
[Max. Marks : 40

Instructions to the candidates:
1) *All questions are compulsory.*
2) *Figures to the right indicate full marks.*
3) *All question carry equal marks.*
4) *Draw neat and lablced diagrams wherever necessary*
5) *Use of scientific calculators is allowed.*

Q1) Answer each sub-question in one or two lines; State whether the statement is true or false. **[10]**

a) Name the products produced by the action of beta amylase on starch.

b) In the process of Vit B 12 production harvested broth is treated with __ to bring about conversion of cobalamine to cyanocobalamine.

c) _____ precursor enhances synthesis of penicillin G by penicillium chrysogenum.

d) Salting out is the process of increasing solubility of solute in the solvent (T/F).

e) Name any two chemicals which enhances the precipitation reaction

f) Name the any two two methods used for continuous filtration of harvested fermentation broth in industrial downstream process.

g) Name any two phosphate solublizers used as bioinoculants.

h) In quick vinegar production process_____ type of generator is used.

i) Enlist names of organism used in cheese production.

j) Enlist name the range of centrifuges used for separation of microbial cells from harvested broth.

Q2) Answer any two of the following: **[10]**

a) Explain methods used for coagulation of milk in cheese production.

b) Explain biosynthesis of L-glutamic acid in Coryne bacterium glutamicum using glucose as carbon source.

c) Explain amylase production and recovery with the help of flow sheet.

Q3) Answer any two of the following: **[10]**

a) Describe the methods used for determination of potency of antibiotic.

b) Explain the principle of ion exchange chromatography with the help of suitable example.

c) Draw the flow chart explaining production of Azotobacter bioinoculants.

Q4) Answer any one of the following: **[10]**

a) With the help of flow sheet describe the production and recovery of Vit. B12 by fermentation.

b) Describe the process of distillation with respect to

 i) Batch distillation

 ii) Continuous distillation

 iii) It's importance in solvent recovery

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[4817]-2042

S.Y.B.Sc. (Vocational)
INDUSTRIAL CHEMISTRY
VOC-IND-INCH-222: Industrial Pollution
(2013 Pattern) (Paper - II) (Semester - II)

Time : 2 Hours]   *[Max. Marks :40*

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: **[16]**

     a) What is nitrogen fixation?

     b) Define BOD.

     c) What are the major and minor constituents of atmosphere?

     d) What are trickling filters?

     e) Write the chemicals responsible for temporary hardness of water.

     f) How smog is responsible for air pollution?

     g) Write two ill effects of SOX pollution on human life.

     h) Explain the term electrodialysis.

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

     a) Explain the floculation process involved in waste water treatment.

     b) Describe the role of CO pollution in human and animal life.

     c) How pesticide pollution affects soil profile?

Q3) Write short notes on <u>any</u> <u>two</u> of the following: **[8]**

    a)   Tannery waste.

    b)   Activated sludge.

    c)   London smog.

Q4) Explain the construction and working of Imhoff septic tank. **[8]**

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

Explain the quality characteristics of water. Explain one method in detail for industrial waste water treatment.

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[4817]-2043

S.Y.B.Sc. (Vocational)
BIOTECHNOLOGY
VOC-Biotech-222: Immunology
(2008 Pattern) (Paper - II) (Semester - II)

Time : 2 Hours]   *[Max. Marks :40*

Instructions to the candidates:

　1)　All questions are compulsory.

　2)　Figures to the right indicate full marks.

　3)　All questions carry equal marks.

Q1) Answer each of the following in 1-2 lines: **[10]**

　　a)　What are cytokines.

　　b)　Name the cells of adaptive immunity.

　　c)　What is the role of secondary lymphoid organs?

　　d)　Give the difference between immunogenicity and Antigenicity.

　　e)　Define Antigen.

　　f)　Give two examples of Type-II hypersensitivity reactions.

　　g)　What are toxoids?

　　h)　What are precipitinins?

　　i)　What is the role of Tc cells?

　　j)　What is humoral immunity?

Q2) Write short notes on any two of the following: **[10]**

　　a)　Lynph nodes

　　b)　Ig A

　　c)　Live attenuated vaccines

Q3) Attempt any two of the following: [10]

    a) Explain in detail type - II hypersensitivity.

    b) Describe in detail secondary Immune response.

    c) What is adaptive immunity? Explain its types with examples.

Q4) Explain in detail the techniques of western blotting and indirect ELISA. [10]

OR

Describe the structure of class - I and class - II MHC molecules and discuss its role in cell mediated immunity.

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[4817]-2044

S. Y. B. Sc. (Vocational)
PHOTOGRAPHY AND AUDIO-VISUAL PRODUCTION
VOC - PAVP - 222 : Principles and Applications of Analog and Digital Communications
(Semester - II) (Paper - II) (2013 Pattern)

Time : 2 Hours]   *[Max. Marks : 40*
Instructions to the candidates:
    1)   All questions are compulsory.
    2)   Draw neat and labeled diagrams wherever necessary.
    3)   Figures to the right indicate full marks.

Q1) Attempt **ALL** of the following: **[10]**

    a)   What is modulation? Give its types.

    b)   Draw frequency spectrums of DSBFC and DSBSC.

    c)   In case of picture transmission other than AM why other modulation is not used?

    d)   Compare PAM with PPM.

    e)   A system sends 9600 symbols per second. A symbol is represented by 32 binary digits. What are the baud rate and bit rate?

Q2) Attempt **ANY TWO** of the following: **[10]**

    a)   Explain generation of FM signal.

    b)   Write the basic principle of superhetrodyne radio receiver. Explain AGC in details.

    c)   A carrier is phase modulated with a sinusoidal signal of 2 KHz resulting in a maximum frequency deviation of 5 KHz. Find the modulation index and bandwidth of the modulated signal.

P.T.O.

Q3) Attempt **ANY TWO** of the following: [10]

a) On OROP (One Rank One Pension), Prime minister finalized the discussion. You have taken a clip of this program. The total size of clip is 10 Mega bytes. You are representing a news paper in Chikkodi tahsil where the telephone/data link speed is 56 kbps. Find the time required to transfer your clip. If communication system has 20% overhead find the time required to transmit data.

b) Explain sampling process. What is the importance of Nyquist criteria.

c) Explain in brief QAM. Compare QPSK and QAM.

Q4) Attempt **ANY TWO** of the following: [10]

a) Explain functioning of CODEC.

b) Draw block diagram of Analog communication system and explain in details.

c) Explain guided transmission media.

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[4817]-2045

S.Y.B.Sc. (Vocational)
ELECTRONIC EQUIPMENT MAINTENANCE
VOC-EEM-222: Audio, Video & Office Equipment -B
(2013 Pattern) (Paper - II) (Semester - II)

Time : 2 Hours] *[Max. Marks :40*

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:

   a) What is light Pen? **[1]**

   b) State various output devices. **[1]**

   c) What is the resolution of scanner? **[1]**

   d) Why is the optical mouse preferred over mechanical mouse? **[1]**

   e) State the applications of barcode. **[2]**

   f) What are the advantages of Laptop over desktop PC? **[2]**

   g) Where do we use CCD array? Why? **[2]**

   h) State the specifications of display devices. **[2]**

Q2) Answer any Two:

   a) Discuss the PC bus stardards in brief. **[4]**

   b) State the function of video adapter. Give different colour display standards. **[4]**

   c) Explain memory card reader in brief. **[4]**

Q3) Answer any Two:

    a)   "It is possible to access internet on smart TV". Elaborate the statement with example. **[4]**

    b)   What is multimedia? State different types of softwares along with their function. **[4]**

    c)   What is DLP? State its advantages over LCD projector. **[4]**

Q4) a)   Describe the construction of over-head projector with a neat diagram.**[6]**

    b)   Write a short note on rolling display. **[6]**

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

    a)   With the help of neat diagram, explain the construction of Laser printer.**[6]**

    b)   What are the different connectors available on the CPU of the PC? State the function of important connectors in brief. **[6]**

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[4817]-2046

S.Y.B.Sc. (Vocational)
COMPUTER HARDWARE & NETWORK ADMINISTRATION
Computer System Management - II
(2013 Pattern) (New Course) (Paper - II) (Semester - II)

Time : 2 Hours]   *[Max. Marks :40*

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

Q1) a)   Attempt the following :   **[4x1=4]**

      i)   What is device driver?

      ii)   What is PDA?

      iii)   List various USB devices that can be interfaced to a computer system.

      iv)   What is router?

   b)   Attempt the following: **[4x2=8]**

      i)   What is android? List various applications of android?

      ii)   What is function of Modem?

      iii)   State advantages of semiconductor memories.

      iv)   List various hardware components of a Desktop PC.

Q2) Attempt any two of the following: **[2x4=8]**

   a)   Explain in brief installation procedure of Windows XP.

   b)   Write a short note on network devices.

   c)   Write a note on WAN.

Q3) Attempt any two of the following: **[2x4=8]**

    a) List any four types of users? Explain their roles and responsibilities.

    b) Comment on the need of up grading a PC.

    c) Write a note on maintenance and disposal of storage media.

Q4) Attempt any two of the following: **[2x6=12]**

    a) Explain with example system software and application software.

    b) What do you mean by portable devices? Explain features of any two portable devices.

    c) What is server? Explain in brief installation windows server.

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[4817]-2047

S.Y. B.Sc. (Vocational)
SEED TECHNOLOGY
VOC-SETE-222:Seed Quality Control
(2013 Pattern) (Semester-II) (Paper-II)

Time : 2 Hours]   *[Max. Marks : 40*

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

Q1) Attempt the following: **[10]**

   a)   Give any one concept of seed quality.

   b)   What is nucleus seed?

   c)   Write any two objectives of seed certification.

   d)   Give any two general principles of field inspection.

   e)   Define isolation distance

   f)   Enlist types of seed legislation.

   g)   Write any two duties of seed inspector.

   h)   Define biofertilizers.

   i)   What is the maximum period of a member on central seed committee?

   j)   Give any two state seed certification agencles.

Q2) Attempt any two of the following: **[10]**

   a)   Describe any one type of seed legislation.

   b)   Write an account on central seed testing laboratory.

   c)   Explain the power of seed inspector.

Q3) Write notes on (any two):   **[10]**

    a)   Seed certification agency and its organization.

    b)   Classes of seed.

    c)   Objectives of field inspection.

Q4) Describe in detail minimum seed certification standards.   **[10]**

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

Give an account of techniques employed in field inspection with suitable example.

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[4817]-2048

S.Y. B.Sc.

INDUSTRIAL MICROBIOLOGY

VOC.IND.MIC.-222:Quality Assurance of Industrial Fermentation Products

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

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

    1)   *All questions are compulsory.*

    2)   *All questions carry equal marks.*

    3)   *Draw neat labelled diagrams wherever necessary*

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

    5)   *Use of log tables, calculators is allowed.*

Q1)   Answer each sub-question in one or two lines; fill in the blanks State whether the statement is true or false.   **[10]**

    a)   In sterility testing, enumeration of aerobic microorganisms is carried out on_____ medium.

    b)   Indian Pharmacopeia 2010 was published by _____.

    c)   Name any two carriers used in solid type of microbial biofertilizers.

    d)   Name any food borne pathogen occurring in cheese.

    e)   Large scale Alpha amylase production can be carried by fungi like ____.

    f)   Give the structural formula for Glutamic acid.

    g)   Absorption maxima of Cyanocobalamin solution exhibits 3 maximum absorbance at _____nm, _____nm and _____nm.

    h)   What should be the particle/sieve size of powdered and granular form of biofertilizer?

    i)   In yeast viability staining, live cells contain reducing compound like ____ that metabolize the stain.

    j)   Name the methods used for sterility test of fermentation product.

P.T.O.

Q2) Answer <u>any Two</u> of the following: [10]

   a) Give a protocol for sterility testing of a penicillin solution vial.

   b) Describe Microbiological analysis of Baker's Yeast.

   c) Write the principle and describe the protocol of LAL test in pyrogen testing of fermentation products.

Q3) Answer <u>any Two</u> of the following: [10]

   a) What are the aim's of the 'Pharmacopeias"?

   b) What are the tests carried out for quality assurance of Cheese?

   c) Write in brief quality tests conducted for Identification, tests for presence of metals, and assay for purity of Citric acid.

Q4) Answer <u>any one</u> of the following: [10]

   a) Describe the microbiological assay for vitamin "Cyanocobalamin"

   b) What are the different tests carried out for Quality Assurance of Pharmaceutical substance with respect to antibiotic Streptomycin? Describe the types of Microbiological assays performed to determine the quantity of active compound in preparation.

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[4817]-2049

S.Y.B.Sc.

MATHEMATICS

MT-222(B): Numerical Methods And It's Applications

(Paper-II(B)) (2013 Pattern)(Semester-II)

Time : 2 Hours]   *[Max. Marks : 40*

Instructions to the candidates:

   1)   *All questions are compulsory.*

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

   3)   *Use of non programmable calculator is allowed.*

Q1) Attempt any five of the following. **[10]**

   a)   Round off the following numbers to two decimal places 4.2368, 1.765, 2.435, 12.975.

   b)   An approximate value of Π is 3.14278152 and it's true value is 3.14159265. Find relative error.

   c)   Prove that $E = 1 + \Delta$, where E is shift operator and Δ is forward difference operator.

   d)   Prepare a backward difference table from the following values of x and y

x	0	1	2	3	4
y	1	3	9	31	81

   e)   Write normal equations for fitting a straight line.

   f)   If $f(0) = 0, f(1) = 2, f(2) = 6, f(3) = 12$ then evaluate $\int_{0}^{3} f(x)\ dx$ by Simpson's 3/8th rule.

   g)   Given $\frac{dy}{dx} = x^2 + y, y(0) = 1$; obtain $y(0.02)$ using Euler's method. (Take h=0.02)

Q2) Attempt any two of the following. **[10]**

   a)   Find an approximate root of the equation $x^3 - 2x - 5 = 0$ between $x = 2$ and $x = 2.5$ using false position method up to two decimal places. (Perform three iterations)

b) Use Newton-Raphson formula to find an approximate root of the equation $x^5 + 5x + 1 = 0$ between $x = -1$ and $x = 0$.

c) State and prove Newton's general interpolation formula.

Q3) Attempt any two of the following. **[10]**

a) If l_x represents the number of persons living at age x in a lifetable, find l_x for $x = 35$.

Given $l_{20} = 512, l_{30} = 390, l_{40} = 360, l_{50} = 243$.

b) State and prove fundamental theorem on differences of polynomial.

c) Find the first and second derivatives of the function tabulated below at the point $x = 2.04$.

x	1.96	1.98	2.00	2.02	2.04
y	0.7825	0.7739	0.7651	0.7563	0.7473

Q4) Attempt any one of the following. **[10]**

a) i) Fit a polynomial of the second degree to the following data

x	0	1	2
y	1	6	17

ii) State general quadrature formula and hence derive Simpson's$(1/3)^{rd}$ rule for numerical integration.

b) i) Use Runge - Kutta second order formula to solve $\frac{dy}{dx} = \frac{x^2 + y^2}{10}$, $y(0) = 1$ for interval $0 \le x \le 0.4$ with $h = 0.2$

ii) Given $\frac{dy}{dx} = 3x^2 + y, y(0) = 4$. Use Euler's modified method to find $y(0.2)$ up to third iteration. (Take $h = 0.2$)

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