Seat No.	

Total No. of Questions : 8] **[Total No. of Printed Pages : 4**

[4261]-1

F. E. Examination - 2012

ENGINEERING MATHEMATICS - I

(2012 Pattern)

Time : 2 Hours] **[Max. Marks : 50**

Instructions :

*(1) Attempt **four** questions : Q. No. **1** or **2**, Q. No. **3** or **4**, Q. No. **5** or **6** and Q. No. 7 or **8**.*

(2) Figures to the right indicate full marks.

(3) Assume suitable data if necessary.

(4) Neat diagrams must be drawn wherever necessary.

(5) Use of electronic non-programmable calculator is allowed.

Q.1) (A) Examine the consistency of the system of the following equations. If consistent, solve system of equations : **[04]**

$x + y + z = 3$

$x + 2y + 3z = 4$

$x + 4y + 9z = 6$

(B) Find Eigen Values and Eigen Vector corresponding to highest Eigen Value for the matrix : **[04]**

$$A = \begin{bmatrix} 1 & 1 & -2 \\ -1 & 2 & 1 \\ 0 & 1 & -1 \end{bmatrix}$$

(C) If $\tan \log (x - iy) = a - ib$ and $a^2 + b^2 \neq 1$, then prove that $\tan \log (x^2 + y^2) = \frac{2a}{1 - a^2 - b^2}$. **[04]**

OR

Q.2) (A) Examine for Linear Dependence or Independence of Vectors (2, 2, 7, –1), (3, –1, 2, 4) and (1, 1, 3, 1). **[04]**

(B) Solve : $x^7 + x^4 + i(x^3 + 1) = 0$. **[04]**

(C) A square lies above real axis in Argand diagram and two of its adjacent vertices are the origin and the point 2 + 3i. Find the complex number representing other vertices. **[04]**

Q.3) (A) Test convergence of the series : **(Any One)** **[04]**

(a) $\frac{2}{9} + \frac{2 \cdot 5}{9 \cdot 13} + \frac{2 \cdot 5 \cdot 8}{9 \cdot 13 \cdot 17} + \ldots$

(b) $\sum_{n=1}^{\infty} \left(\frac{1}{n}\right) \sin\left(\frac{1}{n}\right)$

(B) Expand $3x^3 - 2x^2 + x - 6$ in powers of $(x - 2)$. **[04]**

(C) Find n^{th} derivative of $x^2 e^x \cos x$. **[04]**

OR

Q.4) (A) Solve : **(Any One)** **[04]**

(a) $\lim_{x \to 1} \left(1 - x^2\right)^{\frac{1}{\log(1-x)}}$

(b) Find a and b, if $\lim_{x \to 0} \frac{a \sinh x + b \sin x}{2x^3} = \frac{8}{6}$.

(B) Show that : **[04]**

$$x \operatorname{cosec} x = 1 + \frac{x^2}{6} + \frac{7}{360} x^4 + \ldots$$

(C) Prove that n^{th} derivative of $y = \tan^{-1}x$ is

$$(-1)^{n-1}\,(n-1)!\,\sin n\left(\frac{\pi}{2}-y\right)\sin^{n}\left(\frac{\pi}{2}-y\right). \qquad \textbf{[04]}$$

Q.5) Solve **any two** :

(a) If $u = \log\left(\sqrt{x^2+y^2+z^2}\right)$,

then prove that

$$\left(x^2+y^2+z^2\right)\left(\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}+\frac{\partial^2 u}{\partial z^2}\right)=1. \qquad \textbf{[06]}$$

(b) If $u = \dfrac{x^2y^2z^2}{x^2+y^2+z^2} + \cos\left(\dfrac{xy+yz}{x^2+y^2+z^2}\right)$,

then find the value of

$$x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}+z\frac{\partial u}{\partial z}. \qquad \textbf{[07]}$$

(c) If $u = x^2 - y^2$, $v = 2xy$ and $z = f(u, v)$, then show that

$$x\frac{\partial z}{\partial x}-y\frac{\partial z}{\partial y}=2\sqrt{u^2+v^2}\,\frac{\partial z}{\partial u}. \qquad \textbf{[06]}$$

OR

Q.6) Solve **any two** :

(a) If $ux + vy = 0$ and $\dfrac{u}{x}+\dfrac{v}{y}=1$,

then show that

$$\left(\frac{\partial u}{\partial x}\right)_y-\left(\frac{\partial v}{\partial y}\right)_x=\frac{x^2+y^2}{y^2-x^2}. \qquad \textbf{[06]}$$

(b) If $u = \operatorname{cosec}^{-1}\left(\sqrt{\frac{x^{1/2} + y^{1/2}}{x^{1/3} + y^{1/3}}}\right)$,

then show that

$$x^2u_{xx} + 2xyu_{xy} + y^2u_{yy} = \frac{\tan u}{12}\left(\frac{13}{12} + \frac{\tan^2 u}{12}\right). \quad \textbf{[07]}$$

(c) If $x = r\cos\theta$, $y = r\sin\theta$, where r and θ are functions of t, then prove that :

$$x\frac{dy}{dt} - y\frac{dx}{dt} = r^2\frac{d\theta}{dt}. \quad \textbf{[06]}$$

Q.7) (A) If $u = x(1 - y)$ and $v = xy$,

find $\frac{\partial(x, y)}{\partial(u, v)}$. **[04]**

(B) Examine for functional dependence for $u = y + z$,
$v = x + 2z^2$, $w = x - 4yz - 2y^2$. **[04]**

(C) Discuss the maxima and minima of

$$f(x, y) = xy + a^3\left(\frac{1}{x} + \frac{1}{y}\right). \quad \textbf{[05]}$$

OR

Q.8) (A) If $x = u^2 - v^2$, $y = uv$, find $\frac{\partial u}{\partial x}$. **[04]**

(B) Find the percentage error in computing the parallel resistance r of two resistances r_1 and r_2 from the formula $\frac{1}{r} = \frac{1}{r_1} + \frac{1}{r_2}$,

where r_1 and r_2 are both in error by 2% each. **[04]**

(C) Find the points on the surface $z^2 = xy + 1$ nearest to the origin, by using Lagrange's Method. **[05]**

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Seat No.	

Total No. of Questions : 8] **[Total No. of Printed Pages : 3**

[4261]-2

F. E. Examination - 2012

ENGINEERING PHYSICS

(2012 Course)

Time : 2 Hours] **[Max. Marks : 50**

Instructions :

(1) Assume suitable data, if necessary.

(2) Neat diagrams must be drawn wherever necessary.

Q.1) (A) Prove that in Newton's Ring by reflected light the diameter of bright ring are proportional to the square root of the odd natural number. **[06]**

(B) Explain any one application of Ultrasonic Waves. **[03]**

(C) The average reverberation time of a hall is 1.5 sec. and the area of the interior surface is $3340 m^2$. If the volume of the hall is $13000 m^3$. Find the absorption coefficient. **[03]**

OR

Q.2) (A) Explain how piezoelectric effect can be used for generating Ultrasonic Waves ? **[06]**

(B) Define fringe width for wedge shaped film, obtain an expression for it. **[03]**

(C) Find the half angular width of the central maxima in the fraunhofer diffraction pattern of slit having width 10×10^{-5} cm. When illumininated by light having wave length 5000 A^o. **[03]**

Q.3) (A) State the Phenomena of Double Refraction. Hence explain Huygen's Wave Theory of Double Refraction. **[06]**

(B) Draw energy band picture for P-N junction in case of (i) Zero Bias (ii) Forward Bias (iii) Reverse Bias. **[03]**

(C) A silver wire is in the form of a ribbon 0.5cm wide and 0.1 mm thick. When a current of 2A passes through the ribbon perpendicular to 0.8 Tesla Magnetic Field. Calculate the Hall Voltage produced.

(Given : Density of Silver = 10.5 gm/cc, Atomic Weight of Silver = 108, Avogadros No. 6.02×10^{23} gm/mole) **[03]**

OR

Q.4) (A) Derive an expression for Conductivity in Semiconductor. **[06]**

(B) Explain any one application of Laser. **[03]**

(C) How should the Polarizer and Analyzer be oriented to reduce intensity of beam to (i) 50% (ii) 0.25 of its original intensity ? **[03]**

Q.5) (A) Define Phase Velocity and Group Velocity. Hence obtain the relation between Vp and Vg for DeBroglie Wave. **[06]**

(B) Explain the physical significance of ψ and $|\psi|^2$. **[04]**

(C) An electron is bounded by an infinite potential well of width 2×10^{-8}cm. Calculate the lowest two permissible energies of an electron.

(Given : $h = 6.64 \times 10^{-34}$ J– sec., $m = 9.1 \times 10^{-31}$kg) **[03]**

OR

Q.6) (A) Derive Schroedinger's Time Independent Wave Equation. [**06]**

(B) State DeBroglie's Hypothesis. Hence obtain the relation for DeBroglie's Wave Length in terms of Energy. **[04]**

(C) The position and momentum of 1 kev electron are simultaneously measured. If its position is located within $1A^{o}$. Find the percentage of uncertainty in its momentum.

(Given : $h = 6.64 \times 10^{-34}$ J-sec., $m = 9.1 \times 10^{-31}$ kg) **[03]**

Q.7) (A) Explain the Phenomena of Super-conductivity. Explain Type - I and Type - II Super-conductors. **[06]**

(B) Explain any two applications of Nano-technology. **[04]**

(C) Explain any two properties of Nano-particle. **[03]**

OR

Q.8) (A) Explain Synthesis of Metal Nano-particle by Collidal Route Method. **[06]**

(B) Explain BCS Theory of Super-conductivity. **[04]**

(C) State and explain :

(a) Meissner Effect

(b) Persistent Current **[03]**

Seat No.	

Total No. of Questions : 8] **[Total No. of Printed Pages : 2**

[4261]-3

F. E. Examination - 2012

ENGINEERING CHEMISTRY

(2012 Course)

Time : 2 Hours] **[Max. Marks : 50**

Instructions :

(1) Black figures to the right indicate full marks.

(2) Assume suitable data, if necessary.

(3) Neat diagrams must be drawn wherever necessary.

Q.1) (A) Explain the Methods of Internal Treatment of Boiler Feed Water. **[06]**

(B) Explain different types of Electronic Transitions that occur in an organic molecule after absorbing UV Radiations. **[06]**

OR

Q.2) (A) Explain any six principles of Green Chemistry. **[06]**

(B) Explain the pH metric titration of mixture of weak acid - strong acid against standard alkali, giving chemical reactions, procedure, titration curve and calculations. **[06]**

Q.3) (A) Explain Bulk and Emulsion Polymerization Techniques. **[06]**

(B) What is Biodiesel ? Explain the reaction with conditions involved. Give advantages and disadvantages. **[06]**

OR

Q.4) (A) Explain Kevlar and FRP with respect to their properties and applications. **[06]**

(B) Explain Proximate Analysis of Coal. **[06]**

Q.5) (A) Explain the structure of Fullerene. How does it influence it properties and applications ? **[05]**

(B) Describe the use of sodium alanate for Hydrogen Storage. **[04]**

(C) Explain the Storage of Hydrogen in compressed and liquified form. Explain difficulties in the said Storage Systems. **[04]**

OR

Q.6) (A) Explain the Isotopes of Carbon and Hydrogen. **[05]**

(B) Explain the steam reforming of Methane to obtain Hydrogen Gas. **[04]**

(C) Discuss the types of CNT with respect to their structure. Give their applications. **[04]**

Q.7) (A) Explain the Cathodic Protection of a Underground Structure. Give the principle involved. **[05]**

(B) How does the nature of environment influence the rate of Corrosion ? Explain any four factors with examples. **[04]**

(C) Discuss various steps involved in Powder Coating. **[04]**

OR

Q.8) (A) Explain the Mechanism of Dry Corrosion. Discuss the Oxidation Corrosion in case of Mg, Cr, Mo. **[05]**

(B) How is Steel Galvanized ? Explain the process with the help of a flow diagram. **[04]**

(C) Give conditions under which the Wet Corrosion Occurs. Explain the Mechanism of Wet Corrosion by Hydrogen Evolution with suitable example. **[04]**

Seat No.	

Total No. of Questions : 8] **[Total No. of Printed Pages : 3**

[4261]-4

F. E. Examination - 2012

BASIC ELECTRICAL ENGINEERING

(2012 Course)

Time : 2 Hours] **[Max. Marks : 50**

Instructions :

*(1) Attempt Q. No. **1** or **2**, Q. No. **3** or **4**, Q. No. **5** or **6**, Q. No. **7** or **8**.*

(2) Figures to the right indicate full marks.

(3) Use of non-programmable pocket size scientific calculator is permitted.

(4) Neat diagram must be drawn wherever necessary.

(5) Assume suitable data, if necessary.

Q.1) (A) If α_1 and α_2 are RTCs of Material at t_1^oC and t_2^oC respectively, then prove that :

$$\frac{\alpha_1}{\alpha_2} = 1 + \alpha_1 (t_2 - t_1)$$ **[06]**

(B) If a coil of 150 turns carries a current of 10A and flux linked with it is 0.01 wb, then calculate the inductance of the coil. If the current is uniformly reversed in 0.1 sec., calculate the emf induced. If a second coil of 100 turns is uniformly wound over the first coil, find the mutual inductance between the coils. **[06]**

OR

Q.2) (A) Derive an expression for the energy stored per Unit Volume in the Magnetic Field. **[06]**

(B) Find the current drawn by a crane motor when raising a mass of 1000 kg through a height of 15 meters in 10 sec. The supply is 400V DC, gear efficiency is 0.6 and motor efficiency is 0.8. **[06]**

Q.3) (A) State and derive the expression for the Average Value of Sinusoidally varying alternating quantity. **[06]**

(B) A 30 kVA, 6000/200V, 50Hz single phase transformer has an iron loss of 500 watt. Its primary and secondary winding resistances are 6Ω and 0.02Ω respectively. Find its efficiency on full load at Vnity p.f. **[06]**

OR

Q.4) (A) Derive an expression for energy stored in a Capacitor. **[06]**

(B) A pure inductance L = 0.1H is connected across voltage of $\nu = 200 \sin 314t$. Find the rms value of current, instantaneous and average power. Write down expression for current. **[06]**

Q.5) (A) Derive an expression for line current in terms of phase current for three phase delta connected balanced load, with phasor diagram, connected across three phase supply. **[06]**

(B) A series R-L circuit consist of resistance of 3Ω and inductance of 0.0106H connected across $\nu = 141 \sin wt$, 60Hz supply. Write down expression for inst. Current drawn by circuit. Calculate average power dissipited and p.f. of the circuit. **[07]**

OR

Q.6) (A) Derive an expression for current drawn and power consumed by a circuit consisting of 'R' and 'C' connected in series across $\nu = Vm \sin wt$ supply. **[06]**

(B) A resistance of 20Ω and coil of inductance 31.8 mH and negligible resistance, are connected in parallel across 230V, 50 Hz supply. Find : (i) currents drawn, (ii) p.f. and (iii) power consumed by the circuit. **[07]**

Q.7) (A) Derive an expression to convert Star Connected Network into its equivalent Delta Connected Network. **[06]**

(B) Find applying Kirchhoff's Laws currents in three voltage sources in the network. Shown in fig. 1. **[07]**

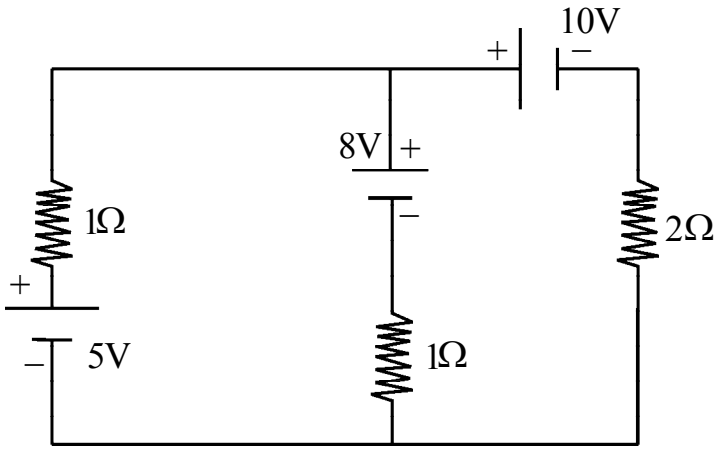

Fig. 1

OR

Q.8) (A) State and explain Thevenin's Theorem. **[05]**

(B) Apply Superposition Theorem to calculate current flowing in 2Ω resistance for the network. Shown in fig. 1. **[08]**

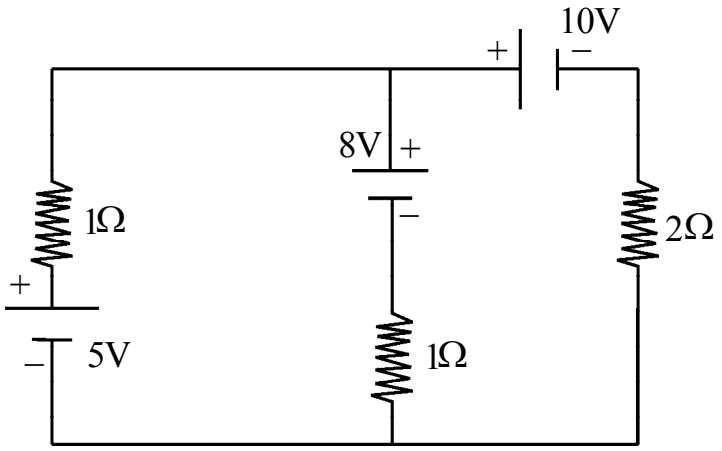

Fig. 1

[4261] – 104

Seat No.	

F.E. (Semester – I) Examination, 2012
BASIC ELECTRICAL ENGINEERING
(2008 Pattern)

Time : 3 Hours Max. Marks : 100

Instructions : *1) Attempt Q. No. **1** or **2**, Q. No. **3** or **4**, Q. No. **5** or **6**, Q. No. **7** or **8**, Q. No. **9** or **10**, Q. No. **11** or **12**.*
*2) Answer to the **two** Sections must be written **separate** answer-books.*
*3) Figures to the **right** indicate **full** marks.*
*4) **Use** of non-programmable pocket size scientific calculator is **permitted**.*
*5) **Neat** diagrams must be drawn **wherever** necessary.*
*6) Assume **suitable** data, **if necessary**.*

SECTION – I

1. a) Define insulation resistance and obtain an expression for it of a single core cable. **8**

   b) A motor pump set lifts 70 cubic meter of water per hour to a height of 40 meters. Efficiency of motor is 87% and that of pump is 83%. Find the monthly Bill for the use of set if it is used for 4 hours a day for 30 days. Cost of Electrical Energy is Rs. 10 per unit. **8**

OR

2. a) If α_1 and α_2 are the resistance temp. coefficients at t_1°C and t_2°C respectively then prove that

   i) $\alpha_1 - \alpha_2 = \alpha_1\alpha_2 (t_2 - t_1)$ and

   ii) $\alpha_1 / \alpha_2 = 1 + \alpha_1(t_2 - t_1)$ **8**

   b) An insulated cable has conductor diameter of 3 cm and insulation thickness of 2 cm. The resistivity of copper and insulation is $1.73 \times 10^{-8}\,\Omega - m$ and $9 \times 10^{12}\,\Omega - m$ respectively. Determine the resistance of conductor and insulator of the cable for 150 m length. **8**

P.T.O.

3. a) Calculate the current flowing in the 10Ω resistance for the circuit shown in fig. 1 applying Kirchhoff's laws. **10**

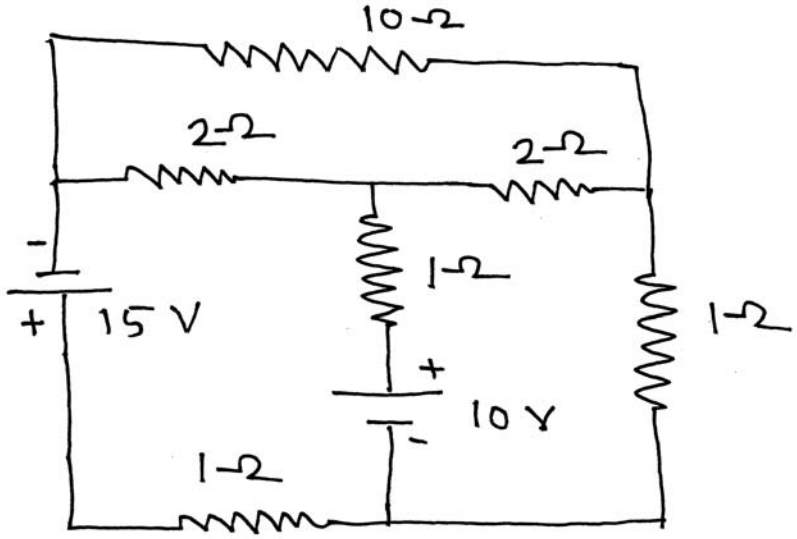

Fig. 1 Q. 3(a)

b) State and explain superposition theorem. **6**

OR

4. a) Apply Thevenin's theorem to calculate the current flowing in 10Ω resistance for the circuit shown in Fig. 1. **10**

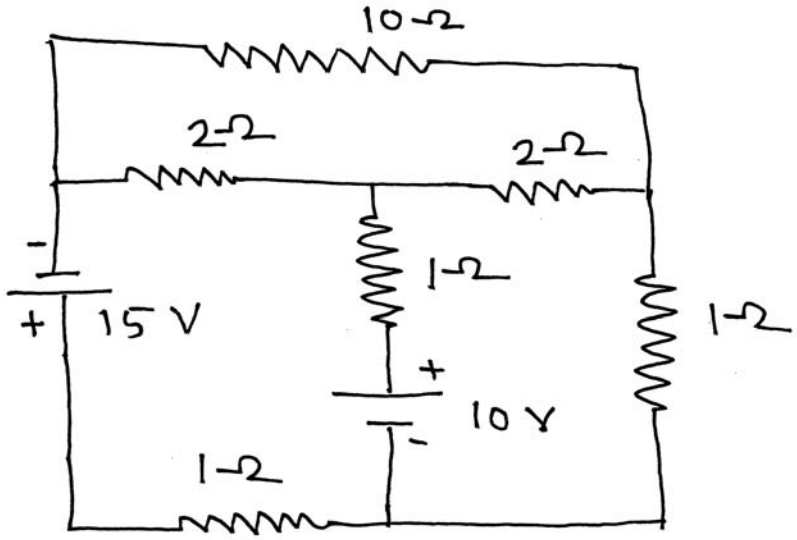

Fig. 1 Q. 4(a)

b) State and explain maximum power transfer theorem. **6**

5. a) Compare Electric and Magnetic circuit. **6**

   b) Derive an expression for energy stored in the magnetic field. **6**

   c) Calculate the inductance of a toroid, 25 cm mean length and 6.25 cm^2 circular cross section, wound with 1000 turns of wire. Also calculate the emf induced when a current increasing at the rate of 200 A/s flows in the winding. **6**

OR

6. a) Define as ref. to magnetic circuit i) Magnetic flux, ii) Magnetic flux density iii) Field strength iv) Reluctance and v) Permeance. **10**

   b) Draw a series magnetic circuit and parallel magnetic circuit also write down the expression for total Amp turns required ref. to both circuits. **8**

SECTION – II

7. a) Define R.M.S. value of sinusoidal quantity. Derive its expression in terms of peak value. **6**

   b) A potential difference of 11 KV is applied across a parallel plate capacitor with plate area of 0.01 m^2 separated by dielectric material 1 mm thick. The resulting capacitance of the arrangement is 300 pF. Calculate –

      i) Total electric charge

      ii) Electric flux density

      iii) Potential gradient

      iv) Relative permitivity of the dielectric. **5**

c) At t = 0, the instantaneous value of 60 Hz sinusoidal current is +5A and increases in magnitude further. Its rms value is 10 Amp.

i) Write the expression for its instantaneous value.

ii) Find the current at t = 0.01 sec.

iii) Sketch the waveform showing all values. **5**

OR

8. a) Define average value of sinusoidal quantity. Derive its expression in terms of peak value. **6**

b) A 12 μF capacitor is charged through 4 MΩ resistance from 120 V d.c. supply. Calculate

i) Time constant of circuit

ii) Time required for the voltage across the capacitor to reach 50 V

iii) Voltage across the capacitor 50 sec after closing the switch. **5**

c) Three alternating currents are given by

$i_1 = 150 \sin (\omega t + \pi/4)$

$i_2 = 40 \sin (\omega t + \pi/2)$

$i_3 = 80 \sin (\omega t - \pi/6)$

They are fed into a common conductor. Find the equation of resultant current. Also find rms value of resultant current. **5**

9. a) If a sinusoidal voltage $V = V_m \sin\omega t$ is applied across purely capacitive circuit, derive the expression for current drawn and power consumed. Draw the waveform of current voltage and power. **8**

b) A coil having resistance of $15\,\Omega$ and inductance of 0.05 H is connected in series with $100\,\mu F$ capacitor across 230 V, 50 Hz a.c. supply. Find :

i) The current taken

ii) The phase difference between supply voltage and current

iii) Voltage drop across the coil

iv) Voltage drop across the capacitor. **8**

OR

10. a) Sketch :

i) Impedance triangle

ii) Admittance triangle

Define admittance, susceptance and conductance as related to a.c. circuit. How admittance is expressed in rectangular form ? **8**

b) Impedance of $(4 - j10)\,\Omega$ is connected in parallel with another impedance of $(6 + j8)\,\Omega$. The circuit is connected across 230 V, 50 Hz, single phase a.c. supply. Find :

i) Branch currents

ii) Total current

iii) Total power factor of circuit

iv) Power consumed by the circuit

v) Total impedance of the circuit. **8**

11. a) Derive the expression for emf equation of single phase transformer. Hence write down the expression for transformation ratio. **6**

b) A 1.5 KVA, 220/110 V, 50 Hz single phase transformer has iron less of 32 W and full load copper less of 44 W. Calculate % efficiency of transformer at

i) Full load 0.8 p.f. log

ii) Full load unity p.f

iii) Half full load 0.8 p.f. lead. **6**

c) State the relationship between line and phase values of voltage and current for 3 phase star connected load and delta connected load state the equation of active and reactive power consumed by 3 phase load. **6**

OR

12. a) With neat diagram describe a test for finding out the efficiency and regulation of transformer by direct loading. **6**

b) Three identical coils each having resistance of 15Ω and inductance of 0.03 H are connected in delta across 3 phase, 440 V, 50 Hz supply. Calculate line current and power consumed by the load.

If the same load is now connected in star across same supply. Calculate the power consumed by the load. **6**

c) State different losses occurring in single phase transformer. Mention the part where each loss occurs. How these losses can be minimised ? **6**

[4261] – 106

Seat No.	

F.E. (Semester – I) Examination, 2012
ENGINEERING GRAPHICS
(2008 Pattern)

Time : 4 Hours Max. Marks : 100

***Instructions** : 1) Answer **03** questions from Section – **I** and **03** questions from Section – **II**.*

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

*3) Black figures to the **right** indicate **full** marks.*

*4) Assume suitable data, if **necessary**.*

SECTION – I

UNIT – I

Engineering Curves

1. A) A plot of land in the shape of parallelogram 28 m × 20 m sides. The angle between two sides being 70°. Show graphically how an elliptical shaped flower bed can be inscribed in it. **7**

   B) A circle of 50 mm diameter rolls on outside the circumference of the directing circle of the same diameter without slipping.

   Draw and Epi-cycloid of point 'P' touching the point of contact of both circles for one complete revolution. **8**

OR

2. A) A line OS is at 70° with another horizontal line OS'. A third line OP is at 35° to OS' and 50 mm long.
   Draw the Hyperbola trough point 'P' to which OS and OS' as asymptote. **7**

   B) A line AB 100mm long revolves about its midpoint 'O'. A point 'P' moves along this line AB from A to B. During one complete revolution by uniform rate. Find the locus of the point 'P'. **8**

P.T.O.

UNIT – II

Orthographic Projection

3. Figure 1 shows a pictorial view of a 'Shaft guide'. Draw the following views using first angle method of projection :

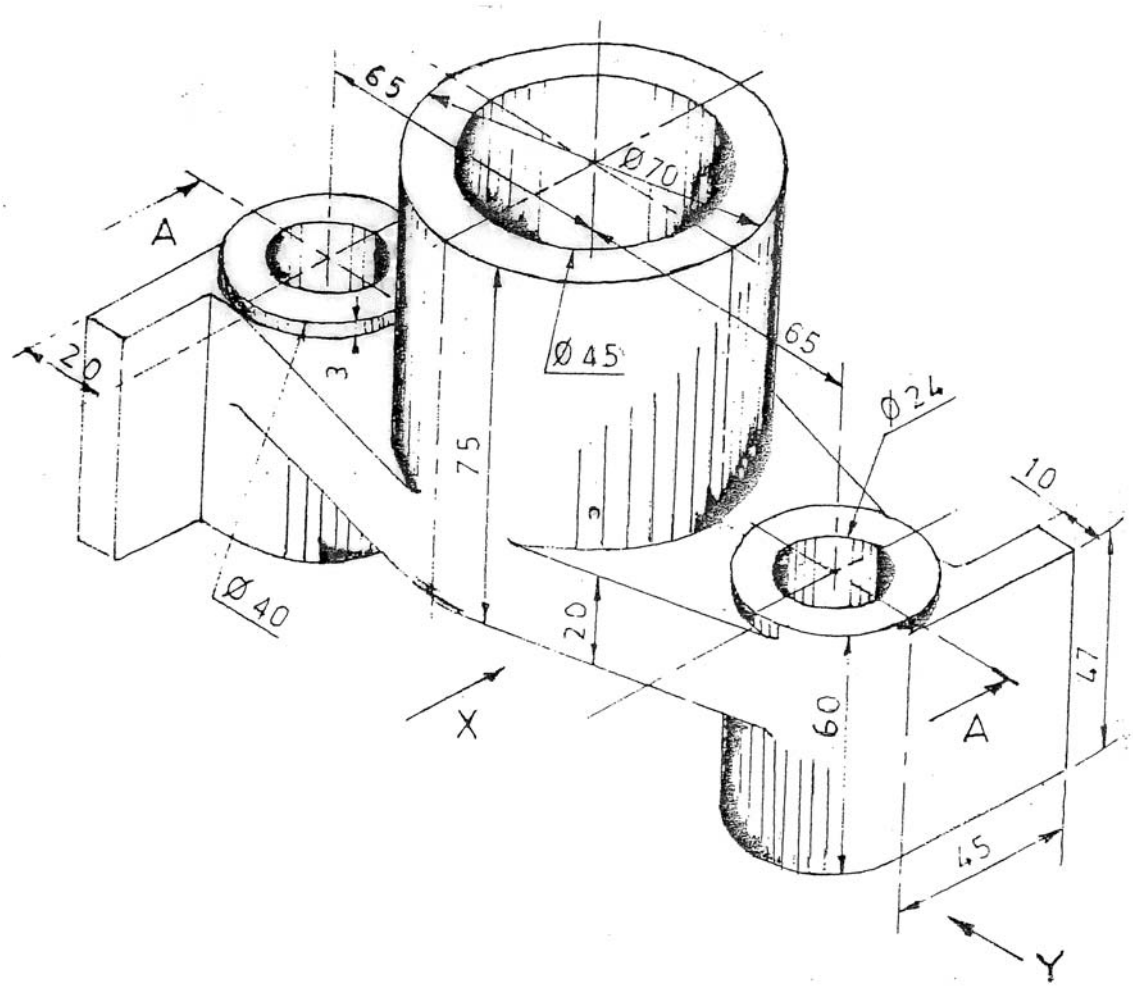

Figure 1

(Shaft Guide)

a) Sectional elevation in the direction of X (Section along A-A) **7**

b) Plan **5**

c) Side view looking along arrow Y. **5**

Give all dimensions. **3**

OR

4. Figure 2 shows a pictorial view of a machine component. Draw the following views using first angle method of projection :

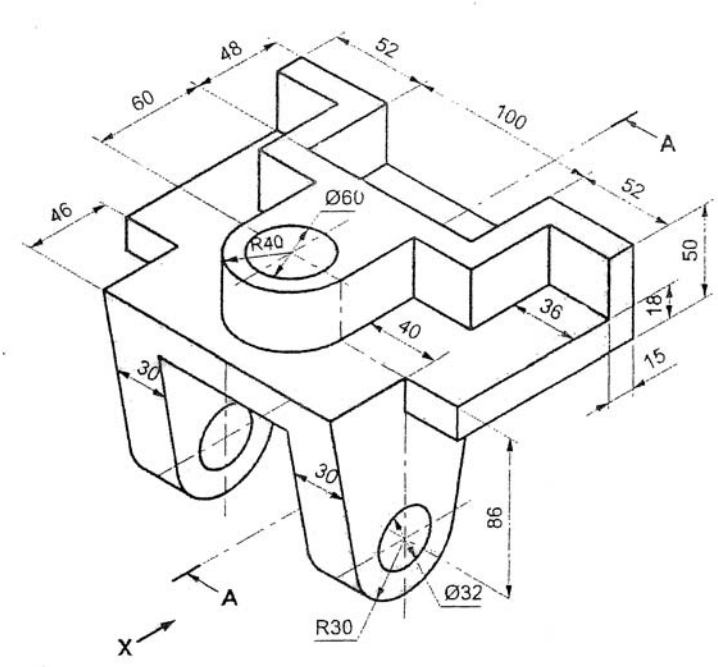

Figure 2

a) Elevation in the direction of X **5**

b) Plan **5**

c) Sectional Right hand side view (Section along A-A). **7**

Give all dimensions. **3**

UNIT – III

Auxiliary Projection

5. Figure 3 shows incomplete F.V, top view and partial auxiliary front view :

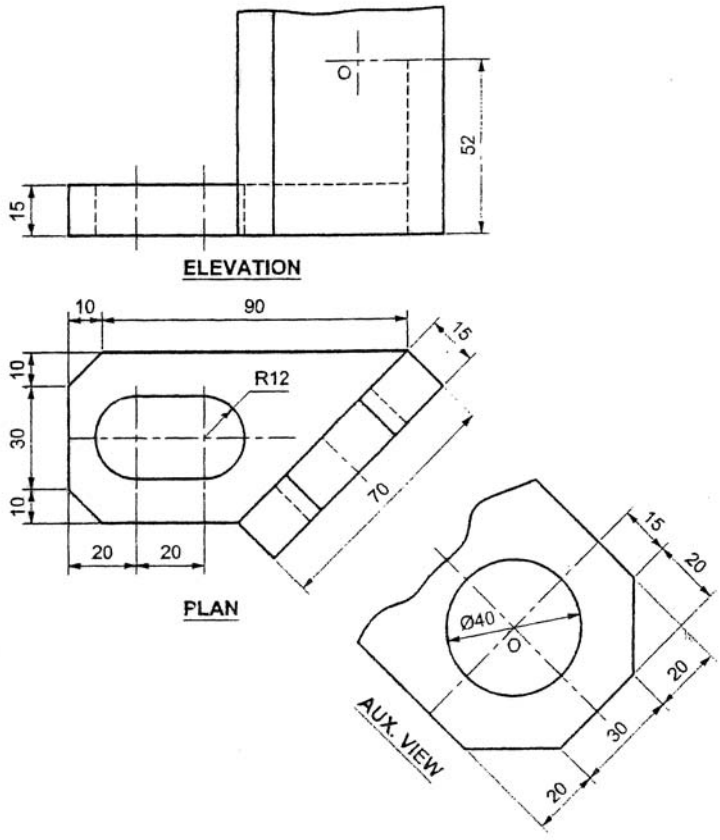

Figure 3

a) Redraw the given views **5**

b) Complete the front view **8**

Give all dimensions. **2**

OR

6. Figure 4 shows Front View, auxiliary view and incomplete side view :

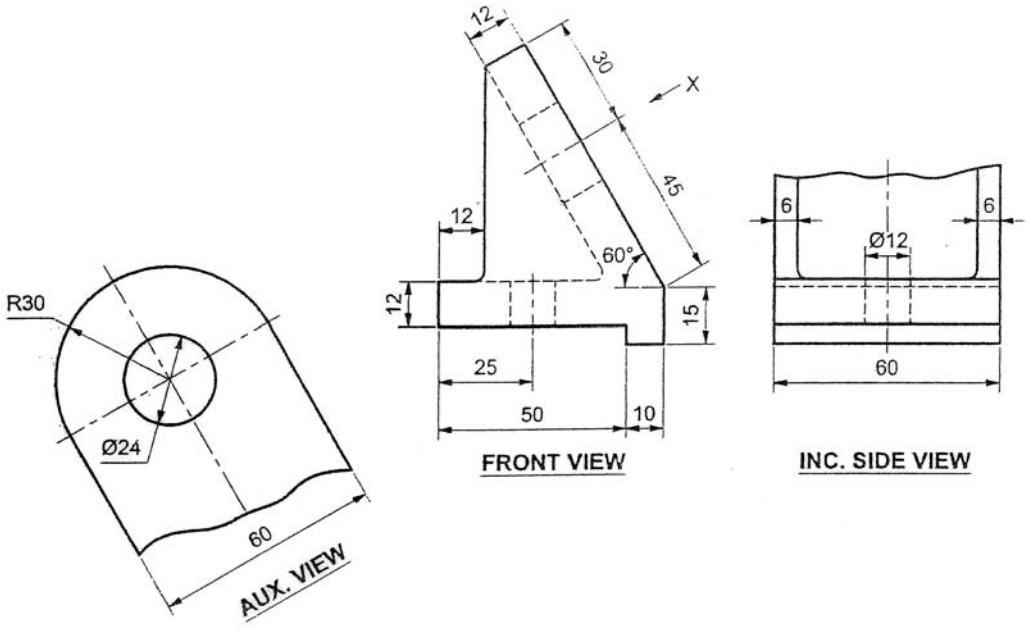

Figure 4

a) Redraw the given views **5**
b) Complete the side view **8**
Give all dimensions. **2**

SECTION – II

UNIT – IV

Isometric

7. The figure 5 shows FV and RHSV of a machine part. Draw its isometric view by using natural scale and show overall dimensions. **20**

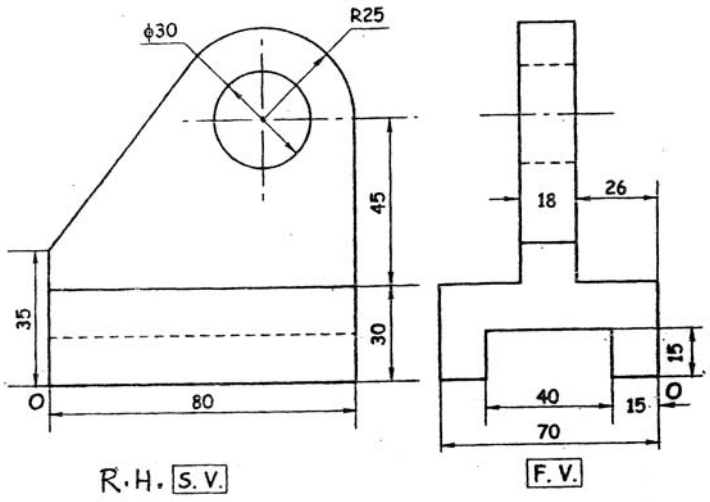

Figure 5

OR

8. The figure 6 shows elevation and LHSV of a machine part. Draw its isometric projections by using isometric scale. **20**

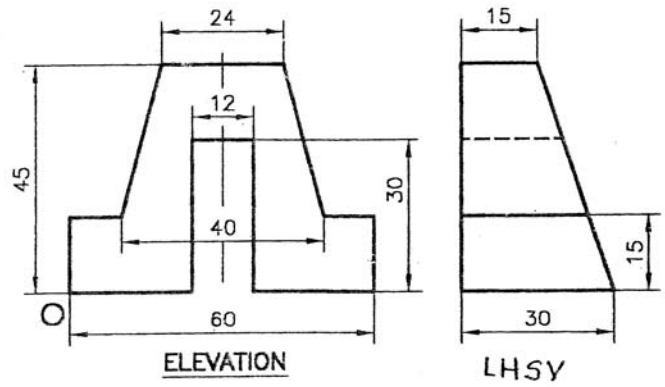

Figure 6

UNIT – V

Missing Views

9. The figure 7 shows FV and TV of a machine part. Draw
   A) Sectional Front View, along section A-A **7**
   B) Top View **3**
   C) Right Side View **7**
   D) Dimensioning. **3**

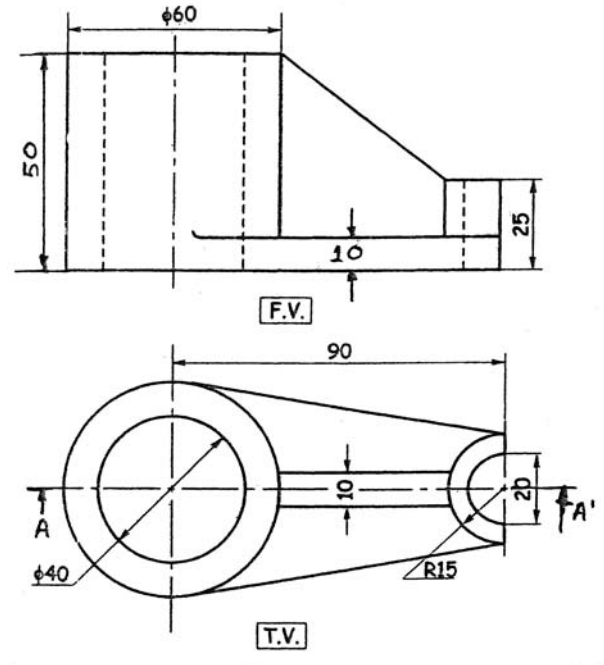

Figure 7

OR

10. The figure 8 shows FV and LHSV of a machine part. Draw
    A) Sectional Front View, along section A-A **7**
    B) Top View **7**
    C) Left Side View **3**
    D) Dimensioning. **3**

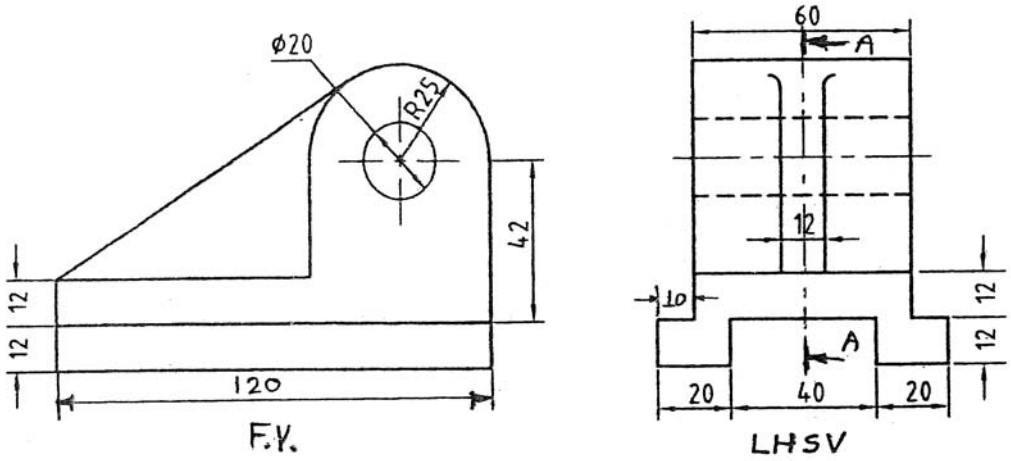

Figure 8

UNIT – VI

Free Hand Sketches

11. Draw proportionate freehand sketches of any two of the following : Rag Foundation bolt, Compression helical spring and Wing nut. **10**

OR

12. Draw proportionate freehand sketches of any two of the following : Lifting eye bolt, square thread, Gib-headed key with assembly. **10**

[4261] – 108

Seat No.	

F.E. (Semester – II) Examination, 2012
APPLIED SCIENCE – II (Chemistry)
(2008 Pattern)

Time : 2 Hours Max. Marks : 50

Instructions *: 1) Solve Q.* ***1*** *or Q.* ***2****, Q.* ***3*** *or Q.* ***4*** *and Q.* ***5*** *or Q.* ***6****.*

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

3) ***Assume*** *suitable data, if necessary.*

1. a) What is rocket propellant ? Explain different types of propellants with suitable example. **7**

   b) Explain :
   1) Octane no. of petrol
   2) Cetane no. of diesel. **6**

   c) 2.4 g of coal sample was heated in a silica crucible at 110°C for 1 hr. The residue weighed 2.35 g. The crucible was then covered with a vented lid and heated at 950°C for 7 min. The residue weighed 2.04 g. The residue was then ignited to a constant weight of 0.36 g. Calculate the percentage of fixed carbon. **4**

OR

2. a) Explain different types of calorific values of a fuel with the help of Boy's gas calorimeter. **7**

   b) How will you calculate % C, H and S by ultimate analysis ? **6**

   c) A producer gas has following composition by valume H_2 – 30%, CO – 14%, CH_4 – 4%, CO_2 – 18% and N_2 – 34%.

   Find the valume of air required for complete combustion of 1 m^3 of the gas. **4**

3. a) How metal is protected by using cathodic protection method ? **6**

   b) Discuss the factors affecting rate of corrosion of metals. **6**

   c) Explain with reactions corrosion of Al and Mo by oxygen. **4**

OR

P.T.O.

4. a) Explain the hydrogen evolution and oxygen absorption mechanism of electrochemical corrosion. **6**

   b) Differentiate between :
      i) E.C.S. and G.S.
      ii) Anodic coating and cathodic coating. **6**

   c) Discuss any 2 methods of surface conversion coatings. **4**

5. a) Discuss the causes of scale formation in boilers. Explain the prevention of scale formation by using phosphate conditioning method. **7**

   b) Draw and explain the phase diagram for water system. **6**

   c) How many litres of 9% NaCl will be required to regenerate the exhausted zeolite which has capacity of softening 20 litres of a water sample and having hardness 320 ppm ? **4**

OR

6. a) How is alkalinity in a water sample determined ? State the types of alkalinities ? **7**

   b) Explain the terms involved in Gibb's phase rule. Give its limitations. **6**

   c) Explain corrosion in boilers due to dissolved gases and methods for prevention of it. **4**

[4261] – 108

Seat No.	

F.E. (Semester – II) Examination, 2012
APPLIED SCIENCE – II (Chemistry)
(2008 Pattern)

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   b) Draw and explain the phase diagram for water system. **6**

   c) How many litres of 9% NaCl will be required to regenerate the exhausted zeolite which has capacity of softening 20 litres of a water sample and having hardness 320 ppm ? **4**

OR

6. a) How is alkalinity in a water sample determined ? State the types of alkalinities ? **7**

   b) Explain the terms involved in Gibb's phase rule. Give its limitations. **6**

   c) Explain corrosion in boilers due to dissolved gases and methods for prevention of it. **4**

[4261] – 101

Seat No.	

F.E. Semester – I Examination, 2012
ENGINEERING MATHEMATICS – I
(2008 Pattern)

Time : 3 Hours Max. Marks : 100

Instructions : *1) Q.**1** or Q.**2**, Q.**3** or Q.**4**, Q.**5** or Q.**6**, from Section **I** and Q.**7** or Q.**8**, Q. **9** or Q.**10**, Q.**11** or Q.**12** from Section **II**.*

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

*3) **Neat** diagram must be drawn **wherever** necessary.*

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

*5) **Use** of logarithmic tables, slide rule, electronic pocket calculator is **allowed**.*

*6) Assume suitable data, **if necessary**.*

SECTION – I

1. A) Find the rank of matrix A by reducing it to its normal form. **6**

$$A = \begin{bmatrix} 2 & 1 & -3 & -6 \\ 3 & -3 & 1 & 2 \\ 1 & 1 & 1 & 2 \end{bmatrix}$$

B) Examine the consistency of the system and if consistent, solve it. **5**

$4x - 2y + 6z = 8$

$x + y - 3z = -1$

$15x - 3y + 9z = 21$

C) Verify Cayley-Hamiltone theorem for the matrix A and find A^4. **7**

$$A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$$

OR

2. A) Find eigen values and eigen vectors for the matrix A. **7**

$$A = \begin{bmatrix} 4 & 6 & 6 \\ 1 & 3 & 2 \\ -1 & -4 & -3 \end{bmatrix}$$

B) Examine whether the following vectors are linearly dependent. If so find the relation between them. **6**

$X_1 = [1 \; -1 \; 2 \; 2]$, $X_2 = [2 \; -3 \; 4 \; -1]$, $X_3 = [-1 \; 2 \; -2 \; 3]$

C) Given the transformation

$y_1 = 2x_1 + x_2 + x_3$

$y_2 = x_1 + x_2 + 2x_3$

$y_3 = x_1 - 2x_3$

Find the co-ordinates (x_1, x_2, x_3) in X corresponding to $(1, 2, -1)$ in Y. **5**

3. A) Prove that :

$$\left(1 - e^{i\theta}\right)^{-1/2} + \left(1 - e^{-i\theta}\right)^{-1/2} = \left(1 + \operatorname{cosec} \frac{\theta}{2}\right)^{1/2}. \quad \textbf{6}$$

B) Find all the values of $(1+i)^{1/3}$ **5**

C) Prove that : **5**

$$\operatorname{Log} \tan\left(\frac{\pi}{4} + i\frac{x}{2}\right) = i \tan^{-1}(\sinh x)$$

OR

4. A) A square lies above the real axis on an Argand's diagram and two of its adjacent vertices are the origin and the point 5 + 6i. Find the complex numbers representing other vertices. **6**

   B) If $\alpha + i\beta = \tanh\left(x + i\frac{\pi}{4}\right)$, Prove that $\alpha^2 + \beta^2 = 1$. **5**

   C) Find the complex number Z so that, $\arg(Z+2) = \frac{\pi}{4}$ and $\arg(Z-2) = \frac{3\pi}{4}$. **5**

5. A) Find the n^{th} order differential co-efficient for $y = \frac{x^2 + x + 1}{x^3 - 6x^2 + 11x - 6}$ **5**

   B) If $\sin^{-1} y = 2 \log (x + 1)$, then prove that

   $(x + 1)^2 y_{n+2} + (2n + 1)(x+1)y_{n+1} + (n^2 + 4)y_n = 0$. **5**

   C) Test the convergence of the series (any **one**) : **6**

   i) $\frac{2}{1} + \frac{2.5}{1.5} + \frac{2.5.8}{1.5.9} + \frac{2.5.8.11}{1.5.9.13} + \ldots$

   ii) $\frac{1}{1.2.3} + \frac{3}{2.3.4.} + \frac{5}{3.4.5} + \frac{7}{4.5.6} + \ldots$

   OR

6. A) Find the n^{th} order differential co-efficient for $y = \cos^4 x$. **5**

   B) If $y = \left(x + \sqrt{x^2 - 1}\right)^m$ show that $(x^2 - 1)y_{n+2} + (2n + 1)xy_{n+1} + (n^2 - m^2)y_n = 0$. **5**

C) Test the convergence of the following series (**any one**) : **6**

i) $1-\frac{1}{2\sqrt{2}}+\frac{1}{3\sqrt{3}}-\frac{1}{4\sqrt{4}}+...$

ii) $\frac{2x}{1^2}+\frac{3^2x^2}{2^3}+\frac{4^3x^3}{3^4}+\frac{5^4x^4}{4^5}+...$

SECTION – II

7. a) Using Taylor's theorem, expand $(x-2)^4-3(x-2)^3+4(x-2)+5$ in ascending powers of x. **5**

b) Show that :

$$\log\left(\frac{1+e^{2x}}{e^x}\right)=\log^2+\frac{x^2}{2}-\frac{x^4}{12}+\frac{x^6}{45}... \quad \textbf{5}$$

c) Solve (**any one**) : **6**

i) Find the values of a and b such that

$$\lim_{x\to 0}\frac{x(-a\cos x+1)+b\sin x}{x^3}=\frac{1}{3}$$

ii) Evaluate : $\lim_{x\to 0}\frac{5\sin x-7\sin 2x+3\sin 3x}{\tan x-x}$

OR

8. a) Using Taylor's theorem, find the expansion of tan x in powers of $\left(x-\frac{\pi}{4}\right)$. **5**

b) Prove that :

$$\text{Sin h}^{-1}\, x = x-\frac{x^3}{6}+\frac{3}{40}x^5+\ldots$$ **5**

c) Solve (**any one**) : **6**

i) Evaluate : $\lim_{x\to 0}\left(\frac{1}{x}\right)^{2\sin x}$

ii) Evaluate : $\lim_{x\to 0}\frac{\sin^{-1}x-x}{x^3}$

9. Solve (**any two**) : **16**

a) If $x=\frac{r}{2}(e^{\theta}+e^{-\theta});\ y=\frac{r}{2}(e^{\theta}-e^{-\theta})$,

Prove that : $\left(\frac{\partial x}{\partial r}\right)_{\theta}=\left(\frac{\partial r}{\partial x}\right)_{y}$

b) If $u=\sinh^{-1}\left(\frac{x^3+y^3}{x^2+y^2}\right)$; Show that : $x^2\,u_{xx}+2xy\,u_{xy}+y^2\,u_{yy}=-\tan h^3\,u$.

c) If $f(x+y+z,\ x^2+y^2+z^2)=0$, prove that

$$(x-y)+(x-z)\frac{\partial z}{\partial y}+(z-y)\frac{\partial z}{\partial x}=0$$

OR

10. Solve (**any two**) : **16**

a) If z = f(u, v) where $x = u\cos\theta - v\sin\theta;\ y = u\sin\theta + v\cos\theta$ (θ is const) then show that : $u\frac{\partial z}{\partial x} - v\frac{\partial z}{\partial y} = x\frac{\partial z}{\partial u} - y\frac{\partial z}{\partial v}$.

b) If $x = e^u \tan v$; $y = e^u \sec v$ and $z = e^{-2u} f(v)$, then prove that :

$$x\frac{\partial z}{\partial x} + y\frac{\partial z}{\partial y} + 2z = 0$$

c) If $2x^2 + 3y^2 + 4z^2 = 1$ and $3x - 2y + 5z = 0$, find $\frac{dy}{dx}$ and $\frac{dz}{dy}$.

11. a) If $u^3 + v^3 + w^3 = x + y + z$ **6**

$$u^2 + v^2 + w^2 = x^3 + y^3 + z^3$$

$$u + v + w = x^2 + y^2 + z^2$$

Show that : $\frac{\partial(u,v,w)}{\partial(x,y,z)} = \frac{(x-y)(y-z)(z-x)}{(u-v)(v-w)(w-u)}$

b) If $u = x^2 - 2y^2$, $v = 2x^2 - y^2$

$x = r\cos\theta$, $y = r\sin\theta$

Show that $\frac{\partial(u,v)}{\partial(r,\theta)} = 6r^3 \sin 2\theta$ **6**

c) Find maximum and minimum values of $x^3 + 3xy^2 + 4 - 3x^2 - 3y^2$. **6**

OR

12. a) Examine for functional dependence : $u = x + y + z$; $v = x^2 + y^2 + z^2$; $w = xy + yz + zx$. If dependent, find relation between them. **6**

b) The area of triangle ABC is calculated using the formula, $\Delta = \frac{1}{2}bc \sin A$. Errors of 1%, 2%, 3% respectively are made in measuring b, c, A. If the correct value of A is 45°, find % error in the calculated value of Δ. **6**

c) Find maximum and minimum value of $x^2 + y^2$ when $3x^2 + 4xy + 6y^2 = 140$. **6**

[4261] – 101

Seat No.	

F.E. Semester – I Examination, 2012
ENGINEERING MATHEMATICS – I
(2008 Pattern)

Time : 3 Hours Max. Marks : 100

Instructions : *1) Q.**1** or Q.**2**, Q.**3** or Q.**4**, Q.**5** or Q.**6**, from Section **I** and Q.**7** or Q.**8**, Q. **9** or Q.**10**, Q.**11** or Q.**12** from Section **II**.*

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Show that : $\frac{\partial(u,v,w)}{\partial(x,y,z)} = \frac{(x-y)(y-z)(z-x)}{(u-v)(v-w)(w-u)}$

b) If $u = x^2 - 2y^2$, $v = 2x^2 - y^2$

$x = r\cos\theta$, $y = r\sin\theta$

Show that $\frac{\partial(u,v)}{\partial(r,\theta)} = 6r^3 \sin 2\theta$ **6**

c) Find maximum and minimum values of $x^3 + 3xy^2 + 4 - 3x^2 - 3y^2$. **6**

OR

12. a) Examine for functional dependence : $u = x + y + z$; $v = x^2 + y^2 + z^2$; $w = xy + yz + zx$. If dependent, find relation between them. **6**

b) The area of triangle ABC is calculated using the formula, $\Delta = \frac{1}{2}bc \sin A$. Errors of 1%, 2%, 3% respectively are made in measuring b, c, A. If the correct value of A is 45°, find % error in the calculated value of Δ. **6**

c) Find maximum and minimum value of $x^2 + y^2$ when $3x^2 + 4xy + 6y^2 = 140$. **6**

[4261] – 102

Seat No.	

F.E. (Semester – I) Examination, 2012
APPLIED SCIENCE – I (Chemistry)
(2008 Pattern)

Time : 2 Hours Max. Marks : 50

Instructions *:* 1) *Answer* ***any 3*** *questions.*
2) ***Neat*** *diagrams must be drawn* ***wherever*** *necessary.*
3) *Black figures to the* ***right*** *indicate* ***full*** *marks.*
4) *Your answers will be valued as a whole.*
5) ***Use*** *of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is* ***allowed****.*
6) ***Assume*** *suitable data, if necessary.*

1. A) Define Wiess and Miller indices. Why Miller indices are superior to Wiess indices ? Explain your answer with suitable example. **7**

   B) Show that the atomic packing factor for BCC is 0.68 and for FCC is 0.74. **6**

   C) Draw the following planes in a cubic system. **4**

   i) [100] ii) [112] iii) [111] iv) [020]

   OR

2. A) Define lattice parameters, give the comparison between HCP and CCP with diagram and examples. **7**

   B) Compare the FCC, BCC and SC unit cells with respect to coordination number, atomic radius and atoms per unit cells. **6**

   C) X-ray of wavelength 0.68 A° are diffracted by a Bragg's spectrometer at a glancing angle 15° in the first order. Calculate the interplanar spacing of the crystal. **4**

3. A) Solve the following :

   i) Find the pH of the solution after adding 18 ml of 0.2 N KOH solution to 25ml of 0.1 N HCl in the titration.

   ii) 20 ml of 10N HCl is mixed with 10ml of 36N H_2SO_4 and the mixture is made upto one litre with water. What is the normality of the mixture ? **6**

   B) Explain Ostwald's theory of pH indicator. **6**

P.T.O.

C) Calculate the weight of following substances will be required to prepare 250 ml of their decinormal solution **4**

i) H_2SO_4 ii) $C_2H_2O_4.2H_20$

iii) HCl iv) NaOH

OR

4. A) What is a complexometric titration ? Explain with suitable examples. **6**

B) Explain in detail the Volhards method for determination of chlorides in the given water sample. **6**

C) What are the characteristics of primary standard substances ? **4**

5. A) What are plastics ? How they are classified ? Explain in brief different ingredients used in plastics. **7**

B) Define and explain with suitable example : **6**

i) Functionality ii) Degree of polymerization

iii) Co-polymer iv) Thermosetting polymer

C) Give a brief account of conducting polymers. **4**

OR

6. A) Explain the mechanism of free radical chain polymerization with suitable examples. **7**

B) Give preparation, properties and application of (**any two**). **6**

i) HDPE ii) SBR

iii) Polystyrene iv) Polypropylene

C) Give classification of polymer on following basis : **4**

i) Type of monomer

ii) Backbone composition.

———————

[4261] – 103 A

Seat No.	

F.E. (Semeter – I) Examination, 2012
APPLIED SCIENCE – I
(Physics) (2008 Pattern)

Time : 2 Hours Total Marks : 50

***Instructions** : 1) Neat diagrams must be drawn **wherever** necessary.*
*2) Black figures to the **right** indicate **full** marks.*
*3) You are advised to attempt not more than **3** questions.*
*4) **Use** of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is **allowed**.*
5) Assume suitable data, if necessary.

1. a) A thin film is illuminated by monochromatic light. Obtain the condition of darkness and brightness of the film as observed in reflected light. Why the colours are formed in the reflected light ? **7**

   b) Explain electrostatic focussing and a neat diagram of electrostatic lens. **6**

   c) White light falls at an angle of 45° on a parallel soap film of refractive index 1.33. At what minimum thickness of the film will it appear bright yellow of wavelength 5900 A° in the reflected light ? **4**

   OR

2. a) Draw neat diagram of Michelsons interferometer. Explain how it used for
      a) the determination of wavelength of light
      b) thickness of thin transparent film. **7**

   b) Explain with a neat diagram the principle, construction and working of a Bainbridge Mass Spectrograph. **6**

   c) In Newton's rings experiment the diameters of n^{th} and $(n + 8)^{th}$ bright rings are 4.2 mm and 7.00 mm respectively. Radius of curvature of the lower surface of the lens is 2.00 m. Calculate the wavelength of the light used. **4**

P.T.O.

3. a) Explain Fraunhofer diffraction due to a single slit and obtain an expression for resultant amplitude of diffraction pattern, the conditions of principal maximum and minima. **7**

   b) How the ultrasonic waves are detected by acoustic diffraction method, explain with neat and labeled diagram ? **6**

   c) A diffraction grating is used for the resolution of two wavelength. If the wavelength difference is 1.8 A° at $\lambda = 6553\,A^{\circ}$. Calculate the minimum number of lines that a diffraction grating would need to have in order to resolve in first order the red doublet given by a mixture of hydrogen and deuterium. **4**

OR

4. a) Give the theory of a plane diffraction grating and obtain the condition for n^{th} order maximum and minimum. **7**

   b) Explain the use of ultrasonic waves for

      i) The detection of flow in metals. **4**

      ii) Depth sounding. **2**

   c) Find the half angular width of the central maximum in the Fraunhofer diffraction pattern of a slit of width 12×10^{-5} cm, when illuminated by light of wavelength 6000 A°. **4**

5. a) Explain the production of plane polarised light by refraction (pile of plates). **6**

   b) Explain principle construction and working of a cyclotron. Obtain the expression for the cyclotron resonance frequency and the maximum energy of the particle. **6**

   c) Calculate the specific rotation, which rotates the plane of polarization 15.2° in 20% sugar solution of 25 cm length. **4**

OR

6. a) What are polaroids ? Explain the construction of polaroids and its uses. **6**

   b) What is stellar energy ? Define nuclear fusion and give an account of Carbon-Nitrogen cycle. **6**

   c) A quarter wave plate of thickness 2.275×10^{-3} cm is cut with its faces parallel to the optic axis. The emergent beam of light is elliptically polarised. Find the wavelength of monochromatic light made incident normally on the plate .

   [Given $\mu_0 = 1.586$, $\mu_e = 1.592$]. **4**

Seat No.	

[4261] – 105

F.E. (Common) (Semester – I) Examination, 2012
BASIC CIVIL AND ENVIRONMENTAL ENGINEERING
(2008 Pattern)

Time : 3 Hours Max. Marks : 100

SECTION – I

1. a) Explain the role of civil engineer in the construction of a power house. **6**

   b) Differentiate between roadways and railways. **5**

   c) Write a short note on Quantity surveying and valuation. **5**

   OR

2. a) Explain in brief the general role of civil engineer in any construction work. **5**

   b) Define fluid mechanics. Explain in brief the practical applications of fluid mechanics. **5**

   c) Explain in brief the following terms : **6**
      1) Hypocentre
      2) Epicenter
      3) Magnitude of earthquake
      4) Intensity of earthquake.

3. a) Define settlement. What are the various causes of settlement ? **6**

   b) Write a short note on types of cement. **5**

   c) Differentiate between load bearing structure and framed structure. **5**

   OR

4. a) Draw a neat sketches of the following : **6**
   1) Simple wall footing
   2) Trapezoidal combined footing
   3) End bearing pile.

   b) State comparison between first class bricks and second class bricks. **5**

   c) Explain in brief the following : **5**
   1) Dead load
   2) Live load.

5. a) State any three modern electronic equipments. Also mention the merits and demerits of each in brief. **6**

   b) Draw a neat sketch of the details of graduations of the 4 m levelling staff. (only show one decimeter length of staff). **6**

   c) Define contour. State any four uses of contour maps. **6**

   OR

6. a) Following consecutive staff readings were taken with the help of a dumpy level and 4 m staff. The R.L. of the first station was known to be 55.275 m. Calculate the reduced levels of the remaining stations by rise and fall method. Apply usual arithmetic check. The readings are, 2.535, 3.675, 1.505, 0.985, 2.585, 0.955, 2.005 and 0.855. **8**

   b) What is GPS ? Explain in brief the various components of GPS. **4**

   c) Define the following terms : **6**
   1) Level surface
   2) Datum surface
   3) Change point
   4) Station.

SECTION – II

7. a) Explain with a neat sketch : Hydrological cycle. **6**

   b) State various methods of carrying out EIA. Explain any one in brief. **6**

   c) Write a short note on sustainable development. **6**

   OR

8. a) State various types of Ecosystem. Mention the Biotic and Abiotic components of forest ecosystem. **6**

   b) Discuss in brief the impact of human behaviour on the environment. **6**

   c) Write a short note on solid waste management. **6**

9. a) State the various principles of building planning. Explain any one in brief. **5**

   b) Determine the carpet area per floor of a two storeyed residential building from the following data : **6**

      1) Plot area = 1200 m^2
      2) F.S.I. allowed = 0.9
      3) Ratio of carpet area to built up area = 0.7

      Assume equal built up area on each floor.

   c) Write a short note on Green Building. **5**

   OR

10. a) State the various points to be considered while selecting a site for a residential building. **5**

    b) If the permissible FSI for a three storeyed building is 0.9 and the total plot area is 500 m^2 and the ratio of carpet area to built up area is 0.7. Calculate the maximum permissible carpet area on each floor assuming equal carpet area on each floor. **6**

    c) What is F.S.I. ? State its importance. **5**

11. a) Write a short note on global warming. **5**

    b) State comparison between renewable and nonrenewable energy sources. **6**

    c) Write a short note on Noise pollution. **5**

OR

12. Write short notes on the following : **(4×4=16)**

    1) Wind energy

    2) Water pollution

    3) Green House Effect

    4) Causes and sources of air pollution.

[4261] – 107

F.E. (Semester – II) Examination, 2012
ENGINEERING MATHEMATICS – II
(2008 Pattern)

Time : 3 Hours Max. Marks : 100

Instructions: *1) Answer **three** questions from **Section I** and **three** questions from **Section II**.*
*2) Answers to the **two** Sections should be written in **separate** answer books.*
*3) Black figures to the **right** indicate **full** marks.*
*4) **Use** of electronic pocket calculator is **allowed**.*
*5) Assume suitable data, **if necessary**.*

SECTION – I

1. A) Form a differential equation whose general solution is $y = Ae^{-2x} + Be^{3x}$ where A and B are arbitary constants. **6**

   B) Solve **any two**. **10**

   i) $y\,(x^2y+e^x)\,dx - e^x\,dy = 0$

   ii) $\frac{dy}{dx} - y\tan x = y^4 \sec x$

   iii) $\frac{dy}{dx} = \frac{x+2y-3}{3x+6y-1}$.

OR

2. A) Form a differential equation whose general solution is $y = c_1x + \frac{c_2}{x}$ where c_1 and c_2 are arbitary constants. **6**

B) Solve **any two**. **10**

i) $(x^4 + y^4)\,dx - (xy^3)\,dy = 0$

ii) $\cos x \frac{dy}{dx} + y = \sin x$

iii) $(x^2y + y^4)\,dx + (2x^3 + 4xy^3)\,dy = 0$.

3. Solve **any three** : **18**

a) A body at temperature 100°C is placed in a room whose temperature is 20°C and cools down to 60°C in 5 minutes. Find its temperature after 8 minutes.

b) A voltage Ee^{-at} is applied at t = 0 to a circuit containing inductance L and resistance R. Show that current at any time t is $\frac{E}{R - aL}(e^{-at} - e^{-\frac{R}{L}t}$.

c) A bullet is fired into sand tank, its retardation is proportional to square root of its velocity $(K\sqrt{V})$. Show that the bullet will come to rest in time $\frac{2\sqrt{V}}{K}$, where V is initial velocity.

d) Find orthogonal trajectories of family of parabola $y^2 = 4ax$, where a is arbitary constant.

OR

4. Solve **any three** : **18**

a) The charge Q on the plate of a condenser of capacity 'C' charged through a resistance R by a steady voltage V satisfy the differential equation

$R\frac{dQ}{dt} + \frac{Q}{C} = V$

If Q = 0 at t = 0, show that $Q = CV\left[1 - e^{-t/RC}\right]$

Find the current flowing into the plate.

b) A steam pipe 20 cm in diameter is protected with a covering 6 cm thick for which the coefficient of thermal conductivity is K = 0.0003 cal/cm.deg.sec. Find the heat lost per hour through a metre length of the pipe, if the surface of the pipe is at 200°C and outer surface of the covering is at 30°C.

c) A tank initially contains 50 litres of fresh water. Brine containing 2 gm per litre of salt flows into the tank at the rate of 2 litres per minute and the mixture kept uniform by stirring runs out at the same rate. How long will it take for the quantity of salt in the tank to increase from 40 to 80 gm.

d) A body starts moving from rest is opposed by a force per unit mass of value cx and resistance per unit mass of value bv^2, where x and v are displacement and velocity of the particle at that instant. Show that the velocity of the particle is given by $v^2 = \frac{c}{2b^2}(1 - e^{-2bx}) - \frac{cx}{b}$.

5. A) Find Fourier series to represent the function $f(x) = \pi^2 - x^2$ in the interval $-\pi \le x \le \pi$ and $f(x + 2\pi) = f(x)$

Deduce that

$$\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \ldots = \frac{\pi^2}{1^2}.$$ **9**

B) If $I_n = \int_0^{\pi/4} \sin^{2n} x \, dx$

prove that $I_n = \left(1 - \frac{1}{2n}\right) I_{n-1} - \frac{1}{n\,2^{n+1}}$ and hence find I_3. **7**

OR

6. A) Obtain the constant term and the coefficient of the first sine and cosine term in the Fourier expansion of y as given in the following table **8**

x	0	1	2	3	4	5
y	9	18	24	28	26	20

B) Evaluate :

$$\int_0^2 x\left(1-\frac{x^3}{8}\right)^{1/3} dx .$$ **4**

C) Show that

$$\int_0^1 (x \log x)^3 dx = \frac{-3}{128} .$$ **4**

SECTION – II

7. a) Trace the following curves **(any two)** : **8**

i) $r^2 = a^2 \cos 2\theta$

ii) $y^2 = \frac{a^3 x}{a^2 - x^2}, (a > 0)$

iii) $\left(\frac{x}{a}\right)^{2/3} + \left(\frac{y}{b}\right)^{2/3} = 1.$

b) Evaluate

$$\int_0^\infty \frac{\cos x}{x}\left\{e^{-ax} - e^{-bx}\right\} dx$$ using DUIS. **5**

c) Find arc length of the curve $r = \frac{2a}{1+\cos\theta}$ from $\theta = 0$ to $\theta = \frac{\pi}{2}$. **4**

OR

8. a) Trace the following curves **(any two)** : **8**

i) $r = a \sin 2\theta$

ii) $x^3 + y^3 = 3axy \quad (a>0)$

iii) $\sqrt{x} + \sqrt{y} = \sqrt{a}$.

b) If $\alpha(x) = \sqrt{\frac{2}{\pi}} \int_0^x e^{-t^2/2}\, dt$ then show that erf(x) = $\alpha(x\sqrt{2})$. **4**

c) Find arc length of the curve $x = a(\cos t + \log \tan \frac{t}{2})$, $y = a \sin t$ intercepted between $t = \pi/2$ to t. **5**

9. a) Find the equation of sphere passes through the circle

$x^2 + y^2 + z^2 - 2x + 3y - 4z + 6 = 0;$

$3x - 4y + 5z - 15 = 0,$

and cuts the sphere $x^2 + y^2 + z^2 + 2x + 4y - 6z + 11 = 0$ orthogonally. **6**

b) Find the equation of right circular cone whose vertex at origin, semivertical angle is 30° and Axis is the line $\frac{x}{1} = \frac{y}{2} = \frac{z}{3}$. **6**

c) Find the equation of right circular cylinder whose axis is the line $\frac{x-1}{2} = \frac{y-3}{2} - \frac{z-5}{-1}$ and the radius is 3. **5**

OR

10. a) Find the equation of sphere which is tangential to the plane $x - 2y - 2z - 4 = 0$ at (4, 0, 0) and passes through the point (2, 2, –2). **6**

b) Find the equation of right circular cone with vertex at the point (1, –1, 1), semivertical angle is 45° and the axis whose dr's are 2, 1, –2. **6**

c) Find the equation of right circular cylinder of radius 4, whose axis passes through origin and makes constant angle with co-ordinate axes. **5**

11. Solve **any two** : **16**

a) Evaluate $\iint_R \frac{xy}{\sqrt{1-y^2}} dxdy$ over the positive quadrant of circle $x^2 + y^2 = 1$.

b) Find the total area included between the two cardiodes $r = a(1+\cos\theta)$ and $r = a(1-\cos\theta)$.

c) Find the centre of Gravity of the area enclosed by the curves $y^2 = x$ and $x + y = 2$.

OR

12. Solve **any two** : **16**

a) Evaluate $\iint_R \frac{x^2y^2}{x^2+y^2}\,dxdy$, where R is annulus between the circles $x^2 + y^2 = 4$ and $x^2 + y^2 = 9$.

b) Evaluate $\iiint_V \sqrt{1-\frac{x^2}{a^2}-\frac{y^2}{b^2}-\frac{z^2}{c^2}}\,dxdydz$ throughout the volume of ellipsoid $\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$

c) Find the moment of inertia (M.I.) about the line $\theta = \frac{\pi}{2}$ of the area enclosed by $r = a(1-\cos\theta)$.

[4261] – 109

F.E. (Semester – II) Examination, 2012
APPLIED SCIENCE – II
(Physics) (2008 Pattern)

Time : 2 Hours | Max. Marks : 50

Instructions: *1) Answer **1** or **2**, **3** or **4**, **5** or **6**.*
*2) **Neat** diagrams must be drawn **wherever** necessary.*
*3) Black figures to the **right** indicate **full** marks.*
*4) **Use** of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is **allowed**.*
*5) Assume suitable data, **if necessary**.*

Constants :

1) Mass of electron - 9.1×10^{-31} Kg.
2) Charge on electron - 1.6×10^{-19} C
3) Velocity of light - 3×10^{8} m/sec.
4) Planks constant (h) - 6.625×10^{-34} J.Sec.

1. A) Show that the group velocity of a matter wave is equal to the particle velocity. **6**

   B) Derive the Schrodinger's time dependent equation starting from the Schrodinger's time independent wave equation. **7**

   C) Lowest energy of an electron trapped in an infinite potential well is 38 ev. Calculate the width of the well. **4**

OR

2. A) State and explain Heisenberg's uncertainty principle. Illustrate it by an experiment on electron diffraction at a single slit. **6**

   B) Derive an expression for the energy levels and wave function of a particle enclosed in an infinite potential well. **7**

   C) An electron has a speed of 600 m/s with an accuracy of 0.005%. Calculate the uncertainty with which we can locate the position of the electron. **4**

P.T.O.

3. A) Explain the construction and operation of Ruby laser with neat labeled diagram. **6**

   B) Distinguish between type I and type II superconductors. **6**

   C) What are lasers ? State the properties of lasers. **4**

OR

4. A) With a neat labeled diagram, explain construction and working of He-Ne laser. **6**

   B) State and explain the Meissner effect. What important property of superconductors it explains. **6**

   C) Explain :

      i) Spontaneous emission

      ii) Stimulated emission. **4**

5. A) Classify the elements into conductors, insulators and semiconductors on the basis of band theory of solids. **6**

   B) Define nanotechnology. Discuss the mechanical and electrical properties of nano materials. **7**

   C) Calculate the conductivity of pure Si at room temperature when the concentration of carriers is 1.6×10^{10}/C.C.
   (μ_e = 1500 cm^2/volt-sec, μ_h = 500 cm^2/volt-sec). **4**

OR

6. A) What is Fermi function ? Show that the Fermi level lies at the centre of the energy gap in an intrinsic semiconductor. **7**

   B) Explain briefly the theory of colloids and hence explain how colloids are synthesized by the chemical route. **6**

   C) Calculate the mobility of charge carriers in a doped silicon whose conductivity is 100 per ohm-m and Hall coefficient is 3.6×10^{-4} m^3/Coulomb. **4**

[4261] – 110

Seat No.	

F.E. (Semester – II) (Common) Examination, 2012
ENGINEERING MECHANICS
(2008 Pattern)

Time : 2 Hours Max. Marks : 50

Instructions : 1) *Attempt Q.**1** or Q.**2**, Q.**3** or Q.**4** and Q.**5** or Q.**6**.*

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

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

4) *Assume suitable data,* ***if*** *necessary and clearly state.*

5) *Use of cell phone is prohibited in the examination Hall.*

6) ***Use*** *of electronics pocket calculator is* ***allowed***.

1. a) Find the magnitude of the resultant and its location of the following forces acting at a point O as shown in Fig. 1.a. **6**

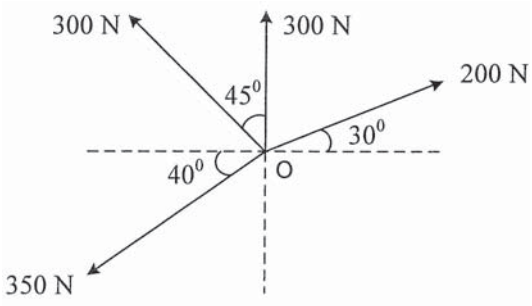

Fig. 1 a

b) A Particle starts with an initial velocity of 2.5 m/s and uniformly accelerates at the rate 0.5 m/s^2. Determine the displacement in 2 s, time required to attain the velocity of 7.5 m/s and the distance travelled when it attain a velocity of 7.5 m/s. **6**

OR

2. a) Determine the position of centroid of the shaded area as shown in Fig. 2a with respect to origin O. **6**

P.T.O.

b) Two weights 100 N and 30 N are connected by a string and move along a rough horizontal plane under the action of force 50 N applied to the first weight 100 N as shown in Fig. 2 b. The coefficient of friction between the sliding surfaces of the weights and plane is 0.25. Determine the acceleration of weights and the tension in the string using Newton's second law. **6**

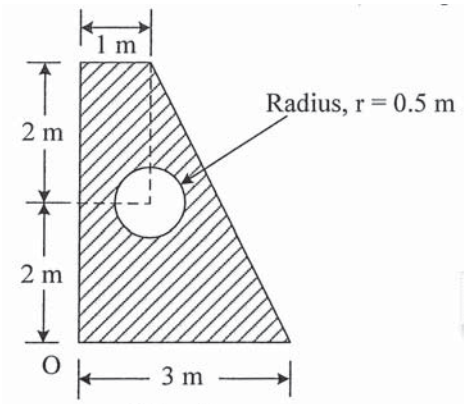

Fig. 2 a

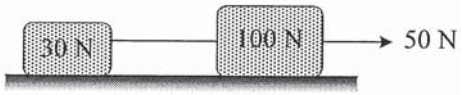

Fig. 2 b

3. a) A square foundation supports four loads as shown in Fig. 3 a. Determine magnitude, direction and point of application of resultant of four forces. **6**

b) Two sphere P and Q each of weight 50 N and a radius of 100 mm rest in horizontal channel of width 360 mm as shown in Fig. 3 b. Determine the reaction at the point of contact A, B and C. **7**

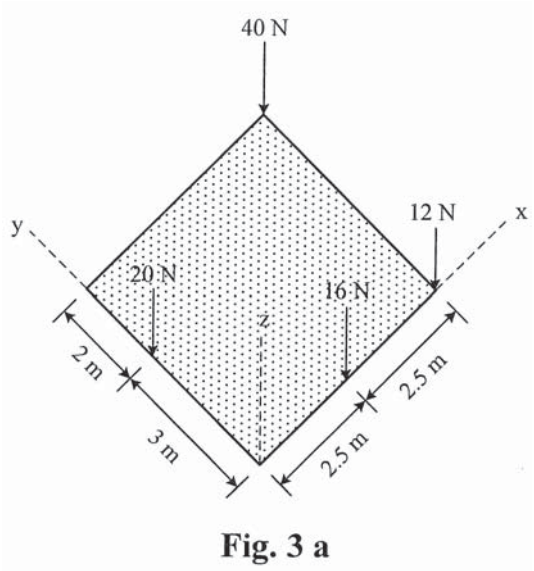

Fig. 3 a

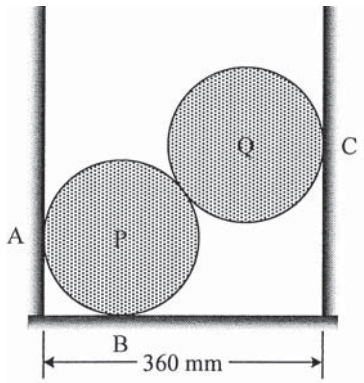

Fig. 3 b

c) A particle is projected at an angle of 30° to the horizontal with a velocity of 100 m/s. Determine the range of radius of curvature of the path followed by the particle. **6**

OR

4. a) Three loads are applied as shown in Fig. 4 a. to a light beam supported by cables attached at B and C. Neglecting the weight of the beam, determine the range of values of Q for which neither cable becomes slack when P = 0. **7**

   b) A 200 kg cylinder is hung by means of two cables AB and AC, which is attached to the top of vertical wall. A horizontal force P perpendicular to the wall holds the cylinder in the position shown in Fig. 4 b. Determine the magnitude of P and the tension in each cable. **6**

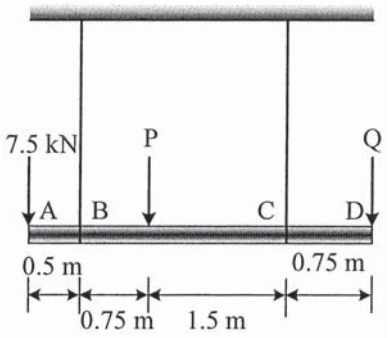

Fig. 4 a

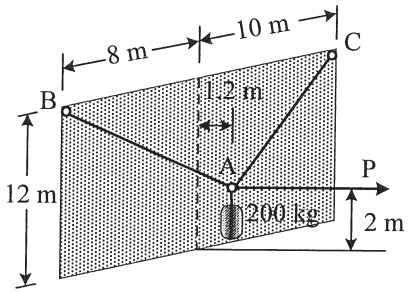

Fig. 4 b

   c) A 150 kg car enters a curved portion of the road of radius 200 m travelling at a constant speed of 36 km/h. Determine the normal and tangential component of force at curved portion. **6**

5. a) A plane truss is loaded and supported as shown in Fig.5 a. Determine the magnitude and nature of forces in all the members. **6**

   b) A body of weight 300 N is kept on a rough horizontal plane and a force P is applied to just move the body horizontally as shown in Fig. 5 b. Find the magnitude of force P required if coefficient of static friction is $\mu_s = 0.4$. **7**

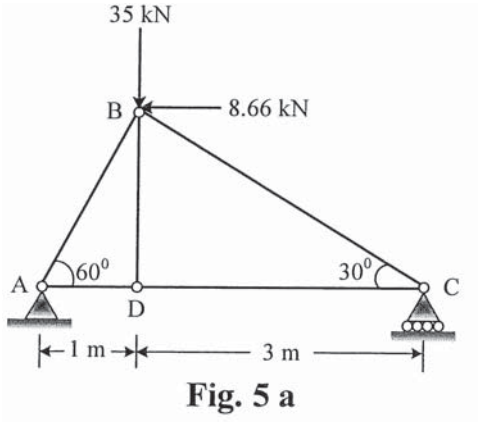

Fig. 5 a

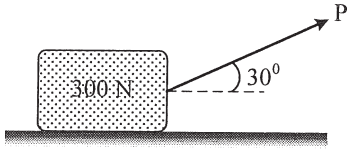

Fig. 5 b

c) A car of mass 1500 kg is moving down a hill having a slope of 15° to the horizontal. At the time, when the car is moving at a speed of 10 m/s, the driver applies the brakes. Calculate the average force applied parallel to the hill slope that will stop the car in a distance of 30 m. Use work energy principle. **6**

OR

6. a) Determine the reactions at A, D and tension in BC of the rope ABCD loaded and supported as shown in Fig.6 a. **6**

b) A 100 N ladder AB of length 6 m rest against a vertical wall and horizontal floor as shown in Fig. 6 b. Determine the slope of the ladder with vertical to maintain equilibrium if the coefficient of static friction at all contact surface is $\mu_s = 0.25$. **7**

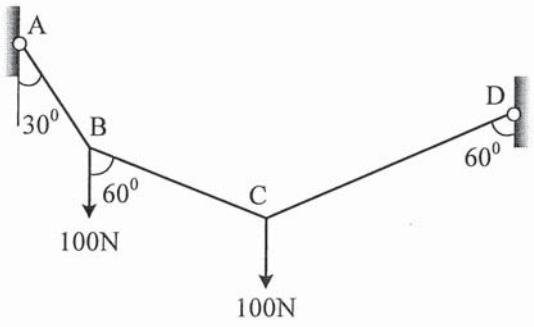

Fig. 6 a

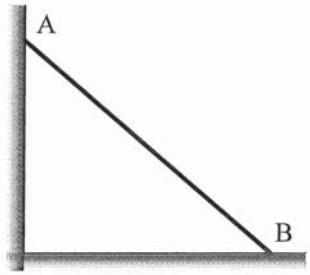

Fig. 6 b

c) Determine the velocities of the two balls shown in Fig. 6 C after impact. Take weight of ball A is 20 N, weight of ball B is 10 N and coefficient of restitution is 0.6. **6**

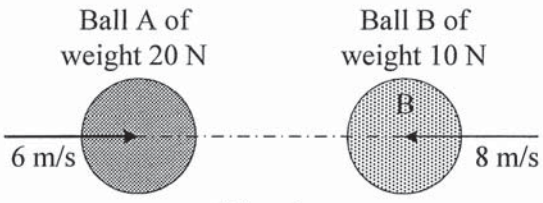

Fig. 6 c

[4261] – 111

Seat No.	

F.E. (Semester – II) Examination, 2012
BASIC MECHANICAL ENGINEERING
(2008 Pattern)

Time : 3 Hours Max. Marks : 100

Instructions *:* 1) *Answers to the* ***two*** *Sections should be written in separate books.*
2) ***Use*** *of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is* ***allowed****.*
3) ***Assume*** *suitable data, if necessary.*
4) *Attempt Q.* ***1*** *or* ***2****, Q.* ***3*** *or* ***4****, Q.* ***5*** *or* ***6****, Q.* ***7*** *or* ***8****, Q.* ***9*** *or Q.* ***10****, Q.* ***11*** *or* ***12****.*

SECTION – I

1. A) Define open system, closed system, internal energy, enthalpy. **(2×4)**
   B) Explain irreversibility, reasons and examples. **(3+3+2)**

OR

2. A) Define isolated system, isobaric process, isothermal process, cycle. **(2×4)**
   B) Explain heat engine and heat pump with formulas of efficiency and COP. **(4+4)**

3. A) Classify boilers, and state any four mountings and 4 accessories. **(4+2+2)**
   B) Explain two stroke petrol engine with figure. **(4+4)**

OR

4. A) Draw sketches and state uses of **(4+4)**
      i) impulse turbine ii) single acting reciprocating pump.
   B) Define Ton of refrigeration, pressure ratio of compressor, split AC, refrigeration effect. **(2×4)**

5. A) State and explain Newton's law of cooling. A person is standing in a room which is at 20°C. Find rate of heat transfer from person, if exposed surface area and body temp. are 1.6 m^2 and 36.7°C respectively.
      Given : convective heat transfer coefficient : 6W/m^2k. **(4+4)**
   B) Describe hydro-electric power plant with figure. **(4+4)**
   C) Define thermal conductivity. **2**

OR

6. A) Explain concept of thermal resistance in series and parallel. **(4+4)**

   B) Describe Nuclear power plant with figure. **(4+4)**

   C) State Stefan Bolfzman's law. **2**

SECTION – II

7. A) Explain open belt and cross belt drive. **(4+4)**

   B) Explain with sketch : cone clutch and band brake. **(4+4)**

OR

8. A) Classify gears. State advantages of geardrive over belt drive. **(4+4)**

   B) Explain with sketch, types of keys and bevel gear. **(4+4)**

9. A) Explain soldering and brazing processes. **(4+4)**

   B) Describe shearing, bending, squeezing and drawing operations for sheet metal. **(2×4)**

OR

10. A) Explain steps of design process. **8**

    B) Describe sand casting process. **8**

11. A) Draw only block diagram of : center lathe machine. Explain any two operations. **(4+4)**

    B) Describe 4 operations on milling machine. **(2×4)**

    C) Sketch cylindrical grinding operation. **2**

OR

12. A) Draw block diagram of CNC machine, state advantages and applications. **(4+4)**

    B) Describe 4 operations on drilling machines. **(2×4)**

    C) Sketch centerless grinding. **2**

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[4261] – 112

Seat No.	

F.E. (Semester – II) Examination, 2012
BASIC ELECTRONICS ENGINEERING
(2008 Pattern)

Time : 2 Hours Max. Marks : 50

Instructions : *1)* ***Neat*** *diagrams must be drawn* ***wherever*** *necessary.*
2) Black figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Use*** *of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is* ***allowed****.*
4) ***Assume*** *suitable data, if necessary.*

1. A) Compare and contrast full-wave rectifier using two diodes and full-wave rectifier using four diodes. **6**

   B) The data sheet of JFET gives $I_{DSS} = 10mA$ and $V_{GS(off)} = -8V$. Using these values, determine the drain current for $V_{GS} = 0V, -1V$ and $-4V$. **6**

   C) Write short notes on Bar Graph and Matrix display. **6**

   OR

2. A) For Zener voltage regulator, if $Iz_{min} = 2$ mA, $Iz_{max} = 20$ mA, $Vz = 4.7V$. Determine the range of input voltage over which output voltage remains constant. Rs. $= 1k\Omega$, $R_L = 1k\Omega$, $Zz = 0\Omega$. **6**

   B) Explain operation of BJT as a switch with neat circuit diagram and waveforms. **6**

   C) With neat construction diagram explain the working of TRIAC. Also draw its characteristics. **6**

3. A) Draw and explain the operation of following gates using CMOS devices :
   1) NAND gate 2) NOT gate **6**

   B) Draw the diagram of 1 : 8 demultiplexer. What is the relation between number of select lines and outputs ? **4**

   C) An Op-amp is used in inverting mode with $R_1 = 1K\Omega$, $R_F = 10K\Omega$, $V_{cc} = +/-15V$. Calculate the output voltage for (1) 140mV (2) 2.1V. **6**

   OR

P.T.O.

4. A) What is full adder ? Explain the working of full adder with the help of truth table and give equation for sum and carry. **6**

   B) What is an operational amplifier ? Draw the neat block diagram and explain its working. **6**

   C) Define oscillator. Find frequency of oscillations of Wien-bridge oscillator with R = 50 KΩ and C = 0.001nF. **4**

5. A) Explain the working of alarm annunciator and PID controller. **6**

   B) Write a short note on two wire transmitter. **4**

   C) Draw the block diagram of basic communication system and explain each block in detail. **6**

OR

6. A) What is the need of modulation ? Compare AM and FM. **6**

   B) Compare Co-axial cable media with fiber optic cable media. **4**

   C) Draw the block diagram of electronic weighing machine and explain its operation. **6**

Seat No.	

Total No. of Questions : 8] **[Total No. of Printed Pages : 3**

[4261]-5

F. E. Examination - 2012

BASIC ELECTRONICS ENGINEERING

(2012 Course)

Time : 2 Hours] **[Max. Marks : 50**

Instructions :

*(1) Solve Q. No. **1** or **2**, Q. No. **3** or **4**, Q. No. **5** or **6**, and Q. No. **7** or **8**.*

(2) Figures to the right indicate full marks.

(3) Neat diagrams must be drawn wherever necessary.

(4) Assume suitable data, if necessary.

Q.1) (A) A diode used as half wave rectifier, whose internal resistance is 20Ω is to supply power to a 1000Ω load from a $1l0V_{rms}$ Source of Supply. **[06]**

Calculate :

(a) the peak load current

(b) the dc load current

(c) the ac load current

(B) (a) Sketch the CE output characteristics and indicate the active, saturation and cut-off regions. **[03]**

(b) Sketch a family of CE input characteristics and explain the shape of these curves qualitatively. **[03]**

OR

Q.2) (A) Refer the circuit diagram of Fig. 1 : **[06]**

(a) Identify the circuit.

(b) Calculate voltage across capacitor C_1 and C_2.

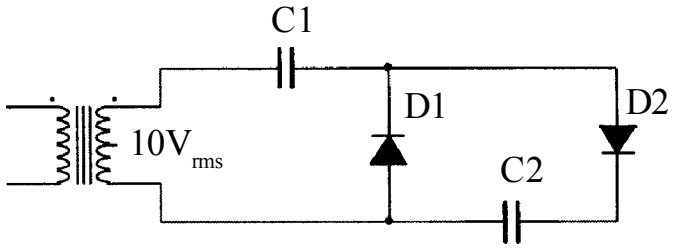

Fig. 1

(B) Explain CE transistor as a switch and why CB and CC configurations are not preferred as a switch. **[06]**

Q.3) (A) Determine the gain and output voltage of the amplifier in fig. 2. Assume ideal Op.-Amp. **[06]**

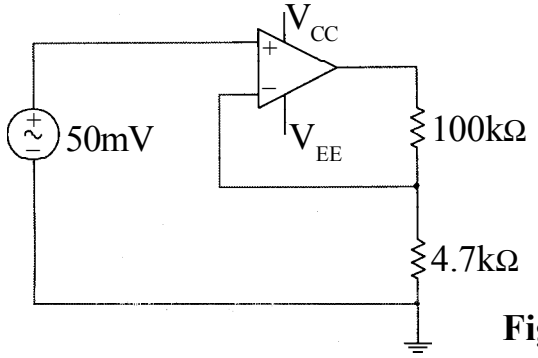

Fig. 2

(B) Realize EX-OR gate using NAND only. **[03]**

(C) Prove the following using Boolean Algebra : **[03]**

$A + \overline{A}.B + A.\overline{B} = A + B$

OR

Q.4) (A) The timing component in square wave generator circuit using IC555 are R_A = 10K, R_B = 20K and C = 0.01 μF, Calculate : **[06]**

(a) Frequency of Oscillation

(b) Percentage Duty Cycle

(B) Draw a full adder circuit using two half adders. Use : **[06]**

(a) Block diagram of Half Adder

(b) Circuit diagram of Half Adder

Q.5) (A) Explain the construction, working and characteristics of SCR. **[06]**

(B) Draw constructional details of LVDT. Explain its operation. State its advantages and disadvantages. **[07]**

OR

Q.6) (A) Draw block diagram of Electronics Weighing Machine and explain its operation. **[06]**

(B) Explain the construction, working and characteristics of TRAIC. **[07]**

Q.7) (A) Draw and explain Electromagnetic Spectrum. **[07]**

(B) Draw and explain the block diagram of GSM System. **[06]**

OR

Q.8) (A) Define Modulation Index and explain the effect of Modulation Index in FM. **[06]**

(B) Write short note on Twisted Pair Cables and explain problem associated with Twisted Pair Cables. **[07]**

Seat No.	

Total No. of Questions : 8] **[Total No. of Printed Pages : 3**

[4261]-6

F. E. Examination - 2012

BASIC CIVIL AND ENVIRONMENTAL ENGINEERING

(2012 Course)

Time : 2 Hours] **[Max. Marks : 50**

Instruction :

*Solve Q. No. **1** or **2**, Q. No. **3** or **4**, Q. No. **5** or **6** and Q. No. 7 or **8**.*

Q.1) (A) Comment a statement "for successful completion of any Civil Engineering Project, combined efforts of all Branches of Engineering is necessary." **[05]**

(B) Define Settlement. State various types of Settlement. State various causes of Settlements. **[05]**

(C) State any two practical application of the following : **[02]**

(a) Fluid Mechanics

(b) Project Management

OR

Q.2) (A) Define Concrete. State various types of Concrete. Also mention one practical application of each. **[05]**

(B) State different Modes of Transportation. Explain any one of in brief. **[05]**

(C) Write a short note on Dead Load. **[02]**

Q.3) (A) Explain in brief Biotic and A Biotic Components of Ecosystem. **[04]**

(B) The following staff readings were taken in continuously sloping ground, along the centre line of a road with the help of level and 4m staff at 30m interval. The first reading was taken on a starting point of a road, whose R-L was known to be 100.00m. The reading are 0.500, 0.900, 1.200, 2.300, 3.800, 0.400, 1.600, 2.200, 3.600, 0.700, 1.500, 2.700 and 3.400 : **[08]**

(a) Determine the Reduced Levels of all Stations by Rise and Fall Method.

(b) Find the Gradient of the Road.

OR

Q.4) (A) Define the following terms : **[04]**

(a) Plane Surveying

(b) Geodetic Surveying

(c) Scale

(d) Reduced Level

(B) State various Natural Resources. Explain any one in brief. **[04]**

(C) Write a short note on Hydrological Cycle. **[04]**

Q.5) (A) State various ways of achieving economy while constructing a building. **[05]**

(B) State with reason, the Desirable Aspect for the following rooms of a residential building : **[04]**

(a) Living Room

(b) Kitchen

(c) Bed Room

(d) Study Room

(C) Define the following terms : **[04]**

(a) Built up Area

(b) Floor Area Ratio

(c) Setback Distance

(d) Roominess

OR

Q.6) (A) Distinguish between Aspect and Prospect with need sketch. **[04]**

(B) A building is to be constructed with G + 2 storey's and built up area on each floor is to be 600m^2. A rectangular plot is purchased for this building, having width one third of the longer side. Find the dimensions of the plot, if FSI allowed is 1.50. **[05]**

(C) Write a short note on Green Building. **[04]**

Q.7) (A) Distinguish between Conventional and Non-conventional Sources of Energy. **[05]**

(B) When a Water is said to be polluted ? What are the various causes of Water Pollution ? **[04]**

(C) State various Eco-friendly Sources of Energy. Explain any one in brief. **[04]**

OR

Q.8) (A) Write a short note on Green House Effect. **[05]**

(B) Define Air Pollution. Explain in brief the various sources of Air Pollution. **[04]**

(C) Write a short note on Land Pollution. **[04]**

Seat No.	

Total No. of Questions : 8] **[Total No. of Printed Pages : 4**

[4261]-7

F. E. Examination - 2012

ENGINEERING GRAPHICS - I

(2012 Course)

Time : 2 Hours] **[Max. Marks : 50**

Instructions :

(1) Use only half imperial size drawing sheet as answer book.

(2) Retain all construction lines.

(3) Assume suitable data, if necessary.

Q.l) The point P of 75mm long line PQ is 25mm above HP while its end point Q is 20mm infront of VP. Its plan makes 36° with HP while, the projector distance between the end points of line is 60mm. Draw the projections of a line and find the inclinations made by it with HP and VP. Also, locate the traces of line. **[12]**

OR

Q.2) A hexagonal plate, base side 50mm, is resting in HP on one of its corner with its side parallel to VP. Then, its surface is inclined to HP so that the corner opposite to resting corner is 51mm above HP. Draw the projections, if its top view line passing through resting corner and its opposite corner, is inclined to VP at an angle of 35°. Also, find the inclination made by the plate with VP. **[12]**

Q.3) A cone of base diameter 60mm and axis height 80mm is resting in HP on one of its base circumference point. Then, it is inclined to HP such that the point opposite to resting point is 52mm above HP. Draw the projections, if its axis is inclined to VP at 35°, with its apex away from the observer. **[13]**

OR

Q.4) (A) Construct a parabola by rectangle method, if the base is 60 mm and axis height is 80mm. **[07]**

(B) Draw the development of a hexagonal prism with base side 25mm and axis height 50mm. **[06]**

Q.5) Fig. 1 shows a Pictorial View of an object. By using First Angle Method of projections, draw :

(a) Sectional Left Hand Side View, along given section plane **[04]**

(b) Front View **[04]**

(c) Top View **[04]**

(d) Dimensions **[01]**

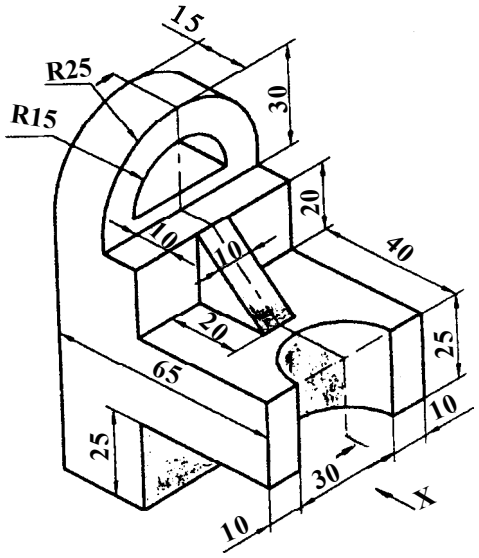

Fig. 1

OR

Q.6) Fig. 2 shows a Pictorial View of an object. By using First Angle Method of projections, draw :

(a) Sectional Front View, along sectional plane A-A **[04]**

(b) Left Hand Side View **[04]**

(c) Top View **[04]**

(d) Dimensions **[01]**

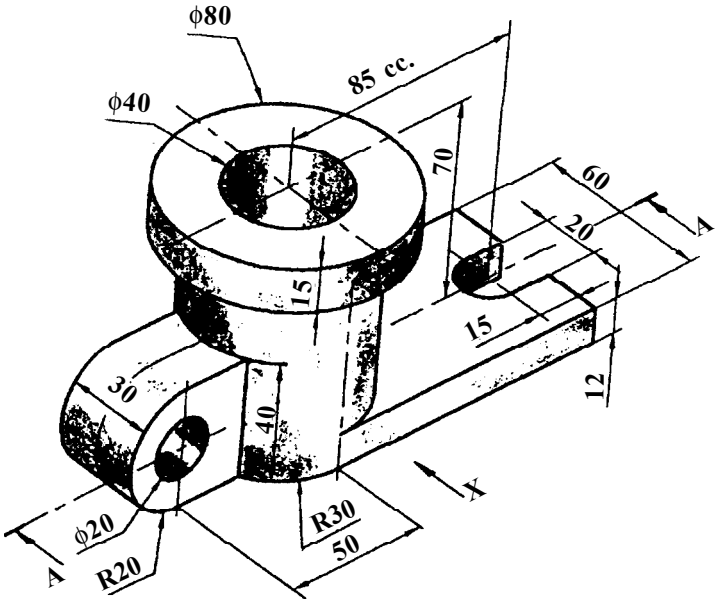

Fig. 2

Q.7) Fig. 3 shows Front View, Top view and End View of a bracket. Draw Isometric View and show overall dimensions : **[12]**

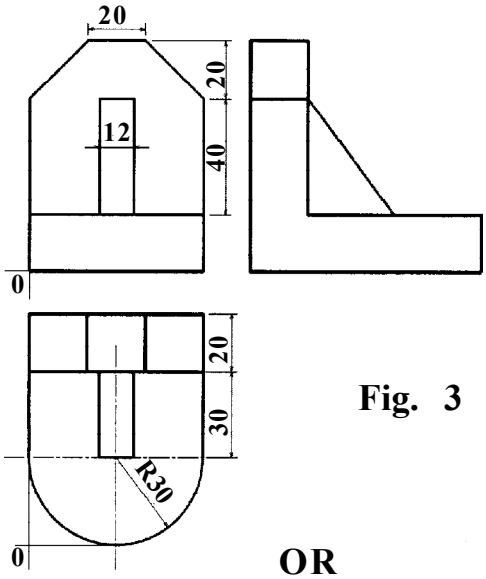

Fig. 3

OR

Q.8) Fig. 4 shows Front View and Top View of an object. Draw Isometric View and show overall dimensions : **[12]**

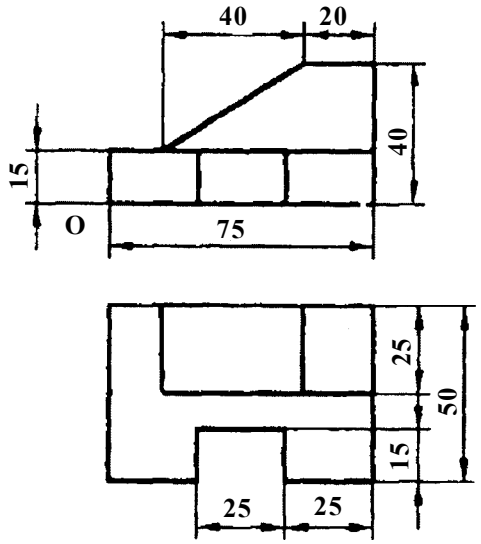

Fig. 4