Total No. of Questions : 12] [Total No. of Printed Pages : 7

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F. E. Examination - 2011

ENGINEERING MATHEMATICS - II

(2008 Pattern)

Time : 3 Hours] **[Max. Marks : 100**

Instructions :

(1) In section I, attempt Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4, Q. No. 5 or Q. No. 6.

In section II, attempt Q. No. 7 or Q. No. 8, Q. No. 9 or Q. No. 10, Q. No. 11 or Q. No. 12.

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

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

(4) Assume suitable data, if necessary.

SECTION - I

Q.1) (A) Form the differential equation by eliminating the arbitrary constants from the equation :

$y = e^x (A\cos x + B\sin x)$ **[06]**

(B) Solve the following differential equations : **(Any Two)** **[10]**

(a) $\left(\frac{e^{-2\sqrt{x}}}{\sqrt{x}} - \frac{y}{\sqrt{x}}\right)\frac{dx}{dy} = 1$

(b) $(3y + 2x + 4)\,dx - (4x + 6y + 5)\,dy = 0$

(c) $(1 + xy)\,ydx + (1 - xy)\,xdy = 0$

OR

Q.2) (A) Form the differential equation by eliminating the arbitrary constants from the equation :

$xy = Ae^x + Be^{-x} + x^2$ **[06]**

(B) Solve the following differential equations : **(Any Two)** **[10]**

(a) $\frac{dy}{dx} + \tan x \tan y = \cos x \sec y$

(b) $\frac{dy}{dx} = \frac{x(2\log x + 1)}{\sin y + y\cos y}$

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

Q.3) Attempt the following : **(Any Three)** **[18]**

(a) Find the orthogonal trajectories of $ay^2 = x^3$.

(b) A body originally at 80°C cools down to 60°C in 20 minutes, the temperature of the air being 40°C. What will be the temperature of the body after 40 minutes ?

(c) The current in the circuit containing an inductance L, resistance R and voltage Esinwt is given by $L\frac{di}{dt} + Ri = E\sin wt$. If initially there is no current in the circuit, find the current in the circuit at time t.

(d) A particle executing SHM has velocities 8cm/sec and 6cm/sec, when it is at distances 3cm and 4cm respectively from the centre of its path. Find its Period and Amplitude.

OR

Q.4) Attempt the following : **(Any Three)** **[18]**

(a) A circuit consisting of a resistance R and inductance L is connected in series with a voltage E. Given i = 0 at t = 0. Show that the current builds up to half its maximum value in $\frac{L(\log 2)}{R}$ seconds.

(b) In a culture of yeast, at each instant, the time rate of change of active ferment is proportional to the amount present. If the active ferment doubles in two hours, how much can be expected at the end of 8 hours at the same rate of growth ?

(c) A body of mass m falling from rest is subjected to the force of gravity and an air resistance proportional to the square of the velocity (kv^2). If it falls through a distance x and possesses a velocity v at that instant, prove that $\frac{2kx}{m} = \log\left(\frac{a^2}{a^2 - v^2}\right)$ where $mg = ka^2$.

(d) A long hollow pipe has an inner diameter of 10cm and outer diameter of 20cm. The inner surface is kept at 200°C and outer surface at 50°C. The thermal conductivity is 0.12. Find the temperature at a distance x = 7.5cm from the centre of pipe.

Q.5) (A) The turning moment T units of the crank shaft of a steam engine is given for a series of values of the crank angle θ in degrees :

θ°	0	30	60	90	120	150	180
T	0	5224	8097	7850	5499	2626	0

Find the first three terms in a series of sines to represent T. Also calculate T when θ = 75°. **[07]**

(B) If $I_n = \int_0^{\infty} e^{-x} \sin^n x \, dx$.

Obtain a relation between I_n and I_{n-2}. **[05]**

(C) Evaluate : $\int_0^1 (x \log x)^4 \, dx$ **[04]**

OR

Q.6) (A) If $I_n = \int_0^{\pi/4} \frac{\sin(2n-1)x}{\sin x}\,dx$.

Prove that $n(I_{n+1} - I_n) = \sin\frac{n\pi}{2}$. Hence find I_3. **[05]**

(B) Evaluate : $\int_0^1 \frac{dx}{\sqrt[3]{1-x^3}}$ **[04]**

(C) Find a Fourier Series of the function $f(x) = x + \frac{x^2}{4}$ when $-\pi < x < \pi$ and $f(x + 2\pi) = f(x)$. Hence show that

$$\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \ldots\ldots = \frac{\pi^2}{12}.$$ **[07]**

SECTION - II

Q.7) (A) Trace the following curves : **(Any Two)** **[08]**

(a) $y^2(a - x) = x^3$

(b) $r^2 = a^2\cos 2\theta$

(c) $x = a\cos^3 t,\ y = a\sin^3 t$

(B) Show that $\int_{\frac{\pi}{6a}}^{\frac{\pi}{2a}} \frac{\sin ax}{\sin x}dx$ is independent of a. **[04]**

(C) Find the length of arc of the curve $\left(\frac{x}{a}\right)^{2/3} + \left(\frac{y}{b}\right)^{2/3} = 1$, in the positive quadrant. **[05]**

OR

Q.8) (A) Trace the following curves : **(Any Two)** **[08]**

(a) $ay^2 = x(a^2 - x^2)$

(b) $a^2x^2 = y^3\ (2a - y)$

(c) $r = a\cos 3\theta$

(B) Show that erf(x) is an odd function. **[04]**

(C) Find the length of arc of the cardioide $r = 2a\ (1 + \cos\theta)$, which lies outside the circle $x^2 + y^2 = a^2$. **[05]**

Q.9) (A) Find the equation of the sphere which passes through the point $(-1, 0, 0)$ and touches the plane $2x - y - 2z = 4$ at $(1, 2, -2)$. **[05]**

(B) Find the equation of the cone passing through the point $(2, -2, 1)$, with vertex at origin and axes parallel to the line $\frac{x - 2}{5} = \frac{y - 1}{1} = \frac{z + 2}{1}$. **[06]**

(C) Find the equation of the right circular cylinder whose axis is $x = 2y = -z$ and radius is 4. **[06]**

OR

Q.10)(A) Find the equation of the sphere passing through the circle : **[06]**

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

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

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

(B) Find the equation of a right circular cylinder of radius 5 and axis is $\frac{x-2}{2} = \frac{y-3}{1} = \frac{z+1}{1}$. **[05]**

(C) Find the equation of a right circular cone with vertex $(1, -1, 1)$, axis parallel to $x = -\frac{y}{2} = -z$ and one of its generators has direction cosines proportional to 2, 2, 1. **[06]**

Q.11) Solve **any two** : **[16]**

(a) Evaluate : $\int_0^1 \int_x^{\frac{1}{x}} \frac{y\,dx\,dy}{(1+xy)^2\left(1+y^2\right)}$

(b) Find the area of the loop of the curve $x(x^2 + y^2) = a(x^2 - y^2)$, where $a > 0$. Also, find the area between the curve and its asymptote.

(c) Find the C.G. of the area of the cardioide $r = a(1 + \cos\theta)$, which lies above the initial line.

OR

Q.12) Solve **any two** : **[16]**

(a) Evaluate : $\int_0^1 4xe^{-x^2}\,dx \int_0^{\sqrt{x-x^2}} \frac{y\,e^{-y^2}}{x^2+y^2}\,dy$

(b) Evaluate $\iiint x^2yz\,dxdydz$ throughout the volume bounded by the planes $x = 0$, $y = 0$, $z = 0$ and $x + y + z = 1$.

(c) A lamina in the first quadrant is bounded by $x = 0$, $y = 0$ and $x^2 + y^2 = a^2$, and the density function is given by $\rho = \frac{x^2y}{a^3}$. Show that the Moment of Inertia of the lamina about the Z-axis is $\frac{5}{7} Ma^2$, where M is the mass of the lamina.

Total No. of Questions : 6] **[Total No. of Printed Pages : 2**

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F. E. Examination - 2011

APPLIED SCIENCE - II

(CHEMISTRY)

(2008 Pattern)

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

Instructions :

(1) All questions are compulsory.

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

(3) Neat diagrams must be drawn wherever necessary.

(4) Assume suitable data, if necessary.

(5) Use of logarithmic tables, slide rule, mollier charts, electronic pocket calculator and steam tables is allowed.

Q.1) (A) What is Ultimate Analysis ? Explain determination of percentage of Carbon and Hydrogen with principle, chemical reaction and formulae. **[07]**

(B) Define Rocket Propellant ? Give characteristics of a good Propellant. Classify the Propellants with explanation and examples. **[06]**

(C) 0.072 gm of a fuel containing 80% carbon when burnt in a Bomb Calorimeter, increased temperature of water from 27.3^{o}C to 29.1^{o}C. If the calorimeter contains 250 gm of water and its water equivalent is 150 gm, calculate GCV of the Fuel. **[04]**

OR

Q.2) (A) Write a note on Refining of Petroleum with principle of Refining, diagram of Refining and various fractions which are used as fuel with their B.P., composition and applications. **[07]**

(B) Write a note on Bio-diesel. **[06]**

(C) A petrol sample contains 14% H and 86% C, calculate the quantity of air required for complete combustion of 1 kg petrol. **[04]**

Q.3) (A) Explain various Cathodic Protection Methods to control corrosion with principle, figures and applications. **[07]**

(B) Write a note an Electroplating with principle, diagram and applications. **[06]**

(C) Differentiate between Anodic Coatings and Cathodic Coatings. **[04]**

OR

Q.4) (A) What is Electro-chemical Corrosion ? Explain Electro-chemical Corrosion by evolution of Hydrogen Gas and absorption of Oxygen Gas. **[07]**

(B) Explain various factors affecting Rate of Corrosion. **[06]**

(C) Explain Atmospheric Corrosion of Na and Cr with chemical reactions and nature of oxide film. **[04]**

Q.5) (A) How alkalinities of water sample is determined ? Explain it with procedure, formulae and table of determination. **[06]**

(B) What are the Scales ? Give their formation, disadvantages and preventive measures in Boiler. **[06]**

(C) 50 ml of a water sample requires 12.7 ml of 0.02 M EDTA during titration. Calculate total hardness of the water sample. **[04]**

OR

Q.6) (A) Draw and explain phase diagram of Sulphur System with respect to areas, curves and triple points. **[06]**

(B) Explain Corrosion of Boiler by dissolved gases and dissolved salts with chemical reactions and its preventions. **[06]**

(C) An Exhausted Zeolite Softener was regenerated by passing 150 litres of Sodium Chloride Solution having strength 150 gm/litre of NaCl. How many litres of hard water sample having hardness 400 ppm can be softened by using this softener ? **[04]**

Total No. of Questions : 6] **[Total No. of Printed Pages : 4**

[4061]-109

F. E. Examination - 2011

APPLIED SCIENCE - II

(PHYSICS)

(2008 Pattern)

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

Instructions :

(1) All questions are compulsory.

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

(3) Neat diagrams must be drawn wherever necessary.

(4) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(5) Assume suitable data, if necessary.

Q.1) (A) Classify the following characteristics of DeBroglie Waves into **true** and **false** : **[06]**

(a) DeBroglie Waves are probability waves.

(b) The wavelength of DeBroglie Waves is inversely proportional to the momentum of the particle.

(c) The Group Velocity of the DeBroglie Waves is given $v_g = v_{particle}$.

(d) DeBroglie Waves are significant for subatomic particles.

(e) DeBroglie Waves associated with bounded particles are quantized.

(f) DeBroglie Waves are associated only with moving material particles.

(B) Calculate the Wavelength of a Photon and an Electron both having an energy 1.0 eV.

(Given : Planck's Constant $h = 6.63 \times 10^{-34}$ J-s

Mass of Electron $= 9.1 \times 10^{-31}$ kg.) **[04]**

(C) Obtain the wavefunction for a particle moving in a rigid box. Also obtain the expression for its quantized energy. Highlight the step at which quantization begins to occur. **[6+1=07]**

OR

Q.2) (A) State Schrödinger's Time Independent and Time Dependant Equations and state any one difference between them. What are the basic requirements for solution of the Schrödinger's Equation to be acceptable ? **[3+4=07]**

(B) Identify and mark which of the following statement of the Heisenberg's Uncertainty Principle are incorrect. In front of the incorrect statement write the corrected statements :

$\Delta x \Delta P_y \geq h$

$\Delta \theta \Delta P_x \geq h$

$\Delta x \Delta E \geq h$

$\Delta x \Delta P_x \leq h$

$\Delta x \Delta t \geq h$ **[05]**

(C) Assuming Atomic Nucleus to be a rigid box (infinite potential well), calculate the ground state energy of an electron if it existed inside the nucleus. (Given Planck's Constant = 6.63×10^{-34} J-s, Mass of the Electron = 9.1×10^{-31} kg. and size of the nucleus ~ 10^{-15}m. Using this result, argue that electron cannot exist inside the nucleus. Given, maximum binding energy per nucleon = 8.8 MeV) **[05]**

Q.3) (A) Define following concepts : **(Any Three)** **[3x2=06]**

(a) Spontaneous Emission

(b) Stimulated Emission

(c) Metastable State

(d) Population Inversion

(e) LASING

(B) Following paragraph gives 6 statements regarding BCS Theory. Rewrite the statements and underline if they are incorrect : **[06]**

(a) BCS Theory indicates electron-lattice-electron interaction through a quantum of lattice vibration called Phonon.

(b) An electron, while passing through lattice distorts it, and another electron while passing across the distorted lattice gets attracted due to accumulated positive charge in the distorted lattice.

(c) Two electrons cannot exist together despite the presence of phonons.

(d) Cooper pairs are Bosons and thus any number of Cooper pairs can be accommodated in single low energy state.

(e) This leads to coherent propagation of the Cooper pairs with lowest possible speeds and thus hindrances are minimized. This leads to the superconducting state.

(f) BCS Theory explains why superconductivity is a high temperature, high magnetic field phenomenon.

(C) Differentiate between Type I and Type II Superconductors, on the basis of their response to the magnetic field and exhibition of the Meissner Effect. Support your explanation with the figures. **[04]**

OR

Q.4) (A) State and explain advantages of Diode/Semiconductor Laser over He Ne Laser. **[04]**

(B) Draw a block diagram of the Fiber Optics Communication System and explain the role of any four components in the system. **[2+4=06]**

(C) Explain Josephson Effect. What is Josephson Junction ? Draw its neat labelled diagram. State any one application of the Josephson Effect. **[2+1+2+1=06]**

Q.5) (A) Classify the following properties of Nano-particles in to optical, electrical and mechanical ones : **[06]**

(a) Nano-particles exhibit change in colour, which changes with the change in their size.

(b) When nano-particles are embedded in plastics, the strength is enhanced.

(c) Gold, when synthesized in nano-particle from, appears red.

(d) The I-V characteristics of nano-particles is not linear but is like a staircase.

(e) Nano-particles may acquire Superconducting State under some conditions.

(f) When Polycrystalline Magnesium is converted into Nano-crystalline Magnesium, the Young's Modulus decreases from 4100 N/m^2 to 3900 N/m^2.

(B) State any seven distinct applications of Nano-technology. **[07]**

(C) Intrinsic Silicon is doped with Phosphorus, with the atomic ratio of 10^8 (Si) : 1 (P). Calculate the conductivity of N type of Silicon thus formed. Given mobility of electrons in Silicon $\mu_e = 1400\ cm^2Vs^{-1}$. Atomic weight of intrinsic Silicon = 28.085, Avogadro's Number = 6.022×10^{23} atoms per mole, Density of Silicon = 2.33 gm/cm^3. **[04]**

OR

Q.6) (A) Write the formula for the Fermi Dirac Probability Distribution Function. Draw in the same figure the Fermi Dirac Probability versus Electron Energy at T = 0K, T_1 and T_2 (where $T_2 > T_1 > 0K$). Explain the significance of the figure. **[1+3+2=06]**

(B) A specimen having length 1.00 cm, width 1.00 mm and thickness 0.1 mm is made to conduct with 1.00 mA current and is placed in a magnetic field of 1.0 Wb/m^2, acting along the thickness. Calculate the Hall Voltage in case of (i) N type semiconductor with Hall Coefficient of $-3.44 \times 10^{-8}\ m^3/C$ and (ii) Aluminum with Hall Coefficient of $-0.3 \times 10^{-10}\ m^3/C$. Which of these materials is more sensitive to Hall Effect ? Why ? **[4+1=05]**

(C) State any four methods used for synthesis of nano-particles and describe any one method. **[06]**

Total No. of Questions : 12] **[Total No. of Printed Pages : 4**

[4061]-110

F. E. Examination - 2011

BASIC MECHANICAL ENGINEERING

(2008 Pattern)

Time : 3 Hours] **[Max. Marks : 100**

Instructions :

*(1) Answer **any one** question from each unit.*

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

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

(4) Neat diagrams must be drawn wherever necessary.

(5) Use of electronic pocket calculator is allowed.

(6) Assume suitable data, if necessary.

SECTION - I
UNIT - I

Q.1) (A) What do you understand by Property of a System ? Distinguish between Extensive and Intensive Properties of a System ? **[04]**

(B) Explain the following terms concerning Thermodynamic Systems : **[06]**

(a) Polytropic Process

(b) Throttling Process

(C) A certain gas occupies a space of $0.3m^3$ at a pressure of 2 bar and a temperature of 77^oC. It is heated at constant volume, until the pressure is 7 bar. Determine : **[06]**

(a) temperature at the end of the process

(b) mass of the gas

(c) change in internal energy

(d) change in enthalpy

Assume c_p = 1.005 kj/kgK; c_v = 0.712 kj/kgK; and R = 287 j/kgK.

OR

Q.2) (A) Explain the significance of First and Second Law of Thermodynamics by giving suitable examples. **[06]**

(B) A cold storage is to be maintained at $-5^{o}C$ while the surroundings are at $35^{o}C$. The heat leakage from the surroundings into the cold storage is estimated to be 29 kW. The actual C.O.P. of the refrigeration plant is one-third of an ideal plant working between the same temperatures. Find the power required to drive the plant. **[06]**

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

(a) Heat Engine

(b) Heat Pump

UNIT - II

Q.3) (A) Explain with a neat diagram the working cycle of Open Cycle Gas Turbine. **[06]**

(B) Describe with a block diagram and state the applications of the following : **[10]**

(a) Single Acting Reciprocating Pump

(b) Reciprocating Air Compressor

OR

Q.4) (A) Explain the working principle of Split Air Conditioner with a neat labelled diagram. **[06]**

(B) How does the Internal Combustion Engines are classified ? List out the advantages and disadvantages of a Two Stroke Cycle Engine over a Four Stroke Cycle Engine. **[10]**

UNIT - III

Q.5) (A) Derive an expression for heat conduction through an infinitely long hollow cylinder. **[06]**

(B) A 20 mm external diameter copper wire is used to carry heated water, the external surface of the pipe is subjected to a convective heat transfer coefficient of h = 6 W/m^2K, find the heat loss by convection per meter length of the pipe when the external surface temperature is 80^oC and the surroundings are at 20^oC. Assuming the black body radiation, what is the heat loss by radiation ? **[06]**

(C) Explain the working of a Steam Power Plant with a neat sketch. **[06]**

OR

Q.6) (A) What is Thermal Resistance ? Explain the Electrical Analogy for heat transfer through a two layer composite slab. **[06]**

(B) An industrial freezer is designed to operate with an internal air temperature of -20^oC when the external temperature is 25^oC and the internal and external heat transfer coefficients are 12 W/m^2K and 8 W/m^2K respectively. The walls of the freezer are composite construction, comprising of an inner layer of plastic (k = 1W/mK, and thickness of 3mm), and an outer layer of stainless steel (k = 16 W/mK and thinkness of 1mm). Sandwiched between these two layers is a layer of insulation material with k = 0.07 W/mK. Find the width of the insulation that is required to reduce the convective heat loss to 15 W/m^2. **[08]**

(C) State the advantages and disadvantages of Nuclear Power Plants. **[04]**

SECTION - II
UNIT - IV

Q.7) (A) Explain the following with a neat labelled diagrams : **[06]**

(a) Woddruff Key

(b) Flat Saddle Key

(c) Gib Head Key

(B) Distinguish between Kinematic Pair and Kinematic Chain with an example for each. [**06]**

(C) What are the advantages and disadvantages of Belt Drives ? **[04]**

OR

Q.8) (A) What is a Clutch ? Explain with a neat diagram the working of a Single Plate Clutch. **[07]**

(B) What is a Brake ? How brakes are classified ? Explain with a neat diagram the working of Shoe Brake. **[09]**

UNIT - V

Q.9) (A) Explain the steps to be followed in design process with a neat flow chart. **[06]**

(B) Define the following Mechanical Properties of Metals : **[04]**

(a) Malleability

(b) Resilience

(c) Toughness

(d) Hardness

(C) Write a short note on Ergonomic Considerations in Design. **[06]**

OR

Q.10) (A) Explain the basic Sand Casting Process with a neat labelled diagram. **[06]**

(B) Explain the following with neat diagrams : **[06]**

(a) Perforating

(b) Angle Bending

(c) Notching

(C) Distinguish between Welding and Brazing. **[04]**

UNIT - VI

Q.11) (A) Explain with neat diagrams, any four Metal Cutting Operations performed on a Lathe Machine. **[08]**

(B) Draw a neat labelled diagram of a Reciprocating Power Saw. **[06]**

(C) What are the advantages and disadvantages of CNC Machines ? **[04]**

OR

Q.12) (A) Explain with neat diagrams, any three Machining Operations performed on a Drilling Machine. **[06]**

(B) Explain in brief the basic elements of a CNC Machine Tools. **[06]**

(C) Draw neat labelled diagrams for the following Machining Operations performed on a Milling Machine : **[06]**

(a) Keyway Milling

(b) Plain Milling

Total No. of Questions : 6] **[Total No. of Printed Pages : 2**

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F. E. Examination - 2011

BASIC ELECTRONICS ENGINEERING

(2008 Pattern)

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

Instructions :

*(1) Answer Q. **1** or Q. **2**, Q. **3** or Q. **4** and Q. **5** or Q. **6***

(2) Figures to the right indicate full marks.

(3) Neat diagrams must be drawn wherever required.

(4) Use of electronic pocket calculator is allowed.

(5) Assume suitable data, if necessary.

Q.1) (A) In a center tapped FWR; rms half secondary voltage is 10V. Assume ideal diodes. RL = 2Ω.

Find :

(a) Peak Current

(b) DC Load Voltage

(c) Rectifier Efficiency **[06]**

(B) Draw constructional details and explain operations and characteristics of n-channel MOSFET (enhancement type). **[08]**

(C) Write short note on : Seven Segment Display. **[04]**

OR

Q.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.

R_S = 1kΩ, R_L = 1kΩ, Z_Z = 0Ω. **[08]**

(B) What is DC Load Line ? Derive the equation of CE amplifier and explain criteria for selection of operating point. **[06]**

(C) Explain BJT as a Switch. **[04]**

Q.3) (A) Draw diagram of 8 : 1 MUX. What is relation between numbers of select lines and inputs ? **[04]**

(B) Draw and explain the functional block diagram of OP-AMP. **[04]**

(C) Draw neat circuit diagram of Ideal Integrator and explain its operation with input and output waveform. Give drawbacks of this circuit. How they are overcome in Practical Integrator ? **[08]**

OR

Q.4) (A) Draw and explain operation of CMOS NAND Gate with truth table. **[04]**

(B) Draw neat circuit diagram and explain closed loop non-inverting adder (Summing Amplifier) using OP-AMP. Derive the expression for V_O. **[06]**

(C) Draw and explain block diagram of Micro-controller. **[06]**

Q.5) (A) Write short notes : **(Any Two)** **[06]**

(a) Two Wire Transmitter

(b) PID Controller

(c) Data Logger

(d) PLC System

(B) Give comparison between AM with FM. **[04]**

(C) Draw constructional details of LVDT (Displacement Transducer). Explain its operation. State its advantages and disadvantages. **[06]**

OR

Q.6) (A) What is need of Modulation ? Explain. **[04]**

(B) Draw and explain block diagram of Mobile Communication System. Explain Concept of Cellular. **[06]**

(C) Draw block diagram of Electronic Weighing Machine and explain its operation. **[06]**

Total No. of Questions : 6] **[Total No. of Printed Pages : 7**

[4061]-112

F. E. Examination - 2011

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) Answer should be written in **one** answer book.*

(3) Figures to the right indicate full marks.

(4) Neat diagram should be drawn wherever necessary.

(5) Assume suitable data if necessary.

(6) Use of cell phone is prohibited in examination hall.

(7) Use of electronic non-programmable pocket calculator is permitted.

Q.1) (A) Knowing that the tension in the cable BC is 145N, determine the resultant of the three forces exerted at point 'B' of beam AB. Refer Figure 1.1. **[06]**

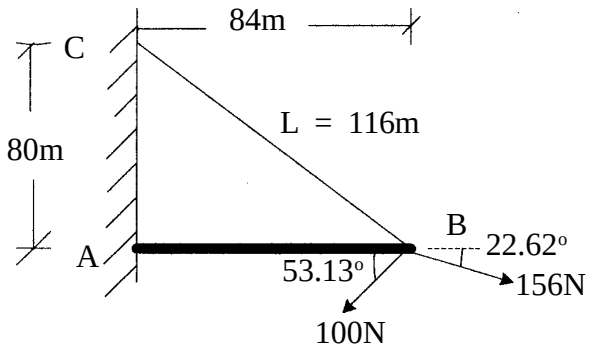

Fig. 1.1

(B) The motion of the particle is defined by the relation $x = t^2 - (t - 3)^3$m where 'x' and 't' are in meters and seconds respectively. Determine :

(a) the time when velocity is maximum.

(b) the position and maximum velocity.

(c) the distance traveled at t = 12 seconds. **[06]**

OR

Q.2) (A) Two quarter circular areas are removed from a rectangular plate AEFG as shown in figure 2.1. Locate the centroid of the remaining area. **[06]**

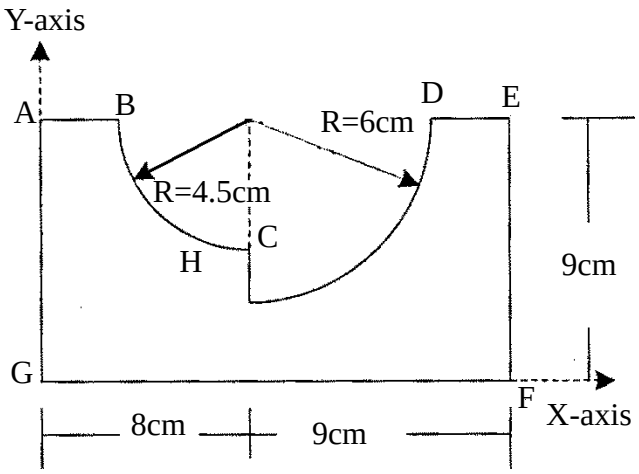

Fig. 2.1

(B) A 50 kg body is initially at rest on a 20^o inclined plane with coefficient of kinetic friction $\mu = 0.25$. Find the distance and the time body travels before attaining the speed of 15m/s. Refer figure 2.2. **[06]**

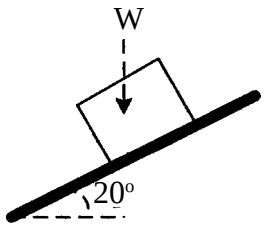

Fig. 2.2

Q.3) (A) A compound beam is loaded as shown in figure 3.1. Find the reactions at the supports 'A', 'D' and 'E'. **[06]**

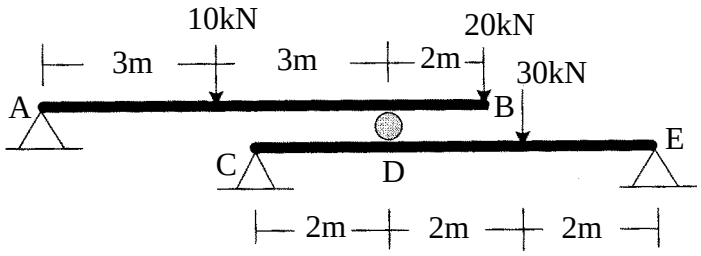

Fig. 3.1

(B) Three cylinders are piled in a rectangular ditch as shown in figure 3.2. The weight of cylinder P, Q and R are 130N, 400N and 200N respectively. The radii of cylinder P, Q and R are 100mm, 150mm and 125mm respectively. Assuming all surfaces smooth, determine reactions at all points of contact 'A', 'B', 'C' and 'D'. **[07]**

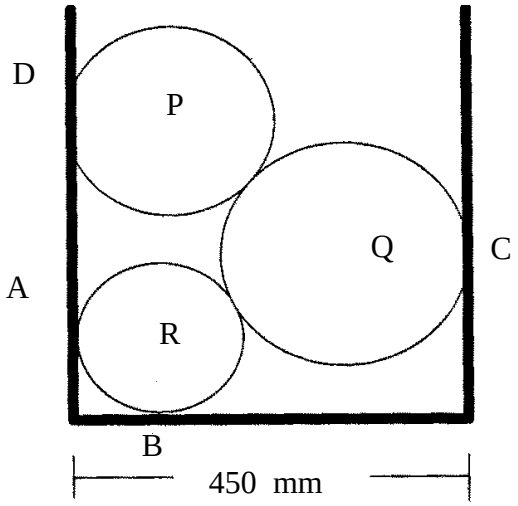

Fig. 3.2

(C) The tennis player serves the ball from height 'H' with an initial velocity of 40m/s at an angle of 4° with the horizontal as shown in figure 3.3. Knowing that the ball clears the 0.914m net height by 152mm, determine : **[06]**

(a) the height 'H'

(b) the distance from the net 'd' where the ball will strike the floor.

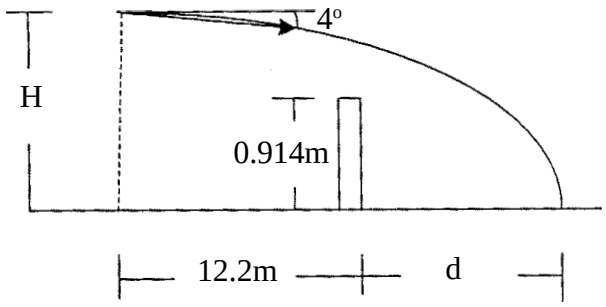

Fig. 3.3

OR

Q.4) (A) The system of forces acting on a frame is as shown in figure 4.1. Calculate the magnitude and direction of the resultant. Also find the position of resultant with respect to point 'A'. **[06]**

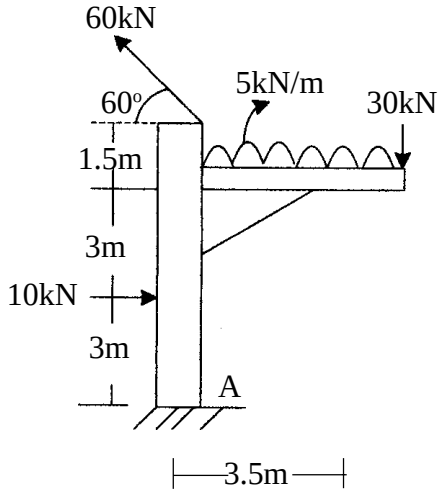

Fig. 4.1

(B) The support assembly shown in figure 4.2 is bolted in place 'B', 'C' and 'D' supporting a downward force of 45N applied at 'A'. Determine the forces in the members AB, AC and AD. **[07]**

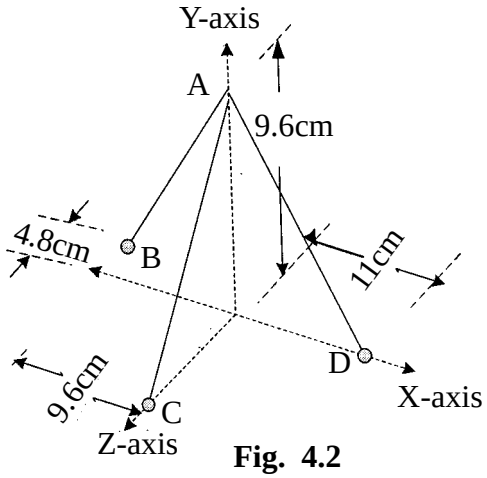

Fig. 4.2

(C) The bob of 2m pendulum describes an arc of circle in vertical plane. If the tension in the cord is 2.5 times the weight of bob for position shown in figure 4.3, find velocity and acceleration of bob in that position. **[06]**

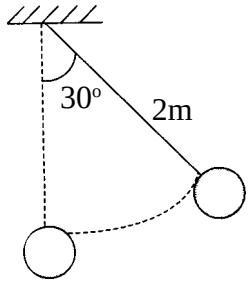

Fig. 4.3

Q.5) (A) Find the magnitude and nature of the forces in the members of the truss loaded as shown in figure 5.1. **[12]**

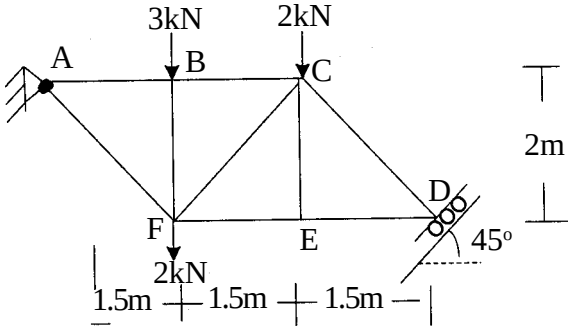

Fig. 5.1

(B) A collar of mass 1.2 kg slides along a smooth path AB in vertical plane as shown in figure 5.2. The collar starts from rest 'A' under the action of constant horizontal force of 10N. Calculate its velocity as it hits at 'B'. **[07]**

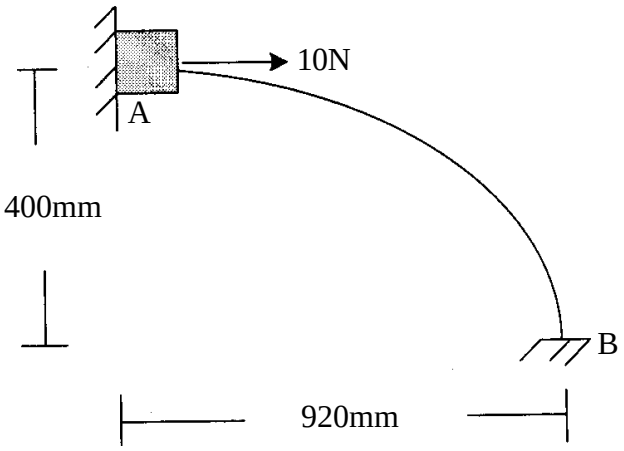

Fig. 5.2

OR

Q.6) (A) Block 'A' supports a pipe column and rests on a wedge 'B' as shown in figure 6.1. Knowing the coefficient of static friction at all surfaces of contact is 0.25 and that $\theta = 45^{o}$, determine the smallest force 'P' required to raise the block 'A'. **[08]**

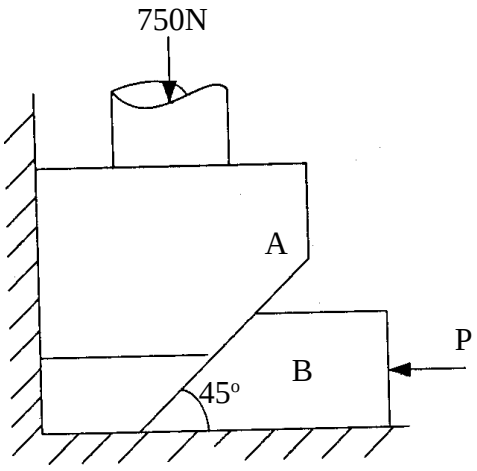

Fig. 6.1

(B) Two loads are suspended as shown in figures 6.2 from a cable ABCD. Knowing that dc = 0.75, determine :

(a) Distance 'd_B'

(b) The reaction components at 'A' and 'D'.

(c) Maximum tension in cable. **[05]**

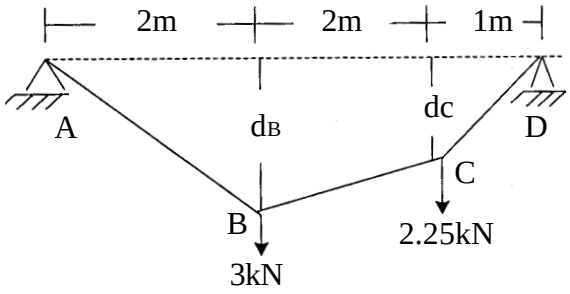

Fig. 6.2

(C) A 900 kg car travelling at 48 km/h couples to a 680 kg car travelling at 24 km/h in the same direction. Determine the common velocity of the cars after coupling. Also find the amount of energy lost. **[06]**

[4061] – 102

F.E. (Semester – I) Examination, 2011
APPLIED SCIENCE – I (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) Black figures to the ***right*** *indicate* ***full*** *marks.*
4) ***Use*** *of logarithmic tables, slide rule, Mollier charts, electronic pocket calculators and steam stables is* ***allowed****.*
5) Assume suitable data, if ***necessary****.*

1. a) What is meant by crystal defects ? State the effects of crystal defects on the properties of crystal. Compare Schottky and Frenkel defects. **7**

   b) i) Show that radius ratio for ionic crystals with co-ordination no. 3 is 0.155. **4**

   ii) Convert the following Weiss indices of the following planes into Miller's Indices.

   a) (2, 1,2) b) (3, –1, 1) **2**

   c) What are carbon nanotubes ? State different types of carbon nanotubes and give their applications. **4**

OR

2. a) Define Atomic Packing Factor (APF). Calculate APF for SC, BCC and FCC unit cells of cubic crystal. **7**

   b) Define co-ordination no.. Explain co-ordination no. with respect to cubic crystal system. **6**

   c) At what glancing angle would the first order diffraction from (110) plane of Nacl be observed using X-ray of wave length 150 pm. The dimension of unit cell is 300 pm. **4**

P.T.O.

3. a) Explain Ostwald's theory of pH indicators. **6**

   b) Calculate the equivalent weight of $KMnO_4$ in acidic, alkaline and neutral medium. **6**

   c) Define primary standard solution. Give examples of primary standard solutions used in redox titration, precipitation titration and complexometric titration. **4**

OR

4. a) How hardness of water is determined using complexometric titration ? **6**

   b) i) Find the pH of the solution after adding 18 ml and 26 ml of 0.2 N NaOH solution to 25 ml of 0.2 N HCl in the titration. **4**

   ii) 100 ml of NaCl solution when titrated with 0.05 N $AgNO_3$ requires 36.5 ml in Mohr's method for the end point. Calculate amount of chloride ions per lit. of NaCl soln. **2**

   c) State the different types of indicators used in direct redox titration with example. **4**

5. a) Explain addition polymerization on the basis of free-radical reaction mechanism with suitable example. **7**

   b) Compare : **6**

   i) Thermosoft and Thermoset polymers

   ii) Natural rubber and vulcanized rubber.

   c) Explain various stages involved in polymer dissolution. **4**

OR

6. a) What are plastics ? Discuss various compoundings of plastics. **7**

   b) Give synthesis, properties and applications of **any two** : **6**

   i) Polystyrene (PS)

   ii) Polypropylene (PP)

   iii) Neoprene rubber

   iv) Silicone Rubber.

   c) Write a short note on : Conducting polymers. **4**

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[4061] – 102

F.E. (Semester – I) Examination, 2011
APPLIED SCIENCE – I (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) Black figures to the ***right*** *indicate* ***full*** *marks.*
4) ***Use*** *of logarithmic tables, slide rule, Mollier charts, electronic pocket calculators and steam stables is* ***allowed****.*
5) Assume suitable data, if ***necessary****.*

1. a) What is meant by crystal defects ? State the effects of crystal defects on the properties of crystal. Compare Schottky and Frenkel defects. **7**

   b) i) Show that radius ratio for ionic crystals with co-ordination no. 3 is 0.155. **4**

   ii) Convert the following Weiss indices of the following planes into Miller's Indices.

   a) (2, 1,2) b) (3, –1, 1) **2**

   c) What are carbon nanotubes ? State different types of carbon nanotubes and give their applications. **4**

OR

2. a) Define Atomic Packing Factor (APF). Calculate APF for SC, BCC and FCC unit cells of cubic crystal. **7**

   b) Define co-ordination no.. Explain co-ordination no. with respect to cubic crystal system. **6**

   c) At what glancing angle would the first order diffraction from (110) plane of Nacl be observed using X-ray of wave length 150 pm. The dimension of unit cell is 300 pm. **4**

P.T.O.

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   b) Calculate the equivalent weight of $KMnO_4$ in acidic, alkaline and neutral medium. **6**

   c) Define primary standard solution. Give examples of primary standard solutions used in redox titration, precipitation titration and complexometric titration. **4**

OR

4. a) How hardness of water is determined using complexometric titration ? **6**

   b) i) Find the pH of the solution after adding 18 ml and 26 ml of 0.2 N NaOH solution to 25 ml of 0.2 N HCl in the titration. **4**

   ii) 100 ml of NaCl solution when titrated with 0.05 N $AgNO_3$ requires 36.5 ml in Mohr's method for the end point. Calculate amount of chloride ions per lit. of NaCl soln. **2**

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   b) Compare : **6**

   i) Thermosoft and Thermoset polymers

   ii) Natural rubber and vulcanized rubber.

   c) Explain various stages involved in polymer dissolution. **4**

OR

6. a) What are plastics ? Discuss various compoundings of plastics. **7**

   b) Give synthesis, properties and applications of **any two** : **6**

   i) Polystyrene (PS)

   ii) Polypropylene (PP)

   iii) Neoprene rubber

   iv) Silicone Rubber.

   c) Write a short note on : Conducting polymers. **4**

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[4061] – 103

F.E. (Semester – I) Examination, 2011
APPLIED SCIENCE – I (Physics)
(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**.*
Constants : $h = 6.63\times10^{-34}$ j.Sec
$m_e = 9.1\times10^{-31}$ kg
$e = 1.6\times10^{-19}$ C
$c = 3\times10^{8}$ m/Sec.

1. A) Explain with diagram and necessary theory how Newton's rings can be obtained in the laboratory ? Why in Newton's Ring centre is always dark for reflected system. **7**

   B) Explain by drawing suitable diagrams the focusing action of a symmetrical electron lens. **6**

   C) A soap film of $\mu = 4/3$ and of thickness 1.5×10^{-4} cm. is illuminated by white light incident at an angle of 45°. The light reflected by it is examined by a spectroscope in which it is found a dark band corresponding to wavelength of 5000 A°. Calculate the order of interference band. **4**

OR

2. A) Derive an expression for path difference in reflected light for thin parallel film and show that the interference pattern in the reflected and transmitted system is complimentary. **7**

   B) Explain with neat diagram the principle, construction and working of Bain Bridge Mass spectrograph. **6**

   C) When the movable mirror of Michelsons interferometer is shifted through 0.0589 mm, 200 fringes move across the field. Calculate the wavelength of light used. **4**

P.T.O.

3. A) What is diffraction grating ? Obtain the condition for the formation of principle maxima and minima in grating. **6**

   B) What are Ultrasonics ? What are different methods of their production ? Explain any one method with suitable diagram. **6**

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

OR

4. A) With necessary theory show that the central maxima lies at $\theta = 0$ in Fraunhoffer diffraction by a single slit. **6**

   B) Explain any one application of Ultrasonics. Calculate a length of iron rod which can be used to produce Ultrasonic wave of 20 KHz. (Given-Density of iron 7.23×10^{3} kg/m^3 and Y = 11.6×10^{10} N/m^2). **6**

   C) Explain : **4**
   i) Diffraction
   ii) Resolving power.

5. A) Explain the term Dichroism. What are Polaroids and how are they produced ? **6**

   B) Explaining the working of a Cyclotron show that the final energy acquired by the particle does not depend on the voltage applied across the Dee's. **7**

   C) In a 70 MeV Betatron, the radius of the stable electron orbit is 28 cm. Find the value of magnetic field B at the orbit for the given energy. **4**

OR

6. A) Explain Nuclear Fusion. Give an account of Carbon Nitrogen cycle in Fusion reaction. **6**

   B) Using Huygens principle, construct refracted beams in calcite crystal when :
   i) Optic axis in the plane of incidence and parallel to the crystal surface.
   ii) Optic axis in the plane of incidence and perpendicular to crystal surface.
   iii) Optic axis in the plane of incidence and inclined to crystal surface. **6**

   C) What is law of Malus ? Polarizer and analyser are set with their polarizing angle parallel, so that the intensity of transmitted light is maximum. Through what angle should either be turned so that the intensity be reduced to 50% and 25% of the maximum intensity. **5**

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[4061] – 104

F.E. (Semester – I) Examination, 2011
BASIC ELECTRICAL ENGINEERING
(2008 Pattern)

Time : 3 Hours Max. Marks : 100

Instructions : *1) In Section – **I**, attempt Q. **1** or Q. **2**, Q. **3** or Q. **4**, Q. **5** or Q. **6**. In Section – **II**, attempt Q. **7** or Q. **8**, Q. **9** or Q. **10**, Q. **11** or Q. **12**.*
*2) Answers to the **two** Sections should be written in **separate** answer books.*
*3) Figures to the **right** indicate **full** marks.*
*4) Neat diagrams must be drawn **wherever** necessary.*
*5) Use of non-programmable electronic calculator is **allowed**.*
*6) Assume suitable data, if **necessary**.*

SECTION – I

1. a) With usual notations prove that **6**

$$(\alpha_1 - \alpha_2) = \alpha_1 \alpha_2 \, (t_2 - t_1)$$

b) Two coils connected in series have resistances of $600\,\Omega$ and $300\,\Omega$ and temp. coefficient of resistance of 0.1% and 0.4% respectively at 20° C. Find the resistance of combination at a temperature of 50° C. What is the effective temperature coefficient of combination ? **6**

c) What are the indications which confirm that a lead acid cell is fully charged ? **6**

OR

2. a) Define insulation resistance and obtain an expression for insulation resistance of a single core cable. **6**

b) A diesel-electric generating set supplies an output of 50 kW. The calorific value of fuel used is 12,500 k cal/kg. If the overall efficiency of the unit is 35%. (i) Calculate the mass of oil required per hour and (ii) The electrical energy generated per tonne of the fuel. **6**

c) Compare lead acid cell and Nickel cadmium cell. **6**

3. a) Explain the following terms with reference to dc resistive networks :
   1) Unilateral and bilateral networks
   2) Linear and non linear networks
   3) Lumped and distributed networks
   4) Active and passive networks. **8**

b) Formulate the Kirchhoff's voltage law equations for the ckt of Fig. 1 and find the values of I_1, I_2 and I_3. **8**

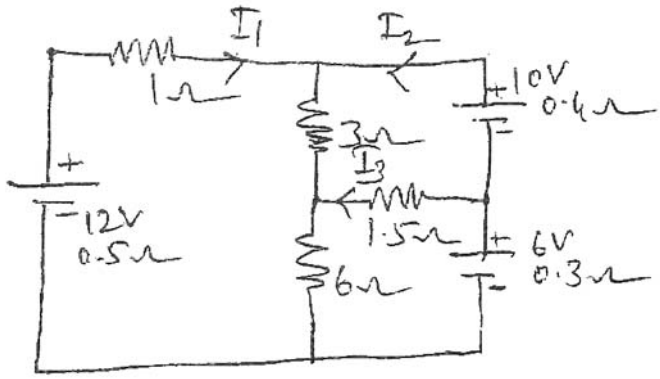

Fig. 1

OR

4. a) Derive an expression to convert Delta connected network into its equivalent star network. **8**

b) Find the current in 20 Ω resistor connected across AB using Thevenin's Theorem. **8**

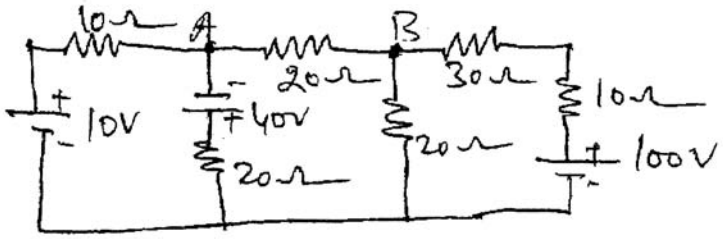

Fig. 2

5. a) Compare electric and magnetic circuits clearly stating similarities and dissimilarities between them. **8**

b) A coil of 2000 turns is wound uniformly over a nonmagnetic ring of mean circumference of 80 cm and cross sectional area of 0.6 cm^2. If the current through the coil is 2 amperes, calculate (i) Magnetising force (ii) Reluctance (iii) Total flux (iv) Flux density. **8**

OR

6. a) Derive the expression for the energy stored in the magnetic field in terms of energy stored per unit volume. **8**

   b) Two coils X and Y, X of 12000 turns and Y of 15000 turns lie in parallel planes so that 45% of the flux produced by coil X links coil Y. A current of 5A in X produces 0.05 mwb, while the same current in Y produces 0.075 mwb. Calculate (i) the mutual inductance and (ii) the coefficient of coupling. **8**

SECTION – II

7. a) Derive mathematical expression for voltage and current at any instant during charging of capacitor through resistance. Also sketch the graph of capacitor voltage and current with respect to time. **8**

   b) Two flat parallel plates measuring 1m × 2 m and separated 10 cm are charged by transferring 10^{-6} coulombs from one plate to other. The permittivity of the oil between the plates is 2. Calculate (i) capacitance of the parallel plates (ii) potential difference between the plates (iii) electric field intensity (iv) electric flux density between the plates. **8**

OR

8. a) Prove that an alternating quantity varying sinusoidally the maximum value is $\sqrt{2}$ times the effective value. Similarly maximum value is also equal to 1.569 times the average value. **8**

   b) In a parallel ckt the three branches, the instantaneous branch currents are represented by

   $i_1 = 10 \sin wt$

   $i_2 = 20 \sin (wt + \pi/3)$

   $i_3 = 12 \sin (wt - \pi/6)$

   Write down the expression for the total instantaneous current in the form $i = I_m \sin (wt + \phi)$. **8**

9. a) A sinusoidal voltage $V = V_m \sin wt$ is applied across a series R – L ckt. Derive the expression for current and average power consumed by the ckt. **8**

   b) A series R-L-C ckt with resistance of $50\,\Omega$, capacitance of $25\,\mu F$ and an inductance of 0.15 H is connected across 230 V, 50 Hz supply. Determine (i) impedance (ii) current (iii) power factor and (iv) power consumption of the ckt. **8**

OR

10. a) What is impedance of ac ckt ? What are its components ? State the units these quantities. How is impedance expressed in rectangular and polar form ? **6**

    b) A and B are two circuits connected in parallel across 200 V, 50 Hz supply. Ckt A consists of choke coil whose resistance is 5Ω and reactance 2Ω. Ckt B consists of non inductive resistor of 6Ω connected in series with a capacitor of capacitive reactance 8Ω calculate (i) total current (ii) power factor of combined ckt and (iii) the resistance and reactance of a series ckt which will take the same current at the same power factor as the parallel combination. Solve by admittance method. **10**

11. a) Write the advantages of 3 phase ac system over single phase ac system. **6**

    b) Define the following terms related to 3 phase ckt. **4**

    i) Symmetrical system ii) Phase sequence

    iii) Balanced load iv) Unbalanced load

    c) Three coils are connected in delta to a 3 phase, 3 wire, 415 V, 50 Hz supply and take a line current of 5A at a 0.8 power factor lagging. Calculate the resistance and inductance of the coils.

    If the coils are star connected to the same supply, calculate the line current and the total power. **8**

OR

12. a) Compare core type and shell type of transformers. **4**

    b) From first principles derive the emf equation of a single phase transformer. **4**

    c) A transformer is rated at 100 kVA at full load its copper loss is 1200 W and its iron loss is 960 W. Calculate :

    i) The efficiency at full load, unity power factor

    ii) The efficiency at half load 0.8 power factor

    iii) The efficiency at 75% full load, 0.7 power factor

    iv) The load KVA at which maximum efficiency will occur

    v) The maximum efficiency at 0.85 power factor. **10**

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[4061] – 105

F.E. (Semester – I) Examination, 2011
BASIC CIVIL AND ENVIRONMENTAL ENGINEERING
(2008 Pattern)

Time : 3 Hours Max. Marks : 100

Instructions *: 1) Answers to the **two** Sections should be written in **separate** books.*
*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.*
*6) Solve 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**.*

SECTION – I

1. a) Explain in brief the role of civil engineer in construction of dam. **6**

   b) State comparison between roadways (Highways) and Railways (any six points). **6**

   c) State and explain any four basic areas/branches of civil engineering, involved in a construction of fly over bridge. **4**

OR

2. a) Define valuation. State any four purposes of valuation. **6**

   b) Mention the name of construction work carried out by civil engineer in following branches of engineering.
      i) Mechanical engineering **4**
      ii) E and TC
      iii) Chemical engineering
      iv) Electrical engineering.

   c) State the two practical application of : **6**
      i) Geotechnical engineering
      ii) Remote sensing
      iii) Fluid mechanics.

P.T.O.

3. a) State the comparison between first class bricks and second class bricks. **4**

   b) Suggest the suitable stone/materials of construction for the following works : **4**

      i) Kitchen platform

      ii) Flooring

      iii) Footing (foundation)

      iv) Fine Aggregate in concrete

   c) Define foundation. Draw neat sketches of any two types of shallow foundations. **4**

   d) State any four fundamental requirements of masonry. **4**

OR

4. a) State the comparison between R.C.C. and P.C.C. **4**

   b) State and explain in brief the following loads. **4**

      i) Dead load ii) Live load.

   c) Write a short note on prestressed concrete (PSC). **4**

   d) Comment on the statement "Automation in construction is the replacement of manpower with machine power." **4**

5. a) What is Map ? State any four types of maps. **4**

   b) Following consecutive readings were taken with a dumpy level and 4 m levelling staff. 0.750, 1.435, 1.800, 0.400, 1.705, 1.525, 0.865 and 1.300. **6**

      The instrument was shifted after 3rd and 6th reading. The first reading was taken on a Arbitrary Bench Mark of R.L. 100.00 m. Calculate the reduced levels of remaining points by rise and fall method. Apply usual arithmetic check.

   c) What is GPS ? State any four applications of GPS. **4**

   d) Define the following terms used in levelling **4**

      1) Line of collimation

      2) Bench Mark

      3) Change point

      4) Fore sight reading (F.S.).

OR

6. a) Define surveying. Explain in brief the principle of 'working from whole to the part'. **4**

   b) The following staff readings were taken using dumpy level and 4 m levelling staff 2.150, 1.630, 1.450, 1.200, 1.500 and 1.450. The level was shifted after 3rd reading. Calculate the R.L.'s of the points by collimation plane method. The first reading was taken on a BM of RL 500 m. Apply usual arithmetic check. **6**

   c) Explain the functions of following keys of digital planimeter. **4**
      1) MEMO
      2) UNIT
      3) AVERAGE
      4) START

   d) State two applications of the following : **4**
      1) Total station
      2) G.I.S.

SECTION – II

7. a) State the various natural resources. What is the need of conserving natural resources ? **4**

   b) What is Environmental Impact Assessment ? State the various methods of carrying out EIA. (only names) **4**

   c) Explain in brief biotic and abiotic components of ecosystem. **4**

   d) List out the various methods of disposal of solid waste. Explain any one in brief. **4**

OR

8. a) Explain with a neat sketch Nitrogen cycle. **4**

   b) Comment on the statement, "Management of E-waste would be the biggest challenge" for the engineers. **4**

   c) Explain in brief the ill effects of technological advancement on environment. **4**

   d) Write a short note on carbon cycle. **4**

9. a) Explain with a neat sketch the following principles of building planning. **6**
   1) Horizontal circulation 2) Roominees
   b) Define setback distance. What are the limits of setback distance for industrial building and residential building. **6**
   c) Write a short note on eco-friendly materials in construction. **4**

OR

10. a) Write a short note on green building. **4**
   b) A residential building is to be constructed in a locality where FSI is 1.2. If the area of the open plot is 450 m^2, and the owner wants to construct a two storeyed building having a built up area on the ground floor as twice the built up area on the first floor. Calculate the maximum permissible built up area on each floor. **6**
   c) State with reason the desirable aspect for the following rooms. **6**
   1) Kitchen 2) Living
   3) Bed 4) Study room

11. a) Explain in brief, how green house gases are contributing to the global warming. **6**
   b) Define noise. Explain in brief various sources of noise. **4**
   c) Write a short note on wind energy. **4**
   d) Define land pollution. Explain in brief various sources of land pollution. **4**

OR

12. a) Explain in brief the ill effects of air pollution on men, materials and vegetation. **6**
   b) Explain in brief how urbanization and industrialisation is resulted into water pollution. **6**
   c) Write a short note on following : **6**
   1) Acid rain
   2) Ozone depletion.

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F.E. (Semester – I) Examination, 2011
ENGINEERING GRAPHICS – I
(2008 Pattern)

Time : 4 Hours Max. Marks : 100

Instructions : *1) Answer **one** question of **each** Unit. Answer **three** questions from Section – **I** and answer **three** questions from Section – **II**.*
*2) Answer of **two** Sections should be drawn on **two separate** drawing sheets.*
*3) Retain **all** Construction Lines.*
*4) **Use** of log-table, electronic pocket calculator is **allowed**.*
*5) Figures in the **bracket** on the **right** sides indicate **full** marks.*
*6) Assume suitable proportionate dimensions / data, if **necessary**.*
*7) **Use** only half imperial size drawing papers as answer sheets.*

SECTION – I

Unit – I

Engineering Curves

1. a) Two Points 'A' and 'B' are 100 mm apart. Point 'C' is 75 mm from 'A' and 60 mm from 'B'. Draw an ellipse passing through 'A', 'B', and 'C'. Also draw Normal and Tangent at a point 30 mm from Major axis. **(8)**

1. b) A wheel of 60 mm diameter rolls along a straight horizontal road without slipping. Draw the curve traced out by a point 'P' on the circumference of wheel, for one complete revolution of the wheel. Initially point 'P' is farthest from the road. Name the curve. **(7)**

OR

2. a) A Fountain jet discharges water from the ground level at an inclination of 45° to the ground. The jet travels a horizontal distance of 250 m. from the point of discharge and falls on the ground. Trace the path of the jet. Name the curve. Also find Direction of jet at 200 m. horizontal distance from the discharge point of Jet. **(8)**

2. b) A circular disc of diameter 'AB' 80 mm rotates about its midpoint 'O', with a uniform angular velocity. The point 'P' which is at 'A' moves with uniform linear velocity and reaches the point 'B', when the disc completes one revolution. Draw the point traced out by point 'P'. **(7)**

P.T.O.

Unit – II

Orthographic Projections

3. For the object shown in figure no. 1, draw the following views, using first angle projection method.

   a) Sectional Front view in the direction of arrow X. (Section along A-A). **(7)**

   b) Top view. **(5)**

   c) Right Hand Side view. **(5)**

   Give all Dimensions. **(3)**

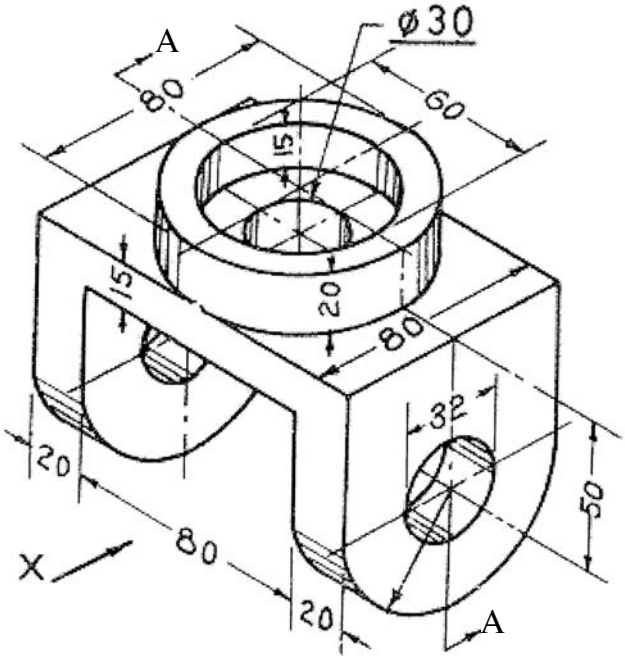

Fig. 1

OR

4. For the object shown in figure no. 2, draw the following views, using first angle projection method.

   a) Front view in the direction of arrow X. **(5)**

   b) Top view. **(5)**

   c) Sectional Left Hand Side view. (Section along A-A). **(7)**

   Give all Dimensions. **(3)**

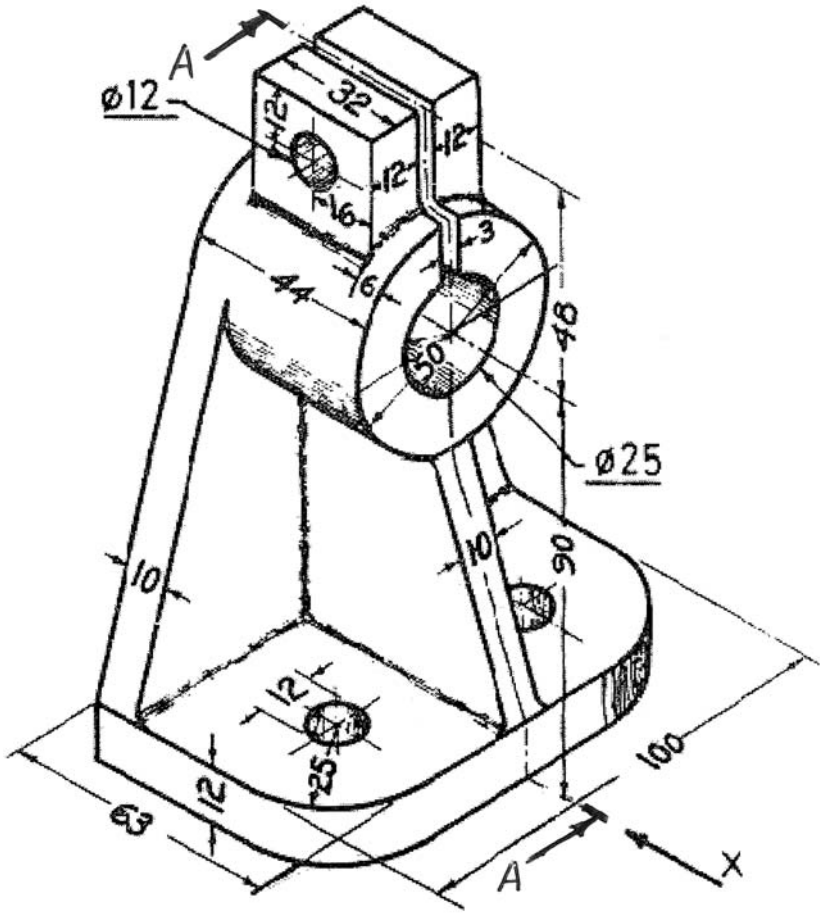

Fig. 2

Unit – III

Auxiliary Projections

5. Figure 3 shows Front view, Partial Auxiliary view and Incomplete Right hand side view.

   a) Redraw the given views. **(5)**

   b) Complete the Right hand side view. **(8)**

   c) Give all Dimensions. **(2)**

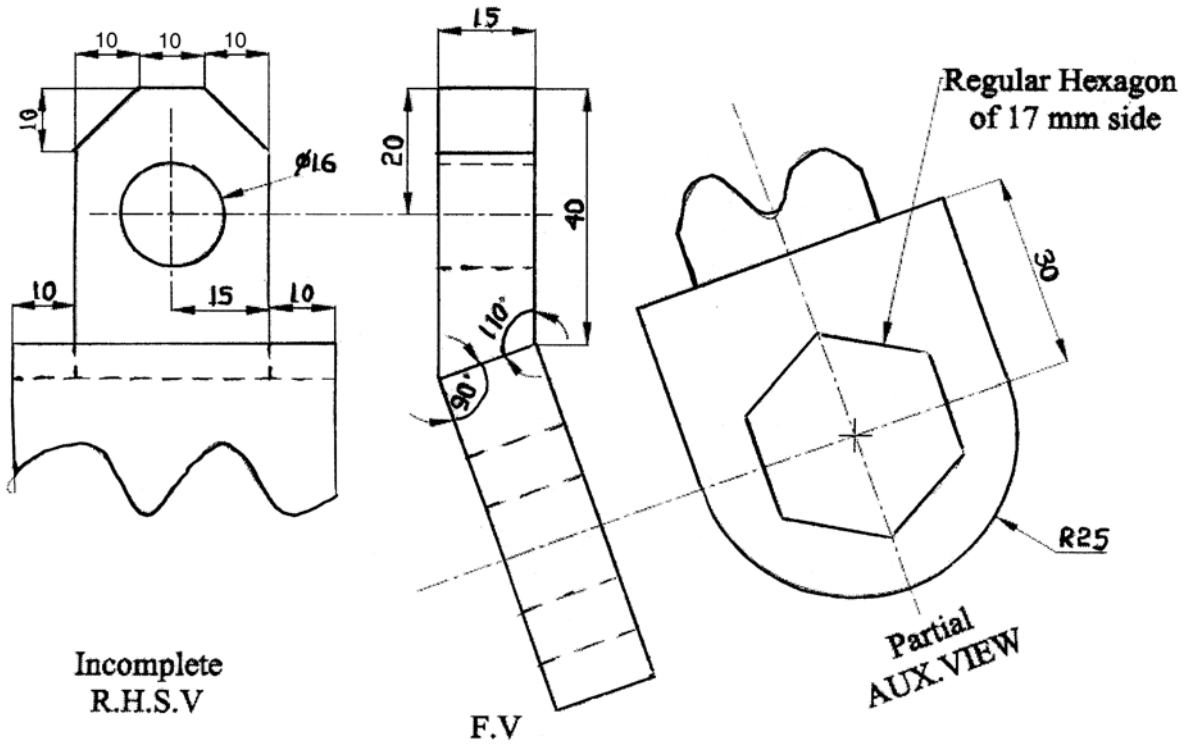

Fig. 3

OR

6. Figure 4 shows Front view and Left hand side view using first angle projection method.
   a) Redraw the given views. **(5)**
   b) Draw the Auxiliary view of the object from the direction X. **(8)**
   c) Give all Dimensions. **(2)**

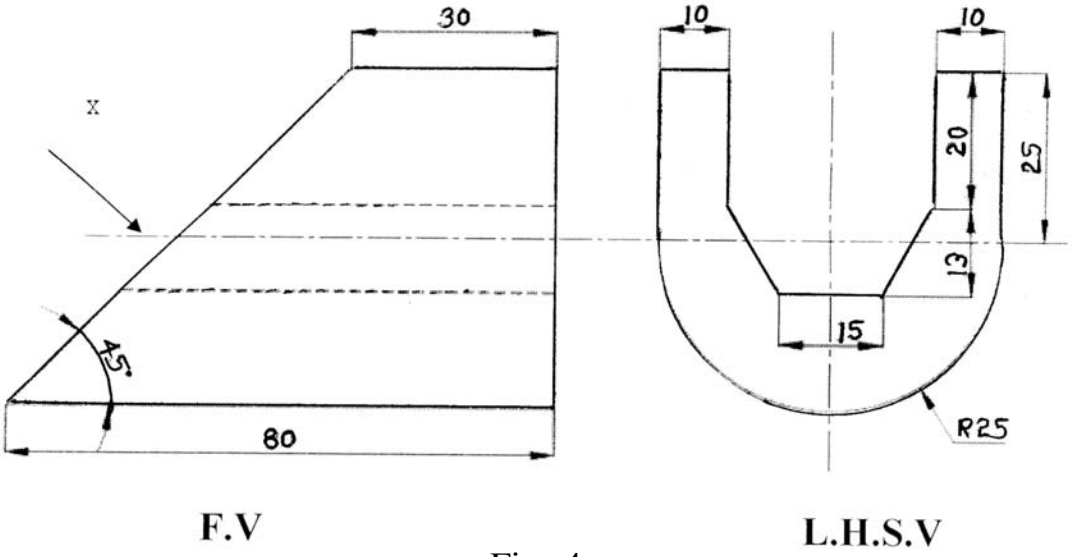

Fig. 4

SECTION – II

Unit – IV

Isometric Projections

7. Figure 5, shows orthographic views of an object by first angle projection method.

Draw its Isometric View taking 'O' as origin and give only major dimensions.

(17+3)

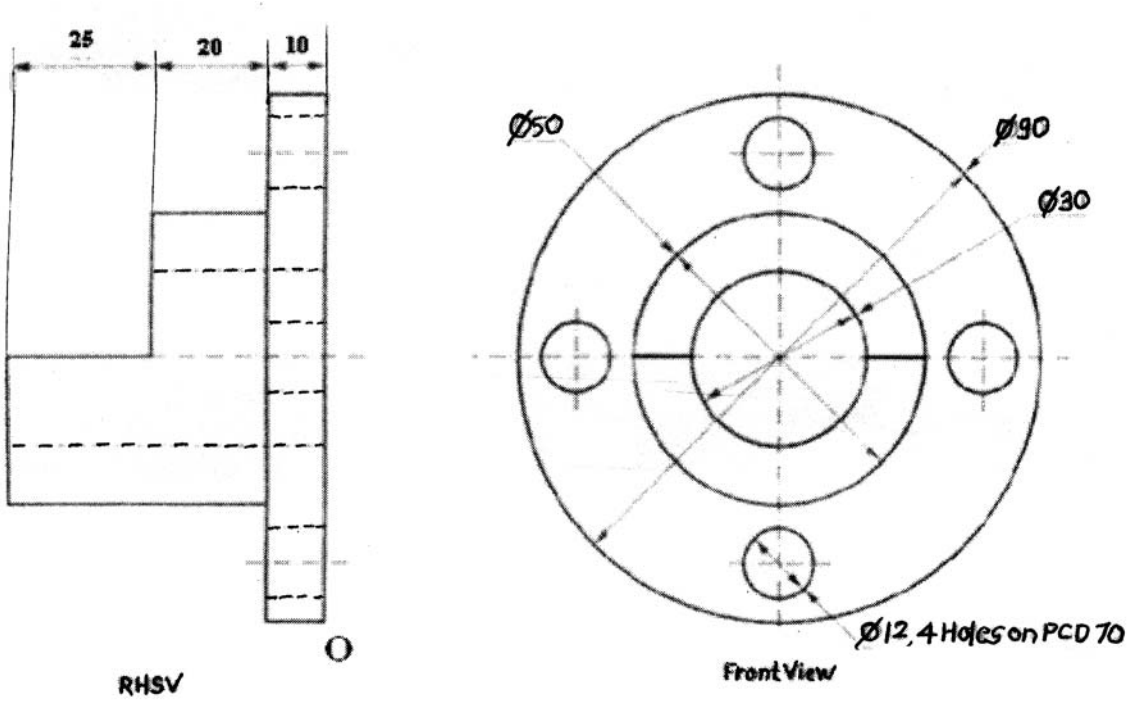

Fig. 5

OR

8. Figure No. 6, shows orthographic views of an object by first angle projection method.

Taking 'O' as origin draw its isometric view, give only major dimensions. **(17+3)**

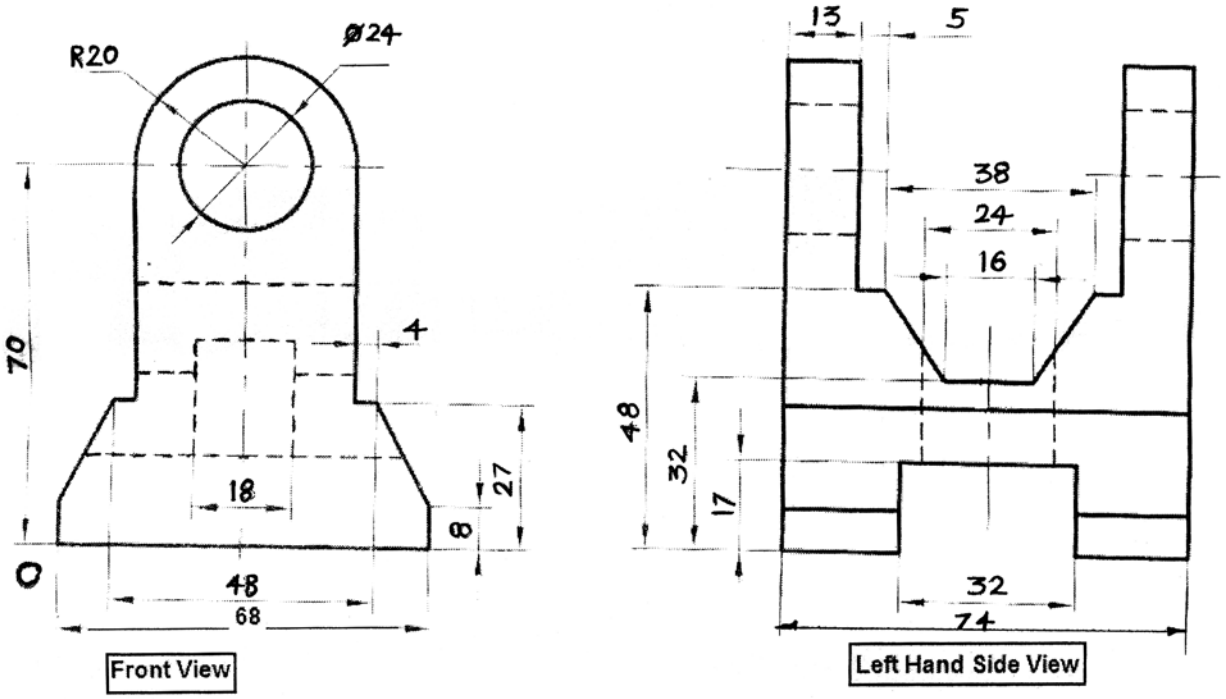

Fig. 6

Unit – V

Missing Views

9. Front view and top view of an object is as shown in figure no. 7. Using first angle method of projection, draw the followings.

a) Sectional elevation (cutting plane A-A). **(6)**

b) Plan. **(3)**

c) Left hand side view. **(9)**

Give all dimensions. **(2)**

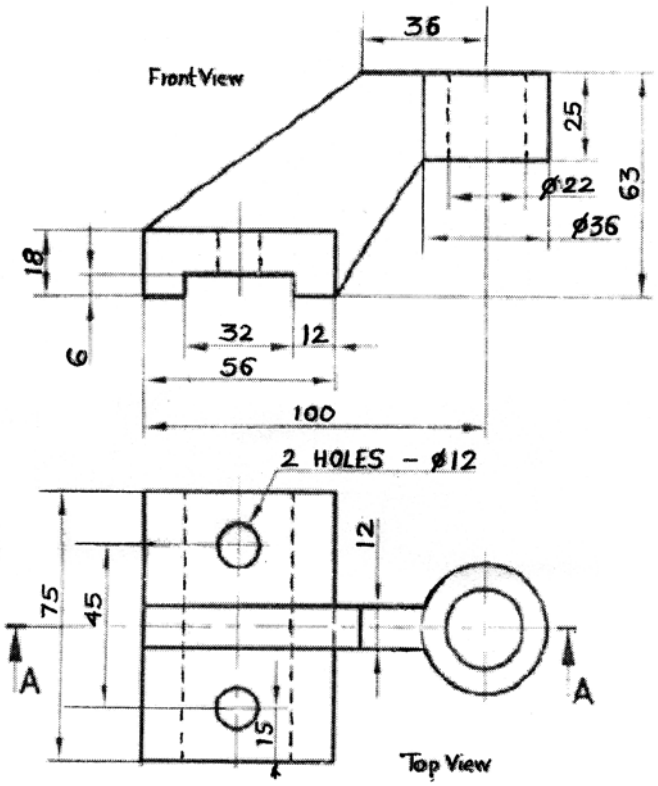

Fig. 7

OR

10. Front view and top view of an object is as shown in figure no. 8. Using first angle method of projection, draw the followings.

a) Sectional elevation (cutting plane A-A). **(6)**

b) Plan. **(3)**

c) Left hand side view. **(9)**

Give all dimensions. **(2)**

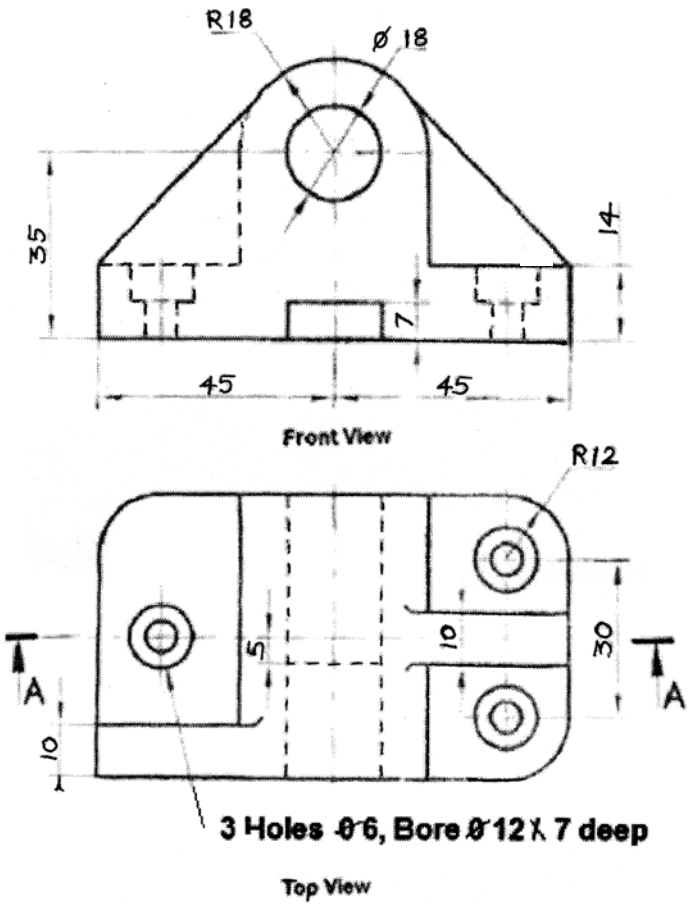

Fig. 8

Unit – VI

Free Hand Sketches

11. Draw proportionate free hand sketches of the followings.
    a) Eye foundation bolt. **(4)**
    b) Universal coupling. **(3)**
    c) Hexagonal nut. **(3)**

OR

12. Draw proportionate free hand sketches of the followings.
    a) Saddle key (Hollow and flat). **(4)**
    b) Semi-elliptical leaf spring. **(3)**
    c) Square thread. **(3)**

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