M 23010

Reg. No. : .....

Name : .....

**Combined I and II Semester B.Tech. Degree (Reg./Sup./Imp. Including Part Time) Examination, April 2013**
**(2006 and Earlier Admn.)**
**EN2K/PTEN2K101 : ENGINEERING MATHEMATICS – I**
**(Common to All Branches)**

Time : 3 Hours Max. Marks : 100

***Instructions :*** *1) Answer **all** the questions.*
*2) **Assume** suitable data that are **missing**.*

1. a) Evaluate : $\lim_{x \to 0} \frac{\log \sin x}{\cot x}$. **5**

b) With usual notations prove that $\rho = \frac{\left(1 + y_1^2\right)^{3/2}}{y_2}$. **5**

c) Expand $e^x$ in powers of $(x - 1)$ upto four terms. **5**

d) Test the following series for convergence $\sum \frac{\sqrt{n+1} - \sqrt{n}}{n^p}$. **5**

e) Find the rank of the matrix given below by reducing it to echelon form.

$$\begin{bmatrix} 1 & 2 & 3 \\ 1 & 4 & 2 \\ 2 & 6 & 5 \end{bmatrix}.$$ **5**

f) Solve the equations

$x + 2y + 3z = 0$

$3x + 4y + 4z = 0$

$7x + 10y + 12z = 0.$ **5**

P.T.O.

g) Find the Fourier expansion of the following function

$$f(x) = \begin{cases} 2, & -2 < x < 0 \\ x, & 0 < x < 2 \end{cases} \text{ over } (-2, 2).$$ **5**

h) Find the half range cosine series for

$f(x) = x \operatorname{Sin} x$ in $0 \le x \le \pi$. **5**

2. a) i) State and prove Euler's theorem for a homogenous fun of degree n and hence deduce $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = n(n-1)u$. **8**

ii) If $x = e^u + e^{-v}$, $y = e^{-u} - e^v$ show that $\frac{\partial z}{\partial u} - \frac{\partial z}{\partial v} = x\frac{\partial z}{\partial x} - y\frac{\partial z}{\partial y}$. **7**

OR

b) i) If $x = r \operatorname{Cos} \theta$, $y = r \operatorname{Sin} \theta$ find $J = \frac{\partial(x, y)}{\partial(r, \theta)}$ and $J' = \frac{\partial(x, \theta)}{\partial(r, y)}$ and verify that $JJ' = 1$. **8**

ii) The radius of a circle was measured as 50 cms. Find the percentage error in the area of the circle due to an error of 1 mm while measuring its radius. **7**

3. a) i) State the values of x for which the following series.

$$x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \frac{x^5}{5} - \ldots\ldots\infty \text{ converges.}$$ **8**

ii) If $u = \operatorname{Sin}^{-1}(x^2 + y^2)^{1/5}$ show that

$$x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \frac{2}{5}u.$$ **7**

OR

b) i) Expand $y = \log \sec x$ upto the terms containing $x^4$ using Maclaurin series. **7**

ii) Test whether the following series is absolutely convergent

$$1 - \frac{1}{2\sqrt{2}} + \frac{1}{3\sqrt{3}} - \frac{1}{4\sqrt{4}} + \ldots\ldots\infty.$$ **8**

4. a) i) Show that the system of equations $x + y + z = 4$, $2x + y - z = 1$, $x - y + 2z = 2$ is consistent and hence find the solution. **8**

ii) Find the eigen values and eigen vectors of the matrix $A = \begin{bmatrix} 1 & 2 \\ 2 & 4 \end{bmatrix}$. **7**

OR

b) i) Using elementary transformations reduce the matrix

$$A = \begin{bmatrix} -1 & 2 & 1 & 0 \\ 2 & 4 & 3 & 0 \\ 1 & 0 & 2 & -8 \end{bmatrix}$$ to normal form. **8**

ii) Solve the following system of linear equations by Gauss elimination method.

$2x + y + z = 10$

$3x + 2y + 3z = 18$

$x + 4y + 9z = 16.$ **7**

5. a) i) Find the Fourier expansion of the following function

$$f(x) = \begin{cases} o, & -2 < x < -1 \\ k, & -1 < x < 1 \\ o, & 1 < x < 2 \end{cases}$$ over $(-2, 2)$. **8**

ii) Express $f(x) = x$ as a half range sine series in the interval $(0, 2)$. **7**

OR

b) i) Obtain the Fourier series for

$$f(x) = \begin{cases} -k, & (-\pi, 0) \\ k, & (0, \pi) \end{cases}$$

Hence deduce that $\pi/4 = 1 - 1/3 + 1/5 - 1/7 + .....$ **8**

ii) From the following table find Fourier series upto the second harmonics

| x : | 0 | 2 | 4 | 6 | 8 | 10 | 12 |
|---|---|---|---|---|---|---|---|
| y : | 9.0 | 18.2 | 24.4 | 27.8 | 27.5 | 22.0 | 9.0 |

**7**

M 23011

Reg. No. : .....

Name : .....

**Combined I and II Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part Time) Examination, April 2013**
**(2006 and Earlier Admn.)**
**EN2K/PTEN 2K 102 : ENGINEERING MATHEMATICS – II**
**(Common to All Branches)**

Time: 3 Hours Max. Marks : 100

***Instruction :*** *Answer* ***all*** *questions.*

PART – A

1. a) Solve $(y^2e^{xy^2} + 4x^3)dx + (2xye^{xy^2} - 3y^2)dy = 0$.

   b) Solve $xy(1 + xy^2)\, dy/dx = 1$.

   c) Find $L^{-1}\left\{ 2s^2 - 6s + 5/s^3 - 6s^2 + 11s - 6 \right\}$.

   d) Find Laplace transform of

$$f(+) = \begin{cases} t-1, & 1<t<2 \\ 3-t, & 2<t<3 \end{cases}$$

   e) Show that $\nabla^2(r^n) = n(n+1)r^{n-2}, |\vec{R}| = r$.

   f) Find the work done in moving a particle in the force field

   $\vec{F} = 3x^2\hat{i} + (2x^2 - y)\,\hat{j} + 2\hat{k}$ along the straight line from (0, 0, 0) to (2, 1, 3).

   g) Show that :

   $\vec{F} = (x^2 - y^2 + x)\,\hat{i} - (2xy + y)\hat{j}$ is irrotational.

   h) Verify Green's theorem for

   $\int_C (3x - 8y^2)\, dx + (4y - 6xy)\, dy$ where

   C is the region bounded by x = 0, y = 0 and x + y = 1. **(5×8)**

P.T.O.

## PART – B

2. a) Find the complete solution of $(D^2 - 4)\, y = x\sinh x$. **8**

   b) Using the method of variation of parameters solve $(D^2 + 4)\, y = \tan^2 x$. **7**

   OR

   c) Solve $x^2 d^2y/dx^2 + 4x\,dy/dx + 2y = e^x$. **8**

   d) Find the complete solution of **7**

   $(D-2)^2 y = 8(e^{2x} + \sin 2x + x^2)$.

3. a) Find $L^{-1}\{\log(s^2+1)/s(s+1)\}$. **8**

   b) Solve $d^2x/dt^2 + 9x = \cos 2t$, $x(0) = 1$, $x(\pi/2) = -1$ **7**

   OR

   c) Find Laplace transform of

   $$f(+) = \begin{cases} \sin \omega t, & 0 < t < \pi/\omega \\ 0 & \pi/\omega < t < 2\pi/\omega \end{cases}$$

   $f(t + 2\pi/\omega) = f(\omega)$. **8**

   d) Solve by Laplace transform method

   $y''' + 2y'' - y' - 2y = 0$ $y(0) = y'(0) = 0$ $y''(0) = 6$. **7**

4. a) Show that $\nabla^2(1/r) = 0$ $r = |\vec{R}|$. **8**

   b) Find $L^{-1}\left\{\log \dfrac{s^2+1}{s(s+2)}\right\}$. **7**

   OR

   c) Find $\nabla \cdot (r^3 \vec{R}|, r = |\vec{R}|$. **8**

   d) If $\vec{A} = x^2 y\hat{i} - 2xz\hat{j} + 2yz\hat{k}$ find curl curl $\vec{A}$. **7**

5. a) If $\vec{F} = y\hat{i} + (x - 2xz)\hat{j} - xy\hat{k}$ evaluate $\iint_S (\nabla \times F) \cdot n ds$ where S is the surface of the sphere $x^2 + y^2 + z^2 = a^2$ above the xy plane. **8**

b) Verify Stokes theorem for

$\vec{A} = (2x - y)\,\hat{i} - yz^2\hat{j} - y^2z\hat{k}$

S is the upper half of the sphere $x^2 + y^2 + z^2 = 1$. C is its boundary. **7**

OR

c) Verify Green's theorem in the plane for $\oint_C (xy + y^2)\,dx + x^2dy$ where C is the closed region bounded by $y = x$ and $y = x^2$. **8**

d) Evaluate $\iint_S F \cdot n ds$ where $\vec{F} = 4xz\hat{i} - y^2\hat{j} + yzk$ and S is the surface of the Cube bounded by $x = 0$, $x = 1$, $y = 0$, $y = 1$, $z = 0$ and $z = 1$. **7**

M 23012

Reg. No. : .....

Name : .....

**Combined I and II Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part Time) Examination, April 2013**
**(2006 and Earlier Admn.)**
**EN2K/PTEN 2K 103(A) : ENGINEERING PHYSICS (A)**
**(For CS/EE/EC/IT/AI Branches)**

Time : 3 Hours Max. Marks : 100

***Instructions*** *: 1) Answer* ***all*** *questions.*
*2)* ***Assume*** *suitable data that are not given.*



1. a) What is interference of light ? What are the conditions to occur ?
   b) Describe the construction and action of a Nicol prism.
   c) Give an account of wave function in quantum mechanics.
   d) Describe ESR technique with the basic principle.
   e) Describe how mechanism of lasing in semiconductors is different from other lasers.
   f) Write a note on the use of optical fibre in communication.
   g) What are semiconductors ? Distinguish between p-type and n-type semiconductors.
   h) What are superconductors ? Mention their properties and applications.

**(8×5=40)**

2. a) i) What are Newton's rings ? How are they formed ? Describe how Newton's rings are used to determine the wavelength of a monochromatic radiation. **10**

   ii) In Newton's ring experiment, the diameters of $4^{th}$ and $12^{th}$ dark rings are 0.4 cm and 0.7 cm respectively. Find the diameter of the $20^{th}$ dark ring. **5**

OR

b) i) Describe the method of determining the wavelength of sodium light using a plane diffraction grating. Derive the necessary formula. **10**

ii) Light of wavelength 500 nm is incident normally on a plane transmission grating. Find the difference in the angles of deviation in first order and third order spectra. The number of lines per centimeter on the grating surface is 6000. **5**

3. a) i) Assuming the time independent Schrodinger wave equation, discuss the solution for a particle in one dimensional potential well of infinite height. **10**

ii) An electron is bound in an one dimensional potential well of width 1 Å, but of infinite height. Find its energy values in the ground state and also in the first two excited states. **5**

OR

b) i) What are ultrasonics ? What are their properties ? Explain the Piezo electric method of producing ultrasonic waves. **10**

ii) Write a note on Nuclear Magnetic Resonance. (NMR) **5**

4. a) i) Describe with energy level diagram the construction and working of a ruby laser. **10**

ii) Write a note on Holography. **5**

OR

b) i) What is an optical fibre ? Describe the types of optical fibres and modes of transmission. **10**

ii) The attenuation of light in an optical fibre is 3.6 dB/km. What fractional initial intensity remains that after 1 km and 3 km ? **5**

5. a) i) Explain the V – I characteristics of a zener diode both in forward and reverse biased conditions. Explain the different breakdown mechanisms. **10**

ii) Write a note on fermi energy and fermi level. **5**

OR

b) i) What is Hall effect ? What are its applications ? Derive an expression for Hall coefficient of a given semiconductor. **10**

ii) The Hall coefficient of a semiconductor is $3.22 \times 10^{-4}$ $m^3/C$. Its resistivity is $9 \times 10^{-3}$ $\Omega$.m. Calculate the mobility and carrier concentration of the carriers. **5**

M 23014

Reg. No. : .....

Name : .....

**Combined I and II Sem. B.Tech. Degree (Reg./Sup./Imp. – Including Part Time) Examination, April 2013**
**(2006 and Earlier Admn.)**
**EN2K/PTEN 2K 104 (A) : ENGINEERING CHEMISTRY (A)**
**(For CS/EE/EC/IT/AI Branches)**

Time : 3 Hours Max. Marks : 100

***Instructions** : 1) Answer **all** questions.*
*2) Assume **suitable** data that are not given.*
*3) **Draw** figures **whenever** necessary.*



I. a) Define space lattice and unit cell of a crystal. Draw a unit cells for space lattices of the following types.
   1) Simple cubic,
   2) Face -- centred cubic ;
   3) Body -- centred cubic.

b) Write a note on super conductors.

c) Explain the buffer action of a weak acid and its salt and weak base and its salt.

d) Write a note on over voltage.

e) Write a note on caustic embrittlement.

f) Explain the mechanism of photochemical smog formation.

g) Differentiate between addition and condensation polymerization.

h) What are greases ? Name any four greases indicating their compositions.

**(8×5=40)**

II. a) i) Distinguish between covalent solids and ionic solids.
   ii) Discuss the electrical conductivity of solids based on 'Band theory'.

OR

b) i) Derive Braggi equation.
   ii) Write notes on Ferroelectric materials and dielectric materials.

P.T.O.

III. a) i) Define standard electrode potential. Derive Nernst equation for single electrode potential.

ii) Explain the construction and working of Pb-acid storage battery. Mention its applications.

OR

b) i) Explain the construction of a glass electrode. How do you determine the pH of a solution using glass electrode ?

ii) What are fuel cells ? Mention their advantages. Explain the construction and working of $H_2 - O_2$ fuel cell.

IV. a) Write notes on following :

i) Dry corrosion,

ii) Cementation,

iii) Thermal pollution.

OR

b) i) What is metallic corrosion ? Explain the electrochemical theory of corrosion taking rusting of iron as example.

ii) Give an account of sources and ill effects of $SO_2$ and CO pollution.

V. a) i) How are the properties :

A) Strength and

B) Plastic deformation of the polymers affected by their structure ?

ii) Write a note on mechanism of fluid-film lubrication.

OR

b) Explain the following :

i) Free radical mechanism of addition polymerization.

ii) Preparation and uses of Butyl rubber ;

iii) Solid lubricants. **(4×15=60)**

M 23016

Reg. No. : .....

Name : .....

**Combined I and II Sem. B.Tech. Degree (Reg./Sup./Imp. – Including Part-Time) Examination, April 2013**

**(2006 and Earlier Admn.)**

**EN2K 105 : HUMANITIES (Common to All Branches)**

Time : 3 Hours Max. Marks : 100

***Instruction** : Answer **all** questions.*

I. a) i) He taught me to read Persian.
(Change to passive)
ii) Chennai is one of the biggest of Indian towns.
(Change the degree of comparison)
iii) I saw him opening the box.
(Change the voice)
iv) I like to live in open air.
(Insert articles)
v) Can you tell me the time of his arrival ?
(Change simple sentence as complex)

b) Point out verbs in the following sentences and name their moods and tenses :
i) The river flows under the bridge.
ii) I shall answer the letter to-night.
iii) It has been raining all night.
iv) I hear he has passed all night.
v) I had finished when he came.

c) Write a note on welding machine and its use.

d) Write a note to your works manager to get your lathe repaired urgently.

e) How do you define technology ? Enumerate ten major technologies.

f) "Man is a social animal". Elaborate the statement.

g) Which are the major centers of science and technology in ancient civilisation ?

h) Explain the development in 'Railway' in India. **(8×5=40)**

P.T.O.

II. a) Write an essay on privatization of public sector undertaking.

OR

b) Write a note on brain drain in india. **15**

III. a) Explain the non-verbal commnunication categories and features.

OR

b) Explain the need and importance of technical communication. **15**

IV. a) Elaborate the relevance of culture on science and society.

OR

b) Explain on the thoughts and ideas of Mahatma Gandhi on the development of our nation. **15**

V. a) Write a note on the growth of communication technology and mention step-by-step achievements in India.

OR

b) Write a note on industrial revolution that took place in Europe and its effect on economy. **15**

M 23019

Reg. No. : .....

Name : .....

**Combined I and II Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part Time) Examination, April 2013**
**(2006 and Earlier Admn.)**
**EN2K 106 (C) : ENGINEERING GRAPHICS (C)**
**(For CS/IT Branches)**

Time: 3 Hours Max. Marks : 100

***Instructions :*** *1) Answer* ***all*** *questions.*
*2)* ***Missing*** *dimensions may* ***suitably*** *assumed.*

1. a) The top view of a line AB, 80 mm long measures 65 mm and length of the front view is 50 mm. The end A is on HP and 15 mm infront of VP. Draw the projection of AB and determine its inclinations with HP and VP. **20**

OR

b) A cone of base 60 mm diameter and axis 80 mm long is lying with one of its generators on HP and the axis appears to be inclined to the VP at an angle of 40° in the top view. Draw its projection. **20**

2. a) A square pyramid of 50 mm edges of base and height 70 mm rests on its base on HP with one of its base edges parallel to VP. It is cut by an inclined section plane in such a way that the true shape of section is trapezium whose parallel sides measure 40 mm and 20 mm. Draw its front view, sectional top view and the true shape of section. **20**

OR

b) A vertical pentagonal prism 30 mm side of base and height 60 mm has one of its rectangular faces parallel to VP and nearer to it. A thorough square hole of 25 mm sides is made in the centre of the prism such that the axis of the hole bisects the axis of the prism at right angles. The edges of the hole are equally inclined to HP. Draw the development of the prism showing the shape of the hole produced by it. **20**

3. a) The frustum of a cone, base 50 mm diameter, top 30 mm diameter and height 40 mm is resting with its base on a cube of side 70 mm, such that their axis are coaxial. Draw the isometric projection of the arrangement. **20**

OR

b) Draw the principal views of the object shown in the pictorial view as in Fig. 1. **20**

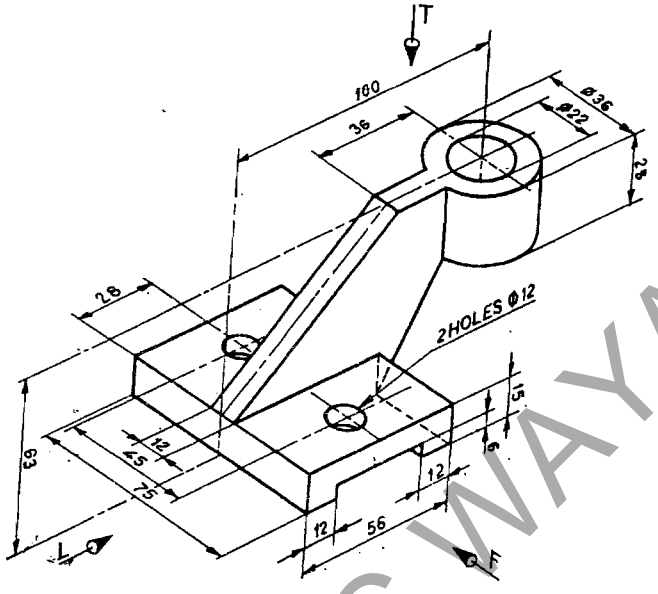



Fig. 1



4. a) Pictorial view of a machine part is shown in Fig. 2. Draw to full scale the following views :

i) Sectional left view

ii) Front view

iii) Top view. **40**

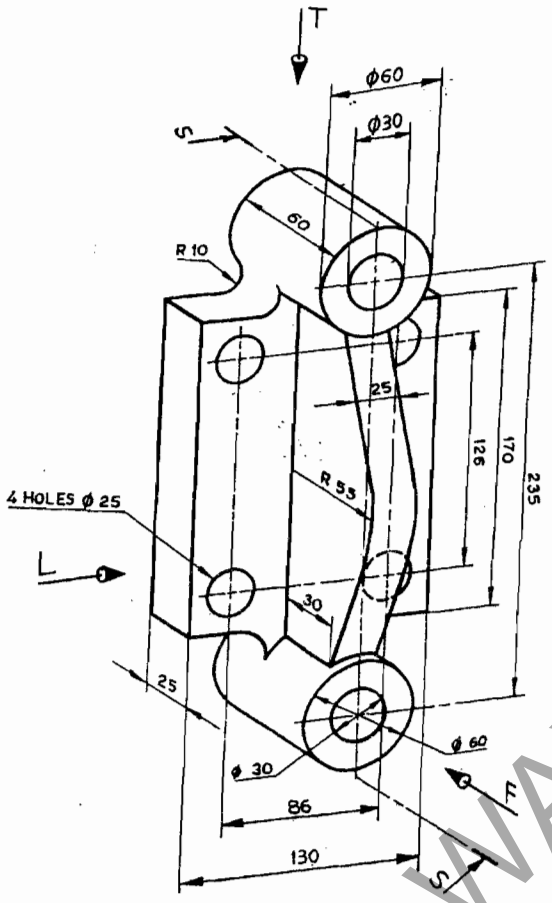



Fig. 2

OR

b) Draw the two principal views of

i) Split pin slotted locking nut

ii) Split pin castle locking nut

iii) Hexagonal headed bolt. **20**

c) i) Draw the proportionate sketch of any two types of foundation bolt.

ii) Draw two principal views of square headed bolt. **20**

M 23020

Reg. No. : .....

Name : .....

**Combined I and II Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part Time) Examination, April 2013**
**(2006 and Earlier Admn.)**
**EN2K 107 (A)/ PTEN 2K 106(A) : ENGG. MECHANICS (A)**
**(For CE/CS/EE/EC/IT/AI Branches)**

Time : 3 Hours Max. Marks : 100

***Instruction** : Answer **all** the questions.*

1. a) i) Composition and resolution.
   ii) Rigid body and deformable body.
   b) State and prove Varignon's theorem.
   c) State and prove parallel axis theorem.
   d) Distinguish between dot product and cross product of vectors.
   e) Explain :
      i) Radius of gyration.
      ii) Polar radius of gyration.
   f) Determine the moment of inertia of a circle about its diametral axis by the method of integration.
   g) State :
      i) D' Alembert's principle.
      ii) Work-energy principle.
   h) Derive an expression for Time of Flight and Range of Projectile with respect to projectile motion. **(8×5=40)**



P.T.O.

2. a) Determine the resultant force acting on the structure at point 'O' both in magnitude and direction. (Refer Fig. 1).

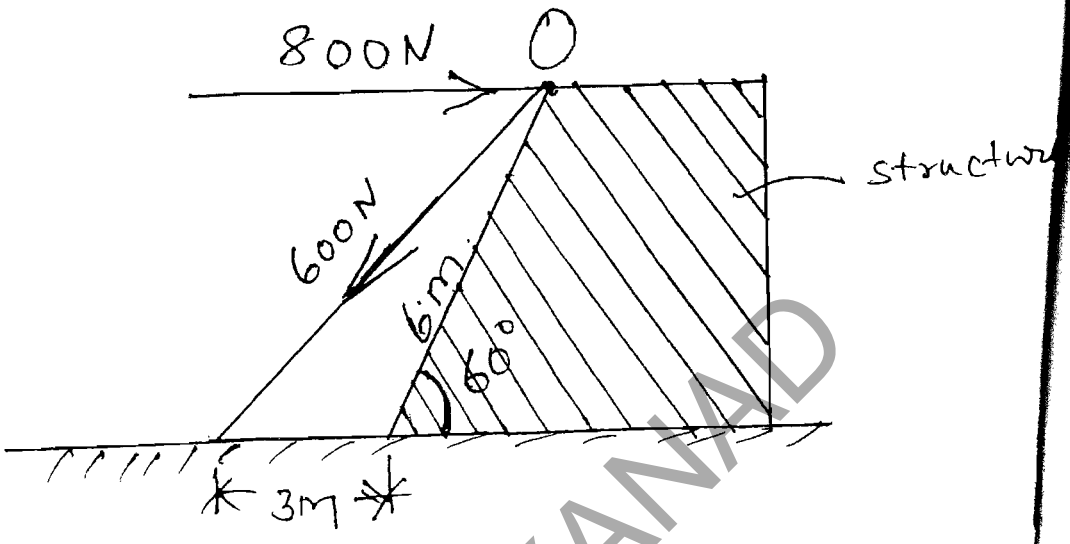



Fig. 1

b) A chord supported at A and B carries a load of 10 kN at D and a load of W a as shown in the Fig. 2. Find the value of W so that CD remains horizonta

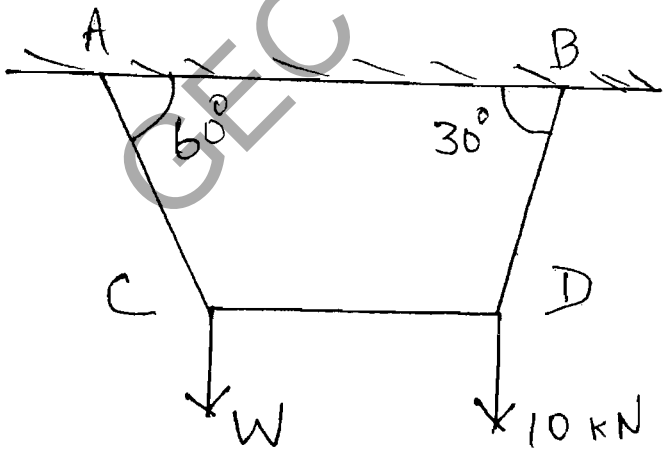



Fig. 2

OR

c) A small block of weight 1000 N is placed on a 30° incline with a coefficient of friction 0.25 as shown in the Fig. 3. Determine the horizontal force to be applied for

i) the impending motion down the plane.
ii) impending motion up the plane. **15**

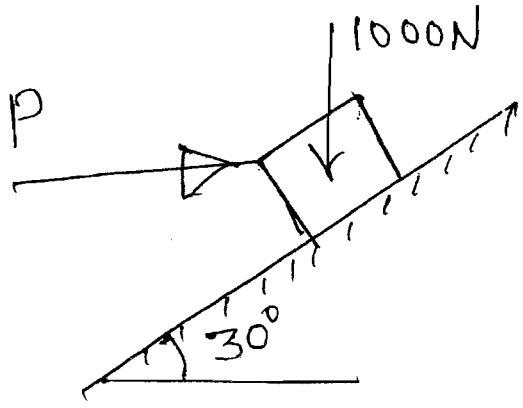



Fig. 3

3. a) Determine the magnitude and nature of forces in all the members of a plane truss as shown in the Fig. 4. **15**

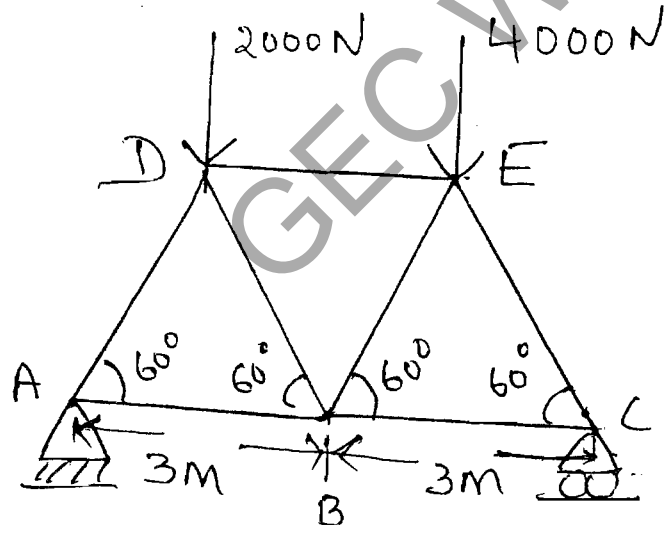



Fig. 4

OR

b) Find the support reactions for the beam loaded as shown in the Fig. 5. **15**

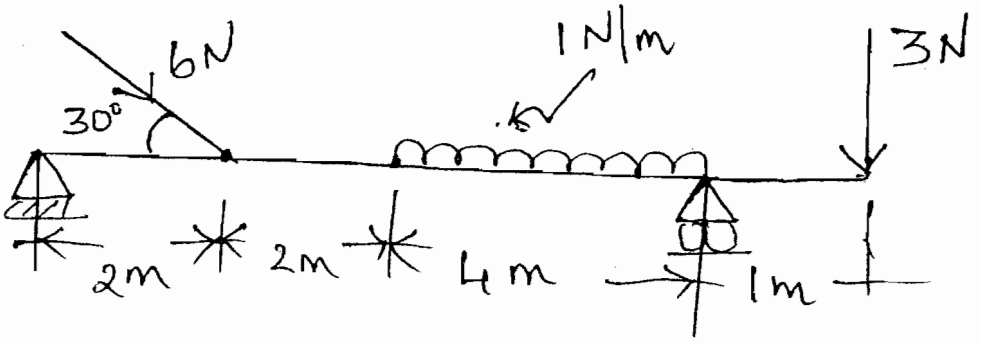



Fig. 5

4. a) Determine the co-ordinates of the centroid of the shaded area with respect to the X and Y axes for the Fig. 6. **15**

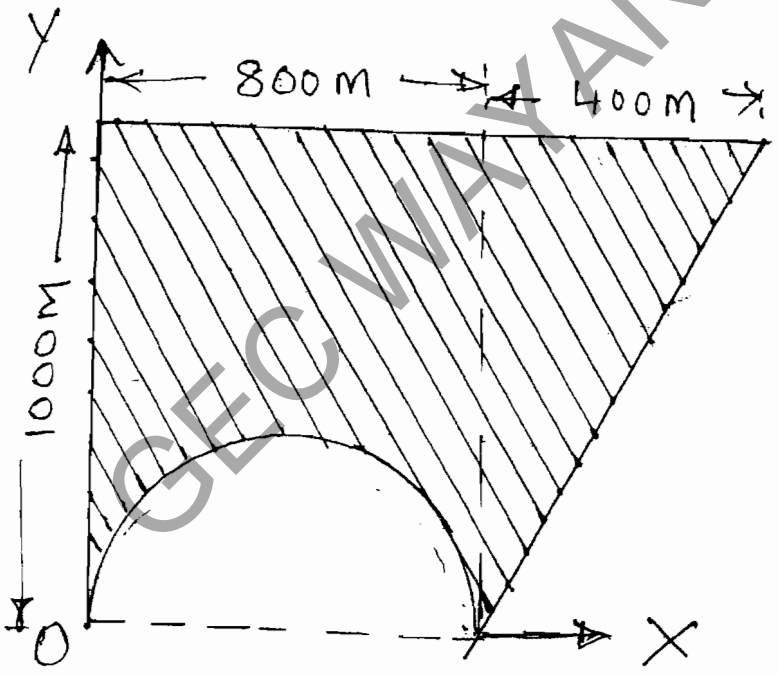



Fig. 6

OR

b) Determine the moment of Inertia of the area shown in the Fig. 7 about the axis AB and PQ. **15**

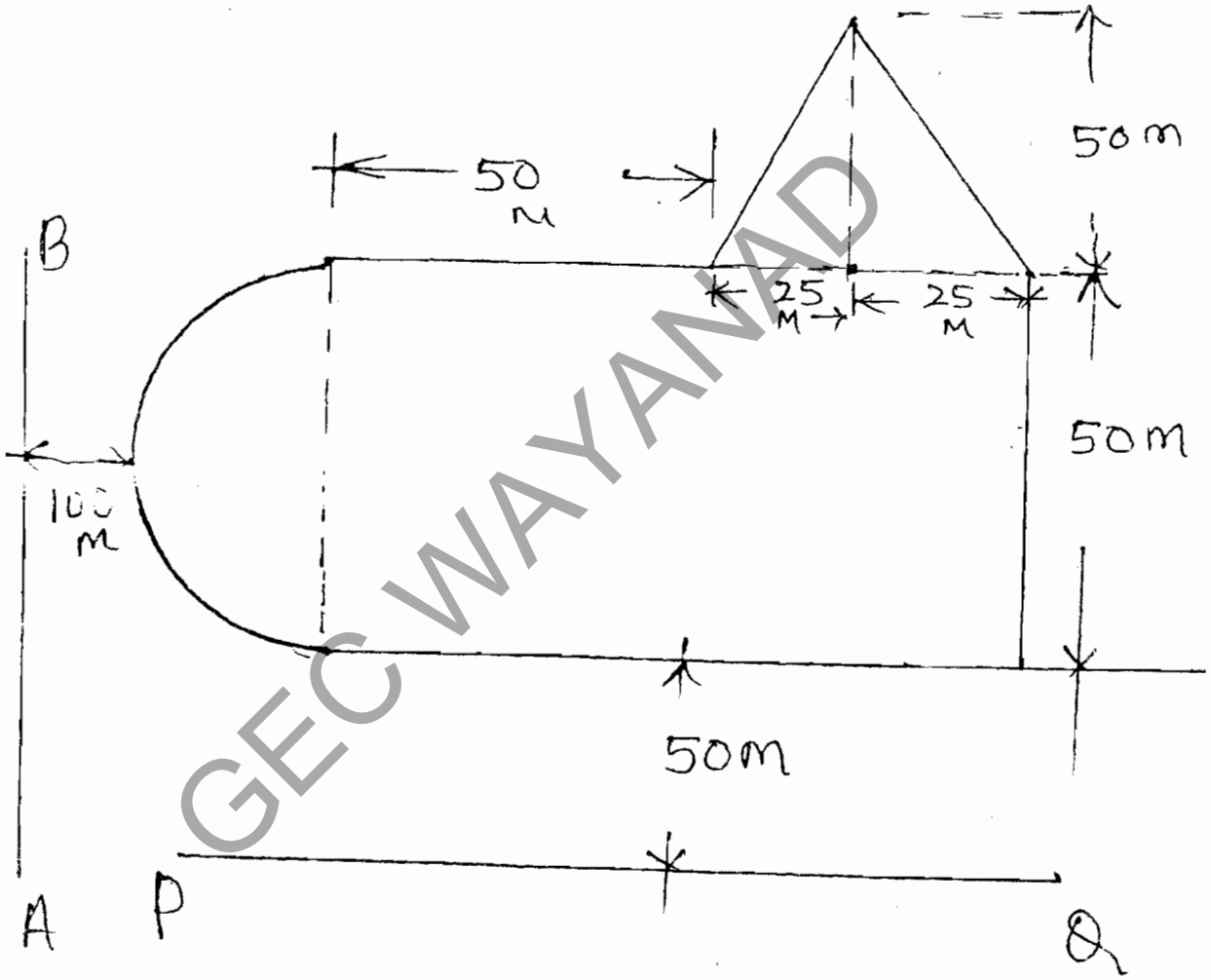





Fig. 7

5. a) A glass ball is dropped on to a smooth horizontal floor from which it bounces to a height of 9 metre. On the second bounce it rises to a height of 6 m. From what height the ball was dropped and what is the coefficient of restitution between the glass and the floor ? **15**

OR

b) A rocket is released from a jet fighter flying horizontally at 1200 kmph at an altitude of 3000 M above its target. The rocket thrust gives it a constant horizontal acceleration of 6 m/sec$^2$. At which angle below the horizontal should the pilot see the target at the instant of releasing the rocket in order to score a hit ? **15**

M 23022

Reg. No. : .....

Name : .....

**Combined I and II Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part Time) Examination, April 2013**
**(2006 and Earlier Admn.)**
**EN2K 108/PTEN 2K 107 : COMPUTER PROGRAMMING IN 'C'**
**(Common to all Branches)**

Time: 3 Hours Total Marks : 100

***Instruction :*** *Answer* ***all*** *questions.*



PART – A

I. a) Distinguish between high-level and assembly language. **5**

b) Explain the top down approach to designing algorithms. **5**

c) Distinguish between global and local variables. **5**

d) What are the types of constants in C ? Explain the difference between them. **5**

e) Explain the string handling function in C. **5**

f) Explain the concept of Unions in C. **5**

g) Explain the input and output function in C++. **5**

h) Explain the concept of polymorphism in C++. **5**

PART – B

II. a) What are the different types of memories used in computers ? Describe their features, advantages and disadvantages. **7**

b) Write an algorithm and a flow chart to generate fibonacci numbers upto 'N'. **8**

OR

c) Draw a neat sketch of block diagram of a computer and explain each block briefly. **8**

d) Write an algorithm and a flow chart find LCM and GCD of three numbers. **7**

P.T.O.

III. a) Explain the steps to be followed in writing and running a C program. 7

b) Write a program that counts number of times the first three letters of the alphabet (a, A, b, B, c, C) occur in a file. Do not distinguish between lower and upper case letters. 8

OR

c) Explain goto, break and continue statements with example. 7

d) Write a program that reads characters from the standard input file until EOF is encountered. Use the variables digit-ent and other-ent to count the number of digits and the number of other characters, respectively. 8

IV. a) What is meant by dynamic memory allocation ? Explain how C supports dynamic memory allocation. 7

b) Write a program to sort 'N' integers using merge sort. 8

OR

c) Explain how arrays can be used to store pointers. Give one example. 7

d) Write a program to sort 'N' input integers using pointers. Use Bubble sort to sort the given numbers. 8

V. a) How C++ supports encapsulation and data hiding ? Explain with example. 8

b) What are generic container classes ? Explain with an example. 7

OR

c) What are uses of constructors in a C++ programing ? Why are destructors used ? Explain with an exarnple. 7

d) How exceptions are handled in C++ ? Write an exception handler that will deal with division error of two integers. 8

M 23026

Reg. No. : .....

Name : .....

**Combined I and II Semester B.Tech. Degree (Reg./Sup./Imp.–Including Part Time) Examination, April 2013**
**(2006 and Earlier Admn.)**
**CS2K/IT2K 109 : BASIC ELECTRICAL ENGINEERING**

Time : 3 Hours Max. Marks : 100



I. a) Explain the terms : Resistance, inductance and capacitance. **(8×5=40)**

b) Define voltage and current in an electric circuit. What are their units ?

c) Explain peak factor and form factor. Give their expressions for a half wave rectified sinusoidal voltage.

d) Describe the concept of poles and zeros.

e) Explain the principle of operation of a transformer.

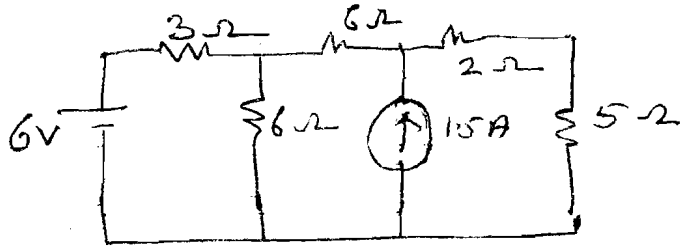
f) Differentiate between moving coil and moving iron instruments.

g) What is the function of commutator in DC machine ? Explain.

h) "An induction motor can not run at synchronous speed". Justify.

II. a) State and explain, with a sample network, the super position theorem. 6

b) Find the current through the 5Ω resistance in the following circuit using Norton's theorem. 9




OR

c) With a suitable circuit explain how the equivalent Thevenin resistance is found out. 6

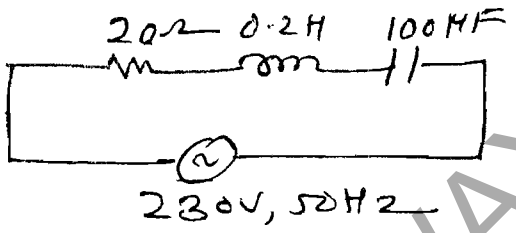
d) Using super position theorem find the voltage across the 2Ω resistor in the circuit of question II b. 9

III. a) An RC series circuit consumes 100 W when connected across 250 V, 50Hz supply. Find R and C. 7

b) What is meant by natural response ? Sketch the unit step response for a first order system. 8

OR

c) Find the impedance, current, apparent power, active power and power factor of the following circuit : 15




IV. a) A 600 KVA, 1– phase transformer when working at u.p.f. has an efficiency of 92% at full load and half load. Find its efficiency at 60% full load u.p.f. 10

b) Describe the working of a moving coil instrument. 5

OR

c) With a diagram expalin the construction and working of an energy meter. 15

V. a) Explain the principle of working of d.c. motor. 7

b) Discuss about the various types of d.c. generators with supporting diagrams. 8

OR

c) Describe the working of a synchronous motor. 7

d) Explain the types and working of alternators. 8

M 23025

Reg. No. : .....

Name : .....

**Combined I and II Semester B. Tech. Degree (Reg./Sup./Imp.– Including Part Time) Examination, April 2013**
**(2006 and Earlier Admn.)**
**EE 2K/EC 2K/AI 2K 109 : BASIC ELECTRICAL ENGINEERING**

Time : 3 Hours Max. Marks : 100

***Instructions :*** *Answer* ***all*** *questions.*
***Missing*** *data may be* ***assumed****.*

PART – A

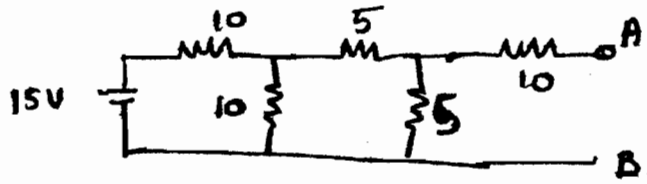
I. a) Define the following :
   a) Kirchoff's laws b) Faraday's law
   b) Write a note on magnetisation curves of ferromagnetic materials.
   c) Define the following :
   a) Rise time b) Fall time c) Steady state.
   d) Explain the concept of D.C. steady state and sinusoidally steady state analysis.
   e) Define the following :
   a) r.m.s. value of voltage
   b) average value of current
   c) form factor
   d) peak factor
   f) Define :
   a) Power factor
   b) Apparent power
   c) Active power
   d) Reactive power.
   g) Write a short note on symmetrical components in a power system.
   h) Prove that any power consumed in inductor is zero. **(8×5=40)**



P.T.O.

PART – B

II. a) State and prove Thevenin theorem. **6**

b) 


Find thevenin equivalent as seen from A and B. **9**

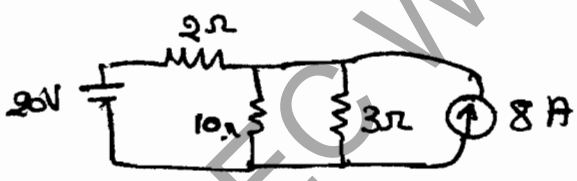
OR

c) Prove expression for energy stored in electro static fields. **6**

d) Two coils when connected in series take a current of 4 amps and consume 128 W when applied voltage is 80 V. When one of the coil is reversed the current taken is 6.5 A. Determine the mutual inductance if the frequency is 50 Hz. **9**

III. a) State and explain superposition theorem. **6**

b) Verify substitution theorem for 10 Ω resistance. **9**




OR

c) Explain V-I relationship for inductance and capacitance. **6**

d) State and prove substitution theorem. **9**

IV. a) State and explain maximum power transfer theorem. **9**

b) A voltage of 220 V is applied across a series circuit of resistance 8Ω and inductive reactance of 6 Ω. Determine the current and power in the circuit. **6**

OR

c) Show that average value of an alternating quantity is 0.637 times of its maximum value. **6**

d) In a series circuit energised by a constant voltage, constant frequency supply, resonance takes place due to variation of inductance. The supply frequency is 300 Hz. The capacitance in the circuit is 10 $\mu$F. Determine the constant value of resistance in the circuit if the Q of the coil is to be 5. Determine value of inductance at resonance and at half power points. **9**

V. a) Write a note on neutral shift and neutral current in a polyphase system. **6**

b) With a neat circuit diagram and phasor, diagram explain the two wattmeter method of power measurement in a 3 phase circuit. **9**

OR

c) Explain the concept of sequence coupling. **6**

d) Three star connected impedances $Z_a = 20 \angle 0^0\ \Omega$ $Z_b = 20 \angle -30^0$ and $Z_c = 20 \angle 30^0$ are connected in star to a 3 wire 400 V supply. Determine the line currents and the power input to the load. **9**