

**B.Tech. DEGREE EXAMINATION, MAY - 2015**

**(Examination at the end of First Year)**

**Paper - I : Mathematics - I**

**Time : 3 Hours**

**Maximum Marks : 75**

Answer question No. 1 compulsory

(15)

Answer one question from each unit

(4 x 15 = 60)

1) a) Obtain the differential equation of all circles of radius  $r$  and centre  $(h, k)$ .

b) Find the order of the differential equation

$$y''' - 4 - 6x^2 y' + e^y = \sin xy$$

c) Define orthogonal trajectory.

d) Define regression.

e) Find  $L(e^{-3t} \sin at)$

f) Find  $L^{-1}\left(\frac{S^2 - 3S + 4}{S^3}\right)$

g) Form the partial differential equation from  $z = ax + by + \frac{a}{b} - b$ .

h) Define Wronskian determinant.

i) Write general form a linear partial differential equation with an example.

j) Define dirac-delta function.

k) Define standard normal variate

l) Two regression line of the variables  $x$  and  $y$  are  $x = 19.13 - 0.87y$  and  $y = 11.64 - 0.50x$  find mean of  $x$ .

m) Find the particular Integral of  $(D^2 + 5D + 6)y = \cos 3x$

n) Solve  $(D + 1)^3 y = 0$ .

o) Write linear property of Laplace transform.

**UNIT - I**

- 2) a) Solve  $x \frac{dy}{dx} + y = x^3 y^6$ .
- b) Find the orthogonal trajectories of the family of Confocal conics  $\frac{x^2}{a^2} + \frac{y^2}{a^2 + \lambda} = 1$  where  $\lambda$  is the parameter.

OR

- 3) a) Find the complete solution of  $y'' - 2y' + 2y = e^x \cos x$ .
- b) Solve  $(1 + xy)ydx + (1 - xy) xdy = 0$ .

**UNIT - II**

- 4) a) Solve  $(D^2 - 4)y = 2\cos^2 x$
- b) Solve  $(x^2 D^2 - 4xD + 6)y = x^2$ .

OR

- 5) a) Apply the method of variation of parameters to solve  $\frac{d^2 y}{dx^2} + y = \cos ecx$ .
- b) Solve  $\frac{dx}{dt} = 3x + 2y, \frac{dy}{dt} + 5x + 3y = 0$ .

**UNIT - III**

- 6) a) Find  $L[e^{4t} \sin 2t \cos t]$ .
- b) Prove that  $L[f^n(t)] = S^n \bar{f}(s) - S^{n-1} f(0) - S^{n-2} f'(0) \dots - f^{n-1}(0)$ .

OR

- 7) a) Find  $L^{-1} \left[ \frac{S^2}{(S+1)(S+2)(S+3)} \right]$ .
- b) Solve by Laplace transform  $\frac{d^2 y}{dt^2} + 2 \frac{dy}{dt} + 5y = e^{-t} \sin t$  given that  $y(0) = 0, y'(0) = 1$ .

**UNIT - IV**

8) a) Find partial differential equation by eliminating the arbitrary constants  $a$  and  $b$  from the equation  $(x - a)^2 + (y - b)^2 = z^2 \cot^2 \alpha$ .

b) Solve  $p \tan x + q \tan y = \tan z$

OR

9) a) Solve  $\frac{\partial^3 z}{\partial x^3} - 2 \frac{\partial^3 z}{\partial x^2 \partial y} = 2e^{2x} + 3x^2 y$

b) Solve  $(D^2 + 4DD^1 + 5D^{12})z = \sin(2x + 3y)$



**B. Tech. DEGREE EXAMINATION, MAY - 2015**

**(Examination at the end of First Year**

**Paper - II : Mathematics - II**

**Time : 3 Hours**

**Maximum Marks : 75**

Answer question No. 1 compulsory

(15)

Answer one question from each unit

(4 x 15 = 60)

1) a) Write conditions system of linear equation of the form  $AX = B$ .

b) Find Rank of  $A = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ 1 & 2 & 3 \end{pmatrix}$ .

c)  $A = \begin{pmatrix} 5 & 4 \\ 1 & 2 \end{pmatrix}$  find the quadratic form of A.

d) Find the eigen value  $A = \begin{pmatrix} 1 & 2 & 3 \\ 0 & 4 & 5 \\ 0 & 0 & -4 \end{pmatrix}$

e) State Lagrange's mean value theorem.

f) Write expansion of  $e^x$  using Taylor series.

g) If  $f(x, y) = xy + (x - y)$  the stationary points are.

h) Find the radius of curvature at the origin of the curve  $y = x^4 - 4x^3 - 18x^2$

i) Evaluate  $\int_0^2 \int_0^x y \, dy \, dx$ .

j)  $\int_0^{\pi} \int_0^{a \cos \theta} r \sin \theta \, dr \, d\theta$

k) Define gamma function.

l) Define gradient.

m) Define  $\nabla \phi$

n)  $\vec{f} = x_1\vec{i} + x_2\vec{j} + x_3\vec{k}$  then  $\nabla \times \vec{f}$

o) State stoke's theorem.

### Unit - I

2) a) Investigate for what values of  $\lambda$  and  $\mu$  the system of simultaneous equations.

$$x + y + z = 6, \quad x + 2y + 3z = 10, \quad x + 2y + \lambda z = \mu \text{ has}$$

- i) no solution
- ii) a unique solution
- iii) an infinite number of solutions.

b) Find the eigen values and Eigen vector of the matrix.

$$A = \begin{pmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{pmatrix}$$

OR

c) Verify the cayley – Hamilton theorem for the matrix A and find its inverse

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

d) Find the Eigen values and Eigen vectors of matrix

$$A = \begin{pmatrix} i & 0 & 0 \\ 0 & 0 & i \\ 0 & i & 0 \end{pmatrix}$$

### Unit – II

3) a) Write taylor series for  $f(x) = (1 - x)^{5/2}$  with Lagranges form of remainder up to 3terms in the internal  $[0.1]$ .

b) Examine for minimum and maximum values of  $\sin x + \sin y + \sin(x + y)$ .

OR

c) Find the maximum and minimum of  $U = x^2 + y^2 + z^2$  if  $ax^2 + by^2 + cz^2 = 1$  and  $lx + my + nz = 0$

**Unit – III**

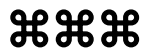
- 4) a) Evaluate  $\iint (x^2 + y^2) dx dy$  over the area bounded by ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ .
- b) Evaluate the triple integral  $\iiint xy^2z dx dy dz$  taken through the positive octant of the sphere  $x^2 + y^2 + z^2 = a^2$ .

OR

- c) Find the volume common to the cylinders  $x^2 + y^2 = a^2$  and  $x^2 + z^2 = a^2$ .
- 5) a) Using Green's theorem evaluate  $\oint_C 2x^2 - y^2 dx + x^2 + y^2 dy$  where c is the boundary in  $xy$  -plane of the arc enclosed by  $x$  - axis and the semicircle  $x^2 + y^2 = 1$  in the upper half of the  $xy$  - plane.

OR

- b) Verify Gauss divergence theorem for  $f = x^3\bar{i} + y^3\bar{j} + z^3\bar{k}$  taken over the cube bounded by  $x = 0, x = a, y = 0, y = a, z = 0, z = a$ .



**B. Tech. DEGREE EXAMINATION, MAY - 2015**

**(Examination at the end of First Year)**

**Paper - III : Physics**

**Time : 3 Hours**

**Maximum Marks : 75**

Answer question No. 1 Compulsory

(15 × 1 = 15)

Answer ONE question from each unit

(4 × 15 = 60)

All questions carry equal marks

- 1) a) Explain Magnetosfriction.  
b) Explain Dispersive of grating.  
c) Explain Biot-savart's law.  
d) Define Fermi level.  
e) Write down applications of lasers.  
f) Explain spontaneous emission.

**Unit - I**

- 2) a) What is piezo electric effect? Explain the production of ultrasonics using piezo – electric Gystal Give applications of ultrasonics in medicine and industry.

OR

- b) What is meant by diffraction of light? Give the theory of fraunhoffer diffraction due to a single slit and hence obtain the condition for primary and secondary maxima. Using this obtain intensity distribution curve.

**Unit – II**

- 3) a) Explain Hall effect and mention its uses. Derive expression for Hall coefficient.

OR

- b) Explain faraday's laws of electromagnetic induction. Obtain expression for growth of electric current in a circuit containing inductance, Resistance and a constant E.M.F.

**Unit – III**

4) a) What is Compton effect? Derive an expression for the Compton shift.

OR

b) What do you understand intrinsic and extrinsic semiconductors? Explain p-type and n-type semiconductors with energy band diagrams.

**Unit – IV**

5) a) Explain characteristics of a laser. Describe the construction and working of Ruby laser.

OR

b) What is meissner effect? Explain type – I, type – II superconductors and high temperature superconductors.





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**B. Tech. DEGREE EXAMINATION, MAY - 2015**

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**Paper - IV : Chemistry**

**Time : 3 Hours**

**Maximum Marks : 75**

Answer question No. 1 compulsory

*(15 × 1 = 15)*

Answer ONE question from each unit

*(4 × 15 = 60)*

- 1) a) Coagulation.  
b) Sterilization.  
c) Sludge.  
d) Semi conductor.  
e) Metallic bonding.  
f) Monomer.  
g) Plastics  
h) Teflon  
i) Poly urethane Rubber  
j) Battery  
k) Nernst equation  
l) Corrosion  
m) Cathodic protection  
n) Sacrificial anode  
o) Iron Sulphide

### Unit – I

- 2) a) What is hardness? How do you express hardness?  
b) Explain the estimation of hardness of water by EDTA method?

OR

- 3) a) Explain briefly about lime – soda process?  
b) Write a short notes on Boiler corrosion?

### Unit – II

- 4) a) Derive the Bragg's equation?  
b) Write a short notes on Semi-Conductors and Insulators?

OR

- 5) Explain briefly about the mechanisms of free-radical and Anionic chain polymerization?

### Unit – III

- 6) a) Explain the processing and vulcanization of natural Rubber?  
b) Buna – N

OR

- 7) Explain the following batteries :

- a) Zinc – carbon battery  
b) Nickel – cadmium battery  
c) Modern lithium batteries

### Unit – IV

- 8) a) What is corrosion? Explain briefly about electro chemical theory of corrosion?  
b) Electroplating

OR

- 9) a) Galvanic Corrosion  
b) Pitting Corrosion  
c) Thermo galvanic Corrosion  
d) Cesium – Lithium – Ferric chloride



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**Paper - V : English**

**Time : 3 Hours**

**Maximum Marks : 75**

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*1)* Correct the errors in the following sentences : *(15)*

- a) One should love his country.
- b) They don't drink wine. Isn't it?
- c) I bought a book. Book was written by Shakespeare.
- d) He did not attended to the class yesterday.
- e) Number five follow number four.
- f) He is a M.L.A.
- g) Rich should help the poor.
- h) They live in Trunkroad in Guntur.
- i) If you insult him, he leaves the house.
- j) I told my mother that I will bring tablets that night.
- k) Usually women wear sarees.
- l) Sushma do not eat meat.
- m) Look, they were playing in the garden.
- n) Hari is junior than Suresh.
- o) I have posted the letter on Saturday.

2) a) Read the following passage and answer the questions : (10)

Written communication is an important part of all study and work situations. In order to be able to handle a writing task well, you have to learn to use the writing norms and conventions characteristic of different forms of writing, such as essays, official letters, reports and project proposals. Each of these forms has its own special set of language expressions, style and format. There are specific techniques you will need to learn to write for different purposes. Further, many fields, for example, journalism, law and medicine, have their own special vocabularies and formats. Finally, you must remember who your readers will be – teachers, subject experts, colleagues or non-specialists.

- i) What is the important part of all study and work situations?
- ii) Is the style and format of essays and reports different?
- iii) Technique changes to write for different purposes – True/False.
- iv) What is it that a writer should remember finally?
- v) What is meant by ‘Vocabulary’?

b) Bring out the differences of meaning of any FIVE of the following Pairs of words and use them in sentences of your own : (5)

- |                        |                  |
|------------------------|------------------|
| i) merry, marry        | ii) rise, raise  |
| iii) forward, foreword | iv) site, sight  |
| v) break, brake        | vi) buy, by      |
| vii) bare, bear        | viii) hear, here |
| ix) hole, whole        | x) none, nun     |

3) a) Write a paragraph on any ONE of the following : (6)

- i) Remedies for road accidents
- ii) Inspiration

b) Write a letter to the officer concerned to change the address in your Adhar card. (1 × 5 = 5)

OR

Write a letter to the editor of a news paper about the dirty surroundings near the Government Hospital.

c) Give meanings and use them in sentences of your own on any EIGHT of the following Idiomatic expressions : (8 × ½ = 4)

- |                            |                                   |
|----------------------------|-----------------------------------|
| i) golden handshake        | ii) eat humble pie                |
| iii) break the ice         | iv) every dog has its day         |
| v) leave no stone unturned | vi) keep an eye on                |
| vii) storm in a tea cup    | viii) keep body and soul together |
| ix) kick the bucket        | x) have big ears                  |

4) a) Write a brief report to your District Collector about your service, on behalf of your college, to the victims of cyclone in your village. (1 × 10 = 10)

b) Give one-word substitutes for the following meanings : (10 × ½ = 5)

- i) Something which cannot be avoided.
- ii) One who is unable to read and write.
- iii) One who does a thing for pleasure.
- iv) That which never dies.
- v) Study of birds.
- vi) That cannot be believed.
- vii) A plant eating animal.
- viii) Writing that can be read clearly.
- ix) One who plays funny parts in films.
- x) Good relation between two people.

5) a) Write a small essay on any ONE of the following : (1 × 5 = 5)

- i) Teachers' Day
- ii) Uses of Physical exercises

b) Expand one of the following : (1 × 5 = 5)

- i) No pains, No gains
- ii) Rome was not built in a Day

c) Write the antonyms of the following words :

$(5 \times \frac{1}{2} = 2\frac{1}{2})$

i) confusion

ii) combine

iii) hidden

iv) send

v) natural

d) Write the synonyms of the following words :

$(5 \times \frac{1}{2} = 2\frac{1}{2})$

i) agree

ii) scold

iii) recognise

iv) check

v) choose



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**Paper - VI : Computer Programming**

**Time : 3 Hours**

**Maximum Marks : 75**

Answer question No. 1 compulsory

(15)

Answer ONE question from each unit

(4 x 15 = 60)

1) Write short notes on :

- a) Type – conversion rules.
- b) If – else statement and else – if statement with syntax and examples.
- c) Different loops with examples.
- d) Command – line arguments.
- e) Structures and unions.

**Unit - I**

2) Explain in detail about different types of operators with examples.

OR

3) Write a 'C' program to evaluate the arithmetic and Boolean expressions and explain.

**Unit - II**

- 4) a) What is Break and continue.
- b) Explain recursion with example.

OR

5) Write a 'C' program to find whether a given number is prime (or) not and find prime factors.

### Unit - III

6) Explain in detail about multi dimensional arrays with examples.

OR

7) Write a 'C' program on :

- a) Bubble sort.
- b) Binary Search.

### Unit - IV

8) Explain in detail about sequential file processing.

OR

9) Write a 'C' program to perform operations on rational numbers (p/q form).





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**Paper - VII : ENGINEERING MECHANICS**

**Time : 3 Hours**

**Maximum Marks : 75**

Answer question No. 1 compulsory

(15)

Answer ONE question from each unit

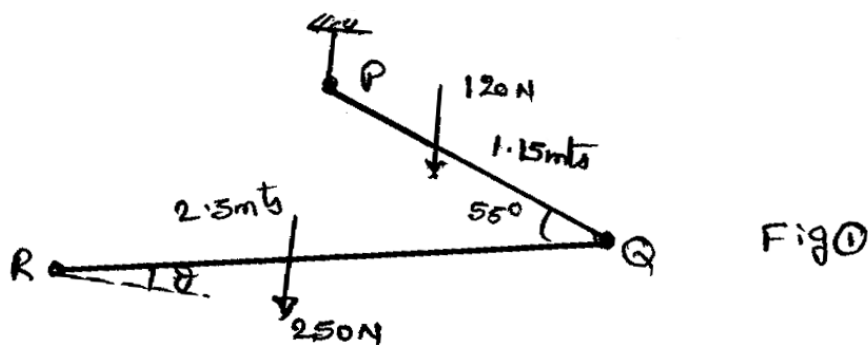
(4 x 15 = 60)

All questions carry equal marks

- 1) a) Draw a sketch to show the characteristics of forces.
- b) State different laws of mechanics.
- c) State the assumptions necessary for the analysis of a plane projectile motion.
- d) State D' Alembert's principle for a particle. How is it similar with the equilibrium equation as obtained from Newton's second law, if at all so?
- e) Explain the mechanism of impact with reference to the direct central impact.

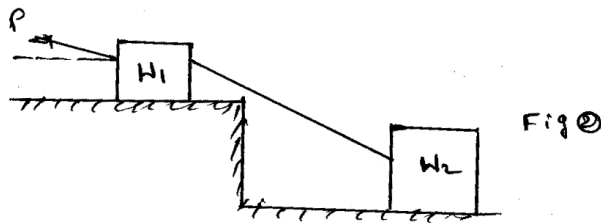
**Unit - I**

- 2) Two metallic rods PQ and QR are fixed with an internal angle  $55^\circ$ , and hung as shown in fig. (1), such that QR makes an angle ' $\theta$ ' in equilibrium condition. Determine the angle  $\theta$ .



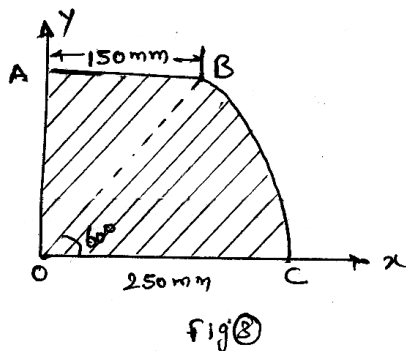
OR

- 3) Two blocks of weights  $W_1$  and  $W_2$  Connected with a string are at rest as shown in fig. (2) If the angle of friction of each block be  $\phi$ , find the magnitude and the direction of least force 'P' necessary for upper block that will induce sliding.



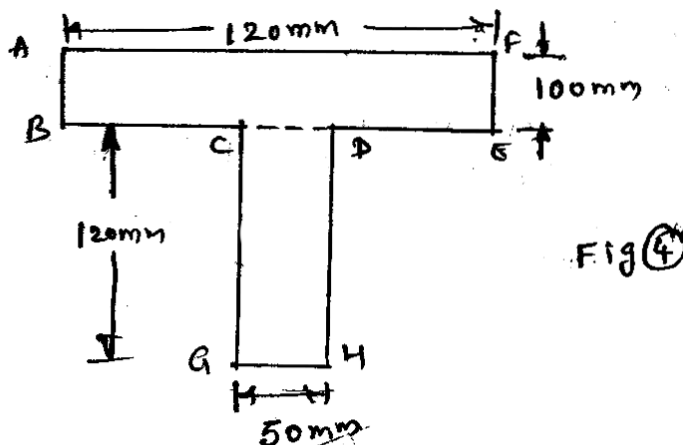
Unit - II

- 4) Locate the centroid of the composite figure OABC shown in fig (3)



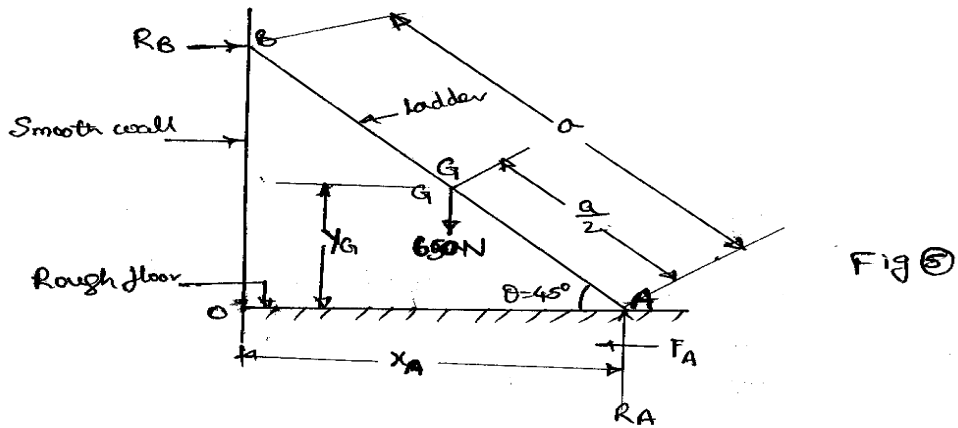
OR

- 5) A 'T' section is shown in fig(4). Find the moment of inertia of this section about X-X axis passing through the CG of the section.



**Unit - III**

- 6) A ladder of weight 650 N and length 'a' rests against a smooth vertical wall and a rough horizontal floor making an angle of  $45^\circ$  with the Horizontal shown in fig(5). Using the method of virtual wall, find the force of friction of the floor.

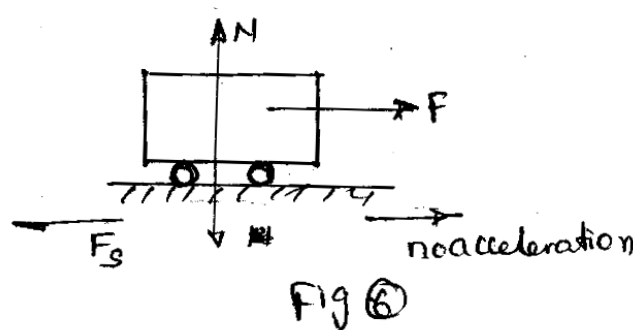


OR

- 7) a) Explain the term inertia of a body. What do you mean by Inertial force and inertial torque?  
 b) Derive the expressions for velocity and acceleration of a particle subjected to a force as a function of velocity.

**Unit - IV**

- 8) A train of weight 25000kg is pulled by an engine on a level track at a constant speed of 58 kmph (as shown is fig(6)). The frictional resistance is 1kg per 100kg of the weight of the train. Determine the power of the engine. If the train is to move with uniform acceleration of  $1.2\text{m/s}^2$  on the track after attaining the speed of 58kmph, determine the power of the engine.



OR

- 9) The speed of a fly wheel rotating at 250rpm is uniformly increased to 300rpm in 5 seconds. Determine the work done by the driving torque and the increase in kinetic energy during this time. What do you infer from the result? Take mass of the fly wheel as 25kg and its radius of gyration as 20cm



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**B. Tech. DEGREE EXAMINATION, MAY - 2015**

**(Examination at the end of First Year)**

**Paper - VIII : Engineering Graphics**

**Time : 3 Hours**

**Maximum Marks : 75**

Answer ONE question from each unit

(5 x 15 = 75)

**Unit - I**

- 1) a) Construct a diagonal scale of R.F. =  $\frac{1}{4000}$  to show metres and long enough to measure upto 500metres. Indicate on the scale, a distance of 374 metres.
- b) Two points A & B are 100 mm apart. Trace the complete path of a point P moving (in the same plane as that of A and B) in such a way, that the sum of its distances from A and B is always the same and equal to 125 mm.

OR

- 2) a) Draw a Vernier scale of R.F. =  $\frac{1}{25}$  to read centimeters upto 4 mts and on it, show lengths representing 2.39 m and 0.91 m.
- b) A circle of 50 mm diameter rolls along a straight line without slipping. Draw the curve traced out by a point P on the circumference, for one complete revolution of the circle.

**Unit - II**

- 3) A line PQ 100 mm long, is inclined at 30° to the H.P and at 45° to the V.P. Its midpoint is in the V.P and 20 mm above H.P. Draw its projections, if its end P is in the third quadrant and Q is in the first quadrant.

OR

- 4) A circular plate of negligible thickness and 50 mm diameter appears as an ellipse in the front view, having its major axis 50 mm long and minor axis 30 mm long. Draw its top view when the major axis of the ellipse is horizontal.

### Unit - III

- 5) Draw the projections of a cone, base 45 mm diameter and axis 50 mm long, when resting on the ground on a point on its base circle with the axis making an angle of  $30^\circ$  with the H.P and  $45^\circ$  with the V.P.

OR

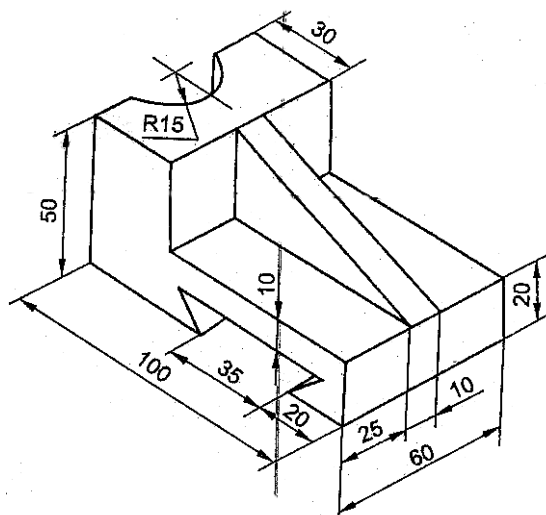
- 6) A cylinder, with a 60 mm base diameter and 70 mm long axis, is lying on a generator on the H.P. with its axis parallel to the V.P. A vertical section plane, the H.T of which makes an angle of  $30^\circ$  with V.P and passes through a point at a distance of 25 mm from one of its ends, cuts the cylinder. Draw its sectional front view and obtain the true shape of the section.

### Unit - IV

- 7) A cone of 95 mm diameter of base and 90 mm height stands on its base on the ground. A semi-circular hole of 50 mm diameter is cut through the cone. The axis of the hole is horizontal and intersects the axis of the cone. It is 30 mm above the base of the cone. The flat surface of the hole contains the axis of the cone and is perpendicular to the V.P. Draw the three views of the cone and also develop the surface of the cone.
- 8) A vertical cylinder of diameter 55 mm resting on the ground is penetrated by another cylinder of 40 mm diameter such that the axis of the penetrating cylinder is 10 mm in front of the axis of the vertical cylinder and is inclined to the H.P. at  $30^\circ$  and parallel to the V.P. Draw the elevation, plan of the solids showing the curves of intersection

### Unit - V

- 9) Draw the orthographic view of the given figure. All dimensions are in mm.



OR

10) Draw the isometric view of the given figure. All dimensions are in mm.

