AR16

CODE: 16ME1003 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech I Semester Supplementary Examinations, January-2019

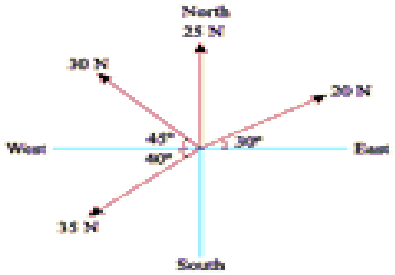
ENGINEERING MECHANICS (STATICS)
(Mechanical Engineering Branch)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

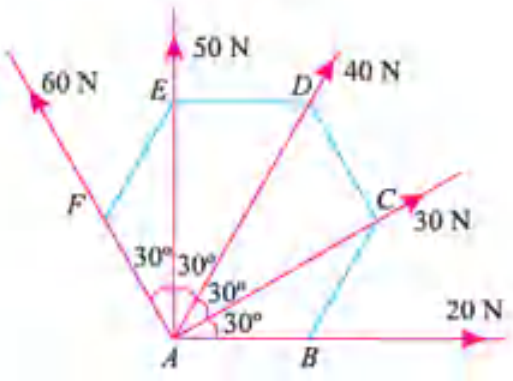
1. a) Find the resultant of the given force system shown in Figure. 10m



b) Find the resultant of two forces equal to 50 N and 30 N acting at an angle of 60°. 4m

(OR)

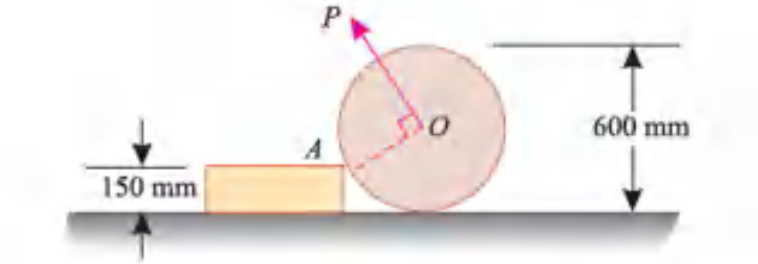
2. a) The forces 20 N, 30 N, 40 N, 50 N and 60 N are acting at one of the angular points of a regular hexagon, towards the other five angular points, taken in order. Find the magnitude and direction of the resultant force. 10m



b) Two forces of 80 N and 70 N act simultaneously at a point. Find the resultant force, if the angle between them is 150° 4m

UNIT-II

3. a) A uniform wheel of 600 mm diameter, weighing 5 kN rests against a rigid rectangular block of 150 mm height as shown in figure below Find the least pull, through the centre of the wheel, required just to turn the wheel over the corner A of the block. Also find the reaction on the block. Take all the surfaces to be smooth. 10m



b) What is meant by moment of a force? How will you explain it mathematically? 4m

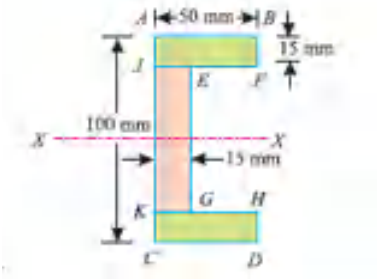
(OR)

4. a) Four forces equal to P, 2P, 3P and 4P are respectively acting along the four sides of square ABCD taken in order. Find the magnitude, direction and position of the resultant force. 10m

b) State the Varignon's principle of moments? 4m

UNIT-III

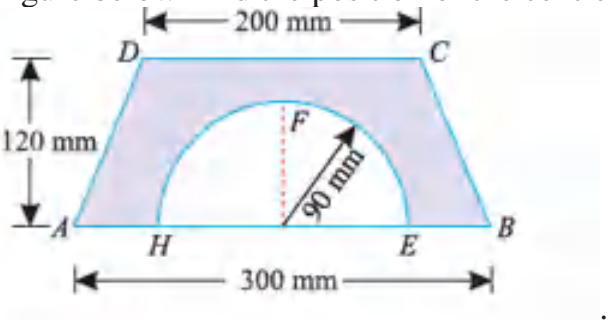
5. a) Find the centre of gravity of a channel section 100 mm × 50 mm × 15 mm. 10m



b) Find the moment of inertia of a rectangular section 60 mm wide and 40 mm deep about its centre of gravity. 4m

(OR)

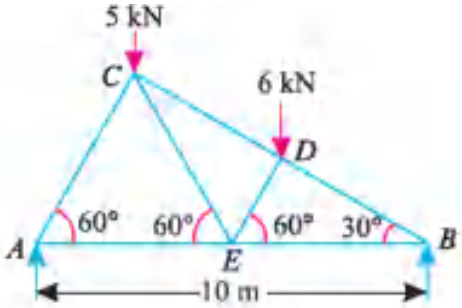
6. a) A semicircle of 90 mm radius is cut out from a trapezium as shown in figure below Find the position of the centre of gravity 10m



b) Find the moment of inertia of a circular section of 20 mm diameter through its centre of gravity. 4m

UNIT-IV

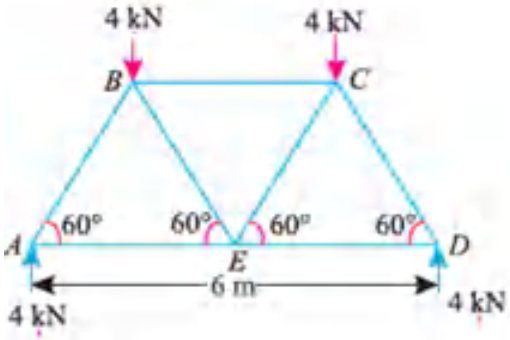
7. a) A truss of span 10 metres is loaded as shown in figure below Find the reactions and forces in the members of the truss. 10m



b) What is a cantilever truss? How will you find out its reactions? 4m

(OR)

8. a) Figure shows a warren girder consisting of seven members each of 3 m length freely supported at its end points. The girder is loaded at B and C as shown. Find the forces in all the members of the girder, indicating whether the force is compressive or tensile. 10m

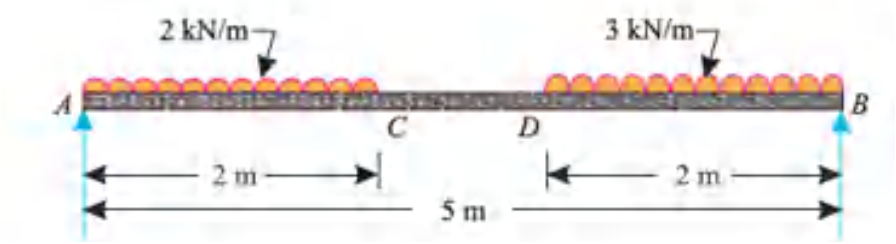


b) Write down the condition for a perfect truss and list out assumptions for perfect truss 4m

UNIT-V

9. a) List out the advantages of virtual work? 4m

   b) A beam of span 5 m is supported at A and B. It is subjected to a load system as shown in figure below. With the help of principle of virtual work, find the reactions at A and B. 10m



(OR)

10. a) How will you apply the principle of virtual work in finding out the forces in a framed Structure? 4m

    b) A uniform ladder of weight 250 N rests against a smooth vertical wall and a rough horizontal floor making an angle of 45° with the horizontal. Find the force of friction at the floor using the method of virtual work. 10m

AR16

CODE: 16ME1002 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech I Semester Supplementary Examinations, January-2019

ENGINEERING MECHANICS

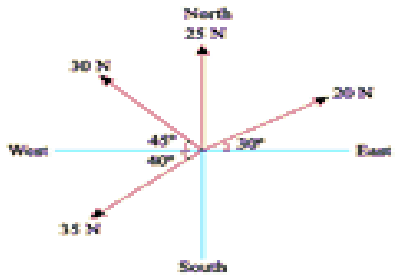
(Common to EEE & ECE Branches)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. a) Find the resultant of the given force system shown in Figure. 7M

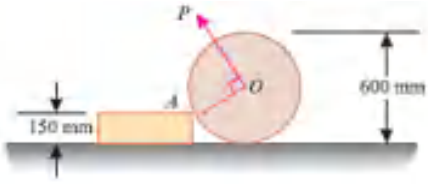


b) State and Prove parallelogram law of forces 7M

(OR)

2. a) The forces 20 N, 30 N, 40 N, 50 N and 60 N are acting at one of the angular points of a regular hexagon, towards the other five angular points, taken in order. Find the magnitude and direction of the resultant force. 7M

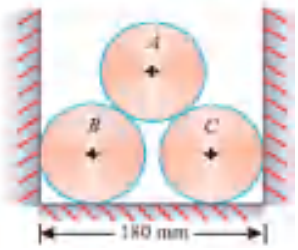
b) A uniform wheel of 600 mm diameter, weighing 5 kN rests against a rigid rectangular block of 150 mm height as shown in Fig 7M



Find the least pull, through the centre of the wheel, required just to turn the wheel over the corner A of the block. Also find the reaction on the block. Take all the surfaces to be smooth.

UNIT-II

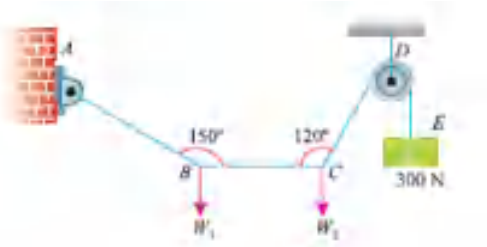
3. Three cylinders weighting 100 N each and of 80 mm diameter are placed in a channel of 180 mm width as shown in Fig 14M



Determine the pressure exerted by (i) the cylinder A on B at the point of contact (ii) the cylinder B on the base and (iii) the cylinder B on the wall.

(OR)

4. a) Light string ABCDE whose extremity A is fixed, has weights W_1 and W_2 attached to it at B and C. It passes round a small smooth peg at D carrying a weight of 300 N at the free end E as shown in Fig. 7M

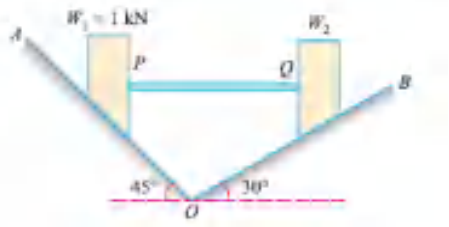


If in the equilibrium position, BC is horizontal and AB and CD make 150° and 120° with BC, find (i) Tensions in the portion AB, BC and CD of the string and (ii) Magnitudes of W1 and W2

b) State and prove Lami's theorem 7M

UNIT-III

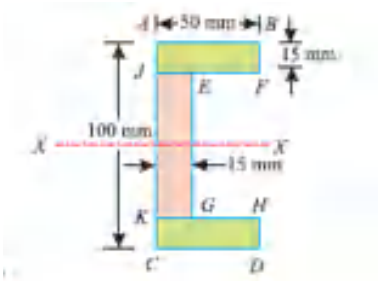
5. Two loads, W_1 (equal to 1 kN) and W_2 resting on two inclined rough planes OA and OB are connected by a horizontal link PQ as shown in Fig. 14M



Find the maximum and minimum values of W_2 for which the equilibrium can exist. Take angle of friction for both the planes as 20°.

(OR)

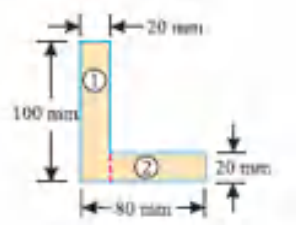
6. a) Find the centre of gravity of a channel section 100 mm × 50 mm × 15 mm. 7M



b) Determine the centroid of a rectangle having base b and height h 7M

UNIT-IV

7. Find the moment of inertia about the centroidal X-X and Y-Y axes of the angle section shown in Fig 14M



(OR)

8. a) Derive Mass moment of inertia of a solid sphere 7M
   b) Derive Mass moment of inertia of a thin circular ring 7M

UNIT-V

9. Two bodies A and B of mass 80 kg and 20 kg are connected by a thread and move along a rough horizontal plane under the action of a force 400 N applied to the first body of mass 80 kg as shown in Fig. 14M

The coefficient of friction between the sliding surfaces of the bodies and the plane is 0.3. Determine the acceleration of the two bodies and the tension in the thread, using D' Alembert's principle.

(OR)

10. a) A man, running eastwards with a speed of 6 kilometres per hour, feels the wind to be blowing directly from North. On doubling his speed, he feels the wind to blow from the North-east. Find the actual direction and velocity of the wind. 7M

    b) A particle, starting from rest, moves in a straight line, whose acceleration is given by the equation : 7M

    $a = 10 - 0.006\ s^2$

    where (a) is in m/s^2 and (s) in metres. Determine

    (i) velocity of the particle, when it has travelled 50 metres.

    (ii) distance travelled by the particle, when it comes to rest.

***

AR16

CODE: 16EE1003 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech I Semester Supplementary Examinations, January-2019

ELECTRICAL & ELECTRONICS ENGINEERING

(Common to CSE & IT Branches)

Time: 3 Hours **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

.

UNIT-I

1. a. Determine the equivalent resistance R_{ab} in the circuit in Fig.1 7M

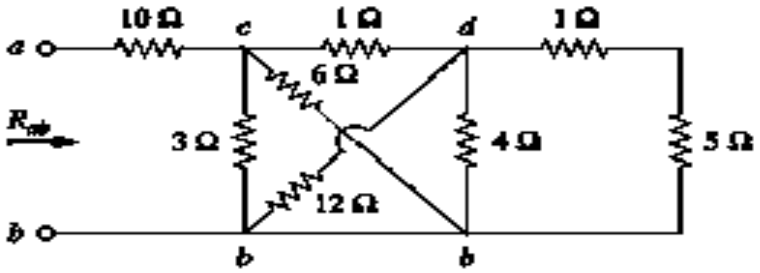


Fig.1

b. For the circuit shown in Fig.2 Calculate the V_1 and V_2 7M

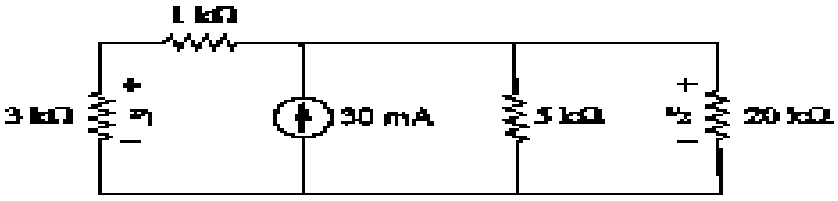


Fig.2

(**OR**)

2. a. Determine the **i** and **Vo** in the circuit of Fig. 3. 9M

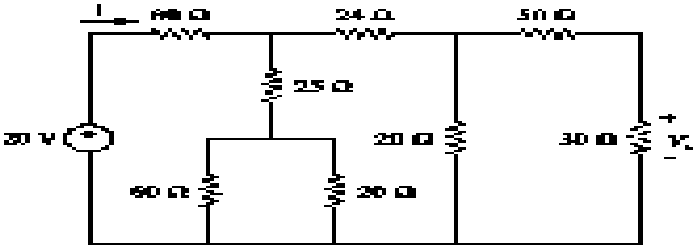


Fig. 3.

b. Calculate the equivalent resistance at terminals *a-b* of the circuits in Fig.4 5M

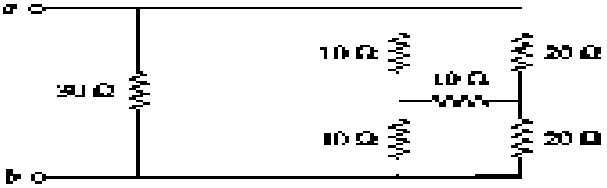


Fig.4

UNIT-II

3. a. Describe the various methods of speed control of dc motor. 8M
   b. Explain the principle operation of DC shunt generator? 6M

(OR)

4. a. Derive the EMF equation of a DC shunt generator? 6M
   b. Derive an expression for the electromagnetic torque developed in a dc machine. 8M

UNIT-III

5. a. Write the difference between Squirrel Cage and Slip Ring Motor? 7M

   b. Draw and explain a circuit diagram to perform a test for determining constant loss of single phase transformer? 7M

(OR)

6. a What is meant by voltage regulation? Derive the expression in a single phase Transformer? 7M
   b Draw and explain torque-speed characteristics of three phase induction motor? 7M

UNIT-IV

7. a With the help of neat sketch, explain the principle of operation of alternators? 7M
   b Explain the working of permanent magnet Moving Coil Instrument with a neat diagram. 7M

(OR)

8. a Explain E.M.F method to determine voltage regulation of an alternator. 7M
   b Derive the torque equation of a moving iron instrument? 7M

UNIT-V

9. a Explain **V-I** characteristics of a PN junction diode. 7M
   b Draw and explain the common base transistor characteristics 7M

(OR)

10. a Draw the half wave rectifier with necessary graphs and derive expression for its output voltage. 7M
    b Explain the input and output characteristics of a common emitter configuration. 7M

***

AR13

CODE: 13BS1002 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

I B.Tech I Semester Supplementary Examinations, January-2019

ENGINEERING MATHEMATICS-II
(Common to CIVIL, MECH, CSE & IT)

Time: 3 Hours **Max Marks: 70**

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

1. a) Write the sufficient condition for the convergence of Newton-Raphson Method
   b) If $x^3 - 9x + 1 = 0$, the first approximations x_0 and x_1 are 0 and 1respectively. Find x_2 by Bisection method
   c) If $f(x) = x^2 + x + 1$, then find the value of $\Delta f(x)$ when $h = 1$
   d) State Gauss forward interpolation formula.
   e) State Simpson's $\frac{3}{8}$ rule
   f) Write merits of Runge-Kutta Method
   g) Find the Laplace transform of $f(t) = 1 + 2\sqrt{t}$
   h) State Convolution Theorem.
   i) Find the general solution of $dx = dy = dz$
   j) Form differential equations of all planes having equal intersects on x and y axes.

PART-B

Answer one question from each unit **[5x12=60M]**

UNIT-I

2. a) Evaluate square root of 28 to four decimal places by Newton-Raphson Method **6M**
   b) Find the root for the equation $x - \cos x = 0$ by Bisection method correct to two decimal places **6M**

(OR)

3. a) Using Regula-falsi method find the real root of $x^3 - 2x - 5$ between (2,3) **6M**
   b) By method of least squares fit a parabola of the form $y = a + bx + cx^2$to the following data **6M**

x	2	4	6	8	10
y	3.07	12.85	31.47	57.38	91.29

UNIT-II

4. a) Find $f(2.5)$ using the following table **6M**

x	1	2	3	4
f(x)	1	8	27	64

b) The area A of a circle of diameter d is given for the following values **6M**

d	80	85	90	95	100
A	5026	5674	6362	7088	7854

Calculate the area of a circle of diameter 83

(OR)

5. a) Given $y_0 = 3, y_1 = 12, y_2 = 81, y_3 = 500, y_4 = 100, y_5 = 8$, without forming the difference table find $\Delta^5 y_0$ **6M**

b) Evaluate $f(10)$ given $f(x) = 168,192,336$ at $x = 1,7,15$ respectively. Use Lagrange's interpolation. **6M**

UNIT-III

6. a) Use Taylor's method to find the approximate value of y when $x = 0.1$ given $y(0) = 1$ and $y^1 = y^2 + 3x$ **6M**

b) Using Euler method, solve for y at $x = 2$ from $y^1 = 3x^2 + 1, y(1) = 2$ taking step size $h = 0.5$ **6M**

(OR)

7. a) Find $y(0.1)$ and $y(0.2)$ using Runge Kutta fourth order formula given that $\frac{dy}{dx} = xy + y^2, y(0) = 1$ **6M**

b) Using Milne's method find $y(0.8)$ from $y^1 = x - y^2, y(0) = 0$ given that $y(0.2) = 0.02, y(0.4) = 0.0795$ and $y(0.6) = 0.1762$ **6M**

UNIT-IV

8. a) Find $L\{t^2 u(t-1) + \delta(t-1)\}$ **6M**

b) Find the Laplace transform of the full wave rectifier function defined by $f(t) = E \sin \omega t \; if \; 0 < t < \frac{\pi}{\omega}$ having period $\frac{\pi}{\omega}$. **6M**

(OR)

9. a) Find the inverse Laplace transform of the following function $\frac{s^2 - 10s + 13}{(s-7)(s^2 - 5s + 6)}$ **6M**

b) Using convolution theorem find $L^{-1}\left\{\frac{1}{(s^2 + a^2)^2}\right\}$ **6M**

UNIT-V

10. a) From the partial differential equation by eliminating the arbitrary constants a and b from $2z = \frac{x^2}{a^2} + \frac{y^2}{b^2}$ **6M**

b) Solve the partial differential equation $p\sqrt{x} + q\sqrt{y} = \sqrt{z}$ **6M**

(OR)

11. a) Solve $pqz = p^2(qx + p^2) + q^2(py + q^2)$ **6M**

b) Solve the partial differential equation $z(x - y) = px^2 - qy^2$ **6M**

***

AR13

CODE: 13ME1003 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

I B.Tech I Semester Supplementary Examinations, January-2019

ENGINEERING MECHANICS
(Common to EEE & ECE)

Time: 3 Hours **Max Marks: 70**

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

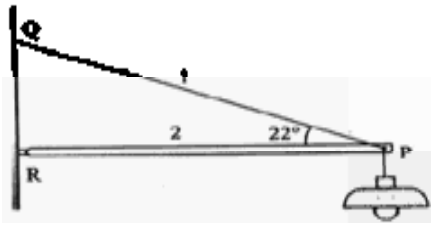
1. a) Differentiate between moment of a force and couple.
   b) Define angle of response
   c) Difference between static and dynamic friction
   d) Define the terms 'moment of inertia' and 'radius of gyration'
   e) State the theorem of Perpendicular axis
   f) A body is moving with a velocity of 2 m/sec. After 4 seconds the velocity of the body becomes 5 m/sec. find the acceleration of the body.
   g) Differentiate between rectilinear motion and curvilinear motion
   h) Define Weight of the body?
   i) Find the force acting on a body of mass 100kg and producing an acceleration of 2 m/sec^2 in its direction
   j) A body is moving with a velocity of 3 m/s. after five seconds the velocity of the body becomes 13 m/sec. find the acceleration of the body.

PART-B

Answer one question from each unit **[5x12=60M]**

UNIT-I

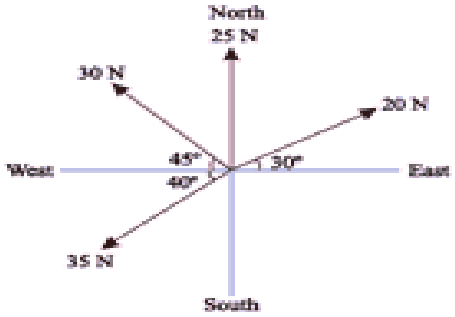
2 An electric light fixture is held with the arrangement shown in figure. If the weight of the fixture is 20kg and the hinge is an ideal one, determine the axial forces in the bar and the string. **12**



(OR)

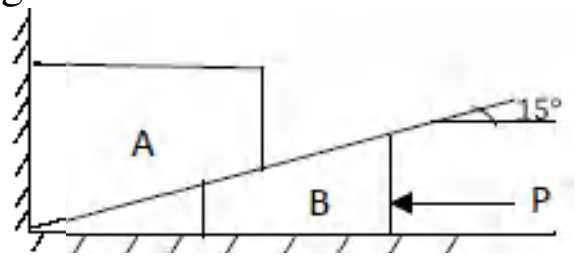
3 Find the resultant of the given force system shown in Figure. **12**

.



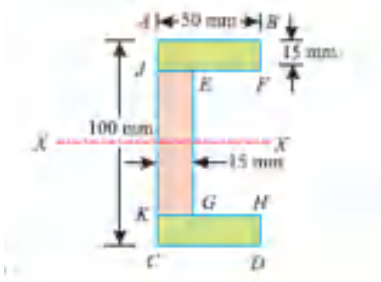
UNIT-II

4. Determine the horizontal force 'P' required for wedge 'B' to raise the block 'A' of weight 4500 kN, if the coefficient of friction on all surfaces is 0.20 as shown in the figure given below. **12**



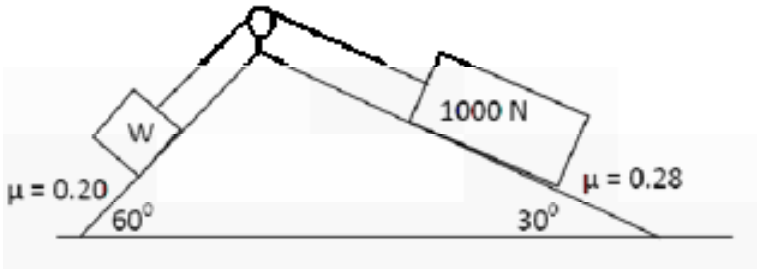
(OR)

5. Find the centre of gravity of a channel section 100 mm × 50 mm × 15 mm. **12**



UNIT-III

6. Find the least and greatest value of "W" for the equilibrium of above system. The pulley is frictionless. **12**



(OR)

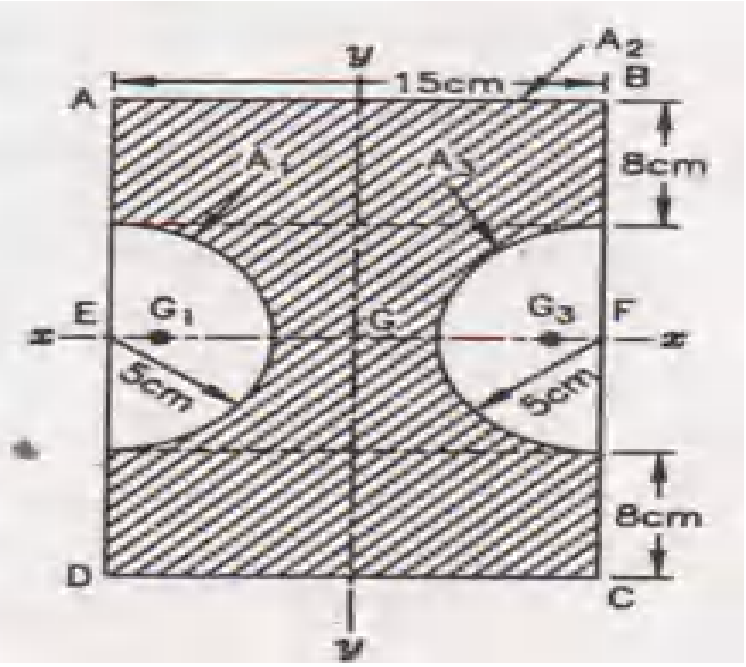
7. A screw jack raises a load of 40 KN. The screw is square threaded having 3 threads per 20 mm length and 40 mm in diameter. Calculate the force required at the end of a lever 400 mm long measured from axis of screw, if coefficient of friction between screw and nut is 0.12. **12**

UNIT-IV

8. Find the mass moment of inertia of a right circular cone of base radius 'R' and mass 'M' about the axis of the cone. **12**

(OR)

9. Determine the moment of inertia and radius of gyration of the section shown in figure below. about the centroidal axes **12**



UNIT-V

10. Two bodies weighing 25 N and 20 N are connected to the ends of an inextensible string, which passes over a smooth pulley. The weight 25 N is placed on a 20^0 inclined plane while the weight 20 N is hanging over the pulley. **12**

Determine: (a)Acceleration of the system when 25N moves up

(b) Tension in the string.

Take the coefficient of friction between the plane and body as 0.25

(OR)

11. A weight of 5 N is suspended by a light rope wound round a pulley of weight 50 N and radius 30 cm, the other end of the rope being fixed to the periphery of the pulley. If the weight is moving downwards, determine: (i) Acceleration of the weight 5 N.(ii) Tension in the string. Take g = 9.81 m/s^2.. **12**

***