AR18

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech II Semester Supplementary Examinations, November-2021
ENGINEERING MECHANICS
(Civil Engineering)

Time: 3 Hours   Max Marks: 60

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) Two forces equal to 2F and F act on a particle. If the first is doubled and the second is increased by 15 N, the direction of resultant remains unaltered. Find the value of F. 6 M

   b) In a concurrent force system, two forces are acting on a point at an angle of 60^0. The resultant force is 120 kN and one of the forces is 80 kN. Determine the unknown force. 6 M
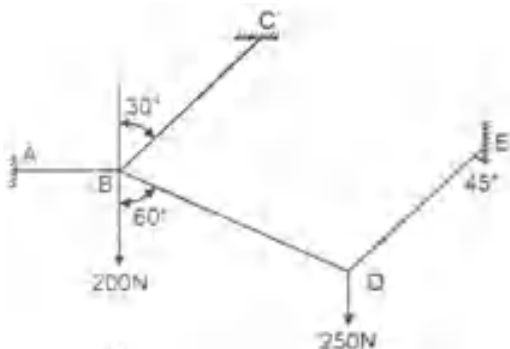
(OR)

2. a) State the parallelogram law 4 M

   b) The following forces are act at a point
      - 20N inclined at 30^0 towards north of east,
      - 25N towards north,
      - 30N towards north west, and
      - 35N inclined at 40^0 towards south of west.

      Find the magnitude and direction of the resultant force.

8 M
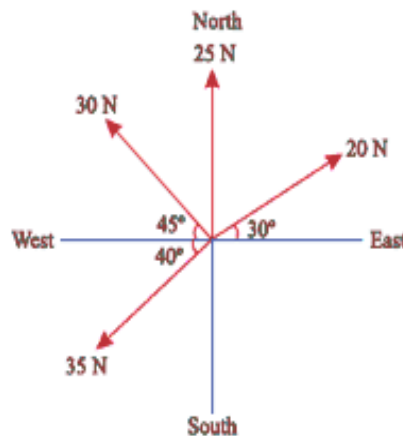
UNIT-II

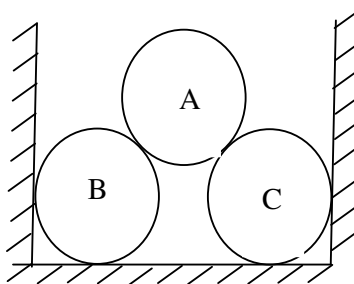3. a) What do you mean by 'Free Body Diagram'? Explain with an Example.   4 M

   b) A System of connected flexible cables as shown in below diagram is supporting two vertical forces 200 N and 250 N at points B and D. Determine the forces in various segments of the cable.   8 M

(OR)

4. a) What are the conditions to be satisfied for the equilibrium of rigid bodies in 2 dimensions   4 M

   b) Three spheres each with 2 kg mass and each 350 mm in diameter rests in a box 760 mm wide as shown in Fig. Find (i) reaction of B on A (ii) reaction of the wall on C (iii) reaction of the floor on B.   8 M


UNIT-III

5. a) What do you mean by coefficient of friction and cone of friction.   4 M

b) Find the force required to move a load of 300 N up a rough plane, the force being applied parallel to the plane. The inclination of the plane is such that when the same load is kept on a perfectly smooth plane inclined at the same angle, a force of 60 N applied at an inclination of 30^0 to the plane, keeps the same load in equilibrium. Assume coefficient of friction between rough plane and the load to be equal to 0.3. 8 M
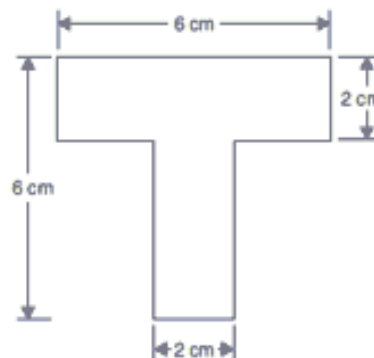
(OR)

6. a) Draw examples for Perfect, Deficient & redundant trusses 4 M
   b) Determine the forces in all the members of the truss shown in Fig.
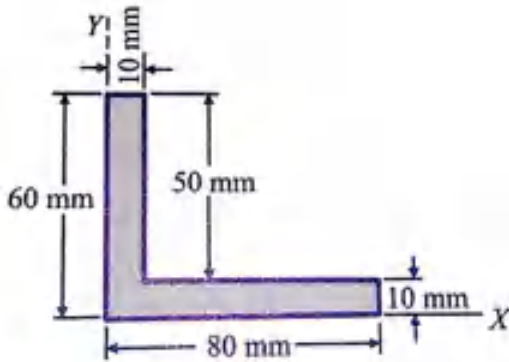

8 M
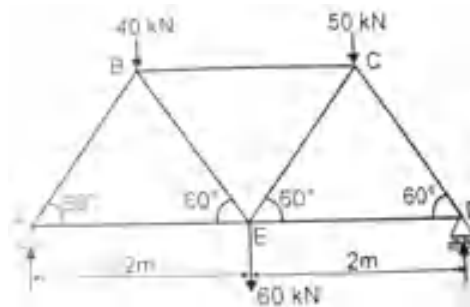
UNIT-IV

7. a) What is the difference between centre of mass and centre of gravity. 4 M
   b) Find the moment of inertia about the centriodal axes XX and YY of the section Shown in figure.

8 M

(OR)

8. a) Define the following (i) Area moment of inertia and (ii) Mass moment of inertia 4 M

b) Find area moment of inertia of L section shown in Fig. about X axis.

8 M

UNIT-V

9. a) The angular displacement of a rotating can is defined by the relation $\theta=t^3 -3t^2+6$ where θ is in radians, determine the angular displacement, angular velocity and angular acceleration of the can when t=3 sec.

6 M

b) The acceleration of a particle is defined by the relation a = 12x - 24, where 'a' and 'x' are expressed in m/s^2 and meters, respectively. When x = 0, v= 6 m/s, determine the velocity when the particle has travelled a total distance of 3 m.

6 M

(OR)

10. a) Explain the concept of D'Alemberts principle?

4 M

b) To blocks of mass 60 kg and 15 kg are connected by a string and move along a rough horizontal surface when force of 300 N is applied to the block of 60 kg msass as shown Figure Aplly D'Alembert's priciple to determine the acceleration of the blocks and tension in the string. Assume tht coefficient of friction between the sliding surface of the blocks and the plane is 0.25.

8 M
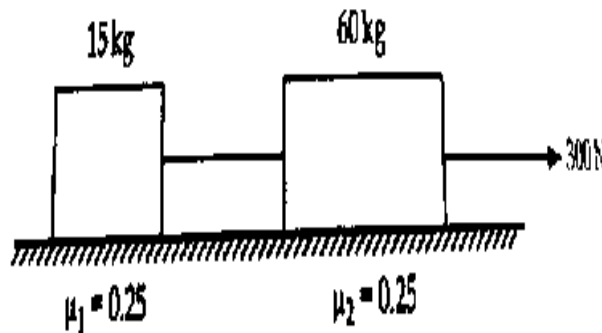
AR18

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech II Semester Supplementary Examinations, November-2021
ELECTRIC CIRCUIT THEORY
(Electrical and Electronics Engineering)

Time: 3 Hours   Max Marks: 60

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 current flowing through 4Ω resistor shown in network Fig.1 using source transformation technique.   4 M
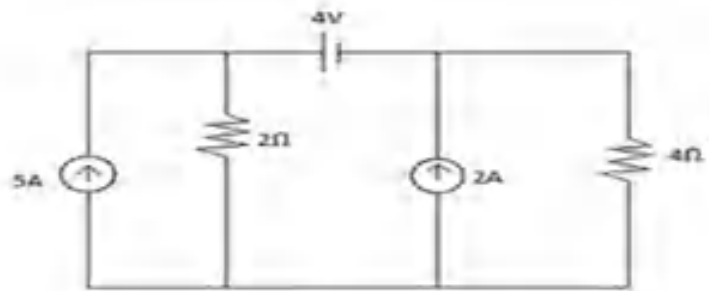

Fig.1

   b) Use mesh analysis to solve i_1, i_2 and i_3 in the given circuit.   8 M

(OR)

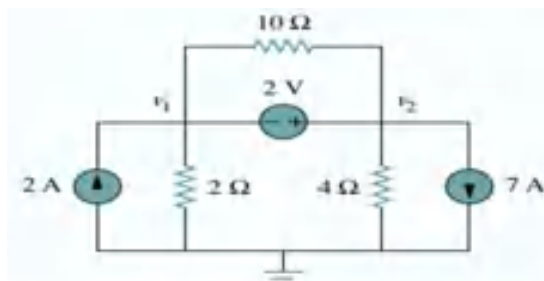2.   For the circuit shown in Fig.3, solve for the node voltages.   12 M


Fig.3

1 of 3

UNIT-II

3. a) Show that the locus of current of a series circuit consisting of resistance and inductance with resistance varied and inductance reactance fixed, when supplied by a constant AC Voltage source, lies on circular path. **8 M**

   b) An RLC Series circuit consists of R=1kΩ, L=100mH, C=10μF. If a voltage of 100V is applied across the combination, determine resonant frequency, quality factor and bandwidth. **4 M**

<div align="center">(OR)</div>

4. Show that in a series RLC circuit, $f_0 = \sqrt{(f_1 f_2)}$ where f_0 is the resonant frequency and f_1, f_2 are half power frequencies. **12 M**

UNIT-III

5. a) Illustrate Thevinin's equivalent circuit at terminals at 1-2 **4 M**
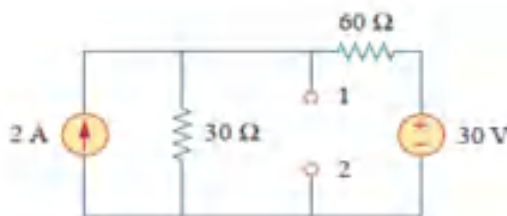
   b) Illustrate the Norton equivalent circuit at terminals a –b. **8 M**
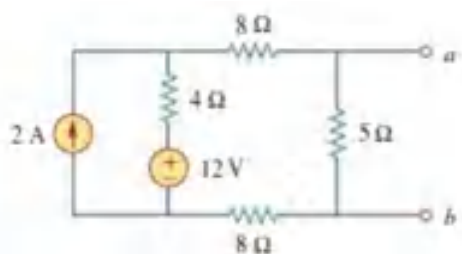
<div align="center">(OR)</div>

6. State and explain Superposition theorem with examples. **12M**

UNIT-IV

7. Determine the value of R_L for maximum power transfer in the circuit shown below and Find the maximum power **12 M**

(OR)

8. State and explain the following theorems for DC excitations with examples.

    (i)Tellegen's theorem (ii)Compensation Theorem
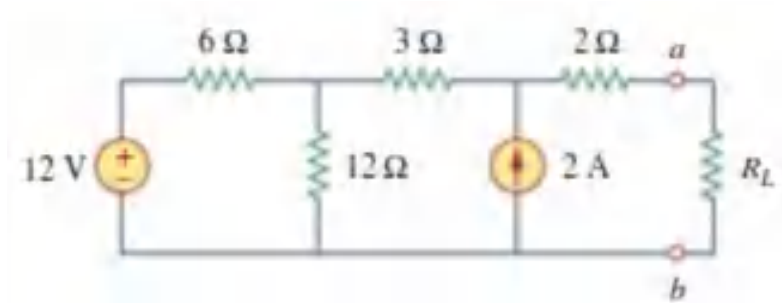
12 M

UNIT-V

9. a) The input power to a 3-phase a.c. motor is measured as 5kW. If the voltage and current to the motor are 400V and 8.6A respectively, determine the power factor of the system?

    4 M

    b) Two wattmeters are connected to measure the input power to a balanced 3-phase load by the two wattmeter method. If the instrument readings are 8kW and 4kW, determine (a) the total power input and (b) the load power factor.

    8 M

(OR)

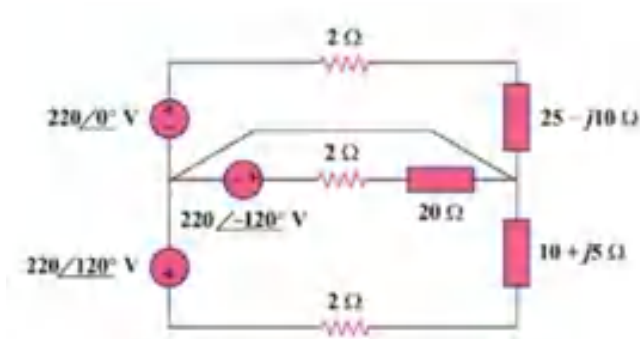10. For the circuit in Fig. 8, determine the current in the neutral line

12 M

Fig.8

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CODE: 18EST105   **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech II Semester Supplementary Examinations, November-2021
BASIC ELECTRONICS
(Mechanical Engineering)

Time: 3 Hours   **Max Marks: 60**

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) Explain the formation of depletion region in a PN junction in no bias condition (6M)
   b) Explain how diode acts as a switch and draw the V-I characteristics of a diode (6M)

(OR)

2. a) Explain the operation of the Full wave rectifier with necessary diagrams (6M)
   b) Explain the construction and working of Zener diode. (6M)

UNIT-II

3. a) Explain about input and output characteristics of a transistor when it is connected in common emitter configuration. (6M)
   b) Explain the construction and amplifying action of Transistor. (6M)

(OR)

4. a) Explain drain-source characteristics and transfer characteristics of JFET. (6M)
   b) What are the differences between N channel and P channel FET (6M)

UNIT-III

5. a) Explain about distortion and draw the AC equivalent circuit of transistor amplifier (6M)
   b) Define h-parameters along with its units. (6M)

(OR)

6. Explain about simplified common emitter hybrid model and derive the expressions for current gain, input impedance, voltage gain and output impedance. (12M)

UNIT-IV

7. a) With a neat block diagram explain the operation of voltage series feedback amplifier (6M)
   b) What is negative feedback amplifier Explain about various topologies (6M)

(OR)

8. a) Explain colipits oscillator using transistor with circuit diagram (6M)
   b) Explain the operation of wein bridge oscillator using circuit diagram (6M)

UNIT-V

9. a) Explain about Non- inverting configuration of a operational amplifier (6M)
   b) List out ideal characteristics of an op-amp. (6M)

(OR)

10. a) Explain about inverting configuration of a operational amplifier (6M)
    b) What are the applications of OP-AMP (6M)

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ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech II Semester Supplementary Examinations, November-2021
ELECTRONIC CIRCUITS
(Electronics and Communication Engineering)

Time: 3 Hours   Max Marks: 60

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)	Draw the circuit diagram of a half wave rectifier and explain its working. Draw its input and output waveforms?	6M
	b)	Prove that the ripple factor of half wave rectifier is 0.46?	6M

(OR)

2.	a)	Prove that DC output of full wave rectifier is twice that of a half wave rectifier?	6M
	b)	Compare the parameters of full wave and half wave rectifiers?	6M

UNIT-II

3.	a)	Draw the circuit diagram of full wave rectifier π section filter and explain its working?	6M
	b)	Explain how ripple voltages are minimised in full wave rectifier with induction filter?	6M

(OR)

4.	a)	Explain regulation characteristics of a zener diode?	6M
	b)	With neat sketch explain the working of a transistor shunt regulator?	6M

UNIT-III

5.	a)	Explain the effect of changing the operating point on load line?	6M
	b)	Explain how thermal stability is provided in a fixed bias circuit?	6M

(OR)

6.	a)	Explain the DC analysis of self bias circuit.	6M
	b)	Explain how thermal stability is provided using thermistor and sensistor devices?	6M

UNIT-IV

7.	a)	Explain how h parameters are measured in a CE configuration?	6M
	b)	Explain CB h parameters in terms of CE h parameters?	6M

(OR)

8.		Draw the low frequency h parameter model of a CE amplifier and derive the expressions for Av, Ai, Zi and Zo of CE amplifier?	12M

UNIT-V

9.	a)	Discuss about the transfer gain expression in a positive and negative feedback configuration?	6M
	b)	Explain the effect of input and output resistance in a voltage shunt positive feedback configuration?	6M

(OR)

10.	a)	Draw the block diagram of a CS feedback configuration and derive expression for transfer gain?	6M
	b)	Explain the effect of negative feedback on bandwidth of an amplifier?	6M

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ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech I / I B.Tech II Semester Supplementary Examinations, November-2021
ENGINEERING MECHANICS
(Common to All Branches)

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

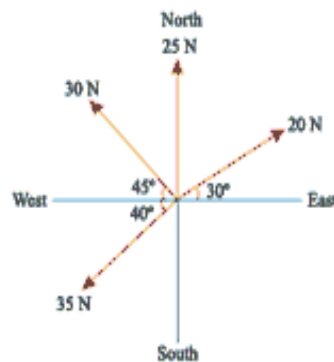Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1.   The following forces are act at a point   14 M
     • 20N inclined at 30^0 towards north of east,
     • 25N towards north,
     • 30N towards north west, and
     • 35N inclined at 40^0 towards south of west.
     Find the magnitude and direction of the resultant force.


(OR)

2.   The forces 20 N, 30 N, 40 N, 50 N and 60 N are acting at one of the angular points   14 M
     of a regular hexagon, towards the other five angular points, taken in order. Find the
   magnitude and direction of the resultant force.

UNIT-II

3.   A bar 2 m long and of negligible weight rests in horizontal position two smooth   14 M
     inclined planes as shown figure. Determine the distance x at which the load Q=
     100 N should be placed point B to kept the bar horizontal.
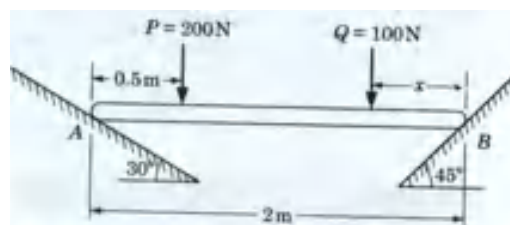
(OR)

4. A string ABCD, attached to fixed points A and D has two equal weights of 1000 N   14 M
   attached to it at B and C. The weights rest with the portions AB and CD inclined at
   angles as shown in Figure. Find the tensions in the portions AB, BC and CD of the
   string, if the inclination of the portion BC with the vertical is 120°.
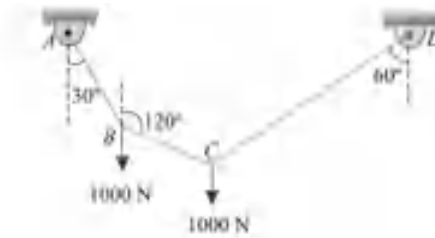
UNIT-III

5. A body, resting on a rough horizontal plane, required a pull of 180 N inclined at   14 M
   30^0 to the plane just to move it. It was found that a push of 220 N inclined at 30^0 to
   the plane just moved the body. Determine the weight of the body and the
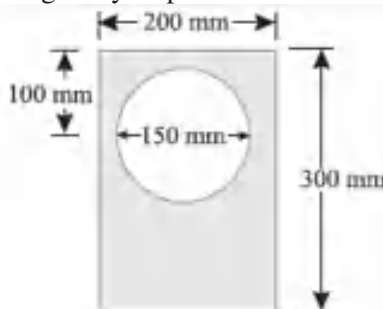   coefficient of friction.

(OR)

6. Find the moment of inertia about the centriodal axes XX and YY of the section   14 M
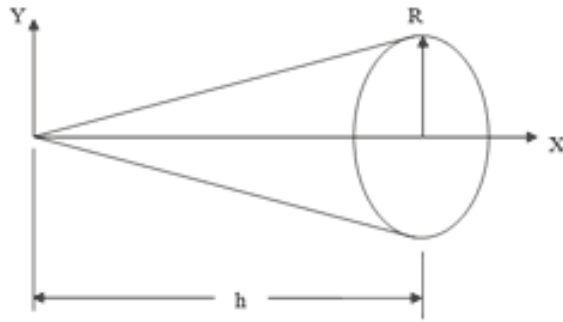   Shown in figure.
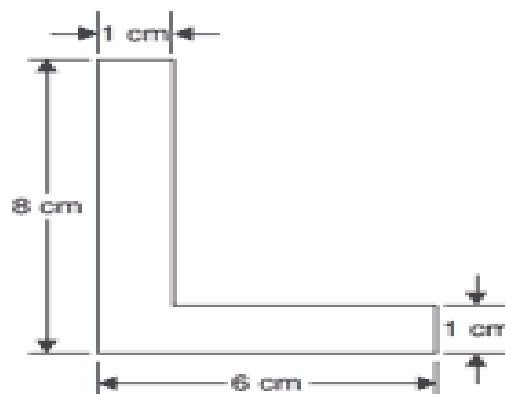
UNIT-IV

7. Find the moment of inertia of a hollow section shown in Figure about an axis   14 M
   passing through its centre of gravity or parallel X-X axis.

(OR)

8.   Find the mass moment of inertia of the solid cone of height h and base radius R   14 M
       about its axis of rotation

UNIT-V

9.   A particle is thrown with a velocity of 5 m/s at an elevation of 60° to the   14 M
       horizontal. Find the velocity of another particle thrown at an elevation of 45°
       which will have (a) equal horizontal range, (b) equal maximum height, and
       (c) equal time of flight.

(OR)

10.   The equation of motion of a particle moving in a straight line is given by :   14 M
       $s = 18t + 3t^2 - 2t^3$, where (s) is in metres and (t) in seconds. Find (1) velocity and
       acceleration at start, (2) time, when the particle reaches its maximum velocity,
       and (3) maximum velocity of the particle.

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ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech I / I B.Tech II Semester Supplementary Examinations, November-2021

ENGINEERING MECHANICS
(Common to all Branches)

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

PART-A

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

1. a) What is the principle of transmissibility?
   b) State the parallelogram law of forces
   c) Define the term Free Body diagram
   d) State the Lamis theorem.
   e) Mention the laws of friction
   f) Locate the centroid of a semicircle of radius r.
   g) Define polar Moment of Inertia.
   h) State Pappus theorems I and II
   i) Write the equations of general plane motion in translation
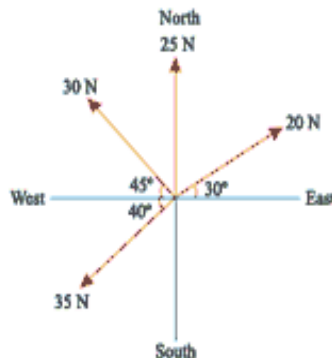   j) State Newton's second law of motion

PART-B

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

UNIT-I

2. The following forces are act at a point   12 M
   - 20N inclined at 30^0 towards north of east,
   - 25N towards north,
   - 30N towards north west, and
   - 35N inclined at 40^0 towards south of west.

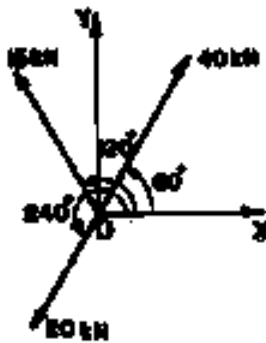   Find the magnitude and direction of the resultant force.


(OR)

3. Three forces of magnitude 40kN, 15kN and 20kN are acting at a point O as shown   12 M
   in figure. The angles made by 40kN, 15kN and 20kN forces with X-axis are 60^0,
   120^0 and 240^0 respectively. Determine the magnitude and direction of the resultant
   force. Show the resultant in the given concurrent force system.
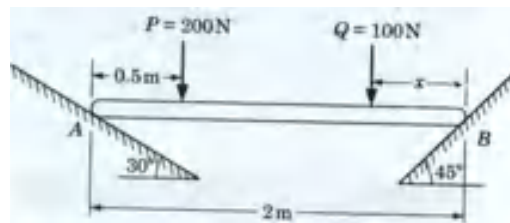
UNIT-II

4. A string ABCD, attached to fixed points A and D has two equal weights of 1000 N attached to it at B and C. The weights rest with the portions AB and CD inclined at angles as shown in Figure. Find the tensions in the portions AB, BC and CD of the string, if the inclination of the portion BC with the vertical is 120°.   **12 M**
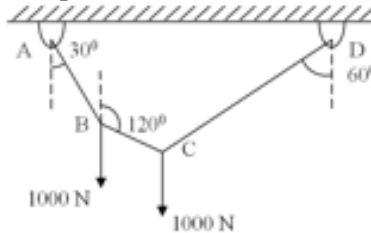
(OR)

5. A bar 2 m long and of negligible weight rests in horizontal position two smooth inclined planes as shown figure. Determine the distance x at which the load Q= 100 N should be placed point B to kept the bar horizontal.   **12 M**


UNIT-III

6. An effort of 200 N is required just to move a certain body up an inclined plane of angle 15° the force acting parallel to the plane. If the angle of inclination of the plane is made 20° the effort required, again applied parallel to the plane, is found to be 230 N. Find the weight of the body and the coefficient of friction.   **12 M**

(OR)

7. Find the moment of inertia about the centriodal axes XX and YY of the section Shown in figure.   **12 M**
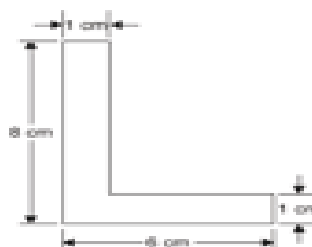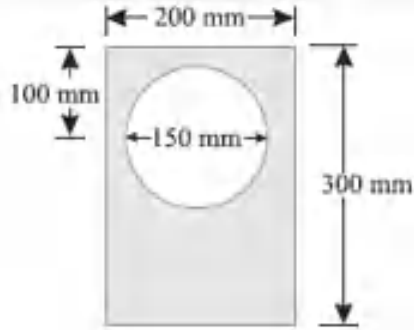
UNIT-IV

8.   Determine the Moment of Inertia of a rectangular lamina about X-X and Y-Y axes   12 M
passing through its centroid.

(OR)

9.   Find the moment of inertia of a hollow section shown in Figure about an axis   12 M
passing through its centre of gravity or parallel X-X axis.

UNIT-V

10. a)   Distinguish between rectilinear motion and curvilinear motion giving at least two   4 M
examples.

    b)   The motion of a particle is given by $a = t^3 - 3t^2 + 5$, where (a) is the acceleration   8 M
in m/s^2 and (t) is the time in seconds. The velocity of the particle at t = 1 second is
6.25 m/sec and the displacement is 8.8 metres. Calculate the displacement and
velocity at t = 2 seconds.

(OR)

11.   A block of wood A of mass 10 kg is held on a rough horizontal table. An elastic   12 M
string connected to the block passes over a smooth pulley at the end of the table
and then under a second smooth pulley carrying a body B of mass 5 kg as shown
in figure. The other end of the string is fixed to a point above the second pulley.
When the 10 kg block is released, it moves with an acceleration of g/9. Determine
the value of coefficient of friction between the block and the table.