AR18

CODE: 18EST103 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech II Semester Supplementary Examinations, February-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) What are the methods used for finding resultant of two concurrent forces? 3M

b) An electric light fixture of weight Q = 178 N is supported as shown in Figure.1. Determine the tensile forces S_1 and S_2 in the wire's BA and BC if their angles of inclination are as shown. 9M

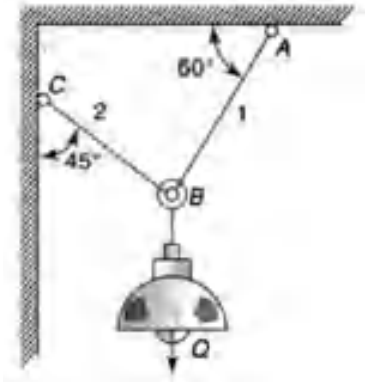

Figure.1

(OR)

2. Determine the resultant, both in magnitude and direction, of the four forces acting on the body as shown figure-2. 12M

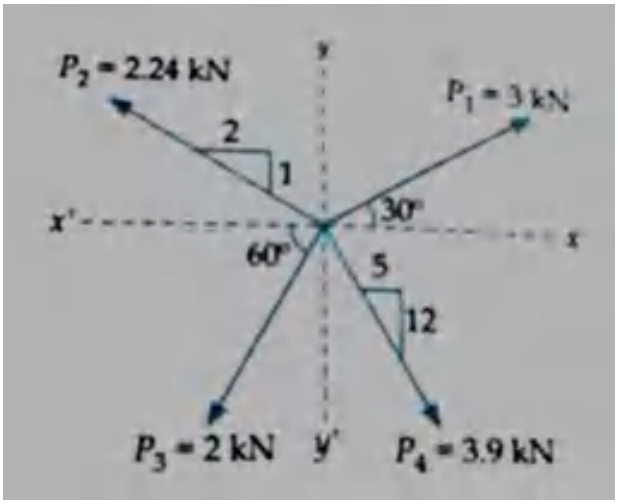

Figure.2

UNIT-II

3. Two identical rollers, each of weight W=1000 N, are supported by an inclined plane and a vertical wall as shown figure-3. Find the reactions at the point of supports A, B and C. Assume all the surfaces to be smooth 12M

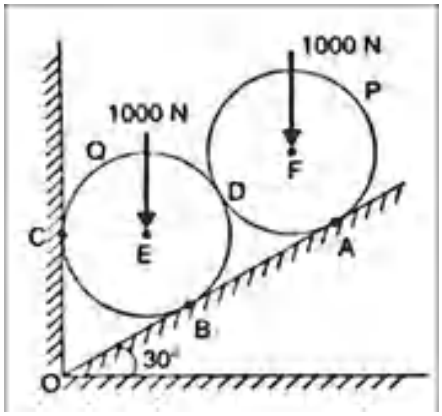

Figure.3

(OR)

4. a) Explain the concept of clockwise moments and anticlockwise moments. 3M

   b) A weightless bar *AB* is supported in a vertical plane by a hinge at *A* and a tie bar *DC* as shown in Figure.4. Determine the axial force *S* induced in the tie bar by the action of a vertical load *P* applied at *B*. 9M

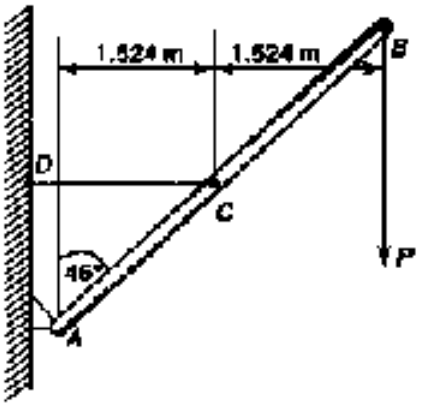

Figure.4

UNIT-III

5. a) State laws of coulomb friction? 3M

b) Referring to Figure.5, the coefficients of friction are as follows: 0.25 at the floor, 0.30 at the wall, and 0.20 between blocks. Find the minimum value of a horizontal force *P* applied to the lower block that will hold the system in equilibrium. 9M

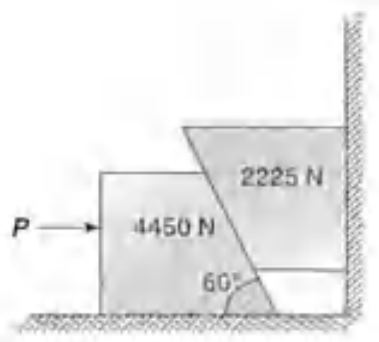

Figure.5

(OR)

6. a) Explain the concept of perfect truss. 3M

b) Determine the axial force in each bar of the plane truss loaded as shown in Figure.6. 9M

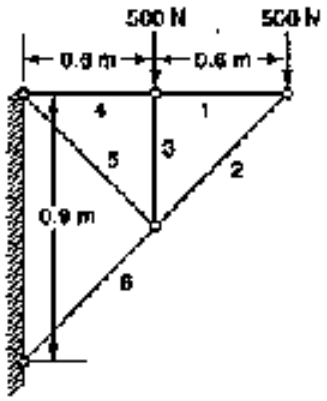

Figure.6

UNIT-IV

7. a) Determine the centroid of the right-angled triangle of base '*b*' and height '*h*' by integration method. 6M

b) With respect to coordinate axes *x* and *y*, locate the centroid of the shaded area shown in Figure.7. 6M

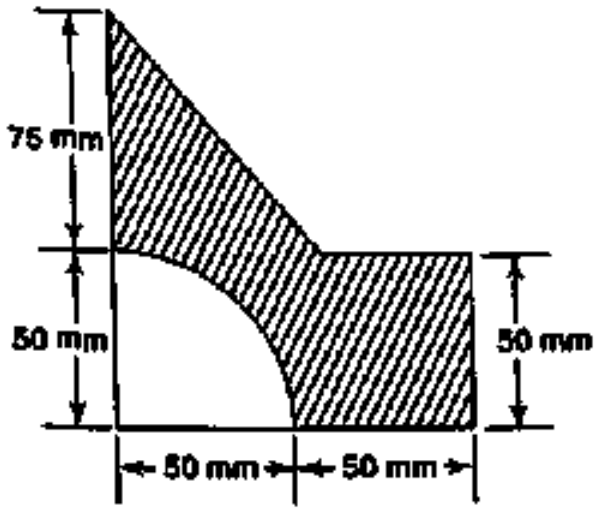

Figure.7

(OR)

8. a) State parallel axis theorem with a neat sketch? 3M

b) Calculate the moment of inertia of the shaded area in Figure.8 with respect to a centroidal axis parallel to the *x*-axis. 9M

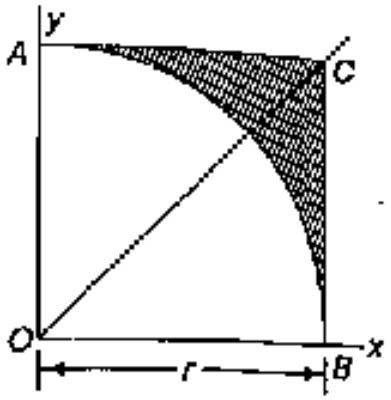

Figure.8

UNIT-V

9. a) The driver of an automobile travelling along a straight level highway, suddenly applies the brakes so that the car slides for 2 s, covering a distance 9.66 m, before coming to a stop. Assuming that during this time the car moved with constant deceleration; find the coefficient of friction between the tyres and pavement. 6M

b) A ship being launched slips down the skids with uniform acceleration. If 10 s is required to traverse the first 4.8 m, what time will be required to slide the total distance of 120 m? With what velocity *v* will the ship strike the water? 6M

(OR)

10. a) Explain D`Alemberts principle with an example. 3M

b) Two blocks of weights800 N and 200 N are connected by a string and move along a rough horizontal surface when force of 400 N is applied to the block of 800 N weight as shown figure-9. Apply 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 0.3. 9M

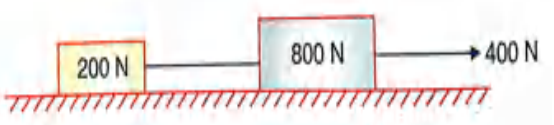

Figure.9

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AR18

CODE: 18EST102 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech II Semester Supplementary Examinations, February-2021

PROGRAMMING FOR PROBLEM SOLVING

(Common to EEE, ME Branches)

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 bitwise operators with examples.	6M
	b)	Draw the primary symbols of flow chart and give their brief description.	6M
		(OR)	
2.	a)	Explain the Programming Development Steps.	6M
	b)	Give the algorithm and its flowchart to calculate factorial of a number.	6M

UNIT-II

3.	a)	Differentiate between while and do while structures.	6M
	b)	Write a program to generate first 100 prime numbers.	6M
		(OR)	
4.	a)	Explain the nested if structure.	6M
	b)	Write a program to evaluate the series ½ + 2/3 + ….. + n/(n+1).	6M

UNIT-III

5.	a)	Write a program to accept a string and check it is palindrome or not.	6M
	b)	Give the advantages and disadvantages of recursion.	6M
		(OR)	
6.	a)	Write a function to find the sum of first n natural numbers.	7M
	b)	Differentiate between getchar(), getch() and getche() functions.	5M

UNIT-IV

7.	a)	Write a program to find largest element in an array.	6M
	b)	What is dynamic memory allocation? What are the functions used for it? Explain.	6M
		(OR)	
8.	a)	Write a C program to access elements in an array.	6M
	b)	Explain the concept of pointers to pointers with an example.	6M

UNIT-V

9.	a)	Differentiate between structure and union.	6M
	b)	Write a C program to count no of lines, words and characters in a file.	6M
		(OR)	
10.	a)	List and explain all file opening modes.	6M
	b)	Write a program in C to store and display the information of 10 students using structure.	6M

AR18

CODE: 18ECT102 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech II Semester Supplementary Examinations, February-2021

NETWORK THEORY

(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) Compute the Thevenin's equivalent circuit between a and b for the circuit shown in Fig-1 [6M]

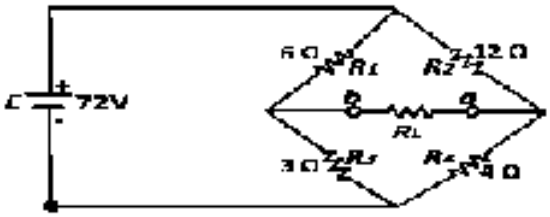


Fig-1

b) Define Super position Theorem and compute the value of 'i' by using Super position theorem for the circuit shown in Fig-2. [6M]

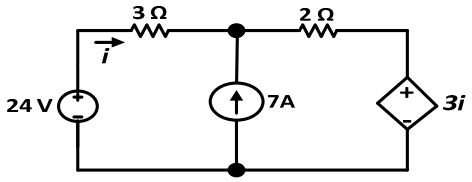


Fig-2

(OR)

2. a) Compute the Norton's Equivalent Resistance between a-b for the circuit shown in Fig-3 [4M]

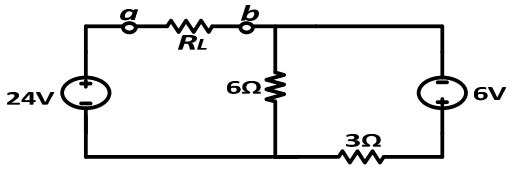
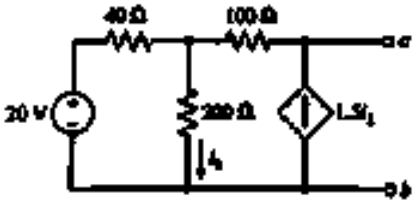


Fig-3

b) Find the Thevenin equivalent of the network shown in figure. What power would be delivered to a load of 100 ohms at *a* and *b*? [8M]



UNIT-II

3. a) Compute the value of Load resistance across a-b such that the Maximum power is transferred to it also find the Maximum power. [9M]

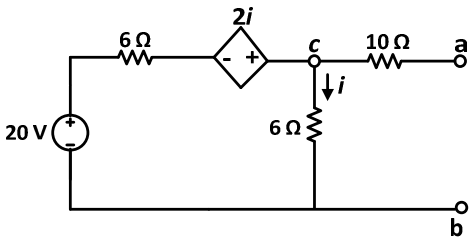


Fig-4

b) State and explain Millman's theorem [3M]

(OR)

4. a) Derive the condition for maximum power transfer with DC excitation and Compute the value of R_L such that the power transferred to R_L is maximum for the circuit shown in Fig-5. [6M]

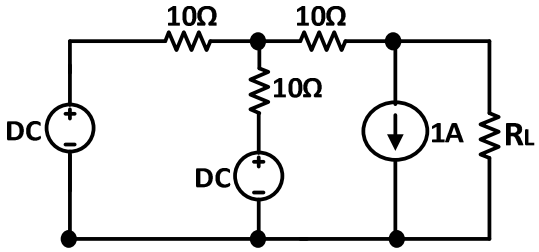


Fig-5

b) Verify the Tellegen's Theorem for the following circuit shown in Fig-6. [6M]

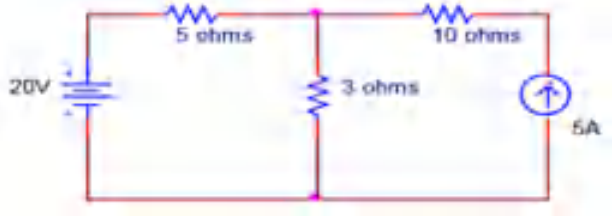


Fig-6

UNIT-III

5. a) Determine the Z-parameters of the network shown in Fig-7. [6M]

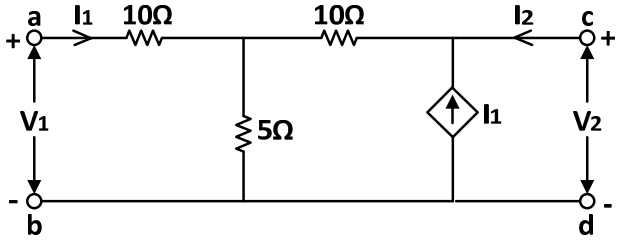


fig-7

b) Obtain the transmission parameters of the network shown in Fig-8. [6M]

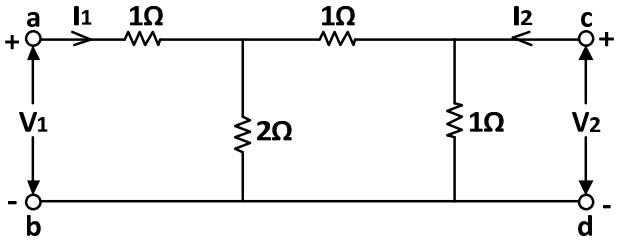


fig-8

(OR)

6. a) Find the Y-parameters for the network shown in Fig-9. [6M]

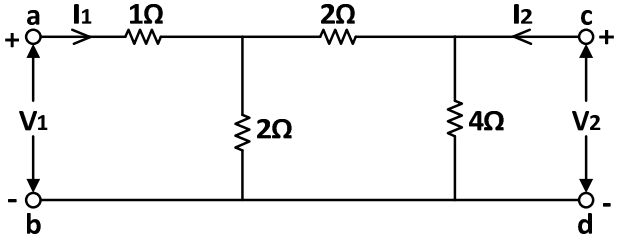


Fig-9

b) Derive h- parameters in terms of transmission line parameters. [6M]

UNIT-IV

7. a) Compute the value of 'L' for which the circuit shown in fig-10. is resonant at a frequency of $\omega_o = 100$ rad/sec. [6M]

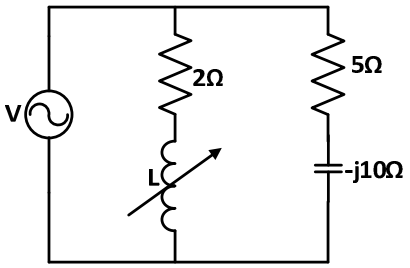


fig-10

b) A series RLC circuit has an impedance of 40Ω at a frequency of 200 rad/s. When the circuit is made to resonate by connecting a 10 V source of variable frequency the current at resonance is 0.5 A, and the quality factor at resonance is 10. Determine the circuit parameters [6M]

(OR)

8. a) A series connected RLC circuit is resonating at 1000 Hz, the indictor is 0.02 H with a quality factor of 200. Compute the R and C values in the circuit. Also compute the band width and half power frequencies. [6M]

b) Derive the expressions for quality factor and bandwidth in a series RLC resonant circuit. [6M]

UNIT-V

9. a) Obtain the expression for current i(t) for t>0 in a driven series R-L circuit and also find the voltage across the resistor and voltage across inductor for the circuit shown in Fig-11 and draw the response curves. [6M]

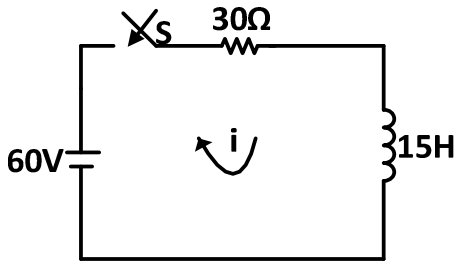


fig-11

b) Derive an expression for current when t>0 for a DC circuit with R and L series with V as supply voltage. At t = 0 the switch is closed [6M]

(OR)

10. a) A series RC circuit consists of resistor of 10 Ω and capacitor of 0.1F as shown in fig. A constant voltage of 20V is applied to the circuit at t=0. Obtain the current equation. Determine the voltage across resistor and capacitor for the circuit shown in Fig-13. [5M]

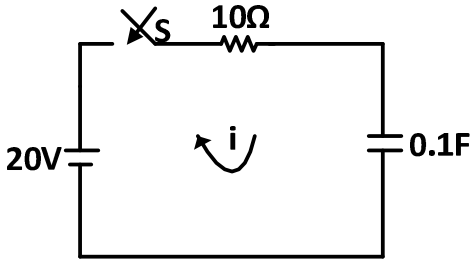


fig-12

b) Derive an equation for current "i" flowing through the 4H inductor in figure below when the switch closed at t=0. Assume that the switch has been in open position for some time for the circuit shown in Fig-14. [7M]

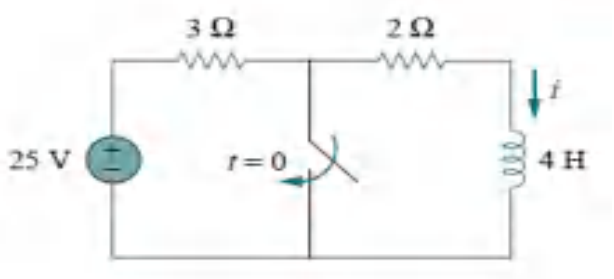


fig-13

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AR16

CODE: 16ME1001 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech II Semester Supplementary Examinations, February-2021

ENGINEERING DRAWING

(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. Draw an ellipse by using concentric circles method by taking major axis as 100 mm and minor axis as 60 mm.

(OR)

2. The actual length of 500 m is represented by a line of 15 cm on a drawing. Construct a Vernier scale to read up to 600 m. Mark on the scale a length of 549 m.

UNIT-II

3. A 90 mm long line is parallel to and 25 mm in front of the V.P. Its one end is in the H.P. While the other is 50 mm above the H.P. Draw its projections and find its inclination with the H.P.

(OR)

4. A point P is 15 mm above the H.P. and 20 mm in front of the V.P. Another point Q is 25 mm behind the VP and 40 mm below the H.P. Draw the projections of P and Q keeping the distance between their projectors equal to 90 mm. Draw straight lines joining (1) their top views and (2) their front views.

UNIT-III

5. Draw the projections of a regular hexagon of 25 mm side, having one of its sides in the H.P. and inclined at 60° to the V.P., and its surface making an angle of 45° with the H.P.

(OR)

6. Draw a regular hexagon of 40 mm side, with its two sides vertical. Draw a circle of 40 mm diameter in its centre. The figure represents a hexagonal plate with a hole in it and having its surface parallel to the V.P. Draw its projections when the surface is vertical and inclined at 30^0 to the V. P. Assume the thickness of the plate to be equal to that of a line.

UNIT-IV

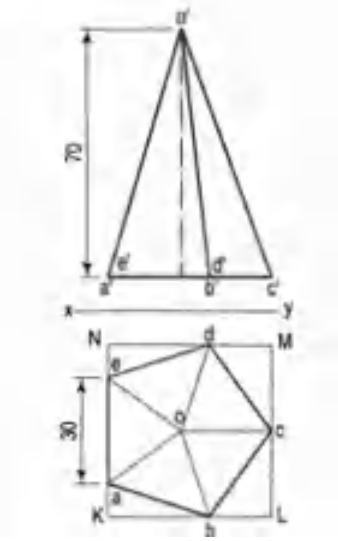
7. Draw the projections of a cone, base 75 mm diameter and axis 100 mm long, lying on the H.P. on one of its generators with the axis parallel to the V.P.

(OR)

8. A hexagonal prism, base 30 mm side and axis 75 mm long, has an edge of the base parallel to the H.P. and inclined at 45^0 to the V.P. Its axis makes an angle of 60^0 with the H. P. Draw its projections.

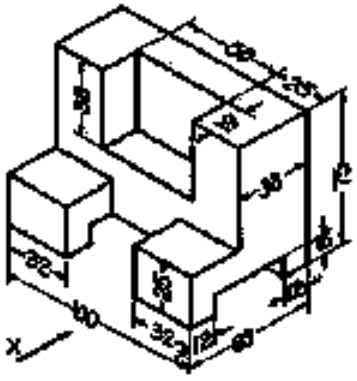
UNIT-V

9. The projection of pentagonal pyramid is shown in the below figure. Draw its isometric view.



(OR)

10. Draw the front view, top view and left hand side view of the block shown in the below figure.



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AR16

CODE: 16ME1002 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech II Semester Supplementary Examinations, February-2021

ENGINEERING MECHANICS

(For 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

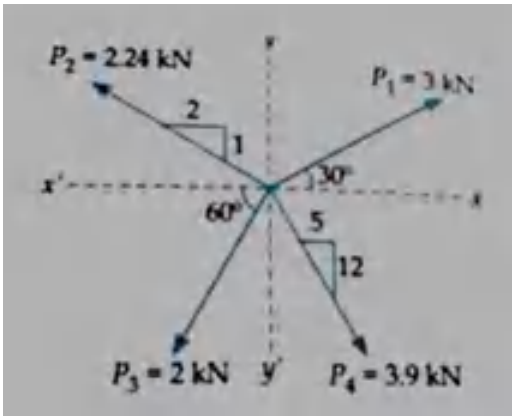
UNIT-I

1. a) Two forces of 100 N and 150 N are acting simultaneously at a point. What is the resultant of these two forces if the angle between them is 45^0? [4 M]

   b) The following forces act at a point. [10 M]
   (i) 20 N inclined at 30^0 towards North of East.
   (ii) 25 N towards North.
   (iii) 30 N towards North West.
   (iv) 35 N inclined at 40^0 towards South of West.
   Find the magnitude and direction of the resultant force.

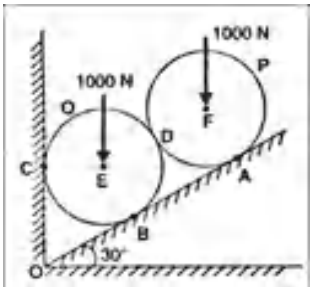
(OR)

2. Determine the resultant, both in magnitude and direction, of the four forces acting on the body as shown figure. [14 M]



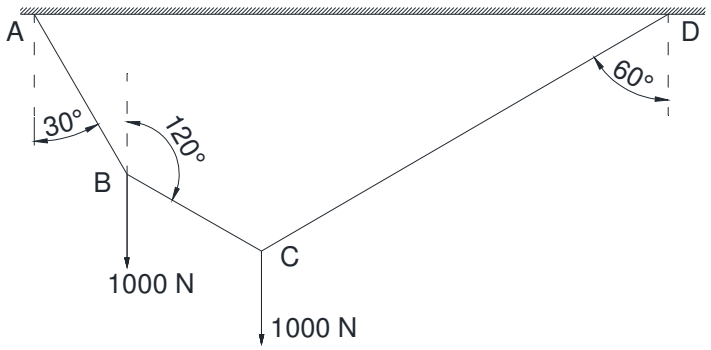
UNIT-II

3. Two identical rollers, each of weight W=1000 N, are supported by an inclined plane and a vertical wall as shown figure. Find the reactions at the point of supports A, B and C. Assume all the surfaces to be smooth. [14 M]



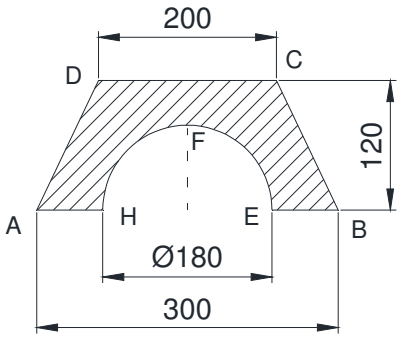
4. a) State the Lami's Theorem [2 M]

b) 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 120^0. [12 M]



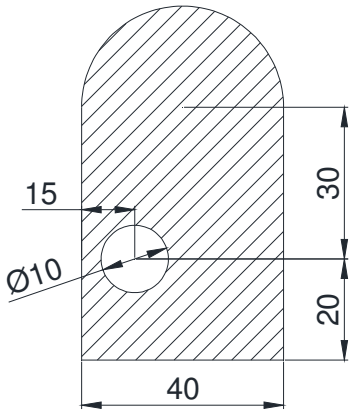
UNIT-III

5. A semicircle of 90 mm radius is cut out of from a trapezium as shown in figure. Find the position of the centroid of the figure. [14 M]



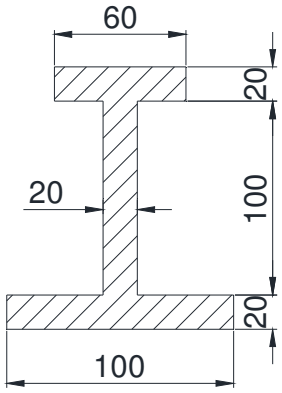
(OR)

6. Locate the centroid of the given composite area shown in figure. All dimensions are in cm. [14 M]



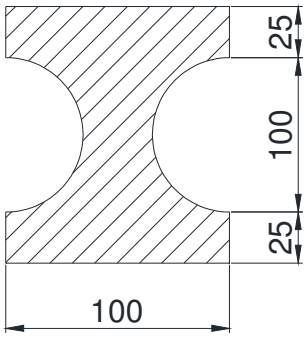
UNIT-IV

7. An I-section is made up of three rectangles as shown in figure. Find the moment of inertia of the section about the horizontal axis passing through the centroid of the section. [14 M]



(OR)

8. Determine the moment of inertia of the section shown in figure about horizontal and vertical axes passing through the centroid of the section. [14 M]



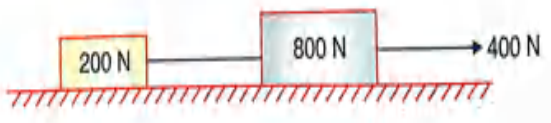
UNIT-V

9. A body of mass 150 kg, rests on a rough plane inclined at 10^0 to the horizontal. It is pulled up the plane, from rest, by means of a light flexible rope running parallel to the plane. The portion of the rope, beyond the pulley hangs vertically down and carries a man of 80 kg at the end. If the coefficient of friction for the plane and the body is 0.2, find [14 M]

(i) the tension in the rope,
(ii) the acceleration in m/s^2, with which the body moves up the plane and
(iii) the distance in metres moved by the body in 4 seconds starting from rest.

(OR)

10. Two blocks of weights800 N and 200 N are connected by a string and move along a rough horizontal surface when force of 400 N is applied to the block of 800 N weight as shown figure. Apply 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 0.3. [14 M]



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AR16

CODE: 16ME1004 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech II Semester Supplementary Examinations, February-2021

ENGINEERING MECHANICS (DYNAMICS)

(Mechanical Engineering)

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

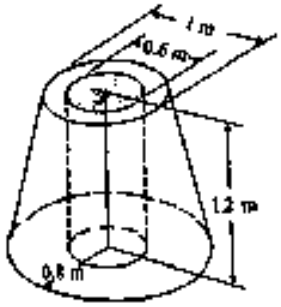
UNIT-I

1 Derive the expression for moment of inertia of solid cylinder of radius 'R', mass M with uniform mass density. 14

(OR)

2. a) Determine mass moment of inertia of circular plate with radius 'R' and thickness 't' about its centroidal axis. 6

b) Determine the C.G of the solid that was formed by removing a cylinder from frustum as shown in below diagram. 8



UNIT-II

3. a) A train starts from rest and increases its speed from zero to v m/s with a constant acceleration of a_1 m/s^2, runs at this speed for some time and finally comes to rest with a constant deceleration a_2 m/s^2. If the total distance travelled is x metres, find the total time t required for this journey. 6

b) Motion of a particle is given by the equation 8

$$x = t^3 - 3t^2 - 9t + 12$$

Determine the time, position and acceleration of the particle when its velocity becomes zero.

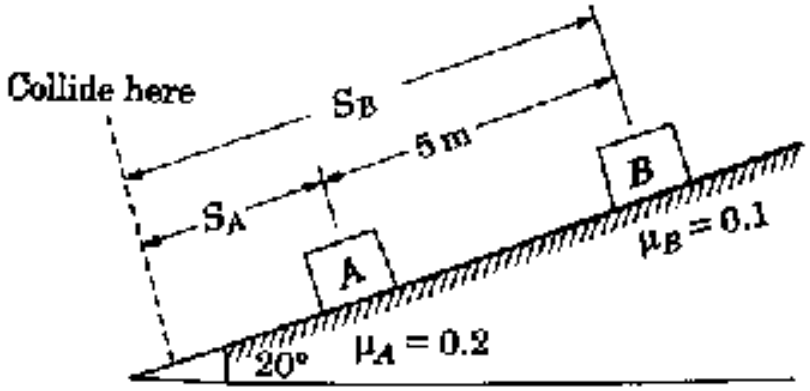
(OR)

4. a) A train starting from rest accelerates uniformly for 3 min, runs at a constant speed for the next 5 min and then comes to rest in 2 min. If it covers a total distance of 9 km, find the retardation in m/s^2. 7

b) A car starts from rest on a curved road of radius 250 m and attains a speed of 18 km/hr at the end of 60 seconds while travelling with a uniform acceleration. Find out the tangential and normal acceleration of the car 30 seconds after it started 7

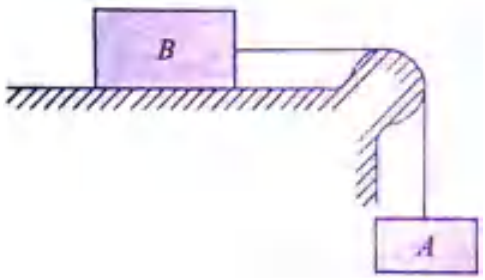
UNIT-III

5. Two blocks A and B are held on an inclined plane 5m apart as shown in Fig. The coefficients of friction between the block A and B and the inclined plane are 0.2 and 0.1 respectively. If the blocks begin to slide down the plane simultaneously calculate the time and distance travelled by the each block before collision. 14



(OR)

6. a) Determine the acceleration of the bodies shown in figure, if the weights of the blocks A & B are 900 N & 1350 N and coefficient of friction between surfaces of contact is 0.2 and when pulley is frictionless. Use D-Alembert's principle. 7

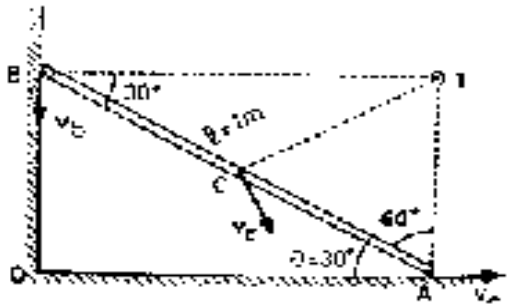


b) A flywheel is made up of steel ring 40 mm thick and 200 mm wide plate with mean diameter of 2 metres. If initially the flywheel is rotating at 300 r.p.m., find the time taken by the wheel in coming to rest due to frictional couple of 100 N-m. Take mass density of the steel as 7900 kg/m^3. Neglect the effect of the spokes. 7

UNIT-IV

7. a) Explain the concept of relative velocity and instantaneous center. 6

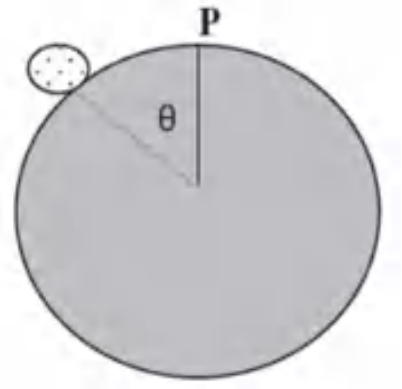
   b) A bar of length 1 m has its ends A and B constrained to move horizontally and vertically as shown in figure – 4. The end A moves with constant velocity of 10 m/s horizontally, find 8
   (a) The angular velocity of the bar AB
   (b) The velocity of the end B and
   (c) The velocity of the mod point C of the bar at the instant when the axis of the bar makes an angle 30^0 with horizontal.



(OR)

8. a) Derive the relationship between linear motion of geometric centre and angular motion of a wheel rolling without slipping. 6

   b) A ball of mass 1 kg is sliding down a horizontal smooth cylinder of radius 1 meter, from top point P. determine the reaction exerted by the cylinder on the ball at the angular position θ=250 as shown in figure. 8



UNIT-V

9. a) Explain and derive an expression for coefficient of restitution 7M

   b) A fly wheel of 550 mm diameter is brought uniformly from rest up to a speed of 350 rpm in 20 s. Find the velocity and acceleration of a point on its rim 3 s after starting from rest. 7M

(OR)

10. a) A ball is dropped from a height h_0 = 1 m on a smooth floor. Knowing that the height of the first bounce is h_1 = 81cm, determine 7M
    (i) Coefficient of restitution, and
    (ii) Expected height h_2 after the second bounce.

    b) The angular displacement of a rotating cam is defined by the relation $\theta=t^3 - 3t^2+6$ where θ is in radians, determine the angular displacement, angular velocity & angular acceleration of the cam when t=3 sec. 7M

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AR13

CODE: 13ME1003 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.TECH II SEM SUPPLEMENTARY EXAMINATIONS, February,2021

ENGINEERING MECHANICS
(CE, CSE&IT)

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

PART-A

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

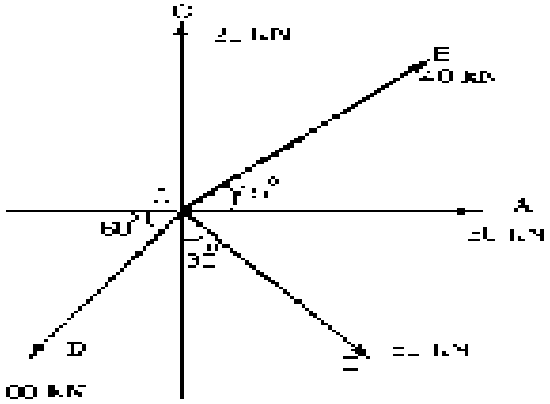
1. a) State parallelogram law of forces.
   b) State triangle law of forces.
   c) State Lami's theorem
   d) Write down the equations of equilibrium.
   e) What is the centroid of a lamina of a quadrant having radius 'R'?
   f) Define the term cone of friction
   g) Define mass moment of inertia
   h) What is the MI of a circle of radius 'R'?
   i) State 'D' Alembert's principle
   j) What is uniform motion?

PART-B

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

UNIT-I

2. A system of four forces acting on a body is as shown in figure. Determine the magnitude and direction of resultant. 12M



(OR)

3. a Explain different system of forces with example. 6M
   b Two forces of magnitude 60N and 80N are acting on a particle such that the angle between the two is 120^0. If both forces acting away from the particle. Calculate their resultant and find its direction 6M

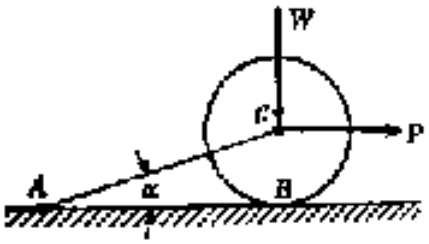
AR13

CODE: 13ME1003 **SET-1**

UNIT-II

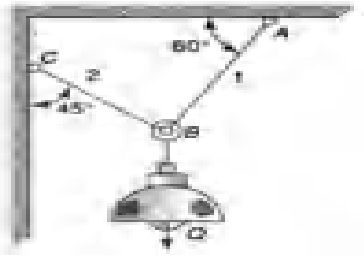
4 a State and prove Varignon's theorem. 4M

b Determine the reaction forces at the supports B of the roller loaded as shown in figure 8M



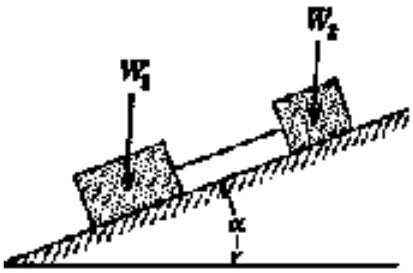
(OR)

5. An electric light fixture of weight **Q = 178 N** is supported as shown in Figure. Determine the tensile forces S_1 and S_2 in the wires **BA** and **BC** if their angles of inclination are as shown. 12M



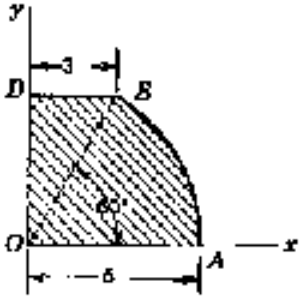
UNIT-III

6. Two blocks of weight W 1 and W 2 rests on rough inclined plane and connect by string as shown in figure. If the coefficient of friction are μ 1 = 0.2 and μ 2 = 0.3 respectively. Find the angle of inclination of the plane for which sliding will impend. 12M



(OR)

7. Determine the coordinates of cetroid C of the shaded area OABD as shown in Figure. 12M

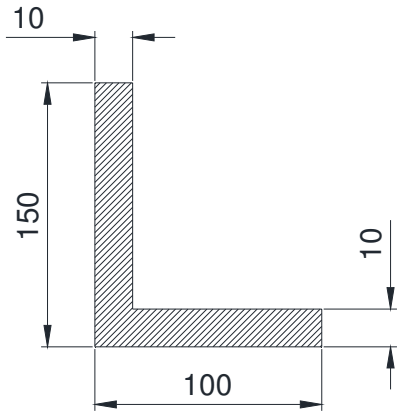


AR13

CODE: 13ME1003 **SET-1**

UNIT-IV

8 Calculate the Moment of Inertia of angle section about X – axis. 12M



(OR)

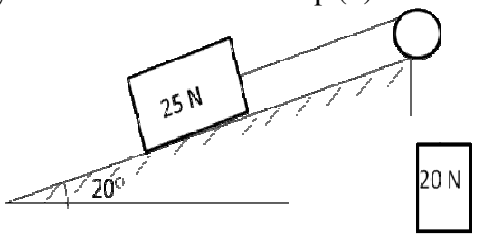
9 Determine the mass moment of inertia of a Triangular plate of base 'b' , height 'h' and thickness 't'. 12M

UNIT-V

10. A particle moves along a straight line and its motion is represented by the equation $s = 16t + 4t^2 - t^3$ where, 's' is in metres and 't' in seconds. 12M
Determine (a) displacement, velocity and acceleration 2 seconds after start
(b) displacement and acceleration when velocity is zero
(c) displacement and velocity when acceleration is zero

(OR)

11. Two bodies weighing 25N 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^o inclined plane while the weight 20 N is hanging over the pulley. Determine (i) Acceleration of the system when 25 N moves up (ii) Tension in the string. 12M



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AR13

CODE: 13ME1001 **SET-2**

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

ENGINEERING DRAWING
(Common to EEE & ECE branches)

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

PART-A

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

1.	a)	What is meant by scale factor?	**1 M**
	b)	What is a regular polygon?	**1 M**
	c)	Why second and fourth angles of projections are not followed in practice.	**1 M**
	d)	What is meant by trace of a line?	**1 M**
	e)	What is a solid of revolution?	**1 M**
	f)	What is isometric projection?.	**1 M**
	g)	How a cylinder is generated?	**1 M**
	h)	Discuss the advantages of projections of solids.	**1 M**
	i)	What is the difference between isometric projection and isometric drawing?	**1 M**
	j)	How orthographic projections differ from isometric projections?	**1 M**

PART-B

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

UNIT-I

2.	Construct a regular hexagon whose side is 45 mm by inscribed circle method.	**12M**
	(OR)	
3.	Draw an ellipse by using concentric circles method by taking major axis as 100 mm and minor axis as 60 mm.	**12M**

UNIT-II

4.	A point P is 15 mm above the H.P. and 20 mm in front of the V.P. Another point Q is 25 mm behind the VP and 40 mm below the H.P. Draw the projections of P and Q keeping the distance between their projectors equal to 90 mm. Draw straight lines joining (1) their top views and (2) their front views.	**12M**
	(OR)	
5	A line AB, 60 mm long, has its end A in both the H.P and the V.P. It is inclined at 45 degrees to the H.P and 30 degrees to the V.P. Draw the projections of the straight line.	**12M**

UNIT-III

6. Draw the projections of a regular hexagon of 25 mm side, having one of its sides in the H.P. and inclined at 60° to the V.P. and its surface making an angle of 45° with the H.P. **12 M**

(OR)

7. An isosceles triangular plane ABC with a 70 mm base and altitude 80 mm has its base in the H.P. and inclined at 45^0 to the V.P. The corners A and C are in the V.P. Draw its projections and determine the inclination of the plane with H.P. **12 M**

UNIT-IV

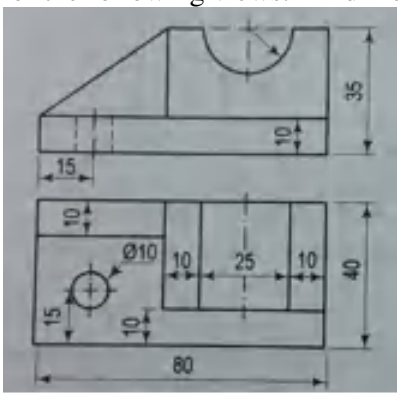
8. Draw the projections of a cone, base 75 mm diameter and axis 100 mm long, lying on the H.P. on one of its generators with the axis parallel to the V.P. **12 M**

(OR)

9. A square prism of base side 30mm and axis length 60mm is resting on HP on one of its base sides with its axis inclined at 45° to HP. The plane containing its axis is inclined at 35° to VP. Draw its projections. **12 M**

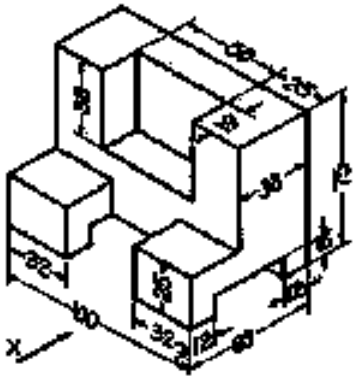
UNIT-V

10. Draw an Isometric view for the following views. All dimensions are in mm. **12 M**



(OR)

11. Draw the following projections (i) Front View (ii) Top View (iii) Side View **12 M**



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AR13

CODE: 13ME1002 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

I B.TECH II SEM SUPPLEMENTARY EXAMINATIONS, February, 2021

CLASSICAL MECHANICS

(Mechanical Engineering)

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

PART-A

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

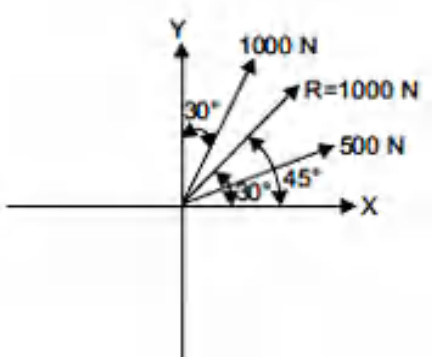
1. a) State parallelogram law.
   b) Define moment of a force.
   c) What is the difference between truss and a frame?
   d) Define the principle of virtual work
   e) Write the expression for centroid of a parabolic spandrel
   f) Define mass moment of inertia
   g) State D Alembert's principle.
   h) A train moving with a velocity of 72 kmph is brought to rest in 8 seconds. Find its acceleration?
   i) Define instantaneous velocity
   j)

PART-B

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

UNIT-I

2. a) State and prove the parallelogram law of system of forces? **4M**
   b) Two forces acting on a body are 500 N and 1000 N as shown in Fig. Determine the third force F such that the resultant of all the three forces is 1000 N directed at 45° to x axis. **8M**

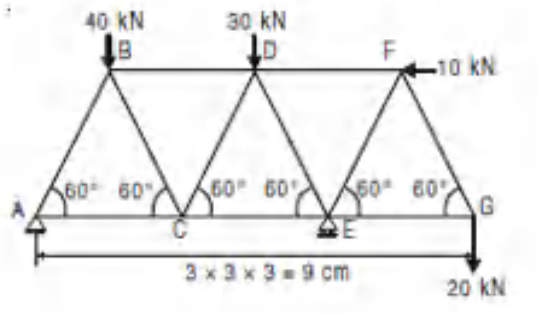


(OR)

3. a) State and prove Varignon's theorem. **4M**
   b) A wire is fixed at two points A and D as shown in Fig. Two weights 20 kN and 25 kN are supported at B and C, respectively. When equilibrium is reached it is found that inclination of AB is 30° and that of CD is 60° to the vertical. Determine the tension in the segments AB, BC and CD of the rope and also the inclination of BC to the vertical. **8M**

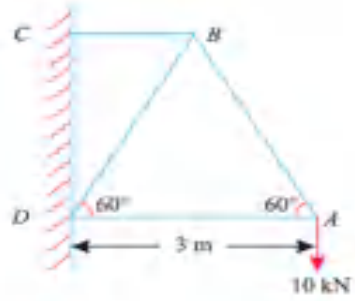
UNIT-II

4. Find the forces in the members of the truss shown in fig. **12M**

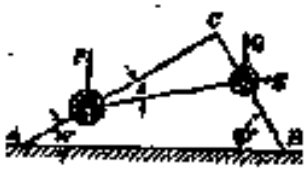


(OR)

5. a) A cantilever truss of 3 m span is loaded as shown in Fig Find the forces in the various members of the truss, and tabulate the results **8M**



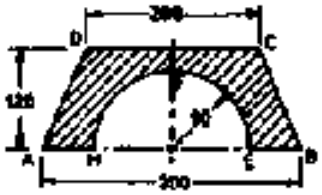
b) Using the principle of virtual work, find the value of angle defining the configuration equilibrium of the system shown in figure below. The balls D & E can slide freely along the bars AC and BC but the string DE connecting them is inextensible. **4M**



UNIT-III

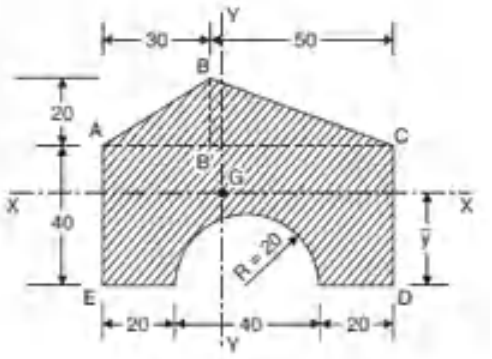
6. a) Derive expression for centroid of a circle. **4M**

b) A semicircular area is removed from a trapezium as shown in Fig. (dimensions in mm) Determine the centroid of the remaining area (shown hatched). **8M**



(OR)

7. Find the second moment of the shaded portion shown in the Fig. about its centroidal axis. **12M**

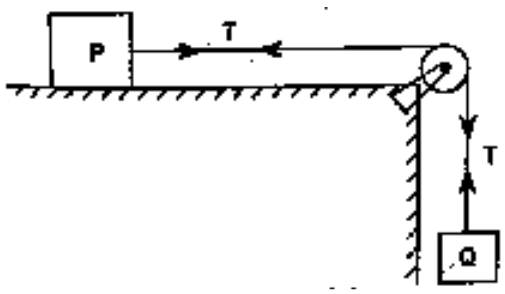


UNIT-IV

8. The motion of a particle is described by the following equations $x = t^2 + 8t + 4$, $y = t^3 + 3t^2 + 8t + 4$. Determine (i) initial velocity of particle (ii) velocity of particle when t = 2 seconds (iii) acceleration of particle at t= 2 seconds. **12M**

(OR)

9. Find the acceleration of moving loads as shown in fig. take mass of P = 120 kg and that of Q = 80 kg and coefficient of friction between surfaces of contact is 0.3 also find the tension in the connecting string. **12M**



UNIT-V

10. Determine the constant force P that will give the system of bodies shown in fig. a velocity of 3 m/s after moving 4.5 m from rest. Co-efficient of friction between the blocks and the plane is 0.3. pulleys are smooth **12M**

(OR)

11. Determine the tension in the strings and the velocity of the 1500 N block shown in fig. a) 5 seconds after starting from rest b) starting with a downward velocity of 3m/s. assume pulleys ass weightless and frictionless. **12M**