AR18

CODE: 18EST103 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech II Semester Supplementary Examinations, August-2022

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) Explain the scalar and vector with an example. 3M

   b) A ball of weight Q = 53.4 N rests in a right-angled trough as shown in Figure.1. Determine the forces exerted on the sides of the trough at D and E if all surfaces are perfectly smooth. 9M

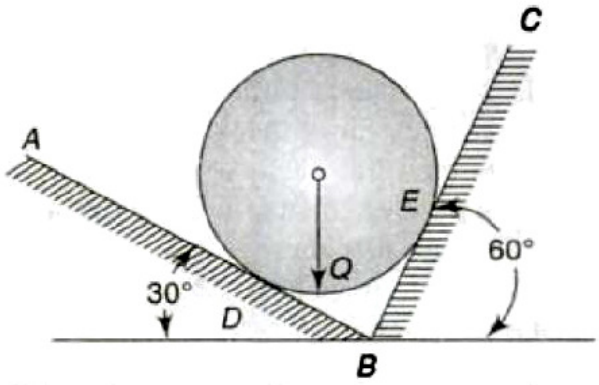


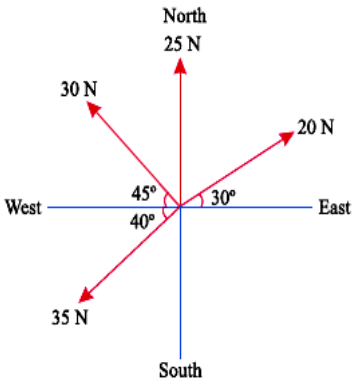
Figure.1

(OR)

2. a) State and prove the parallelogram law of forces with a neat sketch. 3M

   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. 9M



UNIT-II

3. a) Differentiate the equilibrium and equilibrant with an example. 3M

b) A horizontal beam AB is hinged to a vertical wall at A and supported at its mid-point C by a tie rod CD as shown in Figure.3. Find the tension S in the tie rod and the reaction at A due to a vertical load P applied at B. 9M

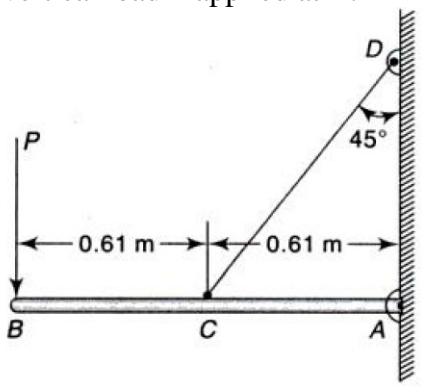
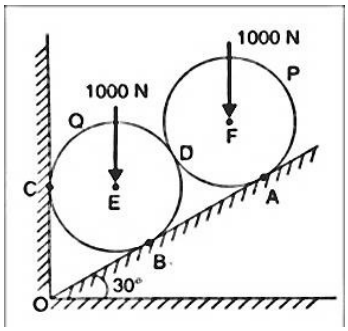


Figure.3

(OR)

4 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. 12M



UNIT-III

5. a) Why is the coefficient of static friction is greater than the coefficient of kinetic friction?. Explain in detail. 3M

b) Two blocks having weights W_1 and W_2 are connected by a string and rest on horizontal planes as shown in Figure.5. If the angle of friction for each block is φ, find the magnitude and direction of the least force P applied to the upper block that will induce sliding. 9M

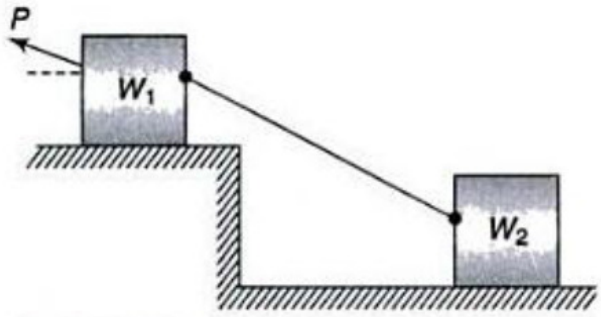
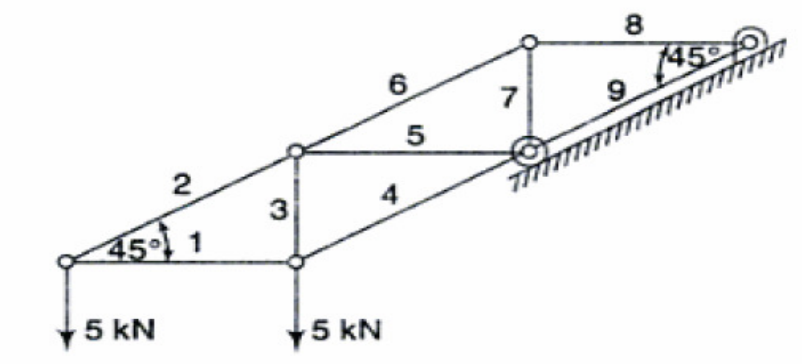


Figure.5

(OR)

6. a) Explain zero force members with an example. 3M

b) Determine the axial force S_i in each bar of the plane truss supported and loaded as shown in Figure.6.

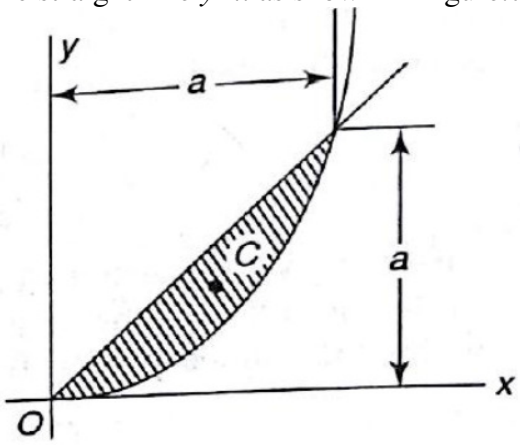


9M

Figure.6

UNIT-IV

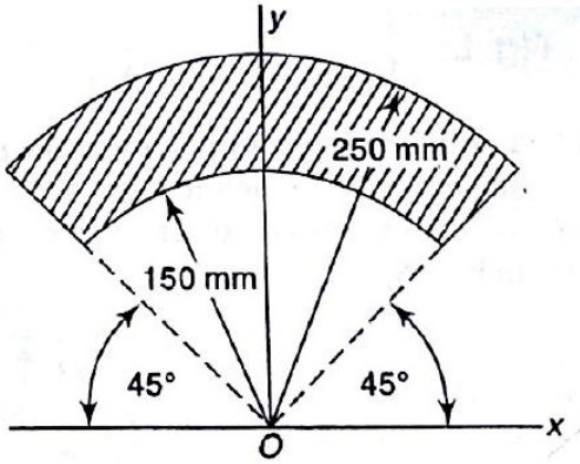
7. a) Determine the coordinates x_c and y_c of the centroid C of the area between the parabola $y=x^2/a$ and the straight-line $y=x$ as shown in Figure.7(a).



6M

Figure.7(a)

b) Locate the centroid C of the shaded sector of a ring subtending a 90° central angle and symmetrical about the *y*-axis as shown in Figure.7(b).

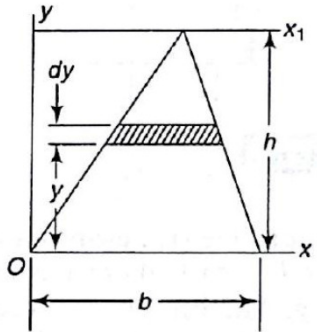


6M

Figure.7(b)

(OR)

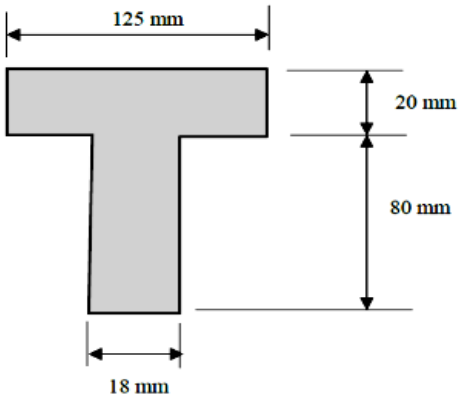
8. a) Find the moment of inertia of the triangle in Figure.8(a) with respect to the axis x_1.



6M

Figure. 8(a)

b) Determine the moment of inertia of the area of T-section as shown in Figure.8(b) with respect to the centroidal x-axis.



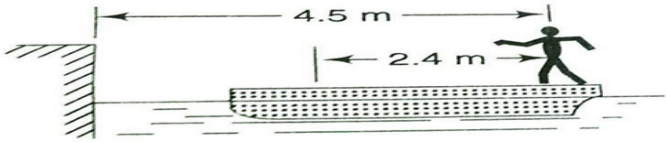
6M

Figure.8(b)

UNIT-V

9. a) A mine cage of weight W= 8.9KN starts from rest and moves downward with constant acceleration, travelling a distance S=30m in 10sec. Find the tensile force in the cable during this time. 6M

b) A man weighing 712 N stands in a boat so that he is 4.5m from a pier on the shore as shown in Figure.9. He walks 2.4m in the boat toward the pier and then stops. How far from the pier will be at the end of this time? The boat weighs 890N and there is assumed to be no friction between it and the water.



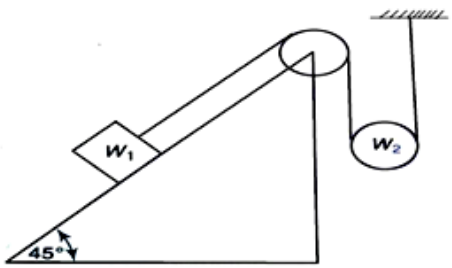
6M

Figure.9

(OR)

10. a) Explain kinematics and kinetics with an example. 3M

b) Find the tension S in the string during motion of the system shown in Figure.10. if W_1=890N; W_2=445N. The system is in a vertical plane, and the coefficient of friction between the inclined plane and the block W_1 is μ=0.2. Assume the pulleys to be without mass.



9M

Figure.10

AR18

CODE: 18EET102 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech II Semester Supplementary Examinations, August-2022

ELECTRIC CIRCUIT THEORY

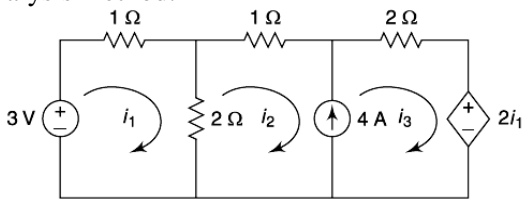
(Electrical and Electronics Engineering)

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

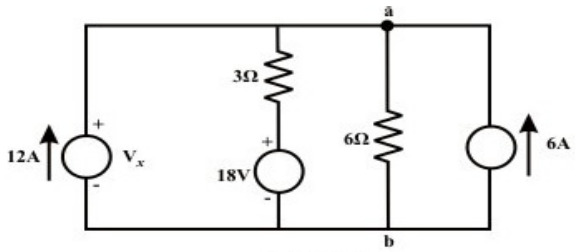
Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. a) Find the loop currents i_1, i_2 and i_3 and the drop across 4A source in the network shown in figure by using mesh analysis method. 7



b) Calculate the value of V_x in the given circuit using Nodal analysis 5



(OR)

2. a) Write a short notes on node voltage analysis. 6

b) Explain the characteristics of open circuit and short circuit in an electrical network by drawing a circuit diagram. 6

UNIT-II

3. a) 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 6

b) Draw and explain the locus diagram of RLC series circuit. 6

(OR)

4. a) A pure inductor, a non-inductive resistor and a pure capacitor are connected in series and this series LRC combination is connected across a single-phase ac supply of 100V at 50Hz. The voltage across the inductor is measured and found out to be equal to 50V. The voltage across the series combination of resistor and capacitor together is found out to be equal to 100V. The current in the series LRC circuit is 5A. Calculate the value of inductance, resistance, and capacitance of the circuit. What is the overall power factor of the circuit? Draw the complete phasor diagram of the circuit. 7

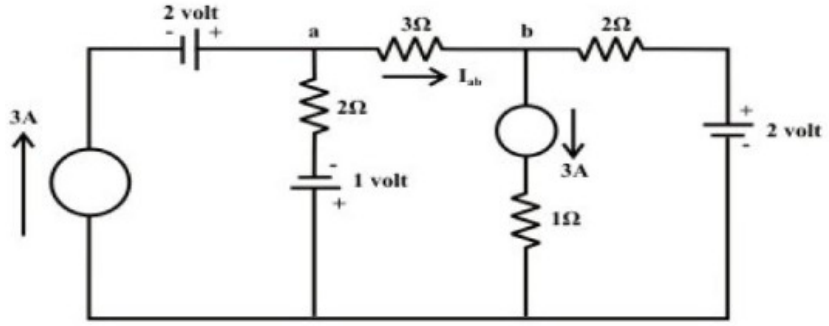
b) What is resonance? Give the characteristics of a resonant series RLC and parallel RLC circuits. 5

UNIT-III

5. State and Explain Thevenin's theorem with suitable example 12

(OR)

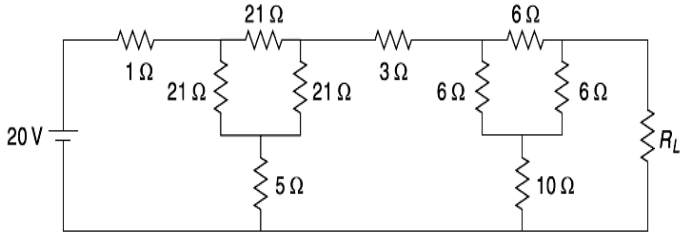
6. a) Calculate the current I_{ab} flowing through the resistor 3Ω using Superposition theorem 6



b) State and explain reciprocity theorem with a suitable example considering an independent AC source. 6

UNIT-IV

7. a) Determine the value of R_L for maximum power transfer to the load and determine the load power in the circuit shown in figure 6



b) State Maximum power transfer theorem and derive the expression for maximum power in a Thevenin's equivalent circuit. Also, discuss the limitations of maximum power transfer theorem. 6

(OR)

8. State and explain Tellegen's Theorem and Compensation theorem with a suitable example each 12

UNIT-V

9. a) Three 50Ω non-inductive resistances are connected in (i) star (ii) delta across a 3Φ, 400V, 50Hz mains. Calculate the power taken from the supply system in each case. In the event of one of the three resistances getting opened, what would be the value of total power taken from the mains in each of the two cases? 7

b) Explain and compare three phase AC system with a single phase AC system. 5

(OR)

10. Derive the relations between line and phase voltages and currents in balance system of star and delta connections. 12

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CODE: 18EST105 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech II Semester Supplementary Examinations, August,2022

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) Describe the action of PN junction diode under forward bias and reverse bias conditions with neat diagrams. 6M
   b) Explain the working of full wave rectifier and give waveforms of input and output voltages. 6M

(OR)

2. a) Indicate the differences between the characteristics of silicon and germanium diodes and state approximately their cut-in voltages 6M
   b) A half wave rectifier having a resistive load of 1000 ohms, rectifies an alternating voltage of 325V peak value and the diode has a forward resistance of 100 ohms. Calculate DC output power, AC input power, Efficiency. 6M

UNIT-II

3. a) Elucidate the input and output characteristics of a transistor in common base configuration with neat diagrams. 6M
   b) Explain why BJT's are called bipolar devices while FET's are called unipolar devices. 6M

(OR)

4. a) Explicate the construction of N-channel and P-channel JFET with neat diagrams. 6M
   b) Determine the values of collector current and emitter current for the transistor circuit of β=250 and I_B= 0.25mA. 6M

UNIT-III

5. a) Explicate the operation of common emitter amplifier with neat diagrams. 6M
   b) Explain the importance of coupling capacitor in amplifier circuits with neat diagrams. 6M

(OR)

6. a) What is an amplifier? What are various types of amplifiers? 6M
   b) What do you understand by the term 'equivalent circuit' of a transistor? Draw the equivalent circuit of generalized transistor amplifier and explain the significance of each parameter. 6M

UNIT-IV

7. a) Show that for current series feedback amplifier input and output resistances are increased by a factor of (1+Aβ) with feedback. 6M
   b) Explain the working of Hartley Oscillator with neat diagrams. 6M

(OR)

8. a) Derive the expressions for input impedance, output impedance and voltage gain of voltage series feedback amplifier with the help of topology diagram. 6M
   b) Clarify the operation of a transistorized Wein Bridge oscillator with the help of neat circuit diagram. 6M

UNIT-V

9. a) Briefly explain the necessity and function of different stages of op-amp with the help of block diagram. 6M
   b) Elucidate the operation of a basic differential amplifier circuit with neat diagram. 6M

(OR)

10. a) List the ideal characteristics of an operational amplifier. 6M
    b) Define following parameters as applied to an op-amp 6M
       a) CMRR b) PSRR c)Slew Rate

AR18

CODE: 18ECT102 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech II Semester Supplementary Examinations, August,2022

NETWORK THEORY

(Electronics and Communication Engineering)

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

Answer ONE Question from each Unit

All Questions Carry Equal Marks

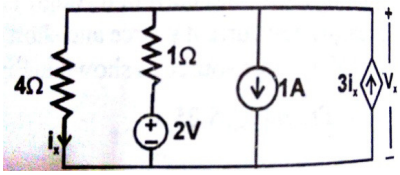
All parts of the Question must be answered at one place

UNIT-I

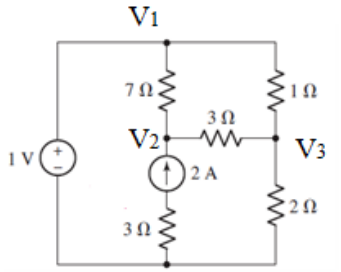
1. a) Sate and explain kirchhoff's Law. (5M)
   b) State and explain Thevenin's theorem with suitable example. (7M)

(OR)

2. a) Determine I_x and V_x using superposition theorem (6M)

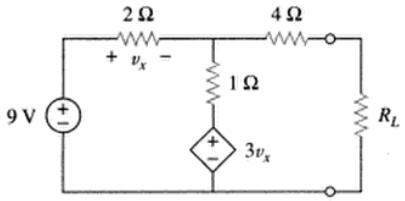


   b) Obtain V1, V2 and V3 using nodal analysis. (6M)



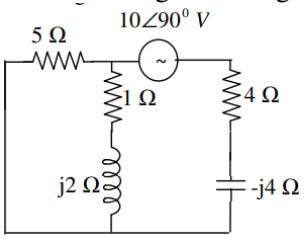
UNIT-II

3. a) State and explain maximum power transfer theorem. (5M)
   b) For what value of R maximum power will be transferred to the load. Also find the value of maximum power. (7M)



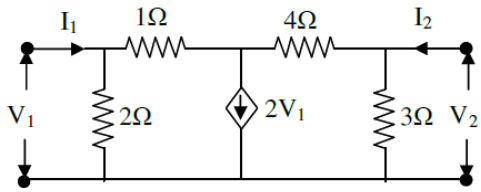
(OR)

4. a) State and Expalin Millimans theorem. (5M)
   b) Verify the reciprocity theorem for the circuits given in figure (7M)



UNIT-III

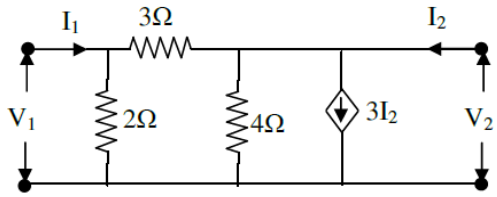
5. a) Find the open circuit impedance parameters of the circuit shown in below figure. (7M)



b) Z-parameters for a two-port network are given as $Z_{11}=25$, $Z_{12}=Z_{21}=20$, $Z_{22}=50$. Find the equivalent T-network. (5M)

(OR)

6. a) Determine Y-parameters of the network shown in below figure. (6M)



b) Two 2-port networks A and B are connected in parallel. Each of these networks has their own y-parameters. Show that resultant y-parameters of the combined parallel network is sum of y-parameters of the individual networks A and B. (6M)

UNIT-IV

7 a) What is resonance in series RLC circuit and draw the behavioural characteristics of resistance, impedance and current in series resonance circuit. (5M)

b) A series connected circuit has R = 4Ω and L = 25mH.(5M) (7M)

i. Calculate the value of C that will produce a quality factor of 50

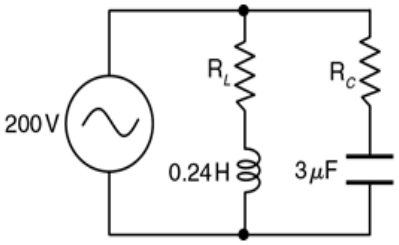
ii. Find Band Width

(OR)

8. a) Explain the parallel resonance. (5M)

b) Determine the resonant frequency, the source current and the input impedance for the circuit shown in figure for each of the following cases (7M)

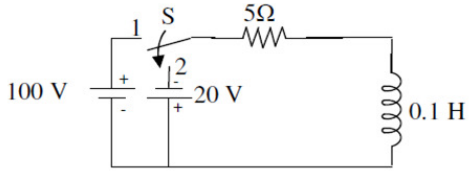
Case 1 : R_L = 150 Ω, Rc = 100Ω Case 2 : R_L = 150 Ω, Rc = 0Ω



UNIT-V

9. a) Derive an expression for voltage across 'R' in a series R-L circuit excited by a unit step voltage. Assume zero initial conditions. (5M)

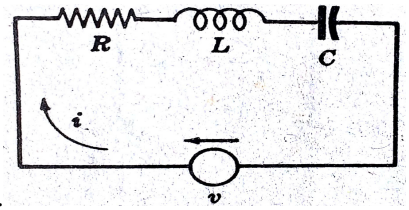
b) In the circuit shown in fig., the switch S is in position 1 for 0.01 seconds and then changed to position 2. Find the time at which the current is zero and reversing its direction. (7M)



(OR)

10. a) A series R-L circuit with resistance, R=100 ohms and inductance, L= 1H has a sinusoidal voltage source 200 Sin(500t + ϕ) applied at time whenϕ= 0. Find the expression for current. (6M)

b) Draw the 's' domain circuit of the network shown and obtain the expression for current. (6M)



AR16

CODE: 16ME1001 **SET-I**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech II Semester Supplementary Examinations, August,2022

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

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UNIT-I

1. Construct a Diagonal scale of RF = 3:200 (i.e. 1:66 2/3) showing meters, decimeters and centimeters. The scale should measure up to 6 meters. Show a distance of 4.56 meters. 14M

(OR)

2. Draw an ellipse by concentric circles method by taking major axis as 100 mm and minor axis as 70 mm. 14M

UNIT-II

3. 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 VPand 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. 14M

(OR)

4. An 80mm long line AB is inclined at 30 deg to V.P and is parallel to H.P. The end A is 20mm above the H.P and 20mm in front of the V.P, draw the projection of the line. 14M

UNIT-III

5. A regular pentagon of 30 mm sides is resting on HP, on one of it's sides with it's surface 45 degrees inclined to HP. Draw it's projections when the side in HP makes 30 degrees with VP? 14M

(OR)

6. Draw the projections of a circle of 50 mm diameter, having its plane vertical and inclined at 30° to the V.P. Its center is 30 mm above the H.Pand 20 mm in front of the V.P. 14M

UNIT-IV

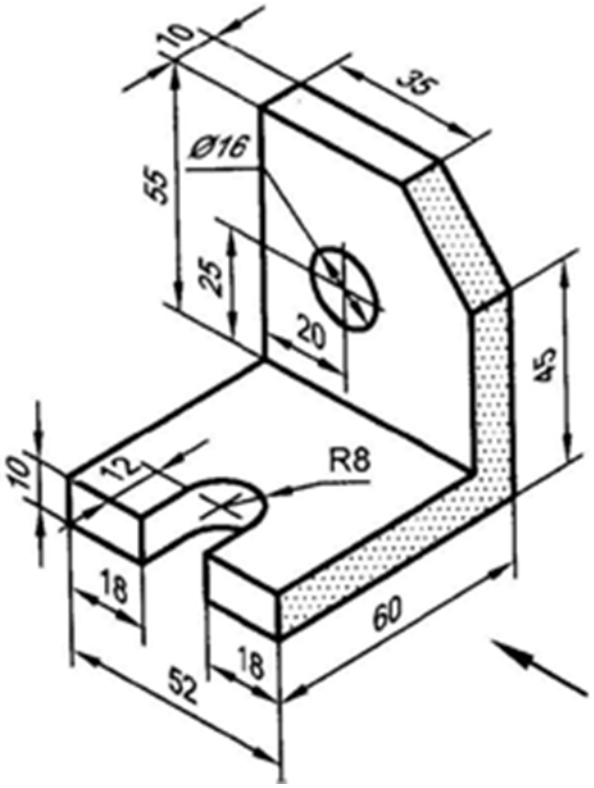
7. Draw the projections of a cone, base 30 mm diameter and axis 50 mm long, resting on HP on a point of its base circle with the axis making an angle of 450 with HP and parallel to VP. 14M

(OR)

8. A square pyramid, base 40 side and axis 90 long has a triangular face on the ground and the vertical plane containing the axis makes an angle of 45°with the VP. Draw its projection. 14M

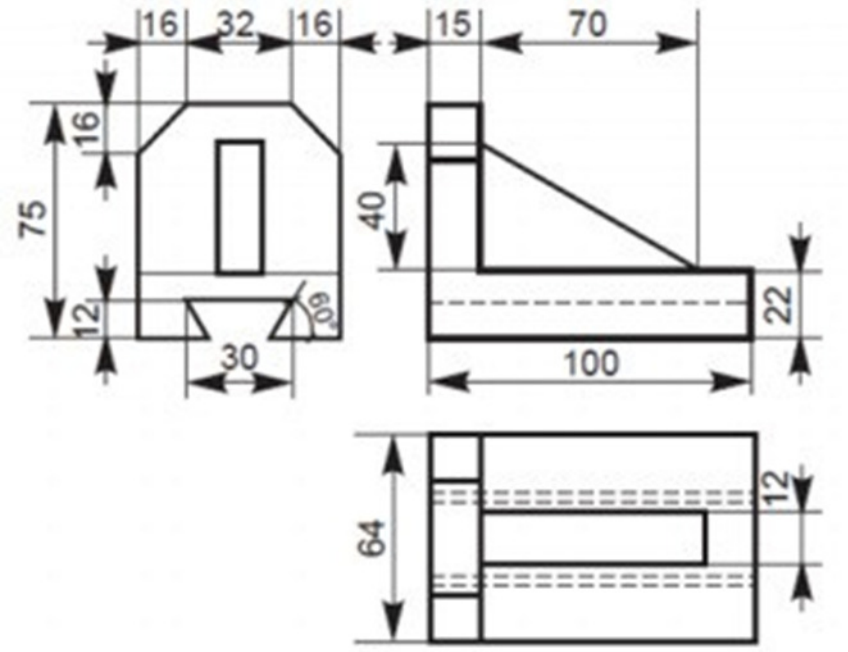
UNIT-V

9. Draw the front view, top view and left hand side view of the block shown in figure shown below. 14M



(OR)

10. Draw the isometric projection of the block shown in Figure below 14M



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AR13

Code: 13ME1001 **SET-I**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B. Tech II Semester Supplementary Examinations, August-2022
ENGINEERING DRAWING
(Common to EEE & ECE)

Time: 3 hours **Max Marks: 70**

PART-A

Answer all questions **[10X1=10M]**

1. a) How hidden lines are represented?
   b) What is a regular polygon?
   c) What is projection?
   d) When will be the front view of a straight line show the true length of the line?
   e) When are both the views of a plane are straight lines?
   f) What is an edge view of a plane?
   g) What is meant by frustum?
   h) State the shape and number of faces of a Dodecahedron?
   i) How the isometric axes are positioned?
   j) Isometric projection or Isometric view of a square will be a _____

PART- B

Answer one question from each unit **[5X12=60M]**

Unit – I

2. a) Construct a diagonal scale of R.F=1/4000 to show metres and long enough to measure upto 500 metres. **8M**

   b) Construct a regular hexagon of 35 mm side with one of its side vertical? **4 M**

(OR)

3. Draw an ellipse by concentric circles method by taking major axis as 100 mm and minor axis as 70 mm. **12 M**

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 VPand 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. **12 M**

(OR)

5. a) The front view of a line inclined at 30^0 to the V.P is 65 mm long. Draw the projections of the line, when it is parallel to and 40 mm above the H.P, its one end being 30 mm in front of the V.P. **6M**

   b) Mark the projections of the following points on a common reference line, keeping the projectors 35 mm apart.
      i) A, 25mm above H.P and 35mm in front of V.P
      ii) B, 25mm above H.P and 40 mm behind V.P
      iii) C, 30mm below H.P and 45 mm behind V.P **6 M**

Unit – III

6. Draw the projections of a circle of 50 mm diameter, having its plane vertical and inclined at 30° to the V.P. Its center is 30 mm above the H.Pand 20 mm in front of the V.P. **12M**

(OR)

7. A 60^0 set-square of 125 mm longest side is so kept that the longest side in the H.P making an angle of 30^0 with the V.P and the set-square itself inclined at 45^0 to the H.P. Draw the projections of the set- square. **12 M**

Unit – IV

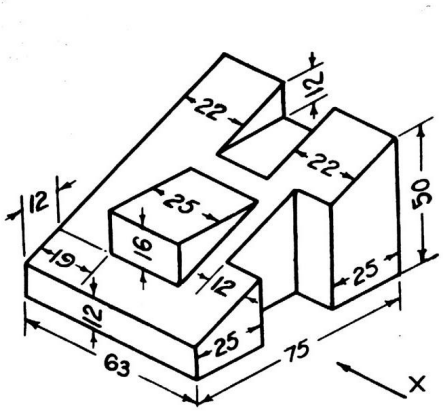
8. Draw the projections of a pentagonal pyramid of base 25 mm side and axis 60 mm longwhen it is lying on H.P on one of its base edges, such that the axis is parallel to VP and inclined at 30^0 to HP. **12 M**

(OR)

9. Draw the projections of a cylinder 75mm diameter and 100 mm long, lying on the ground with its axis inclined at 30^0 to the V.P and parallel to the ground. **12 M**

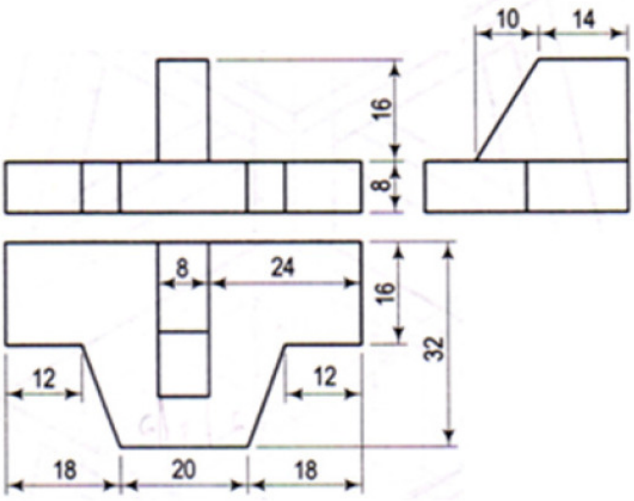
Unit – V

10. Draw (i) front view (ii) side view from the left (iii) top view **12 M**



(OR)

11. Draw the isometric view **12 M**



Note: All dimensions are in mm

AR13

CODE: 13ME1003 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B. Tech II Semester Supplementary Examinations, August-2022
ENGINEERING MECHANICS
(Common to CE, CSE & IT)

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

PART-A

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

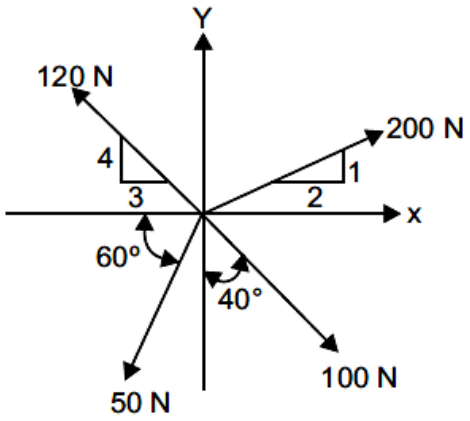
1. a) What is the difference between the collinear and concurrent forces?
   b) Define the term resultant
   c) State Varignon's theorem.
   d) List different types of supports.
   e) What is the centroid of a lamina of a Right angle triangle of base 'b' and height 'h' about its base?
   f) What is angle of friction?
   g) State parallel axis theorem
   h) What is the radius of gyration?
   i) Distinguish between kinematics and kinetics
   j) Differentiate between rectilinear motion and curvilinear motion

PART-B

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

UNIT-I

2. Determine the magnitude and direction of the resultant of the force system as shown in figure below. 12M

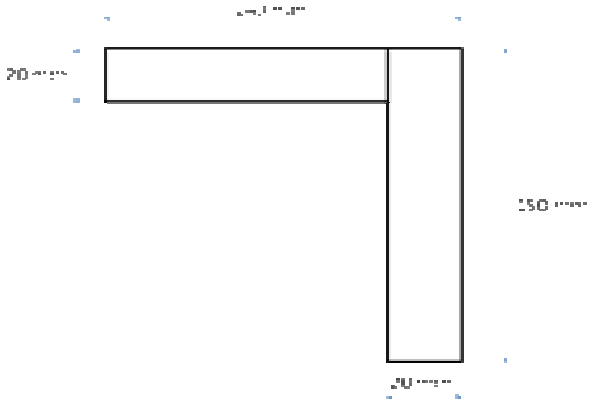


(OR)

3. a) State and prove parallelogram law of forces. 6M
   b) Two forces of magnitude 20N and 40N are acting on a particle such that the angle between the two is 60^0. If both forces acting away from the particle. Calculate their resultant and find its direction 6M

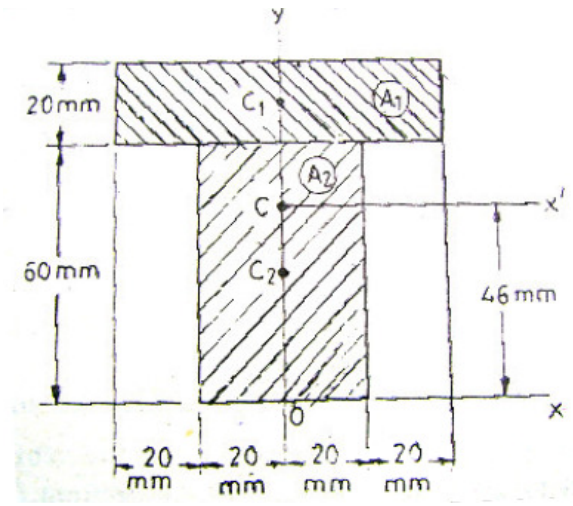
UNIT-II

4. Find the moment of inertia of the area of L-section as shown in Fig. about the centroidal x and y- axis. 12M



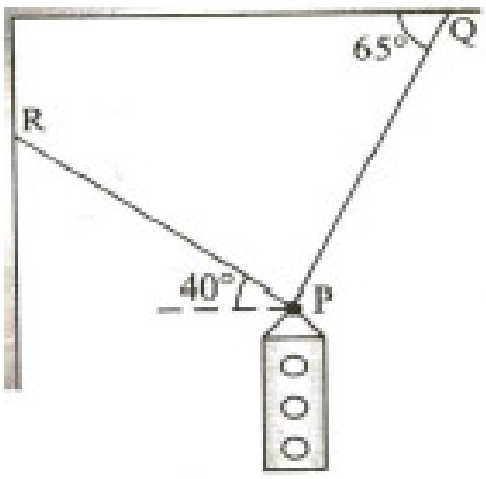
(OR)

5. Determine the moment of inertia of section shown in figure about its centroidal axes 12M



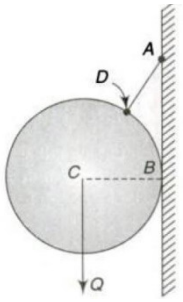
UNIT-III

6. A traffic signal of weight 500N is hung with the help of two strings, as shown in figure below. Find the forces induced in both the strings. 12M



(OR)

7. A ball of weight Q and radius r is attached by a string AD to a vertical wall AB, as shown in Fig. Determine the tensile force S in the string and the reaction R_b against the wall at B if Q = 60 N, r = 75 mm, AB = 100 mm. Neglect friction at wall. 12M

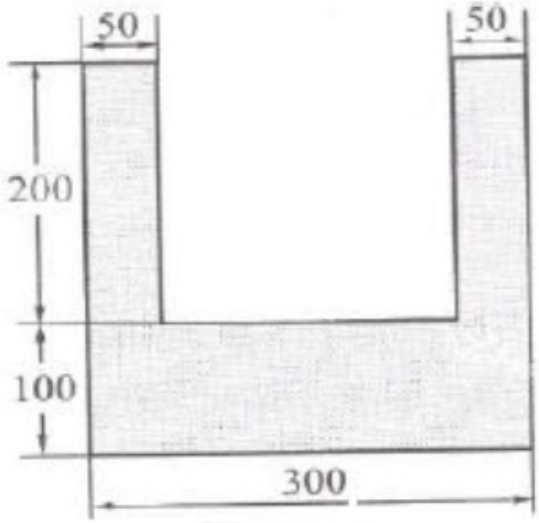


UNIT-IV

8. a) Explain the concept of cone of friction. 4M
   b) Prove that the angle of friction is equal to the angle of the inclined plane, when a solid body of weight W placed on the inclined plane is about to slide down. 8M

(OR)

9. a) Determine the centroid for triangular lamina, having base "b" and height "h". 6M
   b) Determine the cetroid of the following section 6M



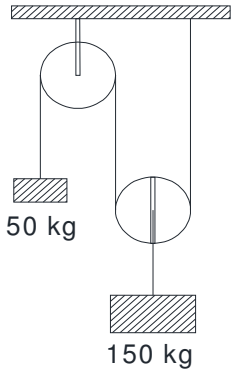
Figure

UNIT-V

10. The x and y components of the displacement in meters of a point are given by the equation $x = 4t^2 - 3t$, $y = t^3 - 10$. Determine the velocity and acceleration of the point when t = 2 sec. 12M

(OR)

11. Determine the tension in the strings and accelerations of two bodies of mass 150 kg and 50 kg connected by a string and a frictionless and weightless pulley as shown in figure. 12M



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