**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**
(AUTONOMOUS)
**I B.Tech I Semester Regular & Supplementary Examinations, December-2017**
**ELECTRICAL AND ELECTRONICS ENGINEERING**
(Common to CSE, IT Branches)

Time: 3 Hours                                                   Max Marks: 70
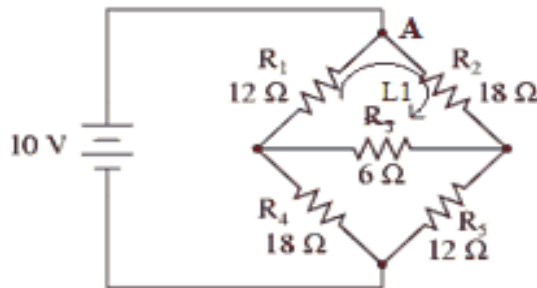
Answer ONE Question from each Unit
All Questions Carry Equal Marks
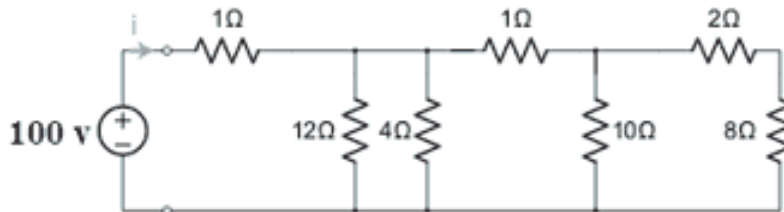All parts of the Question must be answered at one place

## UNIT-I

1.  a)  Determine the unknown currents in the circuit shown in figure          7M
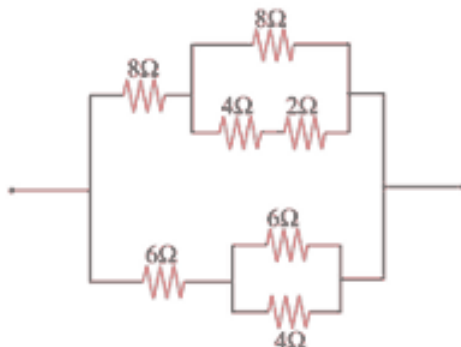


   b)  Write brief notes on V-I relationships for the following          7M
       elements  i) Inductor       ii) Capacitor

**(OR)**

2.  a)  Find the power consumed by the 8Ω resistor.          8M



   b)  Find Equivalent Resistance.          6M

## UNIT-II

3. a) Classify the DC Generators with neat sketch.                    7M
   b) Briefly explain the operation of 3- point starter with neat    7M
      sketch.

**(OR)**

4. a) Explain the internal and external characteristics of DC Shunt  7M
      Generator.
   b) Explain the speed control methods of DC motor.                 7M

## UNIT-III

5. a) Explain the principle operation of single phase transformer?   7M
   b) Explain the principle operation of 3-ØInduction Motor?         7M

**(OR)**

6. a) Derive the EMF equation of 1-Ø transformer?                    7M
   b) Draw and explain torque-speed characteristics of three phase   7M
      induction motor?

## UNIT-IV

7. a) Explain the principle operation of a repulsion type moving     7M
      type instrument.
   b) Explain the procedure to find the regulation of alternator by  7M
      synchronous impedance method?

**(OR)**

8. a) Explain the principle operation of permanent magnet Moving     7M
      Coil with neat diagram?
   b) Derive the EMF equation of a Alternator.                       7M

## UNIT-V

9. a) Explain the operation of PN junction diode and draw the VI     7M
      characteristics.
   b) Explain the operation of Common Base transistor                7M
      configuration.

**(OR)**

10. a) Explain the working of transistor and draw the symbols of P-   7M
       N-P and N-P-N transistor?
    b) Explain the working and operation of half wave rectifier and
       draw the output waveforms?

# AR16

**CODE: 16ME1001**                                                    **SET-2**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**
**(AUTONOMOUS)**
**I B.Tech I Semester Regular & Supplementary Examinations, December-2017**
**ENGINEERING DRAWING**
**(For Civil Engineering)**

Time: 3 Hours                                                    Max Marks: 70M

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered at one place only

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## UNIT-I

1. Draw an involute of a circle of 40mm diameter. Also, draw a normal and tangent to it at a point 100mm from the centre of the circle.   **14M**

(OR)

2. a) Construct a parabola when the distance of the focus from the directrix is 50mm.   **7M**

   b) Construct a hyperbola when the distance of the focus from the directrix is 65mm and eccentricity is 3/2.   **7M**

## UNIT-II

3. A point P is 15mm above the H.P and 20mm in front of V.P. Another point Q is 25 mm behind the V.P. and 40mm below the H.P. Draw the projections of P and Q keeping the distance between their projectors equal to 90mm. Draw the straight lines joining 1)Their top views and      2) Their front views   **14M**

(OR)

4. A line AB, 90mm long is inclined at 30° to the H.P. its end A is 12mm above the H.P. and 20mm in front of the V.P. its front view measures 65mm .Draw the top view of AB and determine the inclination with V.P.   **14M**

## UNIT-III

5. A circular lamina of 50 mm diameter appears as an ellipse in the front view, having its major axis 50mm long and minor axis 30mm long. Draw its top view when the major axis of the ellipse is horizontal.   **14M**

(OR)

6. PQRS is a Rhombus having diagonal PR=60mm and QS=40mm and they are perpendicular to each other. The plane of the rhombus is inclined with H.P. such that its top view appears to be square. The top view of PR makes 30° with V.P. Draw its projections and determines inclination of the plane with the H.P.   **14M**

## UNIT-IV

7. Draw the projections of cylinder 75mm diameter and 100mm long, lying on the ground with its axis inclined at 30° to the V.P. and parallel to the ground.   **14M**

(OR)

8. A pentagonal prism is resting on one of the corners of its base on the H.P. the longer **14M** edge containing that corner is inclined at 45° to the H.P. the axis of the prism makes an angle of 30° to the V.P. Draw the projections of the solid. Also draw the projections of the solid when the top view of the axis is inclined at 30° to xy. Take the side of base 45mm and height 70mm.
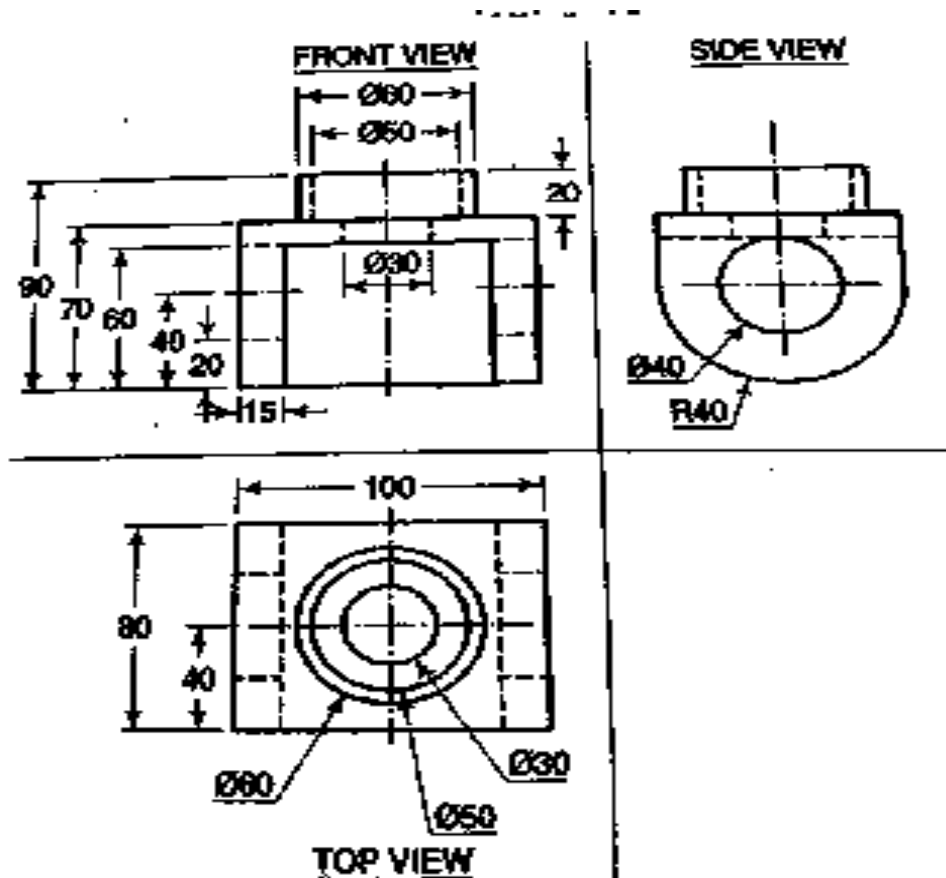
## UNIT-V

9. Draw the 1) Front View 2) Top View 3) Left hand side View of block shown in fig. **14M**
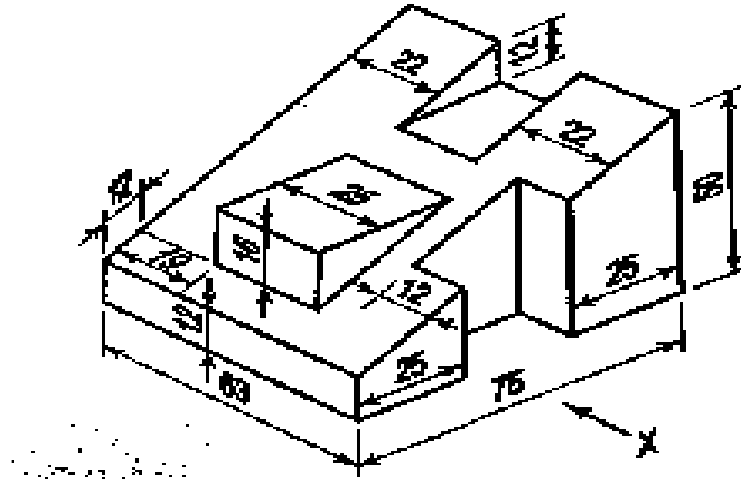


**(OR)**

10. Draw the isometric projection of the block whose orthographic projections are shown **14M** figure?

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# AR16

**CODE: 16ME1002**                                             **SET-1**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**
**(AUTONOMOUS)**
**I B.Tech I Semester Regular & Supplementary Examinations, December-2017**
**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    What is mechanics? Explain the following terms as used in Engineering
            Mechanics: (i) Continuum (ii) Rigid Body
       b    What are equations of equilibrium and explain in detail.

**(OR)**

2.  a    Explain the equilibrium of a body subjected to i) two forces and ii) three forces.
       b    Explain the law of Polygon of forces.

## UNIT-II

3.       A cylinder of weight $W$ and radius $r$ is supported in horizontal position against a vertical wall by a bar AB of negligible weight. The bar is hinged to the wall at A supported at B by a horizontal rope BC. Find the value of the angle θ that the bar should make with the wall so that the tension in the rope is minimum. Assume frictionless conditions.



Fig 1
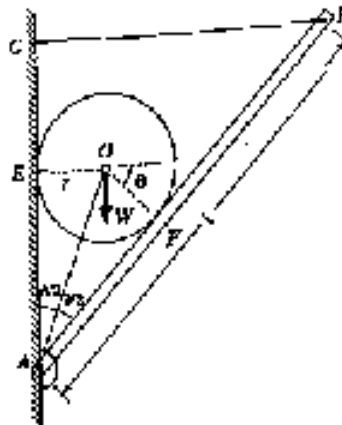**(OR)**

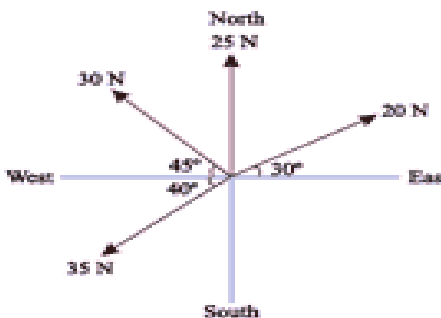4.       Find the resultant of the given force system shown in Figure.



Fig 2.

of 2

5.  a    Define friction and explain laws of friction.

    b    A wooden block rests on a horizontal plane. Determine the force required to i) pull it and ii) push it. Assume the mass of the block to be 5 Kg and coefficient of friction is 0.4

**(OR)**

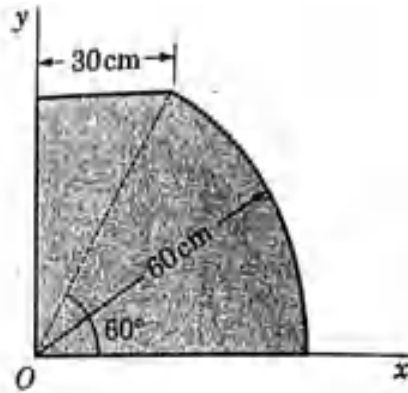6.       Determine the coordinates of the centroid of the shaded area as shown in the Fig.3



Fig 3

**UNIT-IV**

7.  a    State and prove parallel axis theorem.

    b    Find the moment of inertia of the rectangle with respect to the base.

**(OR)**

8.       Find the moment of inertia of the cross-section of an iron beam as shown in the Fig.4, with respect to the centroidal axes.
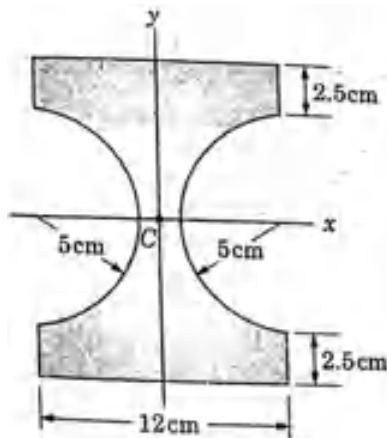


Fig 4

**UNIT-V**

9.       Three blocks $A$, $B$ and $C$ are connected as shown in the Fig.5. Find acceleration of the masses and the tension $T_1$ and $T_2$ in the strings. Given $\mu_1$=0.2 and $\mu_2$=0.25.
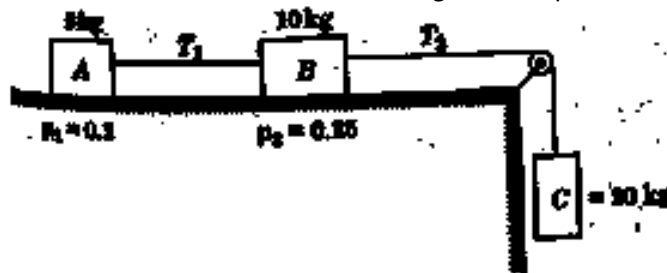


Fig.5

**(OR)**

10. a    Explain D'Alemberts principle in rotation with an example.

    b    Explain the kinematics of plane motion of a rigid body.

2 of 2

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# AR16

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**
**(AUTONOMOUS)**
**I B.Tech I Semester Regular & Supplementary Examinations, December-2017**

## ENGINEERING MECHANICS (STATICS)
### (Mechanical Engineering Branch)

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

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

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### UNIT-I

1.  a)  State and prove Parallelogram Law　　　　　　　　　　　　6M
    b)  A 300N force is applied at C as shown in Fig.01. Determine
        i.   The value of angle θ for which the larger of the cable tension is as small as possible.

        ii.  The corresponding values of tension in the cable AC and BC.　　8M


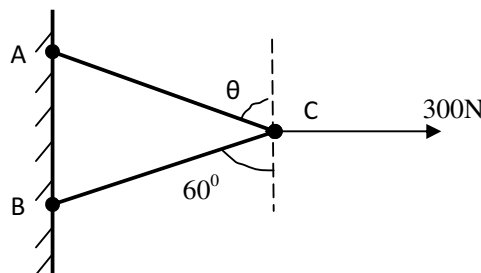
Fig.01

**(OR)**

2.  a)  State and explain the Free body diagram with neat sketch　　　　4M
    b)  A roller of radius 40 cm of weight 3000 N is to be pulled over a rectangular block of height 20 cm as shown in Fig.02. By a force P applied horizontally at the centre of roller. What would be the magnitude of this force? Also determine the least force and its line of action at the centre of the roller for turning the roller over the rectangular block.　　10M
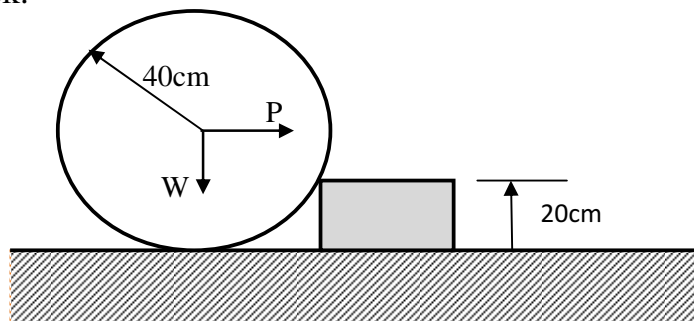


Fig.02

## UNIT-II

3.  a)  State and prove varignons theorem.                                          6M
    b)   Determine the reactions at supports A and B for the loaded beam as
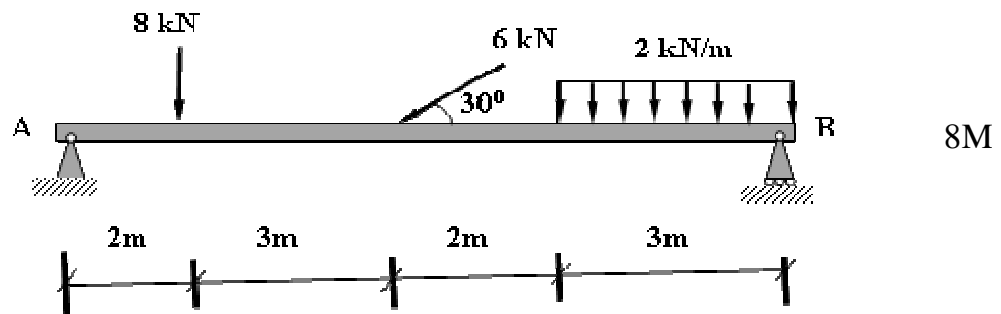        shown in Fig.03.



8M

Fig.03

**(OR)**

4.  a)  Explain with neat diagram the angle of repose.                               4M
    b)  Explain the following terms
        i)  Laws of friction   ii) Coefficient of friction   iii) Angle of friction      10M

## UNIT-III

5.  a)  Determine the coordinates of Centroid of a triangle whose base width      7M
        is 'b' and altitude height 'h'
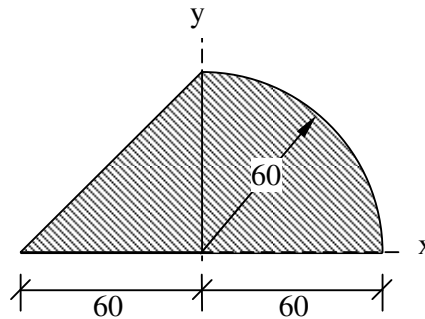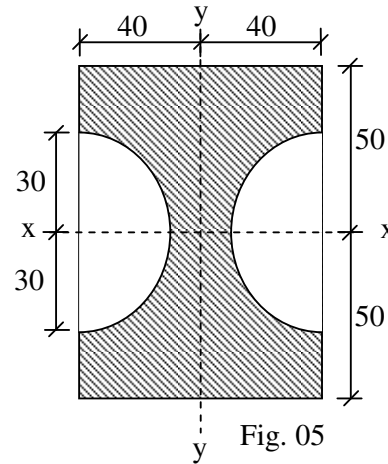    b)  Determine the coordinates of cetroid C of the shaded area as shown in
        Fig.04.



7M

Fig. 04

**(OR)**

6.  a)  State and explain parallel axis theorem.  4M

    b)  From a rectangular cross section, 80 mm wide and 100 mm high, two
        semi circular portions of each 60 mm dia. are removed as shown in
        Fig.05. Determine $I_{xx}$ and $I_{yy}$ for the cross section.  10M



Fig. 05

## UNIT-IV

7.  a)  Write down the condition for a perfect truss and list out assumptions
        for perfect truss  6M

    b)  The truss in Fig.06 is pinned to the wall at point F, and supported by a
        roller at point C. Calculate the force (tension or compression) in
        members BC, BE, and DE.  8M



Fig.06
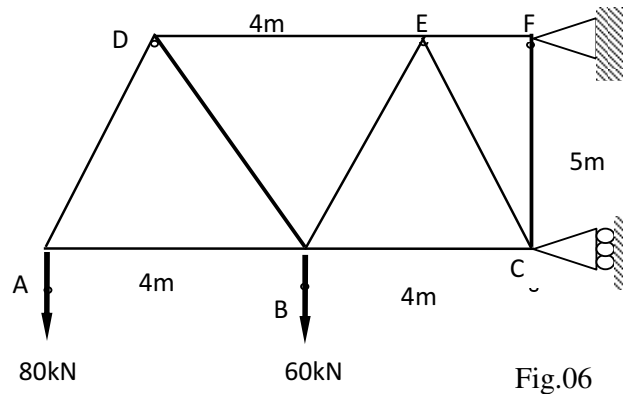
**(OR)**

8.  The cantilever truss in Fig.07. is hinged at D and E. Find the force in
    each member  14M



Fig.07

3 of 4
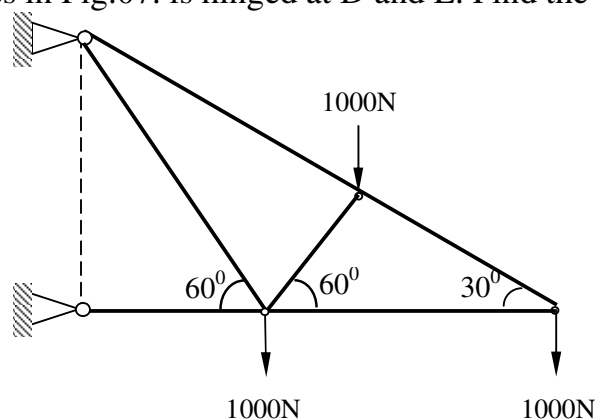
# UNIT-V

9.  a)  Explain the concept of virtual work                                                    4M

    b)  A beam AB of span 10 m carries two point loads of 15 kN and 20 kN at
        4 m and 6 m from A respectively as shown in fig. 08. Determine the
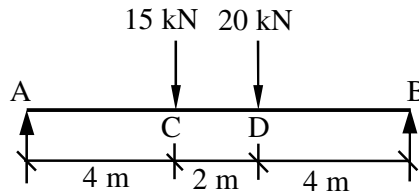        beam reactions by principle of virtual work.                           10M



Fig.08

**(OR)**

10.  a)  List out the advantages of virtual work?                                            4M

     b)  The balls A and B in the system shown in fig. 09 can slide freely along
         the bars which are in the same vertical plane. The string connecting the
         balls is inextensible. Find the value of '$\theta$' for equilibrium using
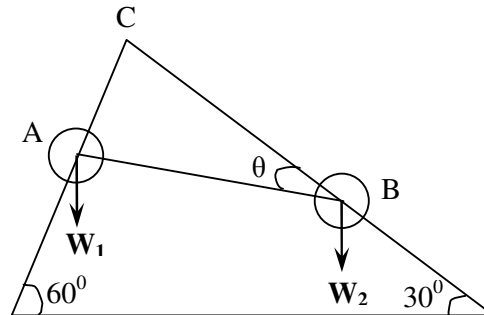         principle of virtual work.                                            10M



Fig. 09

# AR13

Time: 3 Hours                                                 Max Marks: 70

## PART-A

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

1. a) The root of the equation $x^3 - 5x + 1 = 0$ lies between _____ & _____
   b) Write the normal equations of the straight line.
   c) State Simpsons 3/8 $^{th}$ rule.
   d) Evaluate $L^{-1}\{S/_{S^2 - 4}\}$
   e) Write a formula for Newton's forward interpolation.
   f) Write the formula for R-K method of 3$^{rd}$ order
   g) Write first shifting theorem.
   h) Find $L\{\cos at - \cosh at\}$
   i) Eliminate arbitrary Constants from Z=ax+by+ab.
   j) Write one-dimensional wave equation

## PART-B

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

## UNIT-I

2. a   Find a real root of the equation $x^3 - 5x + 3 = 0$ correct to two decimal places by bisection method    **6**

   b   Find a real root of the equation $x^3 - 3x - 5 = 0$, using Newton-Raphson method    **6**

### (OR)

3.   Find the root of the equation $x^3 - x - 4 = 0$ using False position method.    **12**

## UNIT-II

4. a   Find f(2.5) using Newton's forward formula from the following table    **6**

| x | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|----|----|-----|-----|------|
| y | 0 | 1 | 16 | 81 | 256 | 625 | 1296 |

   b   Find the unique polynomial p(x) of degree 2 or less such that p(1)=1,p(3)=27,p(4)=64 using Lagrange's interpolation formula.    **6**

5. a Given that **6**

| x | 4.0 | 4.2 | 4.4 | 4.6 | 4.8 | 5.0 | 5.2 |
|---|---|---|---|---|---|---|---|
| log(x) | 1.3863 | 1.4351 | 1.4816 | 1.5261 | 1.5686 | 1.6094 | 1.6487 |

Evaluate $\int_{4}^{5.2} \log x \, dx$ by Simpson's 3/8 th rule

b Find the first derivative at x=1 from the following data. **6**

| x | 1 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 |
|---|---|---|---|---|---|---|---|
| y | 7.989 | 8.403 | 8.781 | 9.129 | 9.451 | 9.750 | 10.031 |

## UNIT-III

6. a Using Taylor's series method with first five terms in the **6** expansion find y(0.1) and y(0.2) correct to three decimal places, given that $\frac{dy}{dx} = x - y^2$, y (0) = 1

b Apply the fourth order R-K method to find y(0.1) and y(0.2) **6** where $\frac{dy}{dx} = x + y$, y(0)= 1.

**(OR)**

7. Using Modified Euler's method, find y(0.1) and y(0.2), **12** given that $\frac{dy}{dx} = x^2 - y$, y (0) =1

## UNIT-IV

8. Find the laplace transform of $e^{-3t}(2\cos 5t + 3\sin 4t)$ **12**

**(OR)**

9. a Find the inverse laplace transform of $\frac{1}{(s-1)(s+3)}$ **6**

b Using convolution theorem to find the inverse laplace **6** transform of $\frac{s}{(s^2+a^2)^2}$

## UNIT-V

10. a Eliminate h,k from $(x-h)^2 + (y-k)^2 + z^2 = a^2$ **6**
    b Form the differential equation by eliminating arbitrary **6** function from xyz= $f(x^2 + y^2 + z^2)$

**(OR)**

11. Solve the method of separation of variables, $u_{xt} = e^{-t}\cos x$ **12** with u(x,0)=0 and u(0,t)=0

# AR13

**Code: 13ME1003**              **SET NO 1**

## ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
### (AUTONOMOUS)
**I B. Tech I Semester Supplementary Examinations, December, 2017**
### ENGINEERING MECHANICS
**(Common to EEE & ECE)**

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

### PART-A

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

1. a) What is principle of superposition?
   b) Write the equations of equilibrium for coplanar concurrent force system.
   c) State "Varignon's theorem".
   d) Define couple.
   e) What is angle of friction?
   f) What is the distance of centroid of right angled triangle of base 'b' and height 'h', from its base?
   g) Define the term product of inertia.
   h) Define "Polar moment of inertia of a plane area".
   i) State 'D' Alembert's principle.
   j) Write kinetic equation of motion for a body rotating with angular acceleration 'α'.

## PART – B

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

### Unit -1

2. a) Define the following.
       i) Law of transmissibility ii) Parallelogram law of forces
   b) A vessel is pulled by two ropes as shown in Figure. Obtain the magnitude and direction of the resultant force applied on the vessel if the tension on each rope is 1000 N.
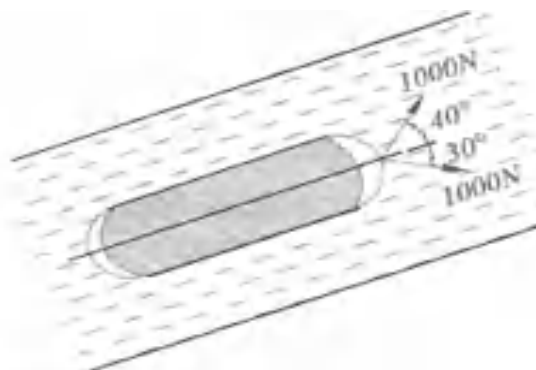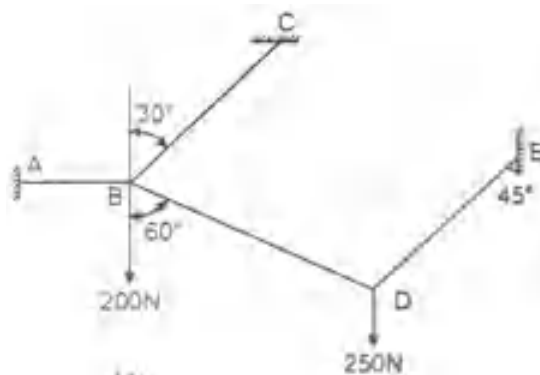


(OR)

3. (a) State and prove  Lami's theorem
   (b) Find the resultant of the given force system shown in Figure.
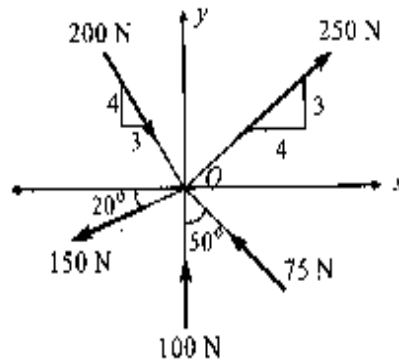


## Unit -2

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

   (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.



(OR)

5. a) Explain the graphical method for finding the resultant of coplanar concurrent force system.
   b) Find analatically the reactions at A and B for the beam loaded as shown in below diagram.
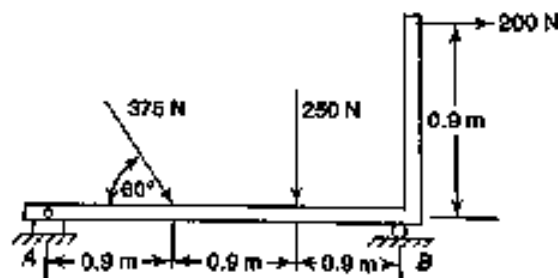
## Unit - 3

6. The 500 N block shown in below diagram is in contact with a 45° incline. The coefficient of static friction is 0.25. Compute the value of the horizontal force 'P' necessary to
    a. Just start the block up the incline
    b. Just prevent motion down the incline.
    c. If P=400N, what is the amount and direction of the friction force?
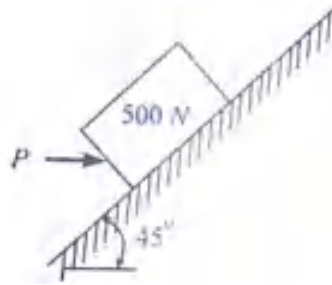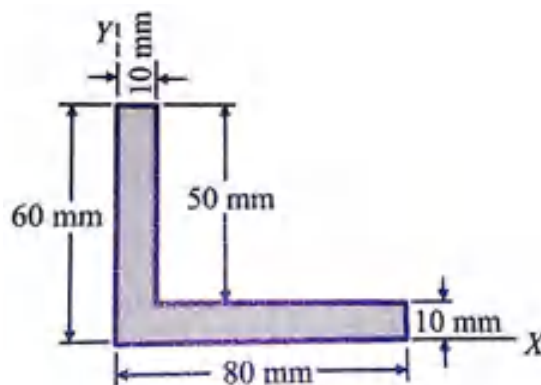


(OR)

7. (a) State the theorems of Pappus.
    (b) Determine the coordinates of the centroid 'C' of the area between the parabola $y = x^2/a$ and the straight line $y = x$, respectively as shown in Figure.
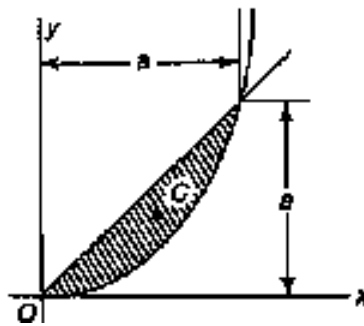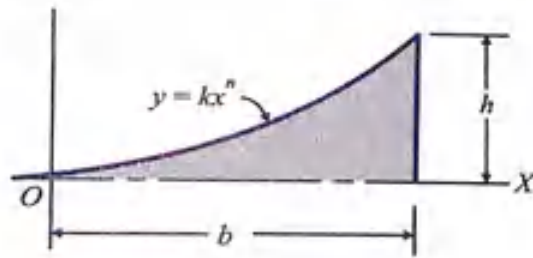


## Unit -4

8.   a) State & derive transfer theorem for areas.
     b) Find area moment of inertia of L section shown in Figure about X axis.

9. Find moment of inertia of the shaded area shown in Figure about X axis.



## Unit - 5

10.    a) A stone is dropped into a well while splash is heard after 2.5 seconds. Then determine depth of water surface assuming the velocity of sound as 330 m/s.

b) Determine the force P that will give the body in Figure an acceleration of $2 \text{ m/s}^2$. The coefficient of friction is 0.2.
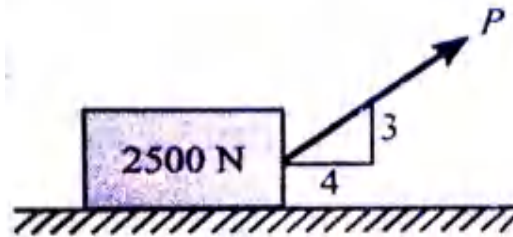


(OR)

11.    In the system of connected bodies shown in Figure, the pulleys are frictionless and of negligible weight. Determine the weight of A to give B, a downward acceleration of $6 \text{ m/s}^2$. Also find the velocity of block 'B' after 1 sec.