AR13

Code: 13ME1003 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B. Tech II Semester Supplementary Examinations, July-2016

ENGINEERING MECHANICS
(Common to CE, CSE & IT)

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

PART-A

Answer all questions **[10 x 1=10M]**

1. a) Define equilibrant
   b) Write the equations of parallel forces in a plane
   c) Define free body diagram
   d) State the Pappus theorem
   e) Define static friction
   f) What is the difference between centriod and C.G
   g) Define rectilinear motion
   h) Define tangential acceleration
   i) Define plane motion
   j) State D' Alemberts principle

PART – B

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

UNIT -1

2. Three forces of magnitude 40 kN, 15kN and 20 kN are acting at a point O. the angles made by 40kN,15kN and 20kN forces with X-axis are 60^o, 120^o and 240^o respectively. Determine the magnitude and direction of the resultant force.

(OR)

3. Explian in detail the method of finding resultant in magnitude and direction of three or more forces acting at a point by analytical method and graphical method. the procedure for the resultant in magnitude and direction of two coplanar concurrent forces

UNIT -2

4. (a) State and prove lames theorem
   (b) A lamp weighing 10N is suspended from the ceiling by a chain. It is pulled aside by a horizontal cord until the chain makes an angel of 60^o with the ceiling. Find the tensions in the chain and cord.

(OR)

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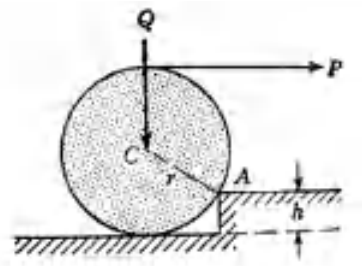
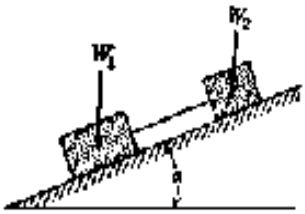
5. A roller of radius r = 12m, and weight Q = 500N is to be pulled over a curb of height h = 6m by a horizontal force P applied to the end of a string wound around the circumference of the roller (figure). Find the magnitude of P required to start the roller over the curb.



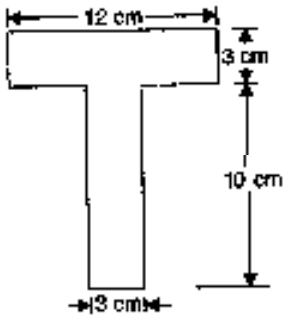
UNIT - 3

6. Two block of weights W_1 (50 N) and W_2(50 N) rest on a rough inclined plane and are connected by a short piece of string as shown in figure below. If the coefficient of friction are $\mu_1 = 0.2$ and $\mu_2 = 0.3$, respectively find the angle of inclination of the plane for which sliding will impend.



(OR)

7. a) determine the centre of gravity of a quadrant AB of the arc of a circle of radius R
   b) Determine the centriod of T-Section with the following dimensions:

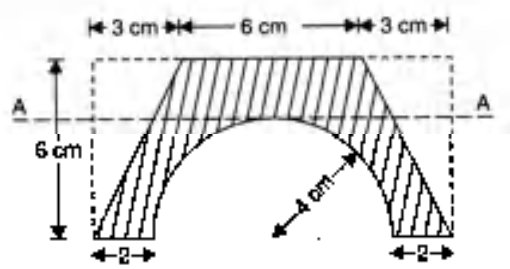


AR13

Code: 13ME1003 **SET-2**

UNIT -4

8. The cross section of a culvert is shown in Fig. Compute the moment of inertia about the horizontal axis



(OR)

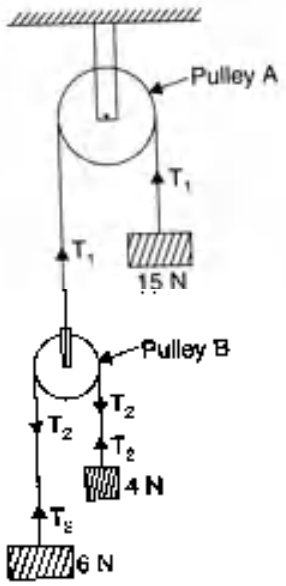
9. Derive the expression for mass moment of inertia of circular plate of radius R

UNIT- 5

10. A stone is thrown vertically upwards with a velocity of 19.6m/s from the top of a tower 24.5m high. Calculate
    (i) Time required for the stone to reach the ground
    (ii) Velocity of the stone in its downward travel at the point in the same level as the point of projection
    (iii) The maximum height to which the stone will rise in its flight.

(OR)

11. A system of weights connected by strings passing over pulleys A and B is shown in Fig. Find the acceleration of three weights, assuming weightless strings and ideal conditions for pulleys.



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AR13 **Set-02**

Code: 13ME1001

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B. Tech II Semester Supplementary Examinations, July-2016
ENGINEERING DRAWING
(Common to EEE & ECE)

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

PART-A

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

1. a) What is an Profile Plane?
b) Differentiate between frustum and truncated pyramid.
c) Define oblique cylinder.
d) Define Representative Fraction.
e) What is conic section?
f) When is isometric scale?
g) What is isometric projection?
h) What are the different methods of drawing an ellipse?
i) What is the position of line, when one view gives true length and other view gives a point?
j) What is Hidden line and where you use it?

PART- B

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

Unit - I

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

(OR)

3. Draw an ellipse with its major axis equal to 100 mm and the minor axis equal to 70 mm. Use concentric circle method.

Unit - II

4. 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.

(OR)

5. Two pegs fixed on a wall are 4.5 metres apart. The distance between the pegs measured parallel to the floor is 3.6 metres. If one peg is 1.5 metres above the floor, find the height of the second peg and the inclination of the line joining the two pegs, with the floor.

Unit - III

6. Draw the projections of a regular pentagon of 40 mm side, having its surface inclined at 30^0 to the H.P. and a side parallel to the H.P. and inclined at an angle of 60^0 to the V.P.

(OR)

7. Draw a rhombus of diagonals 100 mm and 60 mm long, with the longer diagonal horizontal. The figure is the top view of a square of 100 mm long diagonals, with a corner on the ground. Draw its front view and determine the angle which its surface makes with the ground.

Unit - IV

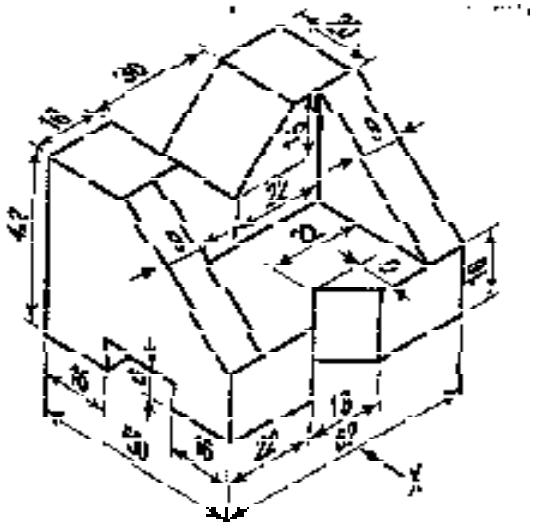
8. A triangular pyramid, base on the H.P. and an edge of the base inclined at 45^0 to the V.P.; the apex 40 mm in front of the V.P. Draw its projections

(OR)

9. A cone, apex in the H.P. axis perpendicular to the H.P. and 40 mm in front of the V.P. Draw its projections

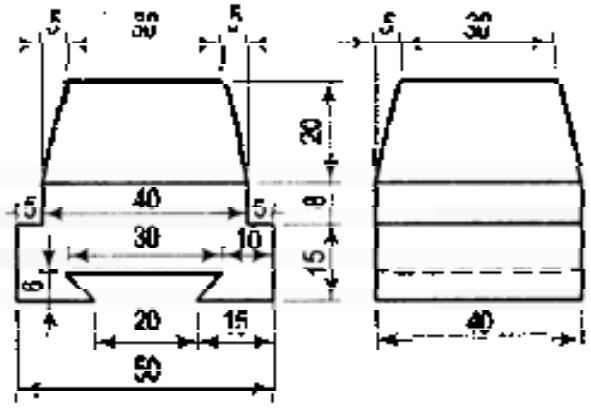
Unit - V

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



(OR)

11. Draw the isometric projection of the block whose orthographic projections are shown in figure below.



AR13

Code: 13ME1002 SET-2

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT,TEKKALI
(AUTONOMOUS)
I B. Tech II Semester Supplementary Examinations, July-2016

CLASSICAL MECHANICS
(Mechanical Engineering)

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

PART - A

Answer All Questions **[10 x 1=10M]**

1. a) Define rigid body.
   b) Differentiate couple and moment.
   c) State Parallel axis theorem.
   d) What are the applications of virtual work?
   e) What are the assumptions made in the analysis of plane trusses?
   f) State and Explain D'Alembert's Principle.
   g) What is moment of inertia of a triangle about its centroidal axis?
   h) What is the maximum horizontal range of a projectile?
   i) Differentiate between kinetics and kinematics.
   j) State Work Energy theorem.

PART – B

Answer one question from each unit **[5 x 12=60M]**

UNIT - I

2. (a) Two equal loads of 2500 N are supported by a flexible string ABCD at points B and C as shown in fig 1. Find the tensions in the portions AB, BC and CD of the string. [6M]

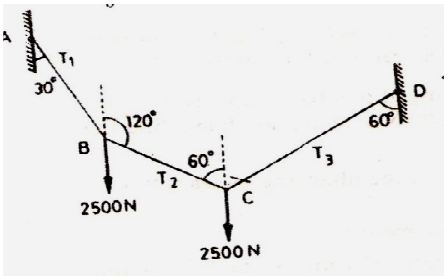


Fig.1

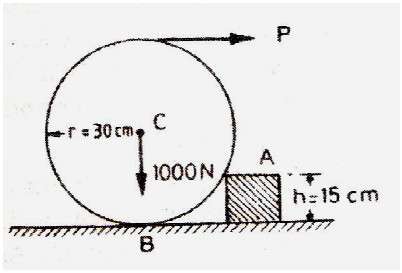


Fig.2

(b) A uniform wheel of 60.0 cm diameter and weighing 1000 N rests against a rectangular block 15 cm high lying on a horizontal plane as shown in fig 2. It is to be pulled over this block by a horizontal force P applied to the end of a string wound round the circumference of the wheel is just about to roll over the block. [6M]

(OR)

3. (a) Three cylinders are piled up in a rectangular channel as shown in the fig 3. Determine the reaction R6 between the cylinder A and the vertical wall of the channel. [8M]

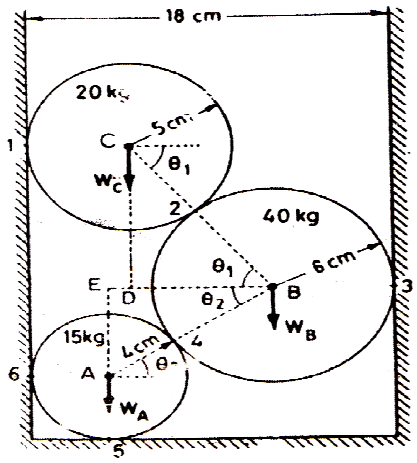


Fig.3

(b) State the theorem of Varignon and Explain . [4M]

UNIT – II

4. Find the axial forces in the members BC,BG,BF,GC,GF and GE of the truss supported and loaded as shown in fig 4. Use method of joints. [12M]

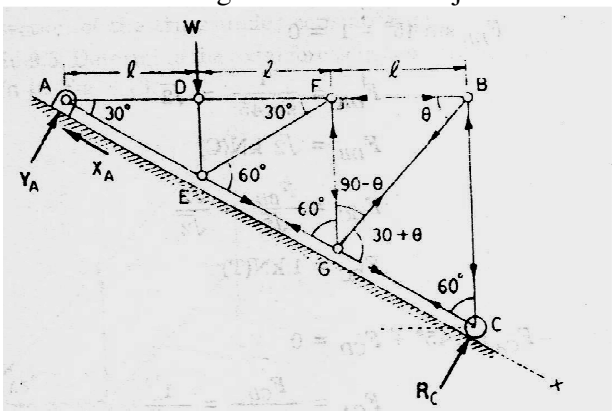


Fig.4

(OR)

5. (a) A weight W of 1000N is to be raised by a system of pulleys as shown in fig 5. Using the principle of virtual work find the value of the force P which can hold the system in equilibrium. [6M]

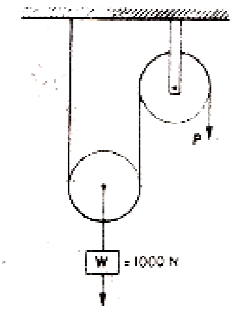


Fig.5

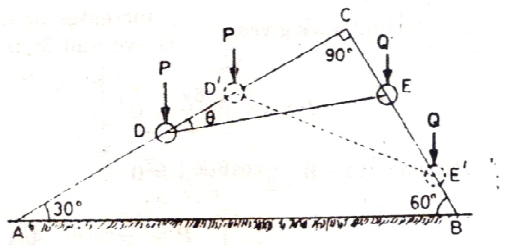


Fig.6

(b) Using the principle of virtual work, find the value of angle defining the configuration equilibrium of the system shown in fig 6. The balls D & E can slide freely along the bars AC and BC but the string DE connecting them is in equilibrium. [6M]

UNIT-III

6. (a) A square hole is punched out of a circular lamina as shown in fig 7. The diagonal of the square which is punched out is equal to the radius of circle. Find the centroid of the remaining lamina. [6M]

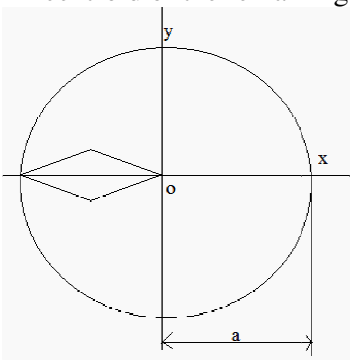


Fig.7

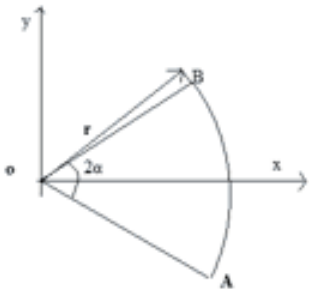


Fig.8

(b) Determine the coordinates of the centroid of a lamina in the shape of a circular sector of radius r and central central angle 2α as shown in fig 8. [6M]

(OR)

7. Find the moment of inertia of the T-cross-sectional of an iron beam fig 9 with respect to the centroidal axes. [12 M]

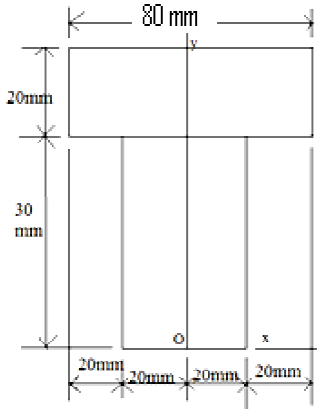


Fig.9

UNIT-IV

8. (a) A lift moves up with a constant acceleration up to a height of 900m and 300m with constant retardation and then comes to rest. Determine: (i) acceleration (ii) retardation and (iii) the maximum velocity of the lift if the total time of travel is 30 seconds and the acceleration is one third of the retardation. [6M]

(b) The position of a particle moving along a straight line is defined by the relation $x=t^3-9t^2+15t+18$ where x is expressed in metres and t in seconds. Determine the time, position and acceleration of the particle when its velocity become zero. [6M]

(OR)

9. (a) A block of mass M_1 lying on an inclined plane of angle θ is pulled by an another block M_2 connected by a string as shown in fig 10. The coefficient of friction between the inclined plane and the block M_1 is μ. Find the acceleration of the mass M_2 and the tension in the string. [6M]

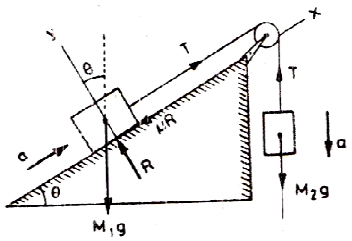


Fig.10

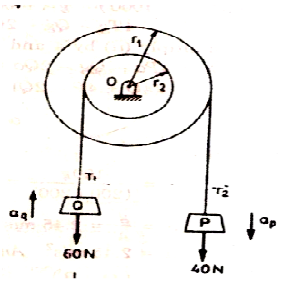


Fig.11

(b) A two step pulley supports two weights P and Q as shown in fig 11.Find the downward acceleration of P. Assume P=40N, Q=60N and $r_1 = 2r_2$. Neglect friction and inertia of pulleys . [6M]

UNIT-V

10. (a) If a system of two masses M_1 and M_2 arranged as shown in fig 12. Are released from rest, find the velocity of the mass M_2 after it has fallen a vertical distance of 2m. Neglect the inertia of the pulleys. Assume $M_1 = M_2 = 10$kg. [6M]

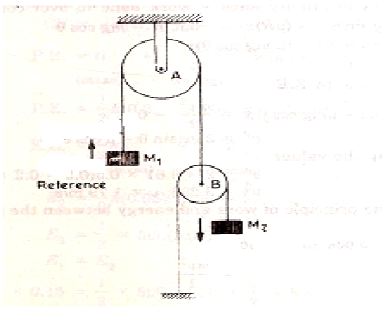


Fig.12

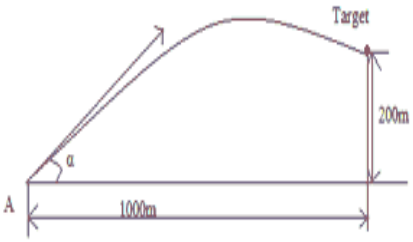


Fig.13

(b) A bullet is fired at 125m/s from a point A and has to hit a target at a horizontal distance of 1000m from A and situated 200m higher than A as in fig 13.Find(i) the angle α at which the bullet must be fired in order to strike the target in the minimum time(ii)the maximum height above A reached by the bullet(iii) the time of flight. [6M]

(OR)

11. (a) At what uniform speed of rotation N around the vertical axis AB, the ball P and Q of equal weight shall begin to lift the weight R of the governing device shown in fig 14? Given P = Q = 50 N, R = 100 N, l = 30 cm. Assume θ = 30° when the weight R begins to get lifted. [8M]

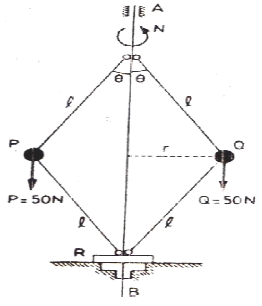


Fig.14

(b) State and explain the principle of conservation of energy? [4M]