

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)****I B.Tech II Semester Supplementary Examinations, October / November-2020
ENGINEERING DRAWING
(Common to EEE & ECE)****Time: 3 Hours****Max Marks: 70****[5x14=70M]****Answer one question from each unit****UNIT-I**

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

(OR)

2. Draw a vernier scale of R.F. = $1/25$ to read centimeters upto 4 meters and on it, show length representing 2.39 m and 0.91 m.

UNIT-II

3. Draw the projections of the following points

- i. Point Q is 25 mm above HP and 35 mm behind VP.
- ii. Point R is 32 mm below HP and 45 mm behind VP.
- iii. Point S is 35 mm below HP and 42 mm in front of VP.
- iv. Point T is in HP and 30 mm behind VP.

(OR)

4. A straight-line *AB* of 60 mm length is parallel to the *HP* and its front view measures 30 mm. If its end *A*, which is nearer to the reference planes, is 10 mm above the *HP* and 15 mm in front of the *VP*, draw the projections of *AB* and find its inclination towards the *VP*.

UNIT-III

5. A hexagonal plane lamina of sides 40 mm is resting on the ground on one of its corners so that surface makes an angle of 45 degrees with the *HP*. Draw the front view and top view of the pentagon.

(OR)

6. Draw the projections of a square lamina of side 40 mm when its centre is 40 mm from the *HP* and *VP* and one of its diagonals makes an angle of 30° to the *HP*.

UNIT-IV

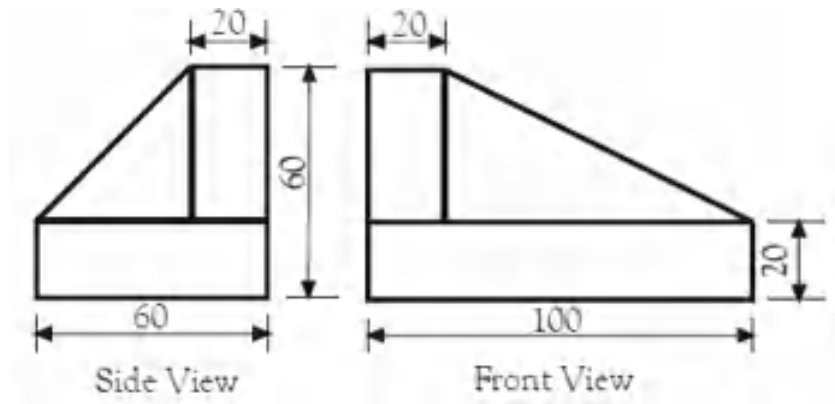
7. Draw the projections of a cone, base 75 mm diameter and axis 100 mm long, lying on the H.P. on one of its generators with the axis parallel to the V.P.

(OR)

8. A tetrahedron with 50 mm edges is having one of its faces parallel to and nearer to the VP. Draw the projections of the tetrahedron.

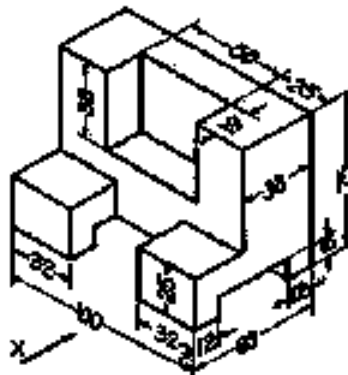
UNIT-V

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



(OR)

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



AR16

CODE: 16ME1002

SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

I B.Tech II Semester Supplementary Examinations, October / November-2020

ENGINEERING MECHANICS

(Common to CE, CSE & IT)

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) State and prove the parallelogram law 7M
b) Find the magnitude of the two forces, such that if they act at right angles, their resultant is $\sqrt{10}$ N. But if they act at 60° , their resultant is $\sqrt{13}$ N 7M

(OR)

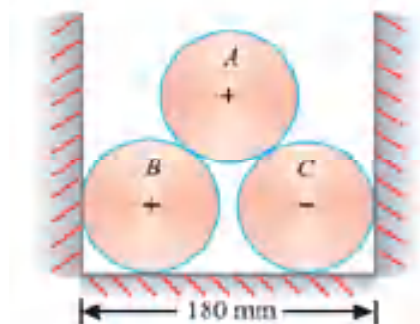
2. a) The following forces act at a point : 14M
(i) 20 N inclined at 30° towards North of East,
(ii) 25 N towards North,
(iii) 30 N towards North West, and
(iv) 35 N inclined at 40° towards South of West.
Find the magnitude and direction of the resultant force.

UNIT-II

3. a) Derive Lami's theorem? 10M
b) State Varignon's theorem / Principles of moment 4M

(OR)

4. Three cylinders weighting 100 N each and of 80 mm diameter are placed in a channel of 180 mm width as shown in Fig. Determine the pressure exerted by (i) the cylinder A on B at the point of contact (ii) the cylinder B on the base and (iii) the cylinder B on the wall. 14M

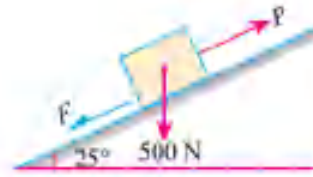


UNIT-III

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

(OR)

6. A body of weight 500 N is lying on a rough plane inclined at an angle of 25° with the horizontal. It is supported by an effort (P) parallel to the plane as shown in Fig 14M



UNIT-IV

7. Find the moment of inertia of a T-section with flange as 150 mm \times 50 mm and web as 150 mm \times 50 mm about X-X and Y-Y axes through the centre of gravity of the section. 14M

(OR)

8. Semicircle of 90 mm radius is cut out from a trapezium as shown in Fig Find the position of the centre of gravity of the figure. 14M

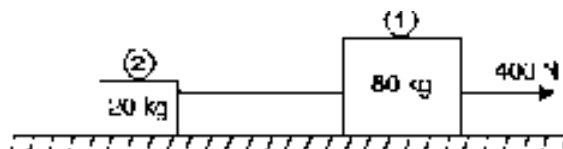


UNIT-V

9. A cage descends a mine shaft with an acceleration of 1 m/s^2 . After the cage has travelled 30 m, stone is dropped from the top of the shaft. Determine: (i) the time taken by the stone to hit the cage, and (ii) distance travelled by the cage before impact. 14M

(OR)

10. Two bodies of masses 80 kg and 20 kg are connected by a thread and move along a rough horizontal surface under the action of a force 400 N applied to the first body of mass 80 kg as shown in figure. The co-efficient of friction between the sliding surfaces of the bodies and the plane is 0.3. Determine the acceleration of the two bodies and the tension in the thread, using D'Alembert's principle. 14M



AR16

CODE: 16ME1004

SET-2

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

I B.Tech II Semester Supplementary Examinations, October/November 2020

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 expressions for the Moment of inertia of a solid cylinder of radius R , mass M with uniform mass density 14 M

(OR)

2. (a) Determine the mass moment of inertia of a rectangular lamina of mass M . Assume that the length of the lamina is ' l ', width is ' b '. 8 M
(b) A uniform solid of revolution is formed by joining the base of a right circular cylinder of height ' h '. calculate the distance of centre of mass of the solid from its plane face when $H=12$ cm and $h=3$ cm. 6 M

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/s², runs at this speed for some time and finally comes to rest with a constant deceleration a_2 m/s². If the total distance travelled is x metres, find the total time t required for this journey. 7 M
b) Motion of a particle is given by the equation 7 M

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

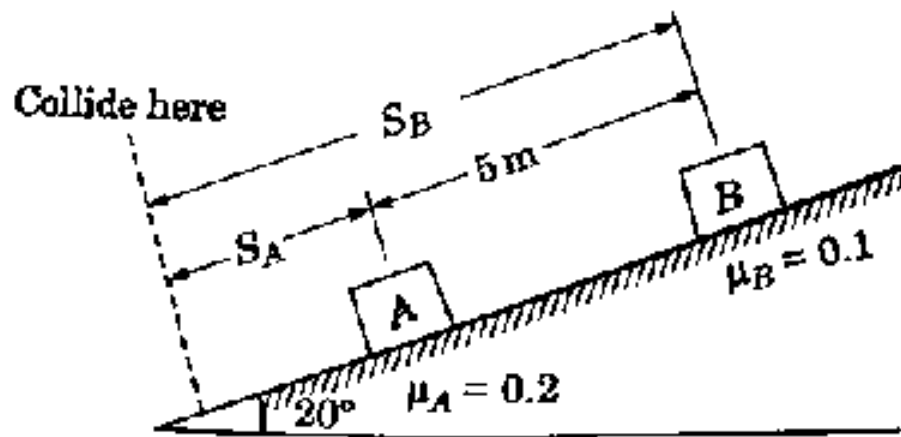
Determine the time, position and acceleration of the particle when its velocity becomes zero.

(OR)

4. (a) An aeroplane goes into a vertical power drive directly over its target at constant velocity of 1000km/hr. An anti-air craft gun fires a shell vertically upwards with an initial velocity of 683 m/s. when the plane is at 1920 m elevation. Find the elevation at which the shell hits the plane and therefore the time required. Neglect air resistance. 7 M
(b) A projectile is aimed at a mark on the horizontal plane through the point of projection and falls 12 m short when the angle of projection is 15° , while it overshoots the mark by 24 m when the same angle is 45° , find the angle of projection to hit the mark. Assume no air resistance. 7 M

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 M



(OR)

6. (a) Calculate the force exerted by the operator having weight 600 N, on the floor of the elevator when (i) The elevator ascends with an acceleration of 3 m/s^2 , (ii) The elevator descends with an acceleration of 4.9 m/s^2 7 M
- (b) A force of 600 N acts on a body of mass 200 kg for 10 seconds. If the initial velocity of the body is 30 m/sec, find the final velocity of the body when, 7 M
 (i) force acts in the direction of motion.
 (ii) force acts in the opposite direction of motion

UNIT-IV

7. (a) Illustrate the difference between Relative velocity method and Instantaneous centre method with a relevant example in the context of kinematics of plane motion. 6 M
- (b) A wooden block weighing 1 kN is placed on a smooth inclined plane which makes 30° with the horizontal. Calculate the work done in pulling the wooden block for a distance of 10 m 8 M

(OR)

8. (a) A disk of radius r is having the angular velocity ω and an angular acceleration of α . A particle P moves in the opposite direction around the circumference with uniform relative velocity V_r . Find the absolute acceleration of P. 7 M
- (b) A railway 4 wheeler wagon weighing 15 kN runs down a gradient of one in hundred. Determine its speed when it has rolled down one km on a straight track. The axle friction is 5 N per kN. The weight of axle and wheels is 2 kN. The wheels have a radius of 40 cm and a radius of gyration of 30 cm. 7 M

UNIT-V

9. A glass ball is dropped on to a smooth horizontal floor from which it bounces to a height of 9m. On the second bounce it rises to a height of 6m. From what height the ball was dropped and what is the coefficient of restitution between the glass and the floor? 14 M

(OR)

10. (a) Describe the Equation of motion for a rigid body rotating about a fixed axis. 4 M
- (b) A fly wheel weighing 5kN and having radius of gyration 1 meter loses its speed from 400 rpm to 280 rpm in 2 minutes. Then calculate (i) retarding torque acting on it, (ii) change in kinetic energy during the above period, (iii) Change in angular momentum during the same period. 10 M

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ENGINEERING DRAWING
(Common to ECE & EEE)****Time: 3 Hours****Max Marks: 70****PART-A****ANSWER ALL QUESTIONS****[1 x 10 = 10 M]**

1.
 - a) Define a straight line.
 - b) Draw symbol for first angle projections.
 - c) What are uses of diagonal scale?
 - d) Plain scale represents _____ units.
 - e) Define isometric projections?
 - f) Length of scale = _____ x maximum length to be measured.
 - g) In first angle projection top view is drawn _____ the front - view.
 - h) A cone is formed by rotation of _____ about its _____ .
 - i) What do you mean by true solid?
 - j) If a plane is perpendicular to VP and parallel to HP, its projection on VP will reveal its View.

PART-B**Answer one question from each unit****[5x12=60M]****UNIT-I**

2. Draw an ellipse by concentric circles method by taking major axis as 100 mm and minor axis as 70 mm.
- (OR)
3. Draw a vernier scale of R.F. =1/25 to read centimeters upto 4 meters and on it, show length representing 2.39 m and 0.91 m.

UNIT-II

4. Draw the projections of the following points
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5. A straight-line *AB* of 60 mm length is parallel to the *HP* and its front view measures 30 mm. If its end *A*, which is nearer to the reference planes, is 10 mm above the *HP* and 15 mm in front of the *VP*, draw the projections of *AB* and find its inclination towards the *VP*.

UNIT-III

6. A hexagonal plane lamina of sides 40 mm is resting on the ground on one of its corners so that surface makes an angle of 45 degrees with the *HP*. Draw the front view and top view of the pentagon.

(OR)

7. Draw the projections of a square lamina of side 40 mm when its centre is 40 mm from the *HP* and *VP* and one of its diagonals makes an angle of 30° to the *HP*.

UNIT-IV

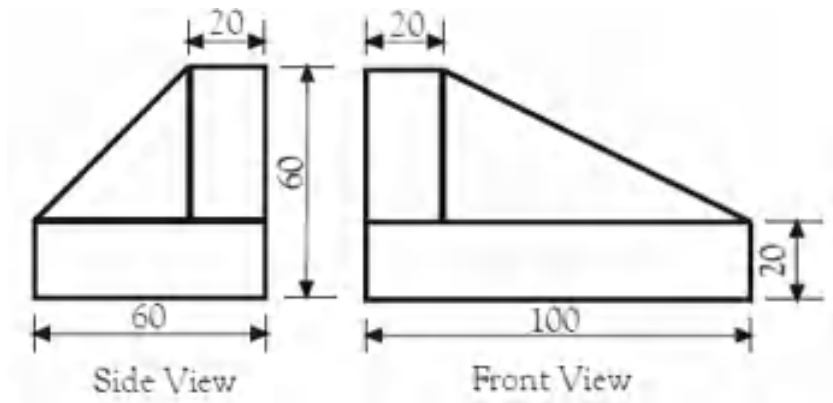
8. Draw the projections of a cone, base 75 mm diameter and axis 100 mm long, lying on the *H.P.* on one of its generators with the axis parallel to the *V.P.*

(OR)

9. A tetrahedron with 50 mm edges is having one of its faces parallel to and nearer to the *VP*. Draw the projections of the tetrahedron.

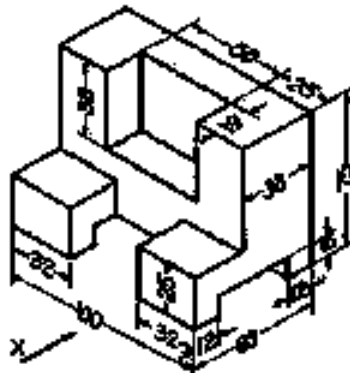
UNIT-V

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



(OR)

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



Time: 3 Hours**Max Marks: 70****PART-A****Answer all questions****[10X1=10M]**

1. a) What is equilibrium?
- b) State the law of transmissibility of forces.
- c) The is a rotational tendency of a force.
- d) When coplanar forces meet in a point, the system is known as force system.
- e) What is cone of friction?
- f) C.G. of a hollow cone lies on the axis at a height of the total height above the base.
- g) Define the term Radius of gyration.
- h) State "Theorem of parallel axes".
- i) State 'D'Alemberts principle.
- j) Define inertial force

PART - B**Answer one question from each unit****[5X12=60M]****Unit -1**

2. The following forces (all pull) act at a point :
 (i) 25 N due North; (ii) 10 N North-East; (iii) 15 N due East;
 (iv) 20 N 30° East of South; (v) 30 N 60° South of West.
 Find the resultant force. What angle does it make with East?

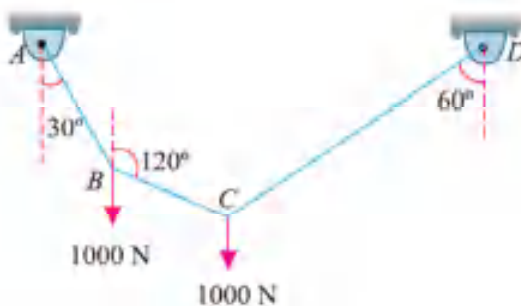
(OR)

3. (a) State and prove the parallelogram law (6M+6M)
 (b) Two forces act at an angle of 120°. The bigger force is of 40 N and the Resultant is perpendicular to the smaller one. Find the smaller force.

Unit -2

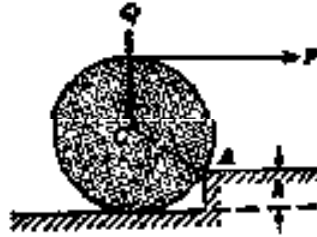
4. A string ABCD, attached to fixed points A and D has two equal weights of 1000 N attached to it at B and C. The weights rest with the portions AB and CD inclined at angles as shown in Fig,

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°.



(OR)

5. A roller of radius $r = 12\text{m}$, and weight $Q = 500\text{N}$ is to be pulled over a curb of height $h = 6\text{m}$ 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.

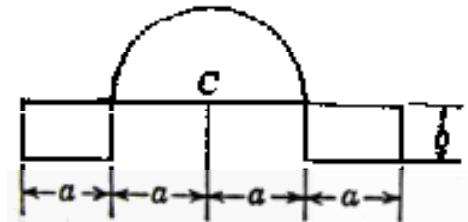


Unit - 3

6. a) Define Laws of friction? (4M+8M)
b) A body, resting on a rough horizontal plane, required a pull of 180 N inclined at 30° to the plane just to move it. It was found that a push of 220 N inclined at 30° to the plane just moved the body. Determine the weight of the body and the coefficient of friction.

(OR)

7. A slender homogeneous wire of uniform cross section is bent into the shape shown in figure below. If the dimension is fixed find the dimension b so that the centre of gravity of the wire will coincide with the center of C of the semicircular portion.

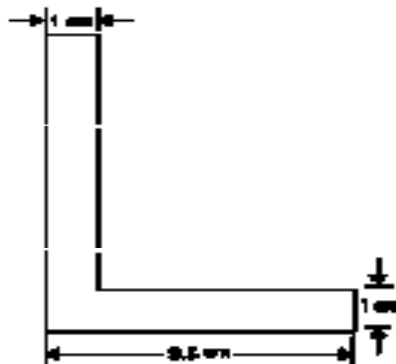


Unit -4

8. Determine moment of inertia of a rectangular section about a line passing through the
a) C.G, b) Base

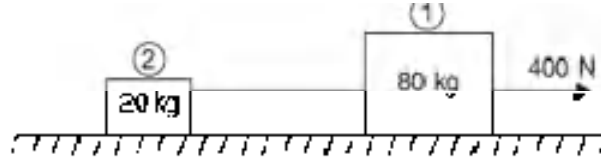
(OR)

9. Find I_{xx} and I_{yy} for the unequal angle section $12.5 \times 9.5 \times 1\text{ cm}$ shown in figure below, if the total mass of the plate is 75 kg .



Unit - 5

10. Two bodies of masses 80 kg and 20 kg are connected by a thread and move along a rough horizontal surface under the action of a force 400 N applied to the first body of mass 80 kg as shown in figure. The co-efficient of friction between the sliding surfaces of the bodies and the plane is 0.3. Determine the acceleration of the two bodies and the tension in the thread, using D'Alembert's principle.



(OR)

11. A cage descends a mine shaft with an acceleration of 1 m/s^2 . After the cage has travelled 30 m, stone is dropped from the top of the shaft. Determine: (i) the time taken by the stone to hit the cage, and (ii) distance travelled by the cage before impact.

3 of 3

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