

Code No: 151AD

R18

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year I Semester Examinations, May/June - 2019

ENGINEERING GRAPHICS

(Electronics and Communication Engineering)

Time: 3 hours

Max Marks: 75

Answer all five questions

All questions carry equal marks

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- 1.a) Two straight lines OA and OB are at right angles to each other. A point Q is 40 mm from OA and 60 mm from OB. Draw a rectangular parabola from Q within 10 mm distance from each line.
- b) A circle of 40 mm diameter rolls on a horizontal line for a half revolution and then on a vertical line for another half revolution. Draw the curve traced out by a point Q on the circumference of the circle.

[6+9]

OR

- 2.a) Draw an epicycloid when the diameters of generating circle and directing circle are 40 mm and 120 mm respectively. Draw a tangent and a normal to the epicycloid at any point.
- b) Draw a diagonal scale of 1:3 showing centimeters and millimeters to measure up to a length of 30 cm. Show a distance of 19.5 cm.

[7+8]

3. A line PQ is 70 mm long and its end P is 20 mm above the H.P. and 30 mm in front of the V.P. while its other end Q is 40 mm above the H.P. and 60 mm in front of the V.P. Draw the projections of PQ and determine the inclinations with the H.P. and the V.P.

[15]

OR

4. A regular hexagon of 20 mm has its one of its sides in the horizontal plane and makes an angle of  $30^\circ$  with the vertical plane. Draw the projections of the plane when its surface makes an angle of  $60^\circ$  with the horizontal plane.

[15]

5. A pentagonal pyramid, of base side 30 mm long and height 80 mm, has one of its triangular faces perpendicular to the horizontal plane and inclined at  $45^\circ$  to the vertical plane. Draw its projections when the base side of the triangular face is parallel to the horizontal plane.

[15]

OR

6. A cone of 50 mm diameter and 70 mm long is resting on the ground on its base. It is cut by a plane inclined at  $30^\circ$  to the horizontal plane and perpendicular to the vertical plane and intersects the axis at 20 mm above the base. Draw its front view and sectional top view.

[15]

7. A square pyramid of base side 30 mm and height 70 mm long is resting on the ground on its base with the two opposite sides of the base parallel to the vertical plane. It is cut by a plane which is perpendicular to the vertical plane and inclined at  $60^\circ$  to the horizontal plane at a height of 40 mm above the ground. Draw the development of the lateral surface of the bottom portion of the pyramid.

[15]

OR

8. A circular hole of 25 mm diameter is cut through a vertical cylinder of 80 mm diameter such that the axis of the hole is horizontal and parallel to the vertical plane and 8 mm away from the axis of the cylinder. Draw the projections of the cylinder showing the holes in it. [15]

9. Draw the a) front view b) both side views and c) top view to the full scale for the pictorial view shown in the figure 1. All dimensions are in mm. [15]

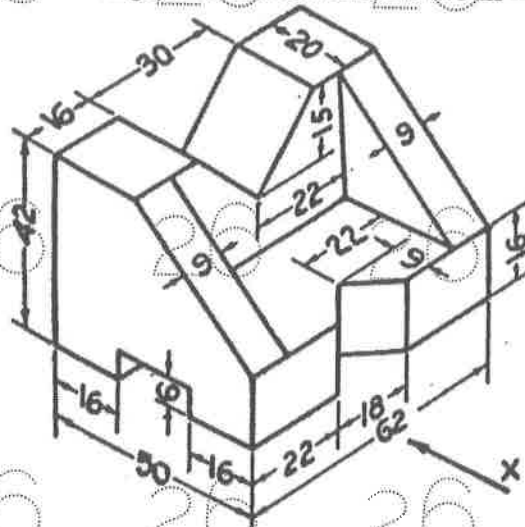


Figure: 1  
OR

10. Draw the isometric view of the casting shown in the figure 2. All dimensions are in mm. [15]

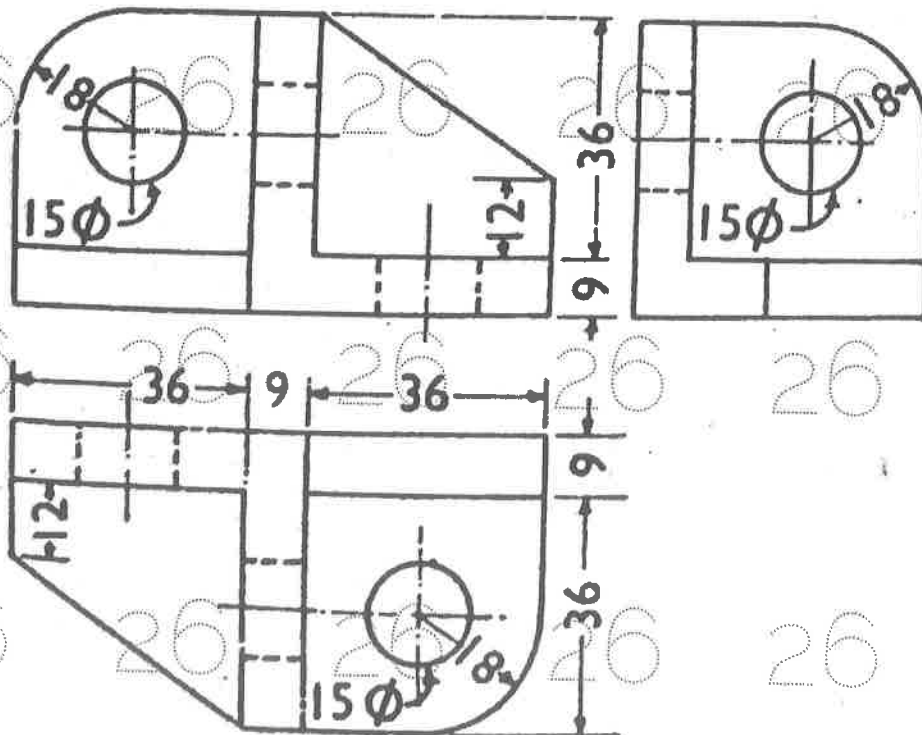


Figure: 2

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R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year I Semester Examinations, May/June - 2019

ENGINEERING MECHANICS

(Common to CE, EEE, ME, ECE, CSE, EIE, IT, MCT, ETM, MMT, AE, MIE, PTM, CEE, MSNT)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A

(25 Marks)

- 1.a) State the necessary and sufficient conditions for equilibrium of rigid bodies in two dimensions. [2]  
b) Calculate the magnitude of the moment about the point 'O' of the 600-N force as shown in figure 1. [3]

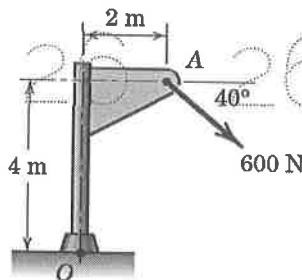


Figure: 1

- c) What is the condition in terms of efficiency for a screw jack to be self-locking? [2]  
d) State the laws of dry friction. [3]  
e) Define polar moment of inertia. [2]  
f) Derive an expression for a centroid of a triangle having base "b" and height "h". [3]  
g) State and explain transfer formula for mass moment of inertia. [2]  
h) Determine the mass moment of inertia of a slender rod of length 'L' and a mass 'm' with respect to an axis perpendicular to the rod and passing through one end of the rod. [3]  
i) What is work-energy principle for rotation bodies? [2]  
j) A train of weight 2000 kN is ascending a slope of 1 in 200 with a uniform velocity of 40 km/hr. Find the power exerted by the engine if the track resistance is 10 N/kN of the weight of train. [3]

PART-B

(50 Marks)

- 2.a) Three concurrent forces  $P$ ,  $T$  and  $F$  having a resultant of 10 N directed forward and up to the right at  $\theta_x = 60^\circ$ ,  $\theta_y = 60^\circ$  and  $\theta_z = 45^\circ$ .  $P$  equal 21 N and passes from the origin through point (3, 2, 6). The value of  $T$  is 18 N and is directed from the origin toward point (-6, 6, -3). Determine the magnitude of the third force  $F$  and the angles it makes with the reference axes.

- b) A man raises a 10 kg joist of 4 m length by pulling on a rope attached to the joist as shown in the figure 2. At this instant, find tension in the rope and reaction at end A of joist. [5+5]

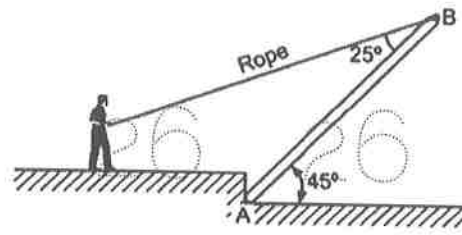


Figure: 2  
OR

- 3.a) Determine and locate the resultant R of the two forces and one couple acting on the I-beam as shown in figure 3.

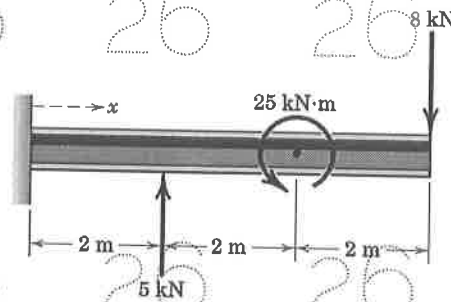


Figure: 3

- b) Three bars pinned together at B and C and supported by hinges at A and D as shown in the figure 4 form a four link mechanism. Determine the value of P which is required to hold the system in equilibrium. [4+6]

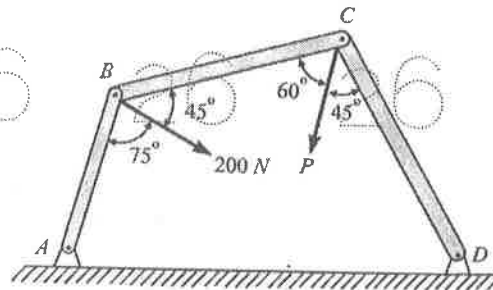


Figure: 4

- 4.a) What is a screw jack? Explain the principle of operation of a screw jack with a neat sketch.
- b) Two block of weight  $W_1 = 50 \text{ N}$  and  $W_2 = 50 \text{ N}$  are resting on a rough inclined plane as shown in the figure 5. If  $\mu = 0.3$  for  $W_1$  and plane and  $\mu = 0.2$  for  $W_2$  and plane, find the inclination of the plane for which slipping will impend. [4+6]

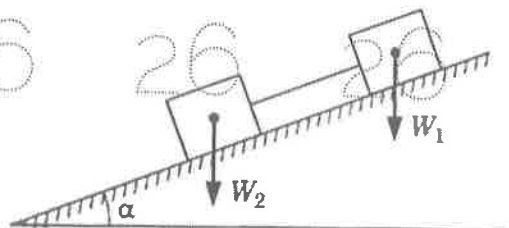


Figure: 5  
OR

- 5.a) Prove that the angle of repose is equal to the angle of friction.  
 b) A block overlaying a  $10^\circ$  wedge on a horizontal floor, leaning against a vertical wall, and weighing 2000 N is to be raised by applying a horizontal force to the wedge as shown in figure 6. Assuming coefficient of friction for all contact surfaces is 0.25, determine the minimum horizontal force to be applied to raise the block. [5+5]

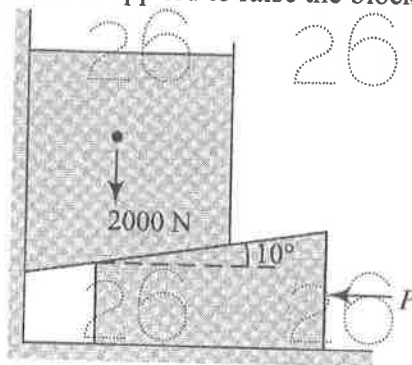


Figure: 6

- 6.a) Compute the moment of inertia of a regular hexagon of side "a" with respect to an axis passing through two opposite apexes.  
 b) Determine the co-ordinates of centroid of the shaded area enclosed by a parabola  $4y = x^2$  and a straight line  $x - y = 0$  as shown in figure 7. [5+5]

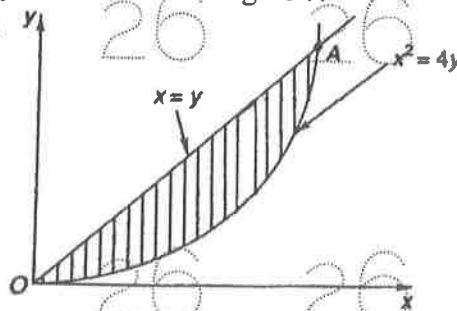


Figure: 7

OR

- 7.a) State and explain Pappus–Guldinus theorems for surface of revolution and volume of revolution.  
 b) Find the moment of inertia of the shaded area shown in the figure 8 about the edge AB. [5+5]

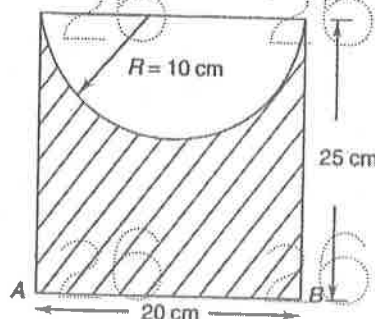


Figure: 8

- 8.a) Obtain an expression for mass moment of inertia of a solid cylinder about geometric axis.  
 b) Find the mass moment of inertia of the homogeneous parallelepiped with respect to centroidal axes parallel to the edges. [5+5]

OR

- 9.a) A Cube of side 400 mm has mass density of  $2000 \text{ kg/m}^3$ . Find out the mass moment of inertia of the cube about its centroidal axis parallel to one of its sides.
- b) A brass cone with base diameter of 400 mm and height of 225 mm is placed on a vertical aluminum cylinder of height 300 mm and diameter 400 mm. Density of brass =  $85 \text{ kN/m}^3$  and density of aluminium =  $25.6 \text{ kN/m}^3$ . Determine the mass moment of inertia of the composite body about the vertical geometrical axis. [4+6]
- 10.a) An elevator has an upward acceleration of  $1 \text{ m/s}^2$ . What pressure will be transmitted to the floor of the elevator by man weighing 600 N travelling in the elevator? What pressure will be transmitted if the elevator has a downward acceleration of  $2 \text{ m/s}^2$ ?
- b) The 3000 N block starting from rest as shown in the figure 9 slides down a  $50^\circ$  inclined plane. After moving 2 m it strikes spring whose modulus is 20 N/mm. If the coefficient of friction between the block and inclined plane is 0.2, determine the maximum deformation of the spring and the maximum velocity of the block. [4+6]

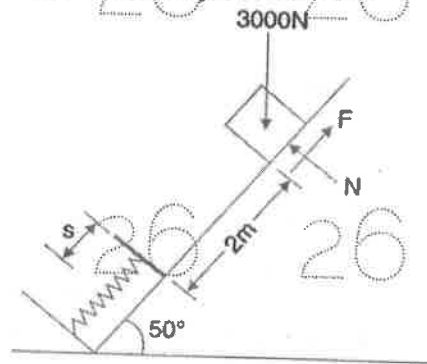


Figure: 9  
OR

- 11.a) A stuntman drives a motor cycle around a circular vertical wall 30 m diameter. The coefficient of friction between tires and wall is 0.60. What is the minimum speed that will prevent his sliding down the wall? At what angle will the motorcycle be inclined to the horizontal? What is the effect of travelling at a greater speed?
- b) After the block in the figure 10 has moved 3 m from rest, the constant force P is removed. Find the velocity of the block when it returns to its initial position. [5+5]

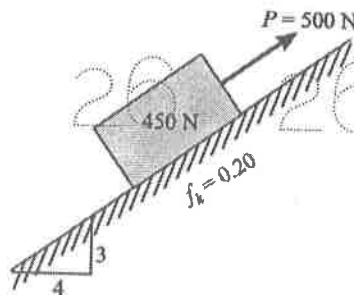


Figure: 10

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R09

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech I Year Examinations, May/June - 2019

ENGINEERING CHEMISTRY

(Common to CE, EEE, ME, ECE, CSE, CHEM, BME, IT, MMT, AE, AME, MIE)

Time: 3 hours

Max. Marks: 75

Answer any five questions

All questions carry equal marks

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- 1.a) Explain the principle and procedure involved in the potentiometric acid base titrations.
- b) What is secondary battery? Describe the construction and working of lead acid storage cell. [7+8]
- 2.a) Discuss the various factors that influence the rate of corrosion of a metal.
- b) Explain galvanization of iron. [8+7]
- 3.a) Discuss the mechanism of chain growth and step growth polymerization with examples.
- b) Outline the synthesis of nylon-6, 6 and SBR and mention their applications. [7+8]
- 4.a) Explain reverse osmosis process and its advantage.
- b) 500 ml of a sample of water contains 43.8mg of  $\text{Mg}(\text{HCO}_3)_2$ , 9.5mg of  $\text{MgCl}_2$ , 2.43mg of  $\text{Ca}(\text{HCO}_3)_2$ , 6.8mg of  $\text{CaSO}_4$  and 5.85mg  $\text{NaCl}$ . Calculate its temporary and permanent hardness. [7+8]
- 5.a) Define adsorption and differentiate between physical and chemical adsorption.
- b) What are nanomaterials? How are they prepared? Give their applications. [7+8]
- 6.a) Discuss the Fischer-Tropsch's process of Synthesis of petrol.
- b) Calculate the HCV and LCV of a fuel having the following composition. 75% C, 6% Hydrogen, 4% Oxygen, 3% Sulphur, 4% Nitrogen and rest is ash. [7+8]
- 7.a) Explain heat treatment based on iron-carbon phase diagram.
- b) With a neatly labeled phase diagram, discuss the one component system. [7+8]
- 8.a) Discuss thick film and boundary film lubrication with suitable examples.
- b) What are insulators? Give their classification and applications. [7+8]

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