

2E2005

Roll No.

Total No of Pages

2E2005

B. Tech. II Sem. (Main / Back) Exam., May - 2017

Common to all Branch
205 Engineering Mechanics

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks Main: 26

Min. Passing Marks Back: 24

Instructions to Candidates:

Attempt any **five** questions, selecting **one** question from each unit. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.

Units of quantities used/calculated must be stated clearly.

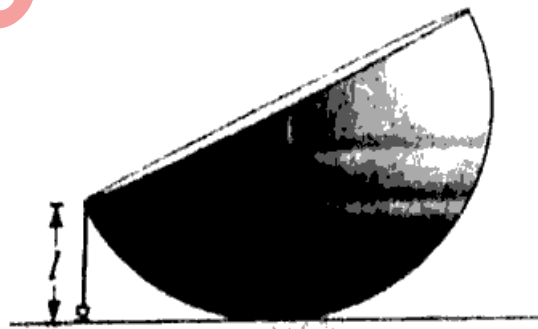
Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. NIL _____

2. NIL _____

UNIT - I

- Q.1 (a) State and explain the Varignon's theorem. [8]
- (b) A hemisphere of radius r and weight W is placed with its curved surface on a smooth table and a string of length l ($l < r$) is attached to a point on its rim and to a point on the table as shown in Figure. Find the tension of the string. [8]

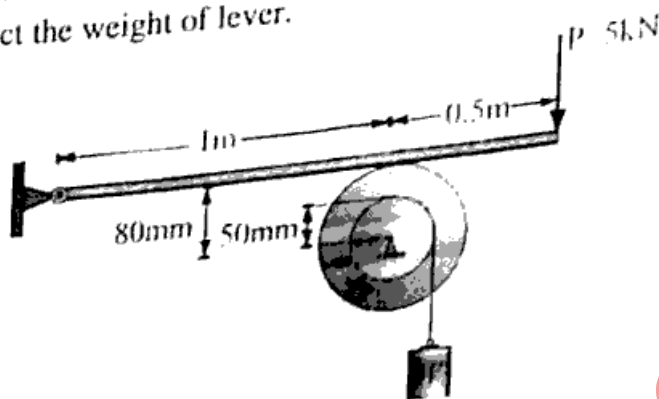


[8]

OR

Q.1 (a) Explain the principle of virtual work?

(b) What is the maximum load W that a force will hold up, if the coefficient of friction between lever and pulley is 0.2 in the arrangement shown in Figure? Neglect the weight of lever. [8]

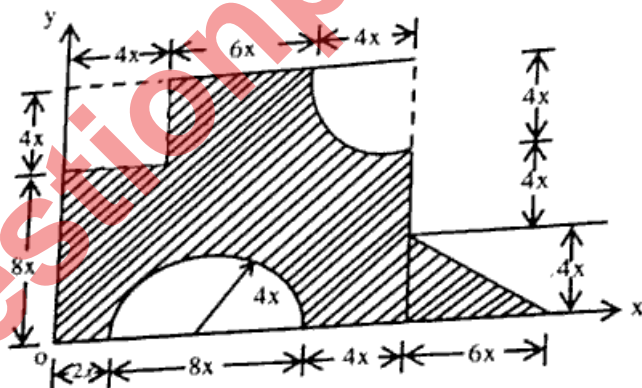


$\frac{5 \times 0.5}{\sqrt{2^2 - 1^2}}$

UNIT - II

Q.2 (a) Determine the moment of inertia of a thin elliptical disk of mass m , having axial radius of a and b . [8]

(b) Determine the centroid of the composite figure about x - y coordinate. Take $x = 40$ mm. [8]



120

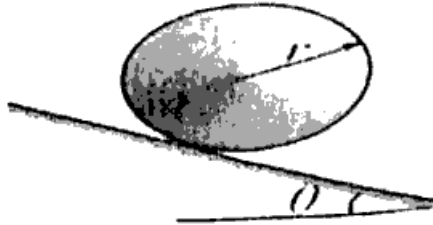
OR

Q.2 (a) Explain the reversibility and law of machine. [8]

(b) The number of teeth on the worm wheel of a single worm and worm wheel is 60. Calculate the velocity ratio if the diameter of effort wheel is 25 cm and that of load drum is 12.5 cm. The effort required to lift a load of 600 N by this machine is 20 N. Find the efficiency of the machine. [8]

UNIT - III

- Q.3 (a) Define the angle of friction and angle of repose. [8]
(b) Find the minimum value of the coefficient of friction between a body and a plane, so that the body may roll without slipping. The radius of gyration and radius of body are k and r , respectively [Fig.] [8]



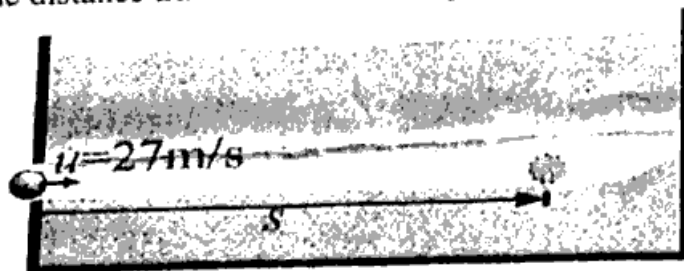
OR

- Q.3 (a) Derive an expression for the limiting ratio of tension in a V-belt over pulley. [8]
(b) Sand drops continuously from a hopper on to a moving belt as shown in Figure. What force and power are required to keep the belt moving at a constant speed? [8]

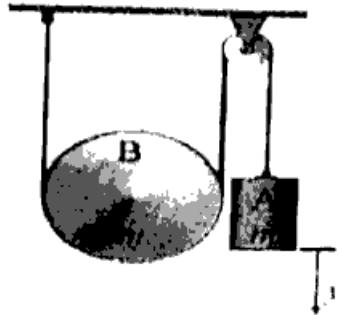


UNIT - IV

- Q.4 (a) Find Range, time of flight and maximum height for a projectile motion. [8]
(b) A sphere is fired horizontally into a viscous liquid with an initial velocity of 27 m/s [Fig.] If it experiences a deceleration $a = -6t$ m/s², where t is in seconds, determine the distance traveled before it stops. [8]



- OR**
- Q.4 (a) Define and explain Newton's law of motion for rotational motion. [8]
 (b) If the system shown in figure is released from rest, find [4]
 (i) velocity v of the falling block A as a function of y , and [4]
 (ii) tensions of the string. [4]

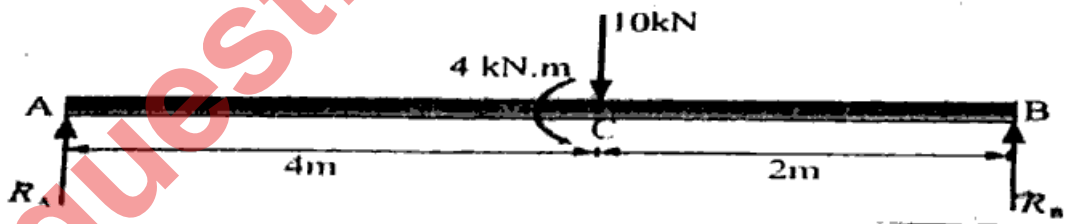


UNIT - V

- Q.5 (a) Explain the principal of work and energy. [8]
 (b) By transferring a load 10 kN at C by a force 10 kN and a moment 4 kNm, we draw free body diagram of the beam [Fig.] and applying equations of equilibrium, we have $\sum M_A = 0 \Rightarrow 10 \times 4 - 4 - R_B \times 6 = 0$ [8]

$$\sum F_y = 0 \Rightarrow R_A + R_B - 10 = 0$$

$$R_A = 4 \text{ kN and } R_B = 6 \text{ kN}$$



OR

Q.5 Write short note on: www.rtuonline.com

- (a) Conservation of Energy [8]
 (b) Conservation of angular momentum [8]