

INDIAN MARITIME UNIVERSITY

Time Bound Assignment September/October 2020

B Tech (ME) Arrear Examinations

Engineering Mechanics- II

UG11T3206

Date: 30/09/2020

Maximum Marks: 70

Time: 3 Hrs

Pass Marks: 35

PART-A

Answer the following (10x2=20 Marks)

- 1] Explain the meaning of S.H.M. and give an example of S.H.M.
- 2] The capacity of brake depends upon which factors?
- 3] State the different types of governor.
- 4] Why does a rolling sphere slow down?
- 5] What is force of friction?
- 6] What is creep in the belts? How it affects the power transmitted?
- 7] What is limiting friction?
- 8] What are the materials used for belts?
- 9] What is the function of governor?
- 10] What is compound pendulum?

PART-B

Answer any five of the following

[10x5=50 Marks]

- 11] The mean diameter of Whitworth bolt having V-threads is 25 mm. The pitch of the thread is 5 mm and the angle of V is 55° . The bolt is tightened by screwing a nut whose mean radius of the bearing surface is 25 mm. If the coefficient of friction for nut and bolt is 0.1 and for nut

and bearing surface is 0.16. Find the force required at the end of spanner 0.5 m long when the load on the bolt is 10 KN. **[10 Marks]**

12] A small flywheel of mass 85 Kg is suspended in a vertical plane as a compound pendulum. The distance of centre of gravity from the knife edge support is 100 mm and the flywheel makes 100 oscillations in 145 seconds. Find the moment of inertia of the flywheel through the centre of gravity. **[10 Marks]**

13] (a) Write mass moment of inertia through centre of following objects

- 1) Uniform sphere of radius R and mass m
- 2) Hollow cylinder of mass m
- 3) Long uniform rod of mass 'm' and length 'L'
- 4) Rectangular thin plate of mass 'm' length 'L' and width 'w'

[5 Marks]

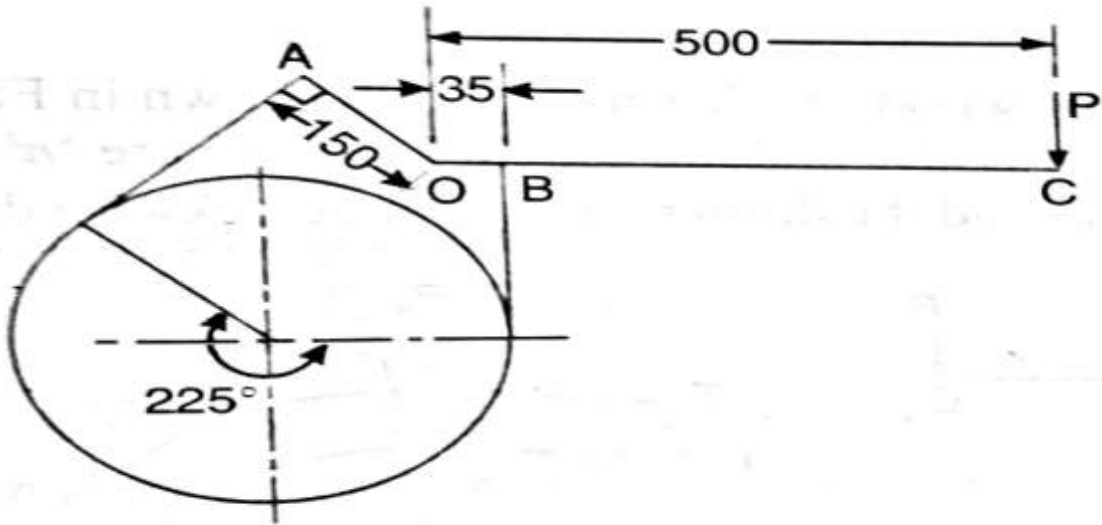
(b) The cable is wrapped around a cylinder of diameter 0.12 m and mass 50 Kg. If it unwinds 2 m by pulling it with force of 9.0 N and it starts at rest. What is its final angular velocity and velocity of cable.

[5 Marks]

14] A conical friction clutch is used to transmit 90 KW at 1500 r.p.m. The semi-cone angle is 20° and the coefficient of friction is 0.2. If the mean diameter of the bearing surface is 375 mm and the intensity of normal pressure is not to exceed 0.25 N/mm^2 . Find the dimensions of the conical bearing surface and the axis load required. **[10 Marks]**

15] An open belt running over two pulleys 240 mm and 600 mm diameter connects two parallel shafts 3 m apart and transmits 4 KW from the smaller pulley that rotates at 300 r.p.m. Coefficient of friction between the belt and the pulley is 0.3 and the safe working tension is 10 N per mm width. Determine 1] Minimum width of the belt 2] Initial belt tension and 3] Length of the belt required. **[10 Marks]**

16] A differential band brake as shown in **FIG.[1]** has an angle of contact of **225°**.The band has a compressed woven lining and bears against a cast iron drum of 350 mm diameter .The brake is to sustain a torque of 350 N-m and the coefficient of friction between the band and the drum is 0.3.Find a] The necessary force(P) for the clockwise and anticlockwise rotation of the drum ; and b] The value of OA for the brake to be self locking,when the drum rotates clockwise.



All dimensions in mm.

FIG. 1

[10 marks]

17] Define and explain the following terms relating to governors

- 1) Sensitiveness
- 2) Hunting

[5x2=10 marks]

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