INDIAN MARITIME UNIVERSITY

(A Central University , Government of India)

May-June 2018 END SEMESTER EXAMINATION

B.Tech **(**Marine Engineering**)**

Semester: II

Engineering Mechanics - II(UG11T2206/1206)

Date: 21-6-2018 **Maximum Marks:** 100

Time: 3 HRS **Pass Marks:** 50

PART-A [10x3=30 Marks]

All questions are compulsory

Q1)

a) Define center of percussion with it's significance.

b) Why porter governor cannot be Isochronous ?

c) What is creep in the belts ? How it affects the power transmitted ?

d) State and explain laws of dry friction.

e) What is the function of governor ?

f) What are the advantages of V-belt drive over flat belt drive?

g) Why does a rolling sphere slow down ?

h) Distinguish between brakes and dynamometers.

i) Write a short note on Friction clutches.

j) Explain angle of repose with a sketch.

PART-B [14x5=70 Marks]

Answer any five of the following

Q2) In **Fig (1)** the block A weighs 250 N, B weighs 500 N. The co-efficient of friction are 0.4 between A and B, 0.1 between B and the plane and 0.3 between fixed drum 'C' and the cable. Determine the least weight of the block D for motion of the block 'D' to impend**.** **[14 Marks**]

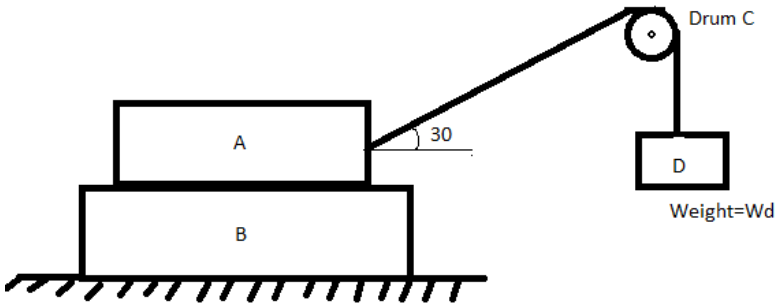

Fig. 1

Q3)

a) Write short notes on following :

1) Simple Harmonic Motion

2) Hydraulic Dynamometer **[7 Marks]**

b) A uniform stick of mass 'm' and length 'L' is suspended horizontally with end 'B' at the edge as shown in **Fig(2).** Point 'A' is suddenly released. At the instant after release.

1) What is the torque about the end B on the table ?
2) What is the angular acceleration about the end 'B' on the table ?.
3) What is the vertical component of the hinge force?

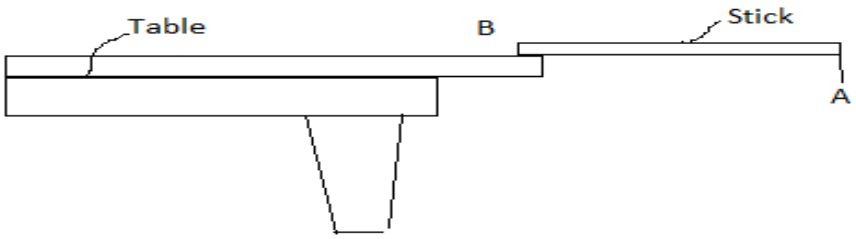

Fig. 2

[7 Marks]

Q4)

a) Show that minimum periodic time of a compound pendulum is given by $(t_p)min = \mathbf{2\pi}\sqrt{\frac{2\,KG}{g}}$ where, KG is radius of gyration about an axis through centre of gravity**.** **[7 Marks]**

b) List out various types of Governors and explain any one of them. **[7 Marks]**

Q5) Determine the width of a 9.75 mm thick leather belt required to transmit 15 KW from a motor running at 900 rpm. The diameter of the driving pulley of the motor is 300 mm. the driven pulley runs at 300 rpm and the distance between the centre of two pulleys is 3 m. The density of leather is 1000 Kg/m^3. The maximum allowable stress in the leather is 2.5 MPa. The coefficient of friction between the leather and pulley is 0.3. Assume open belt drive, Neglecting sag and slip of the belt. **[14 Marks]**

Q6) A simple band brake shown in **Fig (3)** is applied to shaft carrying a flywheel of 250 Kg mass and of radius of gyration of 300 mm. The shaft speed is 200 rpm. The drum diameter is 200 mm and the coefficient of friction is 0.25. determine

1) Brake torque when a force of 120 N is applied at the lever end.
2) Number of turns of the flywheel before it comes to rest.
3) Time taken by flywheel to come to rest.

[14 Marks]

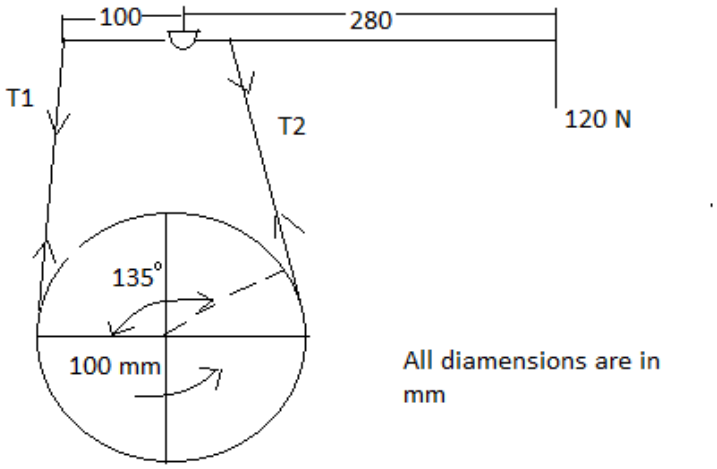

Fig. 3

3)

Q7)

a) Define and explain the following terms relating to governors

1) Stability
2) Sensitiveness
3) Hunting

[7 Marks]

b) In an open-arm type governor as shown in **Fig (4)** AE=400 mm, EF=50 mm and angle θ=35°. Determine the change in vertical height and percentage change in speed when 'θ' decreases to 30°.

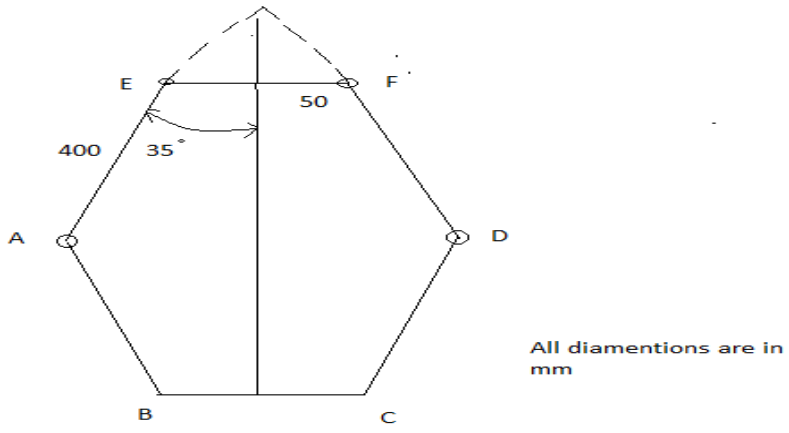

Fig. 4

[7 Marks]

Q8) The mean diameter of the screw jack having pitch of 10 mm is 50 mm. A load of 20 KN is lifted through a distance of 170 mm. Find the work done in lifting the load and efficiency of the screw jack when.

1) The load rotates with the screw and,
2) The load rests on the loose head which doesn't rotate with the screw.

The external and internal diameter of the bearing surface of the loose head are 60 mm and 100 mm respectively. The coefficient of friction for the screw as well as bearing surface can be assumed as 0.08

[14 Marks]

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