

INDIAN MARITIME UNIVERSITY

(A Central University, Govt. of India)

End Semester Examinations December 2017

Programme: B.Tech (Marine Engineering)

Semester: Second Semester

Subject Name: Engineering Mechanics-II

Subject Code:

UG11T2206/UG11T1206

Date: 21.12.2017

Max. Marks: 100

Time: 3 Hrs

Pass Marks: 50

PART-A

Marks: 10X3 = 30

(All questions are Compulsory)

1.

- (a) Define coefficient of friction and cone of friction.
- (b) State the useful and harmful effects of friction.
- (c) Write down any three laws of simple pendulum.
- (d) Define D'Alembert's Principle.
- (e) Define torque? What is the unit of torque?
- (f) Explain the terms: Amplitude and Periodic Time as applied to SHM
- (g) What are the advantages of V-Belt drive over a flat belt drive?
- (h) Differentiate between the open Belt drive & cross belt drive
- (i) Classify the different types of brake.
- (j) What is the function of governor? Classify the different types of governor.

PART-B

Marks: 5X14=70

(Answer any 5 of the Following)

2.

- (a) The pitch of 50 mm in mean diameter threaded screw of a screw jack is 12.5 mm. The coefficient of the friction between the screw and the nut is 0.13. Determine the torque required on the screw to raise a load of 25 kN, assuming the load to rotate with the screw. (6 marks)
- (b) Derive the expression for power lost in friction in flat pivot bearing considering uniform pressure theory. (8 marks)

3. The thrust of a Propeller shaft in a Marine Engine is taken up by 8 collars whose external and internal diameters are 600 mm and 300 mm respectively. The total thrust from the propeller is 100 kN. If the Coefficient of friction is 0.12 and speed of the engine 90 rpm, find the power absorbed in friction of thrust block, assuming i) uniform pressure; and ii) uniform wear (14 Marks)
4. (a) A simple pendulum of amplitude 4° performs 24 oscillations in one minute. Find (i) length of the pendulum (ii) maximum acceleration of the bob, (iii) maximum linear velocity of the bob; and (iv) maximum angular velocity of the bob. (10 Marks)
- (b) A wheel increases its speed from 50 rpm to 100 rpm in 30 seconds. Find angular acceleration of the wheel. (4 Marks)
5. A single block brake is shown in Fig.1 The diameter of the drum is 250 mm and the angle of contact is 90° . If the operating force of 700 N is applied at the end of a lever and the coefficient of friction between the drum and the lining is 0.35, determine the torque that may be transmitted by the block brake. (14 Marks)

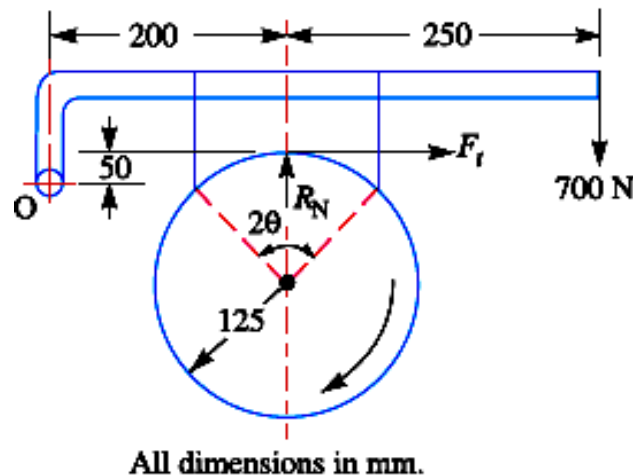


Fig.1

6. Find the power transmitted by a rope drive, from the following data:
 Angle of contact= 180°
 Pulley groove angle= 60°
 Coefficient of friction= 0.2
 Mass of rope= 0.4 Kg/meter length
 Permissible tension= 1.5 KN
 Velocity of rope= 15 m/s (14 Marks)

- 7.** A belt 100mm x 10 mm thick is transmitting power at 1200m/min. The net driving tension is 1.8 times the tension on the slack side. If the safe stress on the belt section is 1.8 N/mm^2 , calculate the power that can be transmitted at this speed Assume mass density of the leather as 1000 kg/m^3 .

Also calculate the absolute maximum power that can be transmitted by this belt and the speed at which this can be transmitted.

(14 Marks)

- 8.** A Porter governor has equal arms each 250 mm long and pivoted on the axis of rotation. Each ball has a mass of 5 kg and mass of the central load on the sleeve is 25 kg. The radius of rotation of the ball is 150 mm when the governor begins to lift and 200 mm when the governor is at maximum speed. Find minimum & maximum speed and range of speed of the governor.

(14 Marks)
