Total No. of Questions – [04] Total No. of Printed Pages - 2

G.R. No.	

Paper Code: U359 -152(T1)

OCTOBER 2019/ INSEM (T1)

T. Y. B. TECH. (MECHANICAL) (SEMESTER - I)

COURSE NAME: Dynamics of Machinery

COURSE CODE: MEUA31172

(PATTERN 2017)

Time: [**1 Hour**] [Max. Marks: **30**]

(*) Instructions to candidates:

1) **Answer Q.1 OR Q.2 and Q.3 OR Q.4.**
2) **Figures to the right indicate full marks.**
3) **Use of scientific calculator is allowed**
4) **Use suitable data where ever required**

Q.1) a) With the help of diagram, derive the expression for the natural frequency of "Bifilar-Suspension". [6 marks]

b) A machine component of 5 kg mass is placed on a horizontal circular platform which is suspended by three equal wires, each 1.25 m long from rigid support. The wires are equally spaced round the reference of circle with 125 mm radius. When the mass centre of the component coincides with the axis of circle, it takes 30 sec for 10 angular oscillations. The platform along has a mass of 1.5 kg and takes 35sec for 10 oscillations. Find M.I. of the component about an axis through its mass centre. [6 marks]

c) Explain the concept of equivalent length of simple pendulum. [4 marks]

OR

Q.2) a) Derive the torque expression in dynamic force analysis or inertia force analysis of IC engine mechanism. [6 marks]

b) The connecting rod of an engine has a length equal to 220 mm between centres and has a mass equal to 2 kg. Its CG is at 150 mm from the small end centre and the moments of inertia of 0.02 kg-m^2 about CG. Find:

(i) the two mass dynamically equivalent system when one mass is located at the small end centre.

(ii) the correction couple, if two masses are placed at the two ends and the angular acceleration of the rod is 20,000 rad/s^2 anticlockwise. [6 marks]

c) Derive an expression for correction couple to be applied to make a connecting rod to be dynamically equivalent, when two masses are placed one at crank pin and other gudgeon pin. [4 marks]

Q.3) a) Derive an expression for frictional torque of a single flat collar thrust bearing assuming uniform pressure and uniform wear theory. [6 marks]

b) A single Block brakes as shown in Fig. (a) has a brake drum of diameter of 2m. it required braking torque 500Nm at 300rpm clockwise. The coefficient of friction is 0.25. Determine the required force P to be applied at the end of lever when (a) Angle of contact is 30^0. (2) Angle of contact is 90^0. [4 marks]

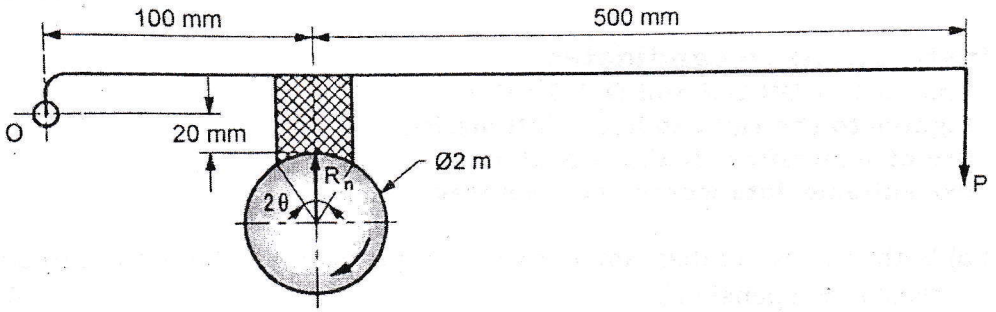

Fig. (a)

c) Explain "self-energizing", and self-locking, effect in block or shoe brakes. [4 marks]

OR

Q.4) a) Derive an expression for torque transmitting capacity of "Cone Clutch". [6 marks]

b) A single plate clutch, effective on both sides, is required to transmit 25 KW at 3000 r.p.m. Determine the outer and inner radii of frictional surface if the coefficient of friction is 0.225, the ratio of radii is 1.25 and the maximum pressure is not to be exceed 0.1×10^6 N/m^2. Also determine the axial thrust to be provided by springs. Assume uniform wear theory. [4 marks]

c) Explain with neat sketch "Centrifugal Clutch". [4 marks]