Find the amount of out of balance force and couple at 600 rpm. If the shaft is balanced by adding two masses at a radius of 70 mm and at a balance of 100 mm from the central plane of the middle eccentric. Find the amount of the masses and their angular positions. **20**

5. A V-twin engine has the cylinder axes at right angle and connecting rods operate a common crank. The reciprocating mass per cylinder is 10 kg and crank radius is 80 mm. The length of connecting rod is 0.4 m. Show that the engine may be balanced of primary forces by means of a revolving balance. If the engine speed is 600 rpm, what is the value of maximum resultant secondary force ? **20**

6. Determine the required input torque on the crank of a slider-crank mechanism for the static equilibrium when the applied piston load is 3000N. The lengths of the crank and the connecting rod are 10 cm and 30 cm respectively and the crank has turned through 60º from the inner dead centre. **20**

W532

B. Tech. (Weekend)

EXAMINATION, Dec. 2018

(Fifth Semester)

(Re-appear Only)

ME

MEW303

DYNAMICS OF MACHINES

Time : 3 *Hours*]   [*Maximum Marks :* 100

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt any *Five* questions. All questions carry equal marks.

1. (a) Explain clearly how you would determine from the controlling force curve whether a governor is stable, unstable or isochronous. **8**

   (b) Calculate the minimum speed, maximum speed and range of the speed of a Porter governor, which has equal arms each 200 mm long and pivoted on the axis of rotation. The mass of each ball is 4 kg and the central mass on the sleeve is 20 kg. The radius of rotation of ball is 100 mm when the governor begins to life and 130 mm when the governor is at maximum speed. **12**

2. (a) The following data refer to a laboratory experiment with rope brake : diameter of the fly wheel = 1.5 m, diameter of the rope = 15 mm, dead weigh on the brake = 65 kg, speed of the engine = 180 rpm, spring balance reading = 120 N, find the power of the engine. **8**

   (b) Explain the working of any transmission type dynamometer. **12**

3. (a) Describe the effect of Gyroscopic couple on a Naval Ship during Steering. **8**

   (b) Find the angle of inclination with respect to the vertical of a two wheeler negotiating a turn. Given : combined mass of the vehicle with its rider 350 kg, moment of inertia of the engine flywheel 0.25 kg-m^2; moment of inertia of each road wheel 1.8 kg-m^2; speed of engine flywheel 6 times that of road wheels and in the same direction; height of centre of gravity of rider with vehicle 0.75 m; two wheeler speed 55 km/h; wheel radius 0.6 m; radius of turn 35 m. **12**

4. A shaft has three eccentries of mass 1 kg each. The central plane of the eccentries is 50 mm apart. The distances of the centers from the axis of rotation are 20 mm, 30 mm and 20 mm and their angular positions are 120° apart.

7. The crank and connecting rod of a vertical petrol engine running at 1800 rpm are 60 mm and 260 mm respectively. The diameter of piston is 100 mm and the mass of the reciprocating parts is 1.2 kg. During the expansion stroke when the crank has turned 30º from the top dead centre, the gas pressure is 600 kN/m^2. Determine (i) net force on the piston, (ii) net load on gudgeon pin, (iii) thrust on the cylinder walls (iv) turning moment on crank shaft. **20**

8. Write short notes on the following : **20**
   (a) Balancing of In-line two cylinder engine
   (b) Different types of engine shaking forces
   (c) Stability and Sensitiveness of the governor.