(b) Prove that the result unbalanced force is minimum when half of the reciprocating masses are balanced by rotating masses i.e. C = ½. **10**

Unit III

5. (a) Explain clearly how you would determine from the controlling force curve whether a governor is stable, unstable or isochronous. **5**

(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 lift and 130 mm when the governor is at maximum speed. **10**

6. (a) Describe the effect of Gyroscopic Couple on a Naval ship during steering. **5**

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B. Tech. EXAMINATION, May 2019

(Sixth Semester)

(B. Scheme) (Main & Re-appear)

(ME)

ME302B

DYNAMICS OF MACHINES

Time : 3 Hours]   [*Maximum Marks :* 75

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.
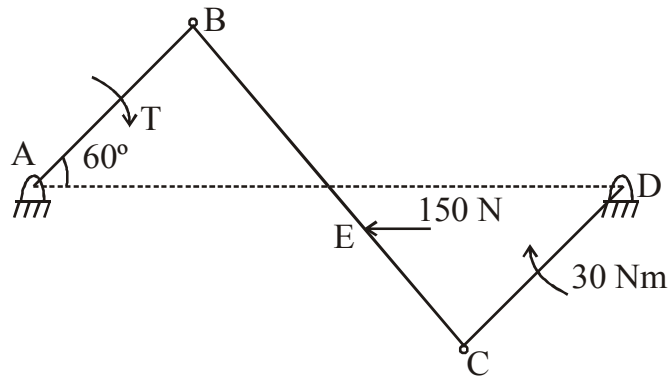
Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. You may assume any missing data.

Unit I

1. Determine the torque to be applied to the link AB of a four link mechanism as shown in figure to maintaing static equilibrium at the given position : **15**

    AB = 200 mm, BC = 700 mm, CD = 400 mm

    BE = 400 mm, AD = 700 mm.

2. A vertical double acting steam engine develops 75 kW at 250 rpm. The maximum fluctuation of energy is 30 per cent of the work done per stroke. The maximum and minimum speeds are not to vary more than 1 per cent on either side of the mean speed. Find the mass of the flywheel required, if the radius of gyration is 0.6 m. **15**

Unit II

3. A shaft has three eccentrics of mass 1 kg. each. The central plane of the eccentrics is 50 mm apart. The distances of the centres from the axis of rotation are 20 mm, 30 mm and 20 mm and their angular positions are 120º apart. 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. **15**

4. (a) Derive an expression for Swaying couple of an uncoupled two cylinder locomotive engine. **5**

(iii) Thrust on the cylinder walls, and

(iv) The speed above which, other things remaining same, the gudgeon pin load would be reversed in the direction.   **15**

8. Describe the working of a band and block bradk with the help of neat sketch. Deduce the relation for ratio of tight and slack side tensions.   **15**

(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.   **10**

Unit IV

7. The crank and connecting rod of a vertical petrol engine, running at 1800 rpm are 60 mm and 270 mm respectively. The diameter of the piston is 100 mm and the mass of the reciprocating parts is 1.2 kg. During the expansion stroke when the crank has turned 20º from TDC, the gas pressure is 650 kN/m^2 determine the :

(i) Net force acting on the piston

(ii) Resultant load on the gudgeon pin