

ADMISSION NUMBER											

School of Engineering
B.TECH Mechanical Engineering
Mid Term Examination - May 2024

Duration : 90 Minutes
Max Marks : 50

Sem VI - G3UB602B - Dynamics of Machines

General Instructions

Answer to the specific question asked

Draw neat, labelled diagrams wherever necessary

Approved data hand books are allowed subject to verification by the Invigilator

- 1) Infer Why smaller fly wheel is used in multi cylinder engines? K2 (2)
- 2) Compare the terms 'coefficient of fluctuation of energy' and 'coefficient of fluctuation of speed', in the case of flywheels. K1 (3)
- 3) Infer the difference between piston effort, crank effort and crank-pin effort K2 (4)
- 4) Derive an analytical expression for velocity of the slider of a single slider crank chain. K2 (6)
- 5) Discuss how a single revolving mass is balanced by two masses revolving in different planes. K3 (6)
- 6) During a trial on steam engine, it is found that the acceleration of the piston is 36 m/s^2 when the crank has moved 30° from the inner dead centre position. The net effective steam pressure on the piston is 0.5 N/sq.mm and the frictional resistance is equivalent to a force of 600 N . The diameter of the piston is 300 mm and the mass of the reciprocating parts is 180 kg . If the length of the crank is 300 mm and the ratio of the connecting rod length to the crank length is 4.5 , find: 1. Reaction on the guide bars, 2. Thrust on the crank shaft bearings, and 3. Turning moment on the crank shaft K3 (9)
- 7) Categorize the techniques used to balance masses rotating in the same plane. K4 (8)
- 8) A shaft fitted with a flywheel rotates at 250 r.p.m. and drives a machine. The torque of machine varies in a cyclic manner over a period of 3 revolutions. The torque rises from 750 N-m to 3000 N-m uniformly during $1/2$ revolution and remains constant for the following revolution. It then falls uniformly to 750 N-m during the next $1/2$ revolution and remains constant for one revolution, the cycle being repeated thereafter. Determine the power required to drive the machine and percentage fluctuation in speed, if the driving torque applied to the shaft is constant and the mass of the flywheel is 500 kg with radius of gyration of 600 mm . K4 (12)

OR

An inside cylinder locomotive has its cylinder centre lines 0.7 m apart and has a stroke of 0.6 m . The rotating masses per cylinder are equivalent to 150 kg at the crank pin, and the reciprocating masses per cylinder to 180 kg . The wheel centre lines are 1.5 m apart. The cranks are at right angles. The whole of the rotating and $2/3$ of the reciprocating masses are to be balanced by masses placed at a radius of 0.6 m . Find the magnitude and direction of the balancing masses. Find the fluctuation in rail pressure under one wheel, variation of tractive effort and the magnitude of swaying couple at a crank speed of 300 r.p.m. K4 (12)