(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 140613 Roll No. | | | | | | | | | | |

B.TECH.

Theory Examination (Semester-VI) 2015-16

DYNAMICS OF MACHINE

Time : 3 Hours ***Max. Marks : 100***

Section-A

Q1. Attempt all question **(2×10=20)**

(a) Differentiate between static force analysis and dynamic force analysis.

(b) Define crank effort and crank-pin effort.

(c) Define coefficient of fluctuation of speed.

(d) State the conditions for complete balance of several masses revolving in different planes of a shaft.

(e) What are the effects of hammer blow and swaying couple?

(j) Write expression for gyroscopic couple.

Q2. Attempt any five. (5×10=50)

(a) Deduce the expression for the inertia force in the reciprocating force neglecting the weight of the connecting rod.

(b) The radius of gyration of a fly wheel is 1 meter and fluctuation of speed is not to exceed 1% of the mean speed of the flywheel. If the mass of the flywheel is 3340kg and the steam develops 150KW at 135rpm, then find

i. Maximum fluctuation of energy

ii. Coefficient of fluctuation of energy

pended mass.

(e) A cantilever shaft 50mm diameter and 300mm long has a disc of mass 100kg at its free end. The young's modulus for the shaft material is 200GN/m². Determine the frequency of longitudinal and transverse vibration of the shaft.

(f) Explain the effect of gyroscopic couple on an Aeroplane on both the tum.

(g) Calculate the rage of speed of a porter governor which has equal arms of each 200mm long and pivoted on the axis of rotation. The mass of each ball is 4kg and the central load of the sleeve is 20kg.The radius of rotation of the ball is 100mm when the governor being to lift and 130mm when the governor is at maximum speed.

(h) A porter governor has equal arms each 250mm long and pivoted on the axis of rotation. Each ball has a mass of 5kg and mass of the central load on the sleeve is 25kg.The radius of rotation of the ball is 150mm when governor is at maximum speed. Find the maximum and minimum speed and range of speed of the governor.

Attempt any two **(2×15=30)**

Q3. The total mass of four wheel trolley car is 1800kg. The car runs on rail of 1.6m gauge and round a curve of 24m mean radius at 36km/hr. The track is banked at 10°. The diameter of the wheel is 600mm. Each pair of wheel with axle has a mass of 180kg and radius of gyration of 240mm. The height of the CG of car above the wheel base is 950mm. Determine the pressure on each rail.

Q4. The length of the upper and lower arms of a porter governor are 200mm and 250mm respectively. Both the arms are pivoted on the axis of rotation. The central load is 150N, the weight of the each ball is 20N and the friction of the sleeve together with the resistance of the operating gear is equivalent to a force of 30N at the sleeve. If the limiting inclinations of the upper arms to the vertical are 30° and 40° taking friction in to account. Find the range of speed of the governor.

Q5. The barrel of a large gun recoils against a spring on firing. At the end of the firing, a dashpot is engaged that allows the barrel to return to its original position in minimum time without oscillation. Gun barrel mass is 400kg and initial velocity of recoils 1m.Determine spring stiffness and critical damping coefficient of dashpot.