2006-VISVESVARAYA TECHNOLOGICAL UNIVERSITY
B.E DEGREE EXAMINATION
DYNAMIC OF MACHINES
(MECHANICAL ENGINEERING)

TIME-3HOUR
MARK-80

ANSWER ANY FIVE QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS

1 a. In a four bar mechanism shown in Fig.Q1(a) Torque T3 and T4 have magnitudes of 3000 Nm and 2000 Nm respectively. If links AD = 800 mm, AB = 700 mm, BC = 700 mm amd CD = 400 mm, find the required torque on the crank for static equilibrium of the Mechanism.

b. What are the implications of considering friction in static force analysis?

2 a. Explain D'Alemberts Principle and state why it is used.

b. Apunching press is required to punch 40mm diameter holes in a plate of 30mm thickness at the rate of 4 holes per minute. It required 6Nm of energy per mm² of shared area. The punch has a stroke of 100mm. The rpm of the Flywheel varies from 320 to 280. If the radius of gyration of flywheel is 1m, find i) the power of the motor and ii) mass of theFlywheel.

3 a. State the Laws of Dry friction.

b. A leather belt is required to transmit 9kW from a pulley 120cm in diameter running at 200 rpm. The angel embraces is 165º and the co-efficient of friction between leather belt and pulley is 0.3. If the safe working stress for the leather belt is 140N/cm², the mass of the leather is 1 gm/cm³ and the thickness of the belt is 10mm, determine the width of the belt taking centrifugal tension into account.

4 a. Explain Static Balancing and Dynamic Balancing.

b. Four masses A,B,C, and D having 200kg, 300kg, 240kg and 260kg respectively, revolve at a radius of rotation 270mm, 210mm, 300mm and 360mm respectively. The distance of planes B,C and D measured from A are 45º, 120º and 255º respectively. Two balancing masses are placed in planes L and M, which are 500mm apart. The distance of Plane L from A is 120mm and M deom D is 100mm. If the balancinf masses revolve at a radius of 72mm, find their magitude and angular position.

5 a. Prove that the resultant unbalances fprce is minimum when half of the reciprocating masses are balanced by rotating masses i.e. C= ½.

b. A V – 90 engine has two cylinders which are placed symmetrically . The two connecting rods operate a common crank. The length of the connecting rods are 320mm each and crank radius is 80mm. The reciprocating mass per cylinder is 12kg. If the engine speed is 600rpm, find the resultant primary and secondary forces. Also find the maximum resultant Secondary force.

6 a. Explain the terms Sensitiveness, Isochronism and Effort and Power of a Gobernor.

b. The length of upper arm and a lower arms of a Porter Governor are 200mm and 250mm respectively. Both the arms are pivoted to the axis of rotation. The central load is 150N, the weight of 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 arm to the vertical are 30º and 40º , determine the range of speed of the Governor.

7 a. Explain the effect of Gyroscopic couple of a ship under i) Steering ii) Pitching and iii) Rolling.

b. Analyze the stability of a two wheel vehicle turning left. Derive the necessary equation.

8 For a symmetrical tangent cam operating roller follower, the least radius of cam is 30mm and roller radius is 15mm. The angle of ascent is 60º, the total lift is 15mm and the speed of the cam is 300rpm. Calculate.
a. Principal dimensions of the cam.

b. Accelaration of the follower at the beginning of lift, where the roller just touches the nose and at the apex of circular nose. Assume that there is no dwell between ascent and descent.