

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

PAPER ID : 4076

Roll No.

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B. Tech.

(SEM. V) ODD SEMESTER THEORY EXAMINATION 2010-11

DYNAMICS OF MACHINE

Time : 3 Hours

Total Marks : 100

- Note :**
- (1) Attempt *all* questions.
 - (2) Marks are indicated against each question part.
 - (3) Assume missing data suitably, if any.

1. Attempt any *four* of the following : (5×4=20)
 - (a) What are free body of a mechanism ? Explain in brief.
 - (b) What is meant by piston effort and make effort ?
 - (c) State and explain D Alembert's principle.
 - (d) What do you mean by dynamically equivalent system ? Explain.
 - (e) Define the terms coefficient of fluctuation of energy and coefficient of fluctuation of speed.
 - (f) What is flywheel ? What is its use ?
2. Attempt any *two* of the following : (10×2=20)
 - (a) Three masses of 8 kg, 12 kg and 15 kg attached at radial distances of 80 mm, 100 mm and 60 mm respectively to a disc on a shaft are in complete balance. Determine the angular position of the masses 12 kg and 15 kg relative to 8 kg mass.

- (b) The following data relate to a single cylinder reciprocating engine :

Mass of reciprocating parts =	40 kg
Mass of revolving parts =	30 kg at crank radius
Speed =	150 rpm
Stroke =	350 mm

If 60% of the reciprocating parts and all the revolving parts are to be balanced, determine :

- the balance mass required at a radius of 320 mm
- the unbalanced force when the work has turned 45° from the top dead centre.

- (c) Explain the method of finding the counter masses in two planes to balance the dynamic unbalance of rotating masses.

3. Attempt any *two* of the following :— (10×2=20)

- What is a Clutch ? Make a sketch of a single plate clutch and describe its working.
- A countershaft is to be driven at 240 rpm from a driving shaft rotating at 100 rpm by an open belt drive. The diameter of the driving pulley is 480 mm. The distance between the centre line of shafts is 2 m. Find the width of the belt to transmit 3 kW of power if the safe permissible stress in tension is 15 N/mm width of the belt. Take $\mu = 0.3$.
- What is the advantage of self-expanding shoe brake ? Derive the relation for the friction torque for such a brake.

4. Attempt any *two* of the following :—

- Sketch a Hatnell governor. Describe its function and deduce a relation to find the stiffness of the spring. (10)
- Explain the terms sensitiveness, hunting and stability relating to governors. (10)
- What is meant by effort and power of a governor ? (4)
 - Explain the working principle of an inertia governor with the help of a neat sketch. (6)

5. Attempt any *two* of the following :—

- What do you mean by spin, precession and gyroscopic planes ? (6)
 - Explain what is meant by applied torque and reaction torque. (4)
- Explain the gyroscopic effect on four wheeled vehicles. (10)
- A flywheel having a mass of 20 kg and a radius of gyration of 300 mm is given a spin of 500 rpm about its axis which is horizontal. The flywheel is suspended at a point 250 mm from the plane of rotation of the flywheel. Find the rate of precession of the wheel. (10)