PVP 14

Code: ME5T1

**III B.Tech - I Semester – Regular Examinations – December 2016**

# DYNAMICS OF MACHINERY
## (MECHANICAL ENGINEERING)

Duration: 3 hours Max. Marks: 70

PART – A

Answer ***all*** the questions. All questions carry equal marks

11x 2 = 22 M

1. a) Define uniform pressure theory.
   b) List the applications of brakes.
   c) Compare clutch and brake.
   d) What do you mean by primary and secondary unbalance?
   e) What do you mean by precession?
   f) State the D–Alembert's Principle.
   g) Explain about turning moment diagram.
   h) Classify the governors.
   i) Discuss static balancing.
   j) What do you mean by vibrations?
   k) Explain about longitudinal vibration.

PART – B

Answer any ***THREE*** questions. All questions carry equal marks. 16 x 3 = 48 M

2. a) A multiple disc clutch has five plates having four pairs of active friction surfaces. If the intensity of pressure is not to exceed 0.127 N/mm$^2$, find the power transmitted at 500 r.p.m. The outer and inner radii of friction surfaces are 125 mm and 75 mm respectively. Assume uniform wear and take coefficient of friction = 0.3. 4 M

   b) What are the various Types of brakes? Describe. 12 M

3. a) Explain the application of gyroscopic principles to aircrafts. 10 M

   b) A vertical double acting steam engine has a cylinder 300 mm diameter and 450 mm stroke and runs at 200 r.p.m. The reciprocating parts have a mass of 225 kg and the piston rod is 50 mm diameter. The connecting rod is 1.2 m long. When the crank has turned through 125° from the top dead centre, the steam pressure above the piston is 30 kN/m$^2$ and below the piston is 1.5 kN/m$^2$. Calculate the effective turning moment on the crank shaft. 6 M

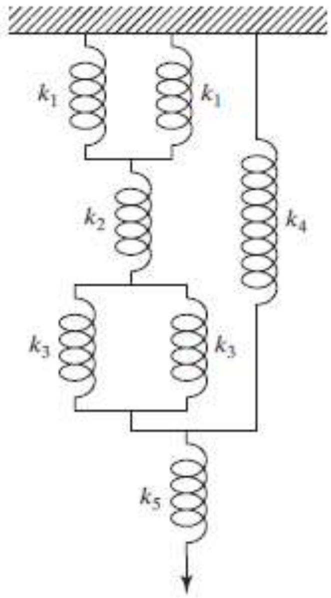
4. a) The turning moment diagram for a multicylinder engine has been drawn to a scale 1 mm = 600 N-m vertically and 1 mm = 3° horizontally. The intercepted areas between the output torque curve and the mean resistance line, taken in order from one end, are as follows:
+ 52, – 124, + 92, – 140, + 85, – 72 and + 107 $mm^2$, when the engine is running at a speed of 600 r.p.m. If the total fluctuation of speed is not to exceed ± 1.5% of the mean, find the necessary mass of the flywheel of radius 0.5 m.
8 M

b) Derive an expression for force required to compress the spring of a Hartnell governor by one mm. 8 M

5. a) Explain the concept of balancing of several masses in different planes. 8 M

b) In an in-line six cylinder engine working on two stroke cycle, the cylinder centre lines are spaced at 600mm. In the end view, the cranks are $60^0$ apart and in the order 1-4-5-2-3-6. The stroke of each piston is 400mm and the connecting rod length is 1 metre. The mass of the reciprocating parts is 200kg per cylinder and that of rotating parts 100kg per crank. The engine rotates at 300 rpm. Examine the engine for the balance of primary and secondary forces and couples. Find the maximum unbalanced forces and couples. 8 M

6. a) Determine the equivalent spring constant of the system shown in figure. 8 M




b) Explain about Energy method for finding the natural frequency of free longitudinal vibrations. 8 M