TME-503   1090

Odd Semester Examination, 2017-18

B.TECH. (SEMESTER-V)

DYNAMICS OF MACHINES

Time: 03:00 Hours   Max Marks : 100

Note : Attempt all questions.

1. Attempt **any four** questions :   (5x4=20)

    (a)   Draw turning moment diagram of a four stroke cycle I.C. Engine and explain its working.

    (b)   The mass of flywheel of an engine is 6.5 tones and the radius of gyration is 1.8mts. From turning moment diagram the fluctuation energy is found to be 56KN-m. If mean speed of engine is 120 rpm, find its minimum and maximum speeds.

    (c)   Derive an expression for energy stored in a flywheel.

    (d)   Derive an expression for Crank effort or torque on the Crank shaft.

    (e)   What do you understand by inertia force and inertia couple?

2. Attempt **any four** questions :   (5x4=20)

    (a)   Four masses m_1, m_2, m_3 and m_4 are 200Kg, 300Kg, 240Kg and 260Kg respectively. The corresponding radii of rotation are 0.2m, 0.15m, 0.25m and 0.3m respectively and the angle between successive masses are 45^0, 75^0 an d135^0. Find position and magnitude of balance mass required if its radius is 0.2m.

    (b)   Explain variation of tractive force and swaying couple.

    (c)   Elaborate term balancing of V-engines. Also discuss its forces.

    (d)   Discuss how a single revolving mass is balanced by two masses revolving in different planes.

    (e)   Explain the 'direct and reverse crank' method for determing unbalanced forces in radial engines.

3. Attempt **any two** questions : (10x2=20)

   (a) Derive an expression for the total frictional torque by a cone clutch assuming :

      (i) Uniform pressure

      (ii) Uniform wear

   (b) A shaft which rotates at a constant speed of 160rpm is connected by belting to a parallel shaft 720mm apart, which has to run at 60, 80, 100rpm. The smallest pulley on the driving shaft is 40mm in radius. Determine the remaining radii of the stepped pulleys for 1.crossed belt 2. An open belt. Neglect belt thickness and slip.

   (c) Explain the self locking and self energized brake. Derive the relation for the friction torque for such brake.

4. Attempt **any two** questions : (10x2=20)

   (a) Explain the terms and derive expressions for 'Effort' and 'Power' of a porter governor.

   (b) A porter governor has equal arms each 250mm long and pivoted on the axis of rotation. Each ball has a mass of 5Kg and the mass of the central load on the sleeve is 25Kg. The radii of rotation of the ball is 150mm when the governor begins to lift and 200mm when the governor is at maximum speed. Find range of speed, sleeve lift, governor effort and power of the governor in following cases :

      (i) When friction at the sleeve is neglected and,

      (ii) When friction at the sleeve is equivalent to 10N.

   (c) Explain the following :

      (i) Sensitiveness

      (ii) Isochronism

      (iii) Hunting

      (iv) Stability

5. Attempt **any two** questions : (10x2=20)

   (a) Explain the effects of the gyroscopic couple on the stability of an aircraft.

   (b) Discuss the effects of gyroscopic couple on a Noval ship during the following:

(i)   Steering

(ii)   Pitching

(iii)   rolling

(c)   When s four wheel vehicle takes turn towards left hand side what would be the direction of gyroscopic couple and centrifugal couple acting on it and what would be the effect on the wheels?

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