013502

December 2022

B. Tech. (HE) V SEMESTER

Dynamics of Machines (PCC-ME-502-21)

Time: 3 Hours] [Max. Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART-A

1. (a) What is balancing? (1.5)

   (b) What are vibrations? (1.5)

   (c) Explain vibration isolation. (1.5)

   (d) Explain D-Alembert principle. (1.5)

   (e) What is controlling force? (1.5)

   (f) What is gyroscope? (1.5)

(g) Explain hunting of governor. (1.5)

(h) What is governor? (1.5)

(i) What do you mean by reference plane? (1.5)

(j) Explain the terms spin and presession. (1.5)

PART-B

2. Find an expression for the torque exerted on the crank shaft when friction and inertia of moving parts are neglected. (15)

3. A ship has a propeller of mass moment of inertia 2000 kg m^2. The propeller rotates at a speed of 360 rpm in clockwise sense looking from stern. Determine

   (a) Gyroscopic couple and its effect when ship moves at 30 km/hr and steers to the left at a radius of 200 m.

   (b) Max. gyroscopic couple and its effect when ship pitches and moving up having amplitude 10 degree and time period 20 seconds. The motion occurs with SHM. (15)

4. With a neat sketch, explain construction and working of Hartnell governor. Also drive an expression to find out the relationship between total lift and stiffness of spring. (15)

5. A number of masses (say four masses) are attached to the shaft which is rotating at some angular speed. If all the masses are rotating in the same plane, then describe the analytical and graphical methods of balancing these four masses by a single mass only. (15)

6. What are different methods of finding the natural frequency of free longitudinal vibrations. Explain any *two* methods in detail. (15)

7. Write the short notes on :

   (a) Whirling of shafts.

   (b) Balancing of V-engine. (7,8)
