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# 013502

**December 2023**

**B.Tech. (ME) Vth SEMESTER**

**Dynamics of Machine (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 Free body diagram? (1.5)

(b) Define and explain Inertia force and inertia torque. (1.5)

(c) Why is balancing of rotating parts necessary for high-speed engines? (1.5)

(d) Explain clear term 'Static balancing'. (1.5)

(e) Explain the application of gyroscopic principle to aircrafts. (1.5)

(f) What is function of a governor? How does it differ from the flywheel? (1 .5

(g) What are causes and effect of vibrations? (1.5)

(h) What is controlling force? (1.5)

(i) Explain the terms spin and precession. (1.5)

(j) Define Free vibrations' and 'Forced vibrations. (1.5)

## PART–B

**2.** Draw and explain Klien's construction for determining the acceleration of the piston in a slider crank mechanism. How are velocity and acceleration of slider of a single crank chain determined analytically? (15)

**3.** Explain the method of balancing of different masses revolving in the same plane. How the different masses rotating in different planes are balanced? (15)

**4.** Explain the term height of governor. Derive an expression for height in the case of Watt governor. What are limitations of a Watt governor. (15)

**5.** What do you understand by gyroscopic couple? Derive a formula for its magnitude. Also discuss the effect: of gyroscopic couple on a two wheeled vehicle when taking a turn. (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) V-engines.

(b) Under damping, critical damping and over damping. (8,7)