

December 2024

B. Tech. (ME/ME (Hindi Medium))

(Fifth Semester)

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

Time : 3 Hours]

[Maximum Marks : 75

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

Part A

1. (a) Distinguish between space diagram and free body diagram. 1.5
- (b) Differentiate static force analysis and dynamic force analysis. 1.5
- (c) Why balancing of dynamic forces is necessary ? 1.5
- (d) State the condition for static balancing. 1.5

- (e) What is the principle of working of centrifugal governors ? 1.5
- (f) Explain the function of governors. 1.5
- (g) What is gyroscopic couple ? 1.5
- (h) Define Spinning. 1.5
- (i) What are the causes of vibration ? 1.5
- (j) Define period and cycle of vibration. 1.5

Part B

2. (a) A petrol engine has a stroke of 120 mm and connecting rod is 3 times the crank length. The crank rotates at 1500 rpm clockwise direction :
- Determine 1. Velocity and acceleration of the piston
2. Angular velocity and angular acceleration of the connecting rod, when the piston has traveled one-fourth of its stroke from I.D.C.

10

- (b) State D'Alembert's principle. 5
3. (a) Explain the method of balancing a single rotating mass by another rotating mass in same plane. 10
- (b) Explain the concept of Partial balancing. 5
4. Explain the effect of Gyroscopic couple on the stability of automotive vehicles. 15
5. (a) Explain Porter governor with a neat diagram. Also derive a mathematical equation to find its speed. 10
- (b) What are various types of governors ? 5
6. (a) Explain the method of direct and reverse cranks. 10
- (b) Explain the methods of reducing undesirable vibrations. 5

7. Discuss the influence of Indian traditional knowledge on modern scientific and technological advancements and how it has been integrated into contemporary practices. **15**