Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 51341

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2024.

Third/Fourth Semester

Mechanical Engineering

ME 3491 — THEORY OF MACHINES

(Common to Mechanical Engineering (Sandwich)/Mechanical and Automation Engineering/Agricultural Engineering)

(Regulations 2021)

Time : Three hours Maximum : 100 marks

(Use of A3 Drawing sheet is permitted)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the main components of a slider-crank mechanism?
2. How are cams classified?
3. Sketch two teeth of a gear and show the following: face, flank, addendum and dedendum.
4. What is the law of gearing?
5. Enumerate the kinds of friction.
6. The inner and the outer radii of a single plate clutch are 40 mm and 80 mm respectively. Find the maximum pressure, when the axial force is 3 kN.
7. Give examples of simple machine members that undergo static force analysis.
8. What are inertia forces in dynamic force analysis?
9. Why is balancing necessary for rotors of high-speed engines?
10. Define the term 'vibration isolation'.

PART C — (1 × 15 = 15 marks)

16. (a) A gear with 20 teeth and a pitch circle diameter of 40 mm is in mesh with another gear with 30 teeth. The pressure angle is 20 degrees and the module is 3 mm. Determine the addendum, dedendum and tooth thickness of each gear. Also, calculate the contact ratio and the minimum number of teeth required to avoid interference.

Or

(b) Discuss the challenges and opportunities involved in the design high-speed mechanisms, including the importance of minimizing vibrations and ensuring accuracy and safety.