



**K. K. Wagh Institute of Engineering Education & Research, Nashik**  
(An Autonomous Institute From A.Y. 2022-23)

SUMMER-2024	
Exam Seat No.:	
Academic Year:2023-2024	Semester: II
Class:FY	Program: B.Tech
Branch Code: CIV/CHE/MEC	Pattern:2023
Name of Course: Fundamentals of Mechanical Engineering	Course Code:2300114A
Max. Marks:60	Duration:2.30 Hrs.

**Instructions:** Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains two page(s).
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

**Question No. 1 Attempt following Question**

- 1a) Spur gear pair is to be used to transmit power from an electric motor running at 1800 rpm to a machine running at 600 rpm. Number of teeth on pinion is 35 while pitch circle diameter of the pinion is 140 mm. Determine: i) Gear ratio ii) No. of teeth on the gear iii) Pitch circle diameter of the gear (6) CO5

**Question No. 2 Attempt following Question**

- 2a) A heat engine operates on a Carnot cycle between source and sink temperatures  $337^{\circ}\text{C}$  and  $27^{\circ}\text{C}$  respectively. If the heat engine receives 450 kJ of heat from the source, find the net work done, heat rejected to the sink and efficiency of the heat engine. (6) CO3

**Question No. 3 Attempt following Question**

- 3a) Describe the operation of a four-stroke diesel engine with a labelled diagram. (8) CO3

**OR**

- 3b) Compare spark ignition (S.I.) engine and compression ignition (C.I.) engine. (8) CO3

- 3c) Describe with a layout series-parallel combination of hybrid electric vehicles. (8) CO2

**OR**

- 3d) Draw a neat and labelled layout of hybrid electric vehicle and explain function of main components. (8) CO2

**Question No. 4 Attempt following Question**

- 4a) State the advantages and limitations of sand casting. (8) CO1

**OR**

4b) Describe open-die forging and closed-die forging processes with a neat and labelled diagram. (8) CO1

4c) Explain the shielded metal arc welding with neat and labelled diagram. (8) CO1

**OR**

4d) Illustrate following sheet metal working operations with neat sketch: (8) CO1

i) Punching ii) Blanking iii) Notching iv) Bending

**Question No. 5 Attempt following Question**

5a) Draw the block diagram showing components of CNC system. State the function of each component. (8) CO1

**OR**

5b) Write short note on i) Agile Manufacturing ii) Lean Manufacturing (8) CO1

5c) What are the types of Automated Guided Vehicles (AGVs). State the benefits and limitations of AGVs. (8) CO1

**OR**

5d) Write short note on i) Computer Integrated Manufacturing ii) Computer aided process planning. (8) CO1

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