



**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:I/II
Class:FY	Program:B.Tech
Branch Code:FYE	Pattern:2022
Name of Course:Fundamentals of Mechanical Engineering	Course Code:FYE221008
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) An aluminium bar of 1.8 meters long and has a  $625 \text{ mm}^2$  cross sectional area. How much will the bar elongate under a tensile load of  $P=17.5 \text{ kN}$  if the Young's modulus of material  $E = 75000 \text{ MPa}$ ? (6) CO5

**Question No. 2 Attempt following Question**

- 2a) A boiler is made of iron plates 12 mm thick. Outer surface temperature is  $100^\circ \text{C}$  and inner surface temperature is  $250^\circ \text{C}$ . If heating surface area is  $8 \text{ m}^2$ , calculate rate of heat transfer, thermal resistance and heat flux. Thermal conductivity of steel is  $84 \text{ W/mK}$ . (6) CO3

**Question No. 3 Attempt following Question**

- 3a) Describe the operation of a four-stroke petrol engine by a labelled diagram. (8) CO1

**OR**

- 3b) Compare four stroke engines and two stroke engines in terms of their fundamental operational principles. (8) CO1

- 3c) Explain the working of parallel hybrid vehicles with layout. (8) CO2

**OR**

- 3d) Illustrate the differences in layout between electric vehicles (EVs) and vehicles powered by internal combustion engines? (8) CO2

**Question No. 4 Attempt following Question**

4a) Explain fundamental steps of metal casting. (8) CO1

**OR**

4b) Describe the working principle of arc welding. (8) CO1

4c) With a neat sketch, write a short note on the following lathe operations. (8) CO1

i) Boring ii) Reaming iii) Parting off iv) Knurling

**OR**

4d) Outline the key principles that differentiate casting, forging, machining and welding. (8) CO1

**Question No. 5 Attempt following Question**

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

**OR**

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

5c) Write short notes on: I) Automatic storage & Retrieval System (AS/RS) ii) Automatic Guided Vehicles (AGVs) (8) CO1

**OR**

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

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