



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

	SUMMER-2023		
	Exam Seat No.:		
	Academic Year:2022-2023	Semester: I	
	Name of Programme: B.Tech	Pattern: 2022	
	Name of Course: Fundamentals of Mechanical Engineering	Course Code: FYE221008	
	Max. Marks: 60	Duration: 2.30 Hrs.	

	<p><b>Instructions:</b> 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.</p> <ol style="list-style-type: none"><li>1. This question paper contains three page(s).</li><li>2. Answer to each new question is to be started on a new page.</li><li>3. Assume suitable data wherever required, but justify it.</li><li>4. Draw the neat labelled diagrams, wherever necessary.</li><li>5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question</li></ol>	
--	--	--

**Question No. 1 Attempt following Question**

1a)

Spur gear pair is to be used to transmit power from an electric motor running at 1500 rpm to a machine running at 500 rpm. Number of teeth on pinion is 25 while pitch circle diameter of pinion is 120 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)

The wall of oven is 40 cm thick having its thermal conductivity of 0.7 W/mk. The interior surface of oven is maintained at temperature of  $800^{\circ}\text{C}$  and outside wall temperature is  $200^{\circ}\text{C}$ . (6) CO3  
The total surface area of wall of oven is  $2\text{ m}^2$ . Find thermal resistance, heat flow rate and heat flux.

### Question No. 3 Attempt following Question

- 3a) Describe working of four stroke engine with neat diagram. (6) CO1

**OR**

- 3b) Write detailed classification of internal combustion engine and state applications of IC engine. (6) CO1

- 3c) State types of hybrid electric vehicle and describe working of series hybrid electric vehicle. (6) CO2

**OR**

- 3d) Differentiate between conventional vehicle and electrical vehicle. (6) CO2

- 3e) Define the following terms: (4) CO1  
i) TDC ii) BDC iii) Stroke iv) Swept volume

**OR**

- 3f) State function of the following engine components: (4) CO1  
i) Spark plug ii) Piston iii) Crank iv) Cylinder head

### Question No. 4 Attempt following Question

- 4a) Describe sand casting process with the help of neat and labelled diagram. (6) CO1

**OR**

- 4b) Explain any four sheet metal working operations with neat diagram. (6) CO1

- 4c) List metal joining processes and describe shielded metal arc welding. (6) CO1

**OR**

- 4d) Describe hot forging with a neat and labelled diagram. (6) CO1
- 4e) State advantages and limitations of sand-casting process. (4) CO1

**OR**

- 4f) Explain following operations with neat diagram. (4) CO1  
i) Taper Turning ii) Knurling

**Question No. 5 Attempt following Question**

- 5a) Explain flexible manufacturing system (FMS) and state its advantages and limitations. (6) CO1

**OR**

- 5b) Describe working of CNC machine with the help of neat block diagram. (6) CO1
- 5c) List types of flexible manufacturing systems. Draw neat layout of any two flexible manufacturing systems. (6) CO1

**OR**

- 5d) Write short notes on i) Lean manufacturing ii) Agile manufacturing. (6) CO1
- 5e) State advantages and limitations of CNC technology. (4) CO1

**OR**

- 5f) Write a short note on Retrieval System (RS). (4) CO1