CBCS SCHEME

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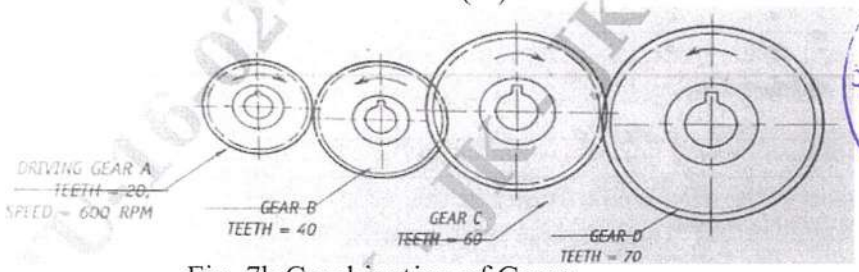
1BEME105

First Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Elements of Mechanical Engineering

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.
3. Use of Steam Table is Permitted.

		Module – 1	M	L	C
Q.1	a.	Discuss the meaning of ferrous materials and outline any three ferrous materials.	10	L2	CO1
	b.	What are smart materials? Explain Piezo-electric materials, MR Fluids and Shape Memory Alloys.	10	L2	CO1
		OR			
Q.2	a.	Describe Nano Materials. Indicate the types of nano materials with their advantages, disadvantages, and applications.	10	L2	CO1
	b.	What are composite materials? Discuss briefly about the types of composite materials based on types of reinforcements and matrix.	10	L2	CO1
		Module – 2			
Q.3	a.	With the Enthalpy-Temperature Diagram, Discuss the formation of steam.	08	L2	CO2
	b.	Find the enthalpy of 1 kg of steam at 12 bar when (i) The steam is dry saturated, (ii) Steam is 22% wet and (iii) Superheated to 250°C. Use the steam table. Assume the specific heat of the superheated steam as 2.25 kJ/kg K.	07	L2	CO2
	c.	Briefly explain Heat Engines.	05	L2	CO2
		OR			
Q.4	a.	With the help of neat Sketch, Enumerate the working principle of 4 stroke SI Engine. Indicate the P-V Diagram.	08	L2	CO2
	b.	Explain the components of Electric Vehicles.	07	L2	CO2
	c.	List the advantages and disadvantages of Hybrid Electric Vehicles.	05	L2	CO2
		Module – 3			
Q.5	a.	With the neat sketch explain the following lathe machine operation. (a) Turning (b) Facing (c) Taper Turning by Swiveling the compound rest method.	08	L2	CO3
	b.	Illustrate the following drilling operation with neat sketch. (a) Reaming (b) Counter Boring (c) Counter Sinking	06	L2	CO3
	c.	Differentiate between up milling and down milling.	06	L2	CO3
		OR			

Q.6	**a.**	Describe with a neat sketch, the working principle of Arc welding process.	**08**	**L2**	**CO3**
	b.	Discuss the following milling operation with neat sketch. (a) Plain Milling (b) Slot Milling.	**06**	**L2**	**CO3**
	c.	Discuss the key differences between soldering and brazing.	**06**	**L2**	**CO3**
		Module – 4			
Q.7	**a.**	Derive expression for simple and compound gear trains.	**08**	**L2**	**CO4**
	b.	A simple gear train is made up of four gears A, B, C and D having 20, 40, 60 and 80 teeth respectively. If gear "A" is the main driver rotating at 500 rpm clockwise. Estimate the following. (i) Speed of the intermediate gears (ii) Speed and Direction of the last follower (iii) Train Value.  Fig. 7b Combination of Gears	**07**	**L2**	**CO4**
	c.	Write a note on open and cross belt drives.	**05**	**L2**	**CO4**
		OR			
Q.8	**a.**	Define Industrial Robot. Enlist the classification of robot based on the physical configuration. Explain the Cartesian coordinate robot with neat sketch.	**08**	**L2**	**CO4**
	b.	Elucidate the following terms related to robots. (i) Work Volume , (ii) Accuracy, (iii) Precision, (iv) Repeatability.	**07**	**L2**	**CO4**
	c.	Write a short note on spur gears.	**05**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	With the help of block diagram, Describe the components of CNC machine.	**08**	**L2**	**CO5**
	b.	Classify the applications of Additive Manufacturing into suitable categories.	**05**	**L2**	**CO5**
	c.	Summarize the sequence of processes in Additive Manufacturing.	**07**	**L2**	**CO5**
		OR			
Q.10	**a.**	What is meant by automation? Discuss the concept and features of flexible automation.	**08**	**L2**	**CO5**
	b.	Highlight the key advantages and disadvantages of CNC systems.	**05**	**L2**	**CO5**
	c.	Elaborate on the contributions of AI to (i) manufacturing operations and (ii) mechanical design solutions.	**07**	**L2**	**CO5**

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