Basavarajeswari Group of Institutions

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT
(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

USN | | | | | | | | | | | Course Code | 2 | 1 | E | M | E | 1 | 5 | / | 2 | 5 |

First/Second Semester B.E. Degree Examinations, September/October 2022
ELEMENTS OF MECHANICAL ENGINEERING
(Common to all Branches)

Duration: 3 hrs   Max. Marks: 100

*Note: 1. Answer any **FIVE** full questions, choosing **ONE** full question from each module.*
2. Missing data, if any, may be suitably assumed

Q. No		Question	Marks	(RBTL:CO:PI)
		Module - 1		
1	a	What is the role of mechanical engineer?	04	(2:1 : 1.3.1)
	b	Discuss the career options and job titles that are available to mechanical engineers.	06	(2:1 : 1.3.1)
	c	Explain the working of an electric power plant with a neat sketch.	10	(2:1 : 1.3.1)
		(OR)		
2	a	With a neat sketch explain the construction and working of a single stage impulse steam turbine.	07	(2:1 : 1.4.1)
	b	Sketch a diagram of a Gas turbine and briefly explain how it works.	07	(2:1 : 1.4.1)
	c	Explain the working principle of Pelton wheel with neat sketch and label all its parts.	06	(2:1 : 1.4.1)
		Module - 2		
3	a	Explain with a neat sketch working of 4 Stroke petrol engine.	07	(2:2 : 1.4.1)
	b	A four cylinder, two stroke engine develops 30 kW at 2500 rpm. The mean effective pressure of each cylinder is 800 kPa and mechanical efficiency is 80 %. Calculate brake power and mass flow rate of fuel if l/d is 1.5, brake thermal efficiency is 28 % and calorific value of fuel is equal to 44000 kJ/kg.	06	(2:2 : 1.4.1)
	c	What is smart hybrid vehicle technology? What happens when a hybrid car runs out of battery?	07	(2:2 : 1.4.1)
		(OR)		
4	a	What is meant by electric vehicle? Why do drivers tend to avoid an electric car?	07	(2:2 : 1.4.1)
	b	What is the basic function of a compressor in vapour compression refrigeration system? Explain with a neat sketch.	07	(2:2 : 1.4.1)
	c	How is heat being removed through air conditioning? Explain with a neat sketch.	06	(2:2 : 1.4.1)
		Module-3		
5	a	What is a compressive force? Name three practical examples of such a force.	06	(2:3 : 1.4.1)

(RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)

	b	Sketch typical load/deformation curves for (i) an elastic non-metallic material, (ii) a brittle material and (iii) a ductile material. Give a typical example for each type of the above materials.	07	(2:3 : 1.4.1)
	c	An aluminium alloy rod has a length of 200 mm and a diameter of 10 mm. When subjected to a compressive force the length of the rod is 199.6 mm. Determine (i) stress in the rod when loaded, and (ii) the magnitude of the force. Take the modulus of elasticity for aluminium alloy as 70 GPa.	07	(2:3 : 1.4.1)

(OR)

6	a	What is a power transmission system? What are the different types of mechanical power transmission systems?	06	(2:3 : 1.4.1)
	b	Explain belt drive and gear drive. With suitable sketch explain Bevel gear.	08	(2:3 : 1.4.1)
	c	List the applications, advantages and disadvantages of V- belt drive.	06	(2:3 : 1.4.1)

Module-4

7	a	Enumerate general features for metals and their alloys, ceramics, polymers, and composite materials.	08	(2:4 : 1.3.1)
	b	List different types of smart materials?	04	(2:4 : 1.3.1)
	c	A broken body of the car needs welding on-site. Recommend a suitable process and outline its working principle.	08	(2:4 : 1.4.1)

(OR)

8	a	Sketch a lathe and label its parts.	04	(2:4 : 1.4.1)
	b	Explain in what cases do you prefer lathe machining process. Explain any three operations that can be performed on lathe machine?	08	(2:4 : 1.4.1)
	c	Explain up-milling and down-milling with sketches.	08	(2:4 : 1.4.1)

Module-5

9	a	Smart manufacturing is the key component for the "future of manufacturing". Explain your understanding of the above statement and outline one process that are in use today.	08	(2:5 : 1.4.1)
	b	Enumerate the advantages and disadvantages of CNC machines.	06	(2:5 : 1.3.1)
	c	What is industry 4.0 (IIOT)?	06	(2:5 : 1.3.1)

(OR)

10	a	Explain different types of Automation systems.	06	(2:5 : 1.3.1)
	b	What are the applications of robot in manufacturing? Explain with neat sketch cylindrical robot.	06	(3:5 : 1.3.1)
	c	Explain briefly robots applications (i)Space industry (ii) Medical (iii) Defence (iv) Entertainment.	08	(2:5 : 1.3.1)

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