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# B.M.S. College of Engineering, Bengaluru-560019

**Autonomous Institute Affiliated to VTU**

## August 2023 Semester End Make-Up Examinations

**Programme: B.E.** **Semester: I**
**Branch: Common to all Branches** **Duration: 3 hrs.**
**Course Code: 22ME1ESIME** **Max Marks: 100**
**Course: Introduction to Mechanical Engineering** **Date: 14.08.2023**

**Instructions**: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may suitably be assumed.

**Important Note:** Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

### UNIT - I

| | | | |
|---|---|---|---|
| 1 | a) | Classify the solar collectors. With a neat sketch explain the helio-thermal process suitable for industrial applications. | **08** |
| | b) | Enumerate the causes and effects of Ozone depletion. | **06** |
| | c) | With a neat sketch explain the device suitable for utilizing the energy available in wind. | **06** |

### UNIT - II

| | | | |
|---|---|---|---|
| 2 | a) | Sketch and explain the following lathe operations:<br>i. To generate serrated surfaces<br>ii. To reduce work piece to cylindrical section of required diameter<br>iii. To convert the cylinder into a cone | **09** |
| | b) | Explain the working principle of the milling operation. | **06** |
| | c) | Identify the Method to increase the hole diameter from 20mm diameter to 25mm and explain the same with a sketch. | **05** |

**OR**

| | | | |
|---|---|---|---|
| 3 | a) | List any four advantages and Disadvantages of the CNC System. | **08** |
| | b) | Identify the process of converting the CAD Model into a Polymer Prototype and explain the steps involved in it. | **08** |
| | c) | Explain with a block diagram, the parts of CNC Machine. | **04** |

### UNIT - III

| | | | |
|---|---|---|---|
| 4 | a) | What is a SI engine? With the help of line diagrams, explain the working of a four-stroke petrol engine. Also, draw the P-V diagram. | **10** |
| | b) | The following readings were taken on a four-stroke IC Engine; Diameter of brake drum= 1.5 m, Diameter of the rope= 10 mm, Load suspended on the brake drum= 100 kg, Spring balance reading = 5 kg, Crankshaft speed= 200 rpm. Determine the brake power of the engine. | **04** |
| | c) | What are hybrid electric vehicles? List any four advantages of the same. | **06** |

**OR**

5 a) The following observations were obtained during a trial on a four-stroke diesel engine: Cylinder diameter = 25 cm, stroke of the piston = 40 cm, Crankshaft speed = 250 RPM, spring balance readings of brake drum are 100 kg and 30 kg, brake drum radius = 0.95 m, radius of rope = 0.05 m, area of indicator diagram = 3 $cm^2$, length of indicator diagram = 5 cm, engine indicator spring constant = 100 $N/cm^2/cm$, Diesel consumption = 0.1 liter/min. Determine: i) Mean effective pressure acting on piston, ii) Indicated power, iii) Torque available at crankshaft, iv) Brake power, v) Friction power and vi) Mechanical efficiency. **10**

b) Sketch and explain the components of hybrid vehicles (block diagram only). **06**

c) Differentiate between SI and CI engines. **04**

**UNIT - IV**

6 a) Identify and explain the material that regains shape on heating. List at least two application. **05**

b) Explain the arc welding process with a simple sketch. List five differences between arc welding and soldering processes. **10**

c) Identify the smart material which generates electric power on change of shape and explain the same. **05**

**UNIT - V**

7 a) Illustrate jointed arm robot configuration and mention its application. **06**

b) Mention different classifications of the Automation system and explain any two. **10**

c) Explain closed loop control system with an example. **04**

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