BME-C103
SEMESTER EXAMINATION-DECEMBER 2023
CLASS: BTech SEMESTER: I
BASIC MECHANICAL ENGINEERING

Time: 3 hour | Max. Marks: 70

Note: Question Paper is divided into two sections: **A and B**. Attempt both the sections as per given instructions.

SECTION-A
(SHORT ANSWER TYPE QUESTIONS)

Instructions: Answer any ***five*** questions in about 150 words each. Each question carries six marks.
(5 X 6 = 30 Marks)

Question-1: Define first law of Thermodynamics and its application.

Question-2: Define a quasi-static process and state its salient characteristics.

Question-3: Prove that $(COP)_{H.P} = (COP)_{REF}$.

Question-4: Define structure and type of structure.

Question-5: State the Kelvin-Plank and Clausius statements of second law of thermodynamics, and establish the equivalence between them.

Question-6: Write short note on System, Surrounding and Universe.

Question-7: Define Principal stress and Principal plane.

Question-8: What are the types of beams? When will bending moment is maximum?

Question-9: What are the differences between petrol engine and diesel engine?

Question-10: What is lateral strain? How is it related with poison's ratio?

SECTION-B
(LONG ANSWER TYPE QUESTIONS)

Instructions: Answer any ***four*** questions in detail. Each question carries 10 marks.

(4 X 10 = 40 Marks)

Question-1: Explain stress strain diagram for mild steel with neat sketch.

Question-2: What do you mean by term Property? Prove that Heat and Work is not a point function.

Question-3: Derive the expression for thermal efficiency of a Carnot cycle.

Question-4: Derive the relation $E = 2G(1+\mu)$.

Question-5: Prove that otto cycle efficiency depends on compression ratio?

Question-6: Define the term Entropy and derive an expression for change of entropy for Isochoric process and Isobaric process.

Question-7: Define throttling process and derive steady flow energy equation.

Question-8: Draw the shear force and bending moment diagram for the simply supported beam as shown below. Clearly mark the position of the maximum bending moment and determine its value