

Roll No. _____
Total no. of Questions: [09]

Total no. of Pages: [01]

B.Tech. (ECE/CSE) (Semester: 2nd)
ELEMENTS OF MECHANICAL ENGINEERING
Subject Code: BMEE0101
Paper ID: [110008]

Time Allowed: 3 Hrs.

Maximum Marks: 60

Instructions to Candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A

(02 marks each)

Q1. Attempt the following:

- a) What is the concept of entropy?
- b) Differentiate between refrigerator and heat pump.
- c) Explain the term latent heat of steam.
- d) Explain the term dryness fraction of steam.
- e) Define polar moment of inertia?
- f) Explain the first law of thermodynamics with respect to close systems.
- g) State Coulomb Law of Friction.
- h) What do you mean by relative efficiency?
- i) Differentiate between centroid and centre of gravity.
- j) Distinguish between Intensive and Extensive properties.

Section – B

(05 marks each)

- Q2. Explain the differences between a two-stroke cycle engine and a four-stroke cycle engine.
- Q3. State and prove Clausius inequality.
- Q4. Determine the maximum angle Θ in fig. 1 before the block begins to slip. $\mu_s =$ Coefficient of static friction between the block and the inclined surface.

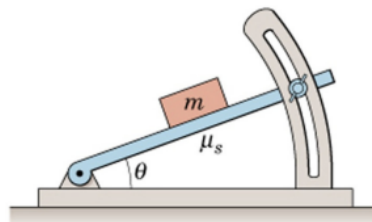


Fig. 1

- Q5. State and proof Lami's theorem.
- Q6. Find the moment of inertia of a rectangular section 30 mm wide and 40 mm deep about X-X axis and Y-Y axis.

Section – C

(10 marks each)

- Q7. An I-section has the following dimensions in mm units: Bottom flange = 300 × 100, Top flange = 150 × 50, Web = 300 × 50. Determine mathematically the position of centre of gravity of the section.
- Q8.
 - a) State and explain Parallel axis theorem.
 - b) One kg of a gas at 240°C, expand adiabatically so that its volume is doubled and the temperature falls to 115°C. the work done during expansion is 89.96KJ. Calculate the two specific heats.
- Q9.
 - a) State Pascal's law and discuss its applications.
 - b) A stone weighs 4400 KN in air and when immersed in water it weighs 225 N. Calculate the volume of the stone and its relative density.