

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: BTECH
BRANCH: CSE/IT/ECE/EEE

SEMESTER: I/BL
SESSION : MO/2019

SUBJECT : ME101 BASICS OF MECHANICAL ENGINEERING

TIME: 2.00 HOURS

FULL MARKS: 25

INSTRUCTIONS:

1. The total marks of the questions are 25.
2. Candidates may attempt for all 25 marks.
3. Before attempting the question paper, be sure that you have got the correct question paper.
4. The missing data, if any, may be assumed suitably.

Q1 (a) Determine the force in members AD, AC and BC of the truss as shown in Fig.1.

[5]

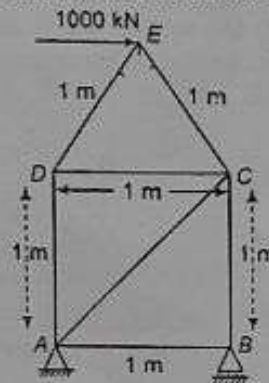


Figure 1

Q2 (a) Define volumetric strain, and tensile strength of a material.

[2]

Q2 (b) A member formed by connecting a steel bar to an aluminium bar is shown in Fig.2. Assuming that the bars are prevented from buckling sideways, determine the magnitude of force that will cause the total length of the member to decrease 0.25 mm. The values of elastic modulus for steel and aluminium are $2.1 \times 10^5 \text{ N/mm}^2$ and $7 \times 10^4 \text{ N/mm}^2$ respectively.

[3]

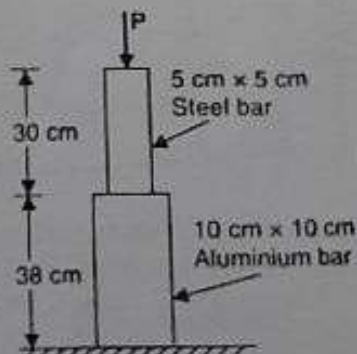


Figure 2

Q3 (a) Define (a) uniform velocity, (b) non-uniform velocity, (c) relative velocity.

[2]

Q3 (b) Two ships (S1) and (S2) are at a given instant 6 km. away from each other, S2 being SE of S1. S1 is travelling at 12 km/hr. due East and S2 is travelling at 20 km/hr. due North. Determine (a) The velocity of S2 relative to S1, (b) The shortest distance between the two ships and (c) The time when the two ships are nearest.

[3]

Q4 (a) Explain Newton's law for rotary motion.

[2]

Q4 (b) A cylinder of radius 1m rolls without slipping on a horizontal plane AB as shown in Fig.3. Its centre has uniform velocity of 20 m/sec. Determine the velocity of the points E and F on the circumference of the cylinder.

[3]