BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION SP2023)

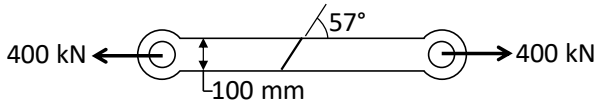
CLASS: BTECH **SEMESTER : III**
BRANCH: MECHANICAL / PIE **SESSION : MO/2023**

SUBJECT: ME205 STRENGTH OF MATERIALS

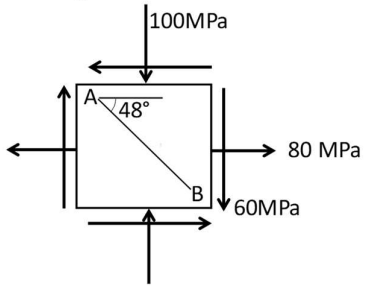
TIME: 02 Hours **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

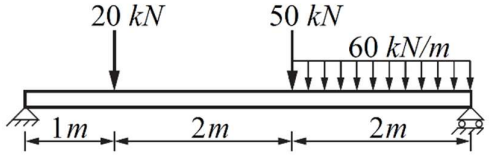
			CO	BL
Q.1	A steel bar with a butt-welded joint, as shown in figure, will be used to carry an axial tensile load of400 kN. If the normal and shear stresses on the plane of the butt weld must be limited to 70 MPa and 45 MPa, respectively, determine the minimum thickness *t* required for the bar.	[5]	1	2



Q.2	Derive the expressions for principal stresses and maximum shearing stress in plane stress condition described by $\sigma_x, \sigma_y,$ and τ_{xy}.	[5]	1	2
Q.3	For the stress element shown in figure, Find normal and shear stresses on plane AB.	[5]	1	3



Q.4	Explain shear forces and bending moments in beams with neat diagram. Also explain the sign convention with diagram.	[5]	2	2
Q.5	Find the support reactions and draw the shear force and bending moment diagrams for a beam as shown in figure.	[5]	2	3



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