

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI  
(MID SEMESTER EXAMINATION SP/2023)

CLASS: BTECH  
BRANCH: MECHANICAL

SEMESTER : VI  
SESSION : SP/2023

SUBJECT: ME355 ADVANCED SOLID MECHANICS

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
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		CO	BL
Q.1(a)	Define stress at a point.	[2]	1 1
Q.1(b)	A body is subjected to uniaxial tensile loading such that $\sigma_x = 10 \text{ MPa}$ , and all other stress components are zero. Find the normal and shear stresses on a plane whose direction cosines are $n_x = n_y = \frac{1}{\sqrt{2}}$ , and $n_z = 0$ .	[3]	1 3
Q.2(a)	What do you understand by principal stresses.	[2]	1 2
Q.2(b)	Find the value of principal stresses if the stress components at a point are $\sigma_x = \sigma_y = \sigma_z = 1 \text{ MPa}$ , $\tau_{xy} = 2 \text{ MPa}$ , $\tau_{yz} = \tau_{zx} = 1 \text{ MPa}$ .	[3]	1 4
Q.3(a)	Define linear strain and shear strain.	[2]	1 1
Q.3(b)	Derive the differential equation of equilibrium	[3]	1 3
Q.4(a)	What is a beam column?	[2]	2 2
Q.4(b)	Derive beam column equation.	[3]	2 3
Q.5	Derive the equation for deflection of a beam column subjected to a concentrated load.	[5]	2 4

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