

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION MO/2024)

CLASS: ARCHITECTURE
BRANCH: ARCH

SEMESTER : III
SESSION : MO/2024

SUBJECT: AR204 STRUCTURAL 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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Q.1(a)	A steel bar 300 mm long, 50 mm wide and 40 mm thick is subjected to a pull of 300 kN in the direction of its length. Determine the change in volume. Take $E = 2 \times 10^5$ N/mm ² and Poission's ratio = 0.25	[2]	3	4
Q.1(b)	A rectangular bar of cross-sectional area 10000 mm ² is subjected to an axial load of 20 kN. Determine the normal and shear stresses on a section which is inclined at an angle of 30° with normal cross-section of the bar.	[3]	3,4	5
Q.2	At a certain point in a strained material, the intensities of stresses on two planes at right angles to each other are 20 N/mm ² and 10 N/mm ² both tensile. They are accompanied by a shear stress of magnitude 10 N / mm ² . Find graphically through Mohr's circle, the location of principal planes and evaluate the principal stresses.	[5]	3,4	5
Q.3(a)	What are the different types of beams ? Differentiate between a cantilever and a simply supported beam.	[2]	1	2
Q.3(b)	What are the assumptions made in the theory of simple bending ?	[3]	1	2
Q.4	Derive an expression for bending stress at a layer in a beam.	[5]	1,2	3
Q.5	Define the terms: neutral axis and section modulus	[5]	1,2	3

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