

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

**CLASS: BARCH
BRANCH: ARCHITECTURE**

**SEMESTER: III
SESSION : MO/2019**

SUBJECT : AR204 STRUCTURAL MECHANICS

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) Define. [2]
(i) principal stresses and (ii) complementary shear stress.
(b) For the rectangular stress components $\sigma_x = \sigma_y = 0$ and $\tau_{xy} = 20$ MPa. Calculate the principal stresses. Also find the locations of principal planes. [3]
- Q2 (a) What are principal strains? [2]
(b) Analyze the working principle of 60 degree delta strain gauge rosette. [3]
- Q3 (a) Write the assumptions made in deriving the bending equations. [2]
(b) A simply supported beam of 20 mm X 20 mm in section and 1 m long carries a concentrated load of 640 N at the mid span. Evaluate the maximum bending stress produced due to bending. [3]
- Q4 (a) Construct the expression of section modulus for rectangular section. [2]
(b) Develop and sketch the shear stress distribution for any rectangular section beam. [3]
- Q5 (a) Explain the terms slope and deflection of beams with the help of a sketch. [2]
(b) A cantilever beam of length L carries a concentrated load of magnitude W at the free end of the beam. Evaluate the maximum deflection of the beam using double integration method. Flexural rigidity of the beam = EI [3]

:25/09/2019 :E