Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 18

B.Tech.(ME) (2018 Batch) (Sem.–3)

STRENGTH OF MATERIALS-I

Subject Code : BTME-304-18

M.Code : 76421

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

Write briefly :

1. State and explain Poisson's ratio.
2. What do you mean by bar of uniform strength?
3. Define shearing force with the help of a diagram.
4. Why point of contraflexure does not exist in a simply supported beam?
5. What do you mean by composite beams? Write their applications.
6. Write the assumptions in derivation of torsion equation.
7. Write bending equation.
8. Define equivalent length in case of columns.
9. Write the relationship between moment, slope and deflection.
10. How Macaulay's method is different from Moment area method, briefly explain?

SECTION-B

11. What is the significance of stress-strain curve? Describe a stress-strain curve for ductile material.

12. A flitched beam consists of a wooden joist 12 cm wide and 20 cm deep strengthened by a steel plate 1 cm thick and 18 cm deep, one on either side of the joist. If the stresses in wood and steel are not to exceed 7.5 MN/m^2 ad 127.5 MN/m^2, find the moment of resistance of the section of the beam. Take, $E_{Steel} = 20\ E_{Wood}$.

13. Derive a relation to find torque transmitted by a hollow shaft.

14. A hollow cast iron column whose outside diameter is 200 mm has a thickness of 20 mm. It is 4.5 m long and is fixed at both ends. Calculate the safe load by Rankine-Gordon formula using a factor of safety of 4. Take permissible compressive stress as 550 MN/m^2 and constant a = 1/1600.

15. A wooden beam 150 mm wide and 250 mm deep has a span of 4 metres. Determine the load that can be placed at its centre to cause the beam a deflection of 12 mm. Take, $E = 6 \times 10^6\ kN/m^2$.

SECTION-C

16. A steel tie rod 50 mm in diameter and 2.5 m long is subjected to a pull of 100 kN. To what length the rod should be bored centrally so that the total extension will increase by 15 percent under the same pull, the bore being 25 mm diameter? Take E = 200 GN/m^2.

17. A horizontal beam AB of length 8 m is simply supported at A and B. It carries uniformly distributed load of 3 kN/m over the entire span and a clockwise moment of 12 kNm is applied in the plane of the beam at a point C, 5 m from A. Draw the shearing force and bending moment diagrams and determine the position and magnitude of maximum bending moment.

18. A beam AB of length *l* simply supported at the ends carries a point load *W* at a distance *a* from the left end. Find the deflection under the load and maximum deflection.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.