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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech II Year I Semester Supplementary Examinations August-2021

STRENGTH OF MATERIALS-II

(Civil Engineering)

Time: 3 hours

Max. Marks: 60

(Answer all Five Units 5 x 12 = 60 Marks)

UNIT-I

- 1 a A cylindrical thin drum 80 cm in diameter and 3 m long has a shell thickness of 1 cm. If the drum is subjected to an internal pressure of 2.5 N/mm^2 , Take $E = 2 \times 10^5 \text{ N/mm}^2$ Poisson's ratio 0.25 Determine (i) change in diameter (ii) change in length and (iii) change in volume. **6M**
- b A compound cylinder is made by shrinking a cylinder of external diameter 300 mm and internal diameter of 250 mm over another cylinder of external diameter 250 mm and internal diameter 200 mm. The radial pressure at the junction after shrinking is 8 N/mm^2 . Find the final stresses set up across the section, when the compound cylinder is subjected to an internal fluid pressure of 84.5 N/mm^2 . **6M**

OR

- 2 a A water main 80 cm diameter contains water at a pressure head of 100 m. If the weight density of water is 9810 N/m^3 , find the thickness of the metal required for the water main. Given the permissible stress as 20 N/mm^2 . **6M**
- b A hollow cylindrical drum 600 mm in diameter and 3 m long, has a shell thickness of 10 mm. If the drum is subjected to an internal air pressure of 3 N/mm^2 , determine the increase in its volume. Take $E = 2 \times 10^5 \text{ N/mm}^2$ and Poisson's ratio = 0.3 for the material. **6M**

UNIT-II

- 3 a Explain maximum shear stress theory & maximum shear strain energy theory. **6M**
- b Explain maximum shear strain energy theory. **6M**

OR

- 4 a Explain maximum strain energy theory. **6M**
- b Explain maximum principal strain theory. **6M**

UNIT-III

- 5 a State the difference between twisting moment and bending moment. **6M**
- b Define Polar modulus, Torsional rigidity. **6M**

OR

- 6 a The ratio of inside to outside diameter of a hollow shaft is 0.6. If there is a solid shaft with same torsional strength, what is the ratio of the outside diameter of hollow shaft to the diameter of the equivalent solid shaft. **6M**
- b Determine the torsional stiffness of a hollow shaft of length L and having outside diameter equal to 1.5 times inside diameter d . The shear modulus of the material is G . **6M**

UNIT-IV

- 7 a State advantages of fixed ends or fixed supports. **6M**
- b A fixed beam AB of length 3 m is having moment of inertia $I = 3 \times 10^6 \text{ mm}^4$. The support B sinks down by 3 mm. If $E = 2 \times 10^8 \text{ N/mm}^2$, find the fixing moments. **6M**

OR

- 8 a A continuous beam ABC of constant moment of Inertia carries a load of 10 kN in mid span AB and a central clockwise moment of 30 kN-min span BC. Span AB = 10 m and span BC = 15 m. Find the support moments and plot the shear force and bending moment diagram. **6M**
- b A fixed beam AB of length 3 m carries a point load of 45 kN at a distance of 2 in from A. If the flexural rigidity (i.e., EI) of the beam is 1×10^4 kNm², determine : (i) Fixed end moments at A and B, (ii) Deflection under the load, (iii) Maximum deflection, and (iv) Position of maximum deflection. **6M**

UNIT-V

- 9 a State the differences between straight beam and curved beam with examples. **6M**
- b Analyse the quarter circle beam fixed at one end and free at other carrying a load 'p' at the free end. **6M**

OR

- 10 a Explain the importance of curved beams in structures. **6M**
- b Explain the importance of simply supported on three supports equally spaced. **6M**