PART – C (1×15=15 Marks)

16. a) A continuous beam ABC covers two consecutive span AB and BC of lengths 4m and 6m, carrying uniformly distributed loads of 6kN/m and 10kN/m respectively. If the ends A and C are simply supported, find the support moments at A, B and C. Draw also B.M.D. and S.F.D.

(OR)

b) i) Explain the failure of long column. (10)

ii) Explain the assumptions involved in Lame's Theory. (5)

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 50264

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017

Third/Fourth Semester

Civil Engineering

CE 6402 – STRENGTH OF MATERIALS

(Common to Petrochemical Engineering, Plastic Technology, Polymer Technology)

(Regulations 2013)

Time : Three Hours Maximum : 100 Marks

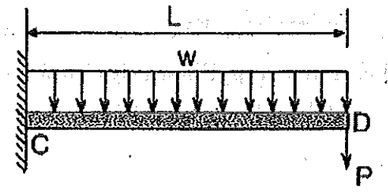
Answer ALL questions.

PART – A (10×2=20 Marks)

1. Define Proof Resilience.
2. Write down the formula to calculate the strain energy, if the moment value is given.
3. What are the advantages of Continuous beam over simply supported beam ?
4. Define Flexural Rigidity of Beams.
5. What are the types of column failure ?
6. What are the assumptions followed in Euler's equation ?
7. Define Maximum Principal Stress Theory.
8. What are the theories used for ductile failures ?
9. What are the reasons for unsymmetrical bending ?
10. How will you determine the product of inertia ?

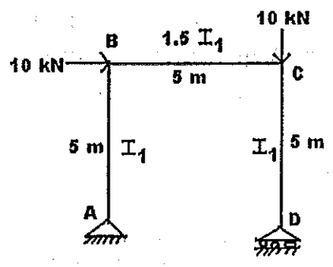
PART – B (5×13=65 Marks)

11. a) The cantilever beam CD supports a uniformly distributed Load w. and a concentrated load P as shown in figure below. Suppose L = 3 m; w = 6KN/m; P = 6KN and E.I = 5 MN/m^2 determine the deflection at D Using Castigliano's Theorem.



(OR)

b) Determine the horizontal displacement at the roller support of the rigid jointed frame shown in figure. Take E = 2×10^5 MPa and $I_1 = 30 \times 10^8$ mm^4.



12. a) A fixed beam AB of length 6m carries point load of 160 kN and 120 kN at a distance of 2m and 4m from the left end A. Find the fixed end moments and the reactions at the supports. Draw B.M. and S.F diagrams.

(OR)

b) Find the fixing moments and support reactions of a fixed beam AB of length 6m, carrying a uniformly distributed load of 4kN/m over the left half of the span.

13. a) State the assumptions made in the Euler's Column Theory. And explain the sign conventions considered in columns.

(OR)

b) A mild steel tube 4 m long, 3 cm internal diameter and 4mm thick is used as a strut with both ends hinged. Find the collapsing load, what will be the crippling load ?

i) Both ends are built in

ii) One end is built – in and one end is free

14. a) Obtain the principal stresses and the related direction cosines for the following state of stress.

$$\begin{vmatrix} 3 & 4 & 6 \\ 4 & 5 & 2 \\ 6 & 5 & 1 \end{vmatrix} \text{ Mpa}$$

(OR)

b) In a steel member, at a point the major principal stress is 180 MN/m^2 and the minor principal stresses is compressive. If the tensile yield point of the steel is 225 MN/m^2, find the value of the minor principal stress at which yielding will commence, according to each of the following criteria of failure.

i) Maximum shearing stress

ii) Maximum total strain energy

iii) Maximum shear strain energy.

Take Poisson's ratio = 0.26.

15. a) A curved bar is formed of a tube of 120 mm outside diameter and 7.5 mm thickness. The centre line of this is a circular arc of radius 225 mm. The bending moment of 3 kN-m tending to increase curvature of the bar is applied. Calculate the maximum tensile and compressive stresses set up in the bar.

(OR)

b) Derive the formula for the deflection of beams due to unsymmetrical bending. Solution.