KUMARAGURU
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M.E DEGREE EXAMINATIONS: MAY 2016

(Regulation 2015)

Second Semester

STRUCTURAL ENGINEERING

P15SET203: Advanced Steel Structures

(*Relevant IS codes are permitted*)

COURSE OUTCOMES

CO1:   Analyse and design various types of steel structural components for industrial buildings

CO2:   Design connections for steel structural elements

CO3:   Analyse and design cold formed steel structural components

CO4:   Analyze and design steel towers

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-
PART A (10 x 1 = 10 Marks)

1. Arrange in order based on its load transfer   CO1   [K$_2$]
   1) Roof Truss
   2) Purlins
   3)Steel Column
   4) Foundation

   a)   1,2,3,4   b)   2,1,3,4

   c)   4,3,2,1   d)   2,1,4,3

2. Roof purlins are   CO1   [K$_1$]

   a)   Tension members   b)   Compression members

   c)   Flexural members   d)   designed for torsion

3. When the end shear to be transferred is less the type of connection to be provided is   CO2   [K$_1$]

   a)   Framed connection   b)   Unstiffened seated connection

   c)   Stiffened seated connection   d)   Clip angle connection

4. Match the list I and II   CO2   [K$_2$]

List I	List II
A.clip angle connection	i.transfer shear only
B. framed connection	ii. moment to be transferred at the

	end is small
C.bracket connection	iii. semi rigid connection
D.transfer part of fixed end moments	iv. moment to be transferred at the end is large

	A	B	C	D
a)	i	ii	iii	iv
b)	ii	i	iv	iii
c)	iii	iv	i	ii
d)	i	ii	iv	iii

5. The maximum allowable overall flat width thickness ratio w/t for stiffened compression element with simple bent lip is   CO3 [K₁]

a) 60   b) 90

c) 500   d) 120

6. The basic design stress σ_b on the net section of tension members shall not exceed the value specified as under (σ_y is the specified minimum yield stress of the mild steel)   CO3 [K₁]

a) $\sigma_b = 0.4\sigma_y$ b) $\sigma_b = 0.6\sigma_y$

c) $\sigma_b = 0.66\sigma_y$ d) $\sigma_b = 0.75\ \sigma_y$

7. Assertion (A): transmission towers are designed to have smaller bending stiffness in the longitudinal direction   CO4 [K₁]

Reason (R): The horizontal forces act from both the sides of the tower keep it balanced.

a) A is true but R is false   b) A is false but R is true

c) A is true, R is true, and R is correct explanation for A   d) A is true, R is true but R is not a correct explanation for A

8. The shape of the conductor wire with the orgin at the end of the conductor is given by ………… (where, y =is the dip at any distance x from the end A, d is the maximum dip at the mid length, L is the span length of the conductor)   CO4 [K₁]

a) $y = \dfrac{4dx}{L^2}(L-x)$ b) $y = \dfrac{4dx^2}{L^2}(L-x)$

c) $y = \dfrac{dx}{4L^2}(L-x)$ d) $y = \dfrac{4d}{L^2}(L^2 - x^2)$

9. All permanent buildings are to be designed for Gust wind because   CO1 [K₂]
1) Gust wind comes for shot duration
2) Duration is not more than 5 minutes
3) Tend to damage the structure
4) Duration is not more than 10 minutes

a) 1 only   b) 1,3,4

c) 1,2,3,4   d) 4 only

10. Conical hoppers are subjected essentially to   CO1   [K$_2$]

a) Meridional stress   b) Hoop stress

c) Both meridional and hoop stress   d) Direct tension

PART B (10 x 2 = 20 Marks)

11. State the component parts of the pitched roof with steel truss.   CO1   [K$_1$]

12. What is the concept of plastic design?   CO1   [K$_2$]

13. Draw the stiffened seated connections.   CO2   [K$_2$]

14. State the merits and demerits of bolted connections.   CO2   [K$_2$]

15. State the advantages of cold formed sections over the hot rolled steel sections.   COL   [K$_2$]

16. Draw the different types of cross sections of cold formed steel sections.   CO3   [K$_2$]

17. State the design loads considered for the steel towers.   CO3   [K$_2$]

18. What are the types of foundations provided for steel towers?   CO4   [K$_2$]

19. Distinguish between self supporting and guyed steel chimneys.   CO1   [K$_3$]

20. What is meant by bunkers?   CO1   [K$_3$]

PART C (6 x 5 = 30 Marks)

21. What are the various component parts of an industrial building?   CO1   [K$_2$]

22. Explain different types of beam column connections with sketches.   CO2   [K$_2$]

23. Define stiffened, unstiffened & multiple stiffened element of light gauge element.   CO3   [K$_2$]

24. What are the factors considered while deciding the configuration of the transmission tower?   CO4   [K$_2$]

25. Write short notes on types of towers.   CO4   [K$_3$]

26. What are the design concepts of silos?   CO1   [K$_3$]

Answer any FOUR Questions
PART D (4 x 10 = 40 Marks)

27. A roof truss of Fink geometry is to be designed for a span of 16m. Central rise is   CO1   [K$_4$]
3m. Taking the weight of the AC sheeting as 180 N/m^2, determine the top panel

point loads for dead load, live load and wind load. The length of the shed is 40m; the height upto eaves level is 6m and the spacing of the truss is at 5 m c/c. The design wind velocity is 42 m/s. Assume appropriate self-weights of different components.

28. A hat section 100mm $\times$ 80mm $\times$ 4mm as lip of 25mm dimension. Find the allowable compressive load if it is to be used as column of 3m effective length.   CO3   [K$_3$]

29. Design a connection between beam ISMB 450 and the flange of column ISHB 300 @ 577 N/m to transmit a shear force of 100 kN and a moment of 120 kN-m . Use M24 bolts at 75 mm pitch.   CO2   [K$_4$]

30. Explain the design loads and design concepts of steel towers.   CO4   [K$_4$]

31. A self supporting steel stack is 80metres high and its diameter at the top is 3metres. Design the plates for the stack. The location of the place is such that the intensity of wind pressure upto 30m height is 1.5 kN/m^2.   CO1   [K$_4$]

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