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**C Reg. No. :**

**Question Paper Code: 52P62**

M.E. DEGREE EXAMINATION, NOV 2017

Second Semester

Structural Engineering

15PSE202 - STEEL STRUCTURES

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART - A (5 x 1= 5 Marks)

|  |  |  |  |  |  |  |  |  |  |  |
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| 1. | Column bases are designed primarily as | | | | | | CO1- R | | | |
|  | (a) Plates | | | | (b) Bearings | | | | | |
|  | (c) Studs | | | | (d) Stub columns | | | | |
| 2. | \_\_\_\_\_\_\_\_\_type of connection used to restrained the end rotation. | | | | | | CO2 -U | | | |
|  | (a) Semi-Rigid | | (b) Rigid | | | (c) Simple | (d) Frame | | | |
| 3. | To resist heavy moment -------- are required. | | | | | | CO3- R | | | |
|  | (a) Channel sections | | (b) I sections | | | (c) Tee sections | (d) Angle sections | | | |
| 4. | Squash load ratio is denoted by | | | | | | CO4 -R | | | |
|  | (a) N/Np | | (b) Np/N | | | (c) Z/Zp | (d) Z/Ze | | | |
| 5. | Compressive stress unit is | | | | | | CO5- R | | | |
|  | (a) kgf/cm2 | | | (b) kgf/cm3 | | (c) kg/m2 | (d) kgf/mm3 | | | |
|  | PART – B (5 x 3= 15Marks) | | | | | | | | | |
| 6. | List the types of base plates used in practice. CO1-R | | | | | | | | | |
| 7. | Illustrate the types of heavy moment connections? CO2-U | | | | | | | | | |
| 8. | Draw the neat sketch of gantry girder. CO3-U | | | | | | | | | |
| 9. | Distinguish upper bound and lower bound theorem. CO4-U | | | | | | | | | |
| 10. | Define flat width ratio. CO5-U | | | | | | | | | |
|  | PART – C (5 x 16= 80Marks) | | | | | | | | | |
| 11. | (a) | Design a steel I section purlin from the following data steel with asbestos cement sheet covering  Spacing of truss : 4 m  Spacing of purlins of principle rafters : 1.8 m  Inclination of principle rafter to the main tie : 30 degrees  Wind pressure of roof : 1 kN/m2 | | | | | | CO1- App | (8) | |
|  |  | Or | | | | | |  |  | |
|  | (b) | A symmetric trusses of span 20m and height 5m are spaced a  4.5m c/c. Design channel section purlin to be placed at suitable distances to resist the following loads,  Weight of sheeting including bolts: 171 kN/m2  Live load: 0.4 kN/m2  Wind load: 1.2 kN/m2 (Suction)  Spacing of purlins: 1.4 m | | | | | | CO1- App | (16) | |
|  |  |  | | | | | |  |  | |
| 12. | (a) | Design a seat angle connection between a beam ISMB 250 and a column ISHB 150 for a factored end reaction of beam 100 kN. Using M20 bolts of 4.6 grade, take Fe410 (fy = 250 N/mm2) grade of steel. | | | | | | CO2- App | (16) | |
|  |  | Or | | | | | |  |  | |
|  | (b) | Design welded seat angle connection between a beam ISMB 300 and a column ISHB 200 for a factored end reaction of beam  100 kN, assuming Fe410 grade of steel (fy = 250 Mpa) and site welding. | | | | | | CO2- App | (16) | |
|  |  |  | | | | | |  |  | |
| 13. | (a) | Briefly explain the types of roof trusses with neat sketch. | | | | | | CO3-U | (16) | |
|  |  | Or | | | | | |  |  | |
|  | (b) | Explain the design procedure for gantry girder located at the industrial building. | | | | | | CO3-U | (16) | |
|  |  |  | | | | | |  |  | |
| 14. | (a) | Determine the elastic section modulus S, plastic section modulus Z, yield moment My, and the plastic moment Mp of the cross-section shown below. What is the design moment for the beam cross-section? Assume Fe500 steel.  C:\Users\Civil\Desktop\Untitled.jpg | | | | | | CO4 - Ana | (16) | |
|  |  | Or | | | | | |  |  | |
|  | (b) | Determine the plastic moment capacity and shape factor of the  I-section shown in Fig. This section is ISMB400 with the root radius omitted. Assume fy = 250MPa. | | | | | | CO4 - Ana | (16) | |
| 15. | (a) | Calculate the axial capacity of a thin rectangular hollow section of size 150mm x 180mm has a wall thickness of 1.4mm and a radius of 6mm. The effective length of the member is 3.3m. Assume fy=250 MPa. | | | | | | CO4 - App | (16) | |
|  |  | Or | | | | | |  |  | |
|  | (b) | A top chord member of a roof truss is of hat section as shown in the fig. It is subjected to a compression of 132.5kN and a moment of 1636 kNm. The span is 1.7m.Check the safety of the section if fy = 210N/mm2. | | | | | | CO5-App | (16) | |
|  |  | | | | | | | | | |