Total No. of Questions – [06]

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| G.R. No. | |
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| PAPER CODE | P-122-212 PSE/PSE |
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**May 2022 / INSEM+ENDSEM**

**F. Y. M. TECH. (Civil-Structures) (SEMESTER – II)**

**COURSE NAME: ADVANCED DESIGN OF STEEL STRUCTURES**

**COURSE CODE: CVPB12202**

**(PATTERN 2020)**

Time: [3 Hours] [Max. Marks: 60]

**Instructions to candidates:**

1) **All Questions are compulsory**
2) **Figures to the right indicate full marks**
3) **Use of scientific calculator is allowed**
4) **Assume suitable data wherever required**
5) **Use of IS 800: 2007, IS 875-Part III:2015, IS 801:1975, IS 1161:2014 and Steel Table is allowed**

Q. 1) The design factored forces coming in a member of a hoarding structure are 145 kN tensile and 255 kN compressive due to reversal of wind forces. Design the member using double unequal angle section back-to-back on opposite faces of 10 mm thick gusset plate using M20 black bolts of 4.6 grade. Assume Fe-415 grade of steel. Take length of member as 2.2 m. **[10 marks]**

Q. 2) Design a castellated beam to carry an imposed load of 5.0 kN/m and dead load of 4.5 kN/m over a simply supported span of 15 m. Assume that the compression flange is fully restrained. Take Fe 410 grade steel. **[10 marks]**

Q. 3) a) Differentiate between microwave tower and transmission line tower structures. **[04 marks]**

b) Explain with suitable diagram:
(i) XBX Bracing
(ii) K-Bracing
(iii) Y-Bracing **[06 marks]**

Q. 4) a) A tubular column hinged at one end and roller at other end has the outside diameter of tube 150 mm and is of heavy gauge (i.e. @ 16.2 kg/m). The length of the column is 3.0 m. determine the safe load the column can carry if the column is of IS 1161 grade Yst 240 steel. **[06 marks]**

b) List out the advantages of using tubular structures. **[04 marks]**

Q. 5) Find the allowable compressive load for a hat section 120 mm × 80 mm × 2.5 mm with lip of 25 mm dimension if it is to be used as column of 3 m effective length. Take $f_y$ = 235 N/mm$^2$. **[10 marks]**

Q. 6) Calculate maximum bending moment and shear force for the gantry girder as shown in following figure. Consider longitudinal spacing between columns as 8 m and wheel spacing of crane girder as 3.5 m. **[10 marks]**