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Code No. : 17153 (A) N/O

**VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD**

*Accredited by NAAC with A++ Grade*

**B.E. (Civil Engg.) VII-Semester Main & Backlog Examinations, Dec.-23/Jan.-24**

**Advanced Design of Steel Structures (PE-III)**

Time: 3 hours

Max. Marks: 60

*Note: Answer all questions from Part-A and Part-B*

*Use of IS:800-2007, steel tables and Railway Bridge Rules is permitted. Assume any missing data suitably.*

**Part-A (10× 2 = 20 Marks)**

Q. No.	Stem of the question	M	L	CO	PO
1.	What is the function of flange plates and web plates in plate girder design?	2	1	1	1
2.	What is the proper assumption of preliminary optimum depth of plate girder?	2	1	1	1
3.	What is the function of end bearing stiffeners in a plate girder?	2	1	1	1
4.	Write the necessary formula adopted in the welding design for flange to web connection in a plate girder.	2	1	1	1
5.	How lateral forces are generated in a gantry girder?	2	1	2	1
6.	What is limiting value formula of deflection for an electrically operated gantry girder of span L?	2	1	2	1
7.	Define a beam-column.	2	1	2	1
8.	Briefly explain how racking forces are generated on a typical riveted plate girder railway bridge	2	1	3	1
9.	What is the difference between a deck type plate girder railway bridge and a through type plate girder railway bridge?	2	1	3	1
10.	Briefly describe the term coefficient of dynamic augmentation(CDA) in railway bridges.	2	1	3	1
<b>Part-B (40 Marks)</b>					
11.	Design the cross section only for a welded plate girder 24m in span and laterally restrained throughout. It has to support a uniform load of 100kN/m throughout the span exclusive of self weight. The steel for the flange and web plates is of grade Fe410. Use Limit State Design	13	2	1	1,2
OR					
12.	Design the flange to web welded connection and end bearing stiffener for a plate girder consisting of one top flange plate and one bottom flange plate of size 560mm X 50mm and a web of 16mm X 1800mm. Take maximum shear force value equal to 1908kN and take the stiff bearing length $b_1=125$ mm. Adopt Fe410 grade steel. Use Limit State Design	13	2	1	1,2

13.	A built-up gantry girder of span 8m consists of I-section ISWB 600 @ 1311.6 N/m with Channel section ISMC 300 @ 351.2 N/m placed on its top with web of channel section in contact with top flange of I-section and flanges of web downward. Determine the moment capacity and buckling resistance in bending of the gantry girder. The steel is of grade Fe410. Take the relevant properties of the above sections from steel table.	13	2	2	1,2
OR					
14.	A beam column ISHB 300@618 N/m in a framed building carries a total factored maximum axial load of 1275kN and total factored maximum bending moment of 22.5 kN-m. The effective length of column is 3.2m about both the axes. Check for local capacity of section and member buckling resistance in compression. Adopt Fe410 grade steel. Use limit state design. Take relevant sectional properties from steel table.	13	3	2	1,2
15.	Determine the cross section needed for a deck type riveted plate girder railway bridge as per Indian Railways specifications for a single track broad guage main line loading for the following data: Effective span of the bridge = 24m Spacing of plate girders = 2m Total DL per running metre of track = 35kN/m (includes girders, sleepers and fasteners etc) Check for stresses as per railway bridge code EUDLL for BM =2034 kN EUDLL for SF = 2231kN CDA = 0.417 Draw a neat cross section.	14	4	3	1,2
OR					
16.	Neatly draw the diagram of rocker and roller bearings as per Indian railways specifications and mention all the parts. Also explain in detail the stepwise design procedure of the rocker and roller bearing.	14	3	3	1,2

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	39%
iii)	Blooms Taxonomy Level – 3 & 4	41%

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