Hall Ticket Number:

Time: 3 hours

Code No. : 16104 N

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD B.E. (Civil Engg.: CBCS) VI-Semester Main Examinations, May-2019

Design of Steel Structures

Max. Marks: 70

Note: i) Answer ALL questions in Part-A and any FIVE from Part-B ii) Use of IS:800-2007 and Steel Tables is permitted

iii) Answer all questions of Part-A in one place and in the same order as they appear in the question paper.

Q.N	Stem of the question	M	L	CO	PO
	Part-B $(10 \times 2 = 20 \text{ Marks})$				
1.	Explain the differences between the limit state method and working stress method.	2	1	1	1,2,4
2.	List the different types of bolts. What is meant by a bolt of property class 4.6	2	1	1	1,2,4
3.	What is Shear lag? How its effects are accounted for in the design calculations?	2	1	2	1,2,4
4.	What are the functions of Lacings and Battening?	2	1	3	1,2,4
5.	Explain the types of column splices with neat sketches.	2	1	3	1,2,4
6.	Draw a neat sketch showing the parts of a Gusseted base.	2	1	3	1,2,4
7.	Classify the section ISHB400@77.4kg/m.	2	1	4	1,2,4
8.	What is meant by laterally unsupported beam?	2	1	4	1,2,4
9.	Find the design wind pressure on a roof truss if basic wind speed at a site is $47m/sec$, $k_1=1$, $k_2=1$, $k_3=1.054$.	2	1	1	1,2,4
10.	What is meant by economical spacing of roof trusses?	2	1	4	1,2,4
	Part-B $(5 \times 10 = 50 \text{ Marks})$				
11.	 a) Find the efficiency of a single bolted lap joint connecting two plates of 6mm thickness with 20mm diameter bolts at a pitch of 60 mm. Grade of bolts is 4.6 and Grade of steel plates is Fe410. Refer Fig. 1. 20 num bolts 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	5	1	1	1,2,4
	Fig. 1	6	1	1	104
	b) A tie member consisting of an ISA 80mm x 50mm x 8mm is welded to a 12mm thick gusset plate at site. Design welds to transmit a load equal to 220kN.	5	1	1	1,2,4
	12. The longer leg of a single angle ISA $125 \times 75 \times 6$ mm is connected to a 10mm thick gusset plate by four bolts of 16mm diameter as shown in fig. 2. Determine the design tensile strength of the angle. fy= 250MPa and fu=410MPa.	10	3	2	1,2,4
		1			

	13.	A column section ISHB 300 @ 618N/m in the lower storey of a building is to be joined to a stanchion ISHB 200 @ 392.4N/m of the next upper storey. A load of 600kN is to be transferred from the top storey column. Design the column splice. The column ends are made flush. Use steel of grade Fe410 and bolts of grade 4.6.	10	3	3	1,2,4
	14.	A simply supported beam 5m span carries u.d.l. of 60kN/m at factored loads. In addition the beam a central point load of 75kN at factored loads. The beam is laterally supported. Design the beam section and make all the checks.	10	5	4	1,2,4
	15.	Design a purlin on a sloping roof truss with the dead load of 0.15 kN/m ² (cladding and insulation), a live load of 2kN/m ² and 0.5 kN/m ² (suction). The purlins are 2m c/c and of span 4m simply supported on a principal rafter making an angle 20°. Design a channel section purlin.	10	4	4	1,2,4
16.	a)	Two plates of 16mm and 14mm thickness are to be joined by a double v groove weld, the joint is subjected to a factored tensile load of 430kN. The effective length of the weld provided is 125mm. Check the safety of the joint. Assume the angle between the plates to be 180° and the plates are shop welded.	5	2	1	1,2,4
	b)	Find the minimum net effective area of the plate of size 240mm × 10mm with bolted connections as shown in fig. 3. Bolts are of 16mm diameter.	5	1	2	1,2,4
		Fig. 3				
17.	A	nswer any <i>two</i> of the following:	- 1			
	a)	Use of slab base for transferring column load to its foundation.	5	2	3	1,2,4
	b)	Crippling of a beam member.	5	2	4	1,2,4
	c)	Types of loads on roof truss and load combinations.	5	2	1	1,2,4

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

S. No.	Criteria for questions	Percentage
1	Fundamental knowledge (Level-1 & 2)	58
2	Knowledge on application and analysis (Level-3 & 4)	32
3	*Critical thinking and ability to design (Level-5 & 6) (*wherever applicable)	10

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