B.C.E Examination ,2017

3rd year, 2nd semester ref Ex/CE/T/325/2017 (old)

Design of Metal structures-I

Time 3 hours Full Marks 100

Use separate answer script for each part

(50 marks for each part)

Part –1

Answer any two questions

Assume reasonable values of any data if required

IS 800, IS-875 and SP-6 are allowed in the examination hall

Q 1 Design member forces of a rafter member in a roof truss of a factory shed are as follows:

Compressive force (factored) = 320 KN (DL + LL)

Tensile force (Factored) = 260 KN (DL + WL)

Design the member using double angle section. Nodal distance of the rafter member is 1.75 m. Assume weld connection. Use limit state method of design. **25**

Q 2 (a) What are the advantages of HFSG bolt over Black bolt?

(b) Explain with diagram "BLOCK SHEAR FAILURE"

(c) Determine the maximum load P (factored)could be resisted by the bracket as shown in Fig Q 2. Size of the fillet weld is 6mm (shop) **2+4+19=25**

Q3. A 20 m X60m factory shed is to be constructed at Jalpaiguri. The steel roof trusses are to be used for roofing on the concrete columns. The spacing of the rood truss is 5 m and span of the truss is 20m. Column height above GL is 5 m. Galvanised corrugated iron sheet will be used. Maximum spacing of the purlin is 1.8m. Propose a suitable type of roof truss and calculate the wind load acting at the nodal point for the design. **25**

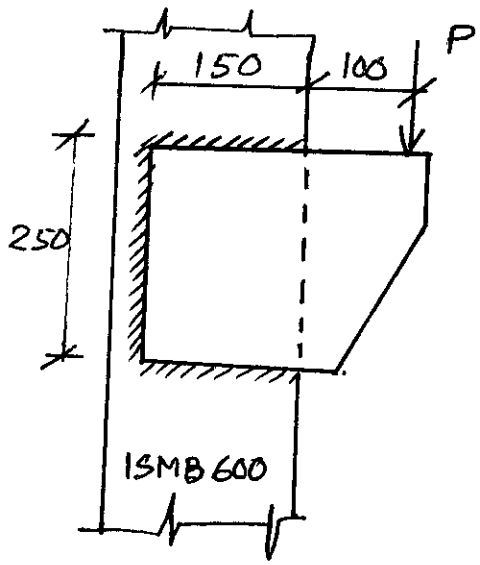

Fig Q.2

.....*B.C.E. 3rd Year 2nd Semester [OLD]*..... EXAMINATION, *2017*

SUBJECT ..... ***Design of Metal Structures - I*** .....

PAPER .....--.....

Full Marks 100
(50 marks for each part)

Time: **Three hours**

Use a separate Answer-Script for each part

No. of Questions	**PART II**	Marks
	[Use of I.S. 800 and SP-6(1) are allowed in the examination hall.] (Consider Fe410 steel i.e. 'yield stress' of steel = 250MPa) **Answer any TWO questions**	
1.	A steel floor beam is simply supported over a span of 6m. It is subjected to uniformly distributed load of intensity 40kN/m [15kN/m (D.L.) and 25kN/m (L.L.)] acting over its entire length. Design a rolled steel ISMB-section for this beam if the compression flange of the beam is '***not laterally supported or restrained***' along its length. Show all checks. Assume any reasonable data, if required.	[25]
2.	Design a rolled steel **ISMC** section, under 'dead load and wind load (thrust)' combination, for a purlin member in an industrial shed having the following data: Spacing of truss = 4.5 m c/c Span of truss = 20.0 m Spacing of purlins = 1.5 m c/c Angle of truss = 21^0 Net intensity of wind pressure = 1.6 KN/m^2 Weight of galvanized sheet = 160 N/m^2 Assume any reasonable data, if required.	[25]
3.	A column made of **ISMB 500 @ 86.9 kg/m** is hinged at both the ends. Its effective length is 4.0m. It is subjected to factored axial compressive load of 750kKN and a factored moment of 105kNm about its major axis at both the ends. Check whether the column section is safe or not.	[25]
4.	a) Design a column with rolled steel I-section to support a factored axial load of 2000 kN. The column has an effective length of 7.0m with respect to major axis of the cross-section (z-axis) and 5m with respect to minor axis of the cross-section (y-axis). b) Design a suitable 'slab-base' plate for the above mentioned column. The base plate is to rest on a concrete pedestal having the safe bearing capacity of 9.0N/mm^2. Assume any reasonable data, if required. Draw a neat sketch to show the details of the column with base-plate. = = = E N D = = =	[25]