B.C.E Examination ,2017

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

Design of structures-II

Time 3 hours Full Marks 100

Use separate answer script for each part

Part –I (full marks = 60)

Answer Q1 and any one from the rest

Assume reasonable values of any data if required . The notations have their usual meaning.

IS 800, IS-875 and SP-6 are allowed in the examination hall . Use E250BR grade steel

Q 1 (a) Design member forces of the bottom chord (node to node distance =1.5 m) of a typical pitched Pratt truss of span 18 m of a factory shed are as follows:

Compressive force (Factored) = 340 KN (DL + WL) . Tensile force (Factored) = 250 KN (DL + LL)

Design the member using double angle section. Longitudinal ties are provided at the alternate node of the bottom chord member. Design and detail the weld connection at the ends also. Use limit state method of design. Assume 12 mm thick gusset plate. The height of the truss is 3.0m

(b) Draw the junction of column (HB400) and the above truss using weld or bolt .The section of the rafter is assumed to be same as that of bottom chord. Thickness of cap and shoe plates = 20 mm .

(c) Check the adequacy of the column (fixed at base and hinged at top) of size HB250 subjected to a factored axial compressive load of 600 KN and factored moment of 40 KN-m at the base about major axis only. Height of the column is 3.5 m. The Buckling check against (i) bending and (ii) combined bending and axial compression is not needed. For HB250, $Z_{pz}=674x10^3$ mm^3 $Z_{py}=305x\ 10^3\ mm^3$. **20+5 +15**

Q2. A 15 m X45m steel factory building with side cladding is to be constructed at Visakhapatanam. The steel sloped roof trusses resting on the steel columns are to be used. The spacing of the roof truss is 4.5 m and span of the truss is 15m. Column height above GL is 5 m. The galvanised corrugated iron sheet will be used. Maximum spacing of the purlins is 1.8 m. Propose a suitable type of roof truss and calculate the wind load at the nodal point for the design of truss. Also calculate the wind load acting on the typical column. **20**

Q3 (a) Find the maximum load carrying capacity of a bracket as shown in fig A.

(b) When the bending moments to be considered in the design of top chord of trusses? Explain with sketches **15+5**

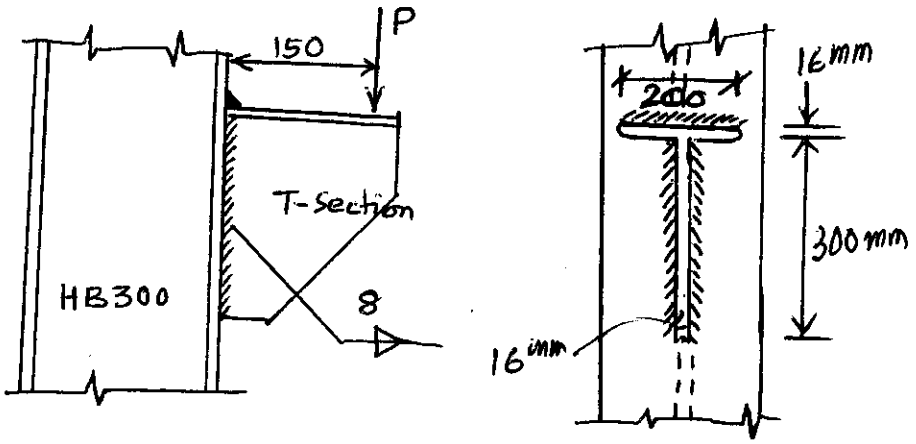

Fig · A.

Form A : Paper-setting Blank

Ref. No. *Ex/CE/T/325/2017*

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

SUBJECT ..... ***Design of Structures - II*** .....
(Name in full)

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

Full Marks 100
(40 marks for this 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 one question from [Q1 and Q2]. Q3 is compulsory.**	
1.	A steel floor beam is simply supported over a span of **5m**. It is subjected to one concentrated load of magnitude **80kN** (40%D.L.+60%L.L.) acting at a distance 2m from left end of the beam and a uniformly distributed load of intensity of **20kN/m** acting over the entire span of the beam. Design a rolled steel **ISMB-section** for this beam if the compression flange of the beam is '**NOT laterally restrained or supported**' along its length. Stiff bearing length is 150mm. Show all checks. Assume any reasonable data, if required.	[25]
2.	Design a rolled steel **ISMC section**, under '**dead load, live load and wind load (suction)**' and '**dead load, live load and wind load (thrust)**' combination, for a purlin member in an industrial shed having the following data: a) Angle of truss = 22.5^0; b) Spacing of truss = 6.5 m c/c; c) Span of truss = 24.0 m; d) Spacing of purlins = 1.65 m c/c; e) Net intensity of wind pressure = 1.1 kN/m^2; f) Weight of galvanized sheet = 150 N/m^2, g) Intensity of live load = 0.7 kN/m^2. Assume any reasonable data, if required.	[25]
3.	Design a suitable 'welded gusseted base plate' for the column made of rolled steel I-section **ISMB 600 @122.6kg/m** subjected to factored axial load of 1800kN. The base plate is to rest on a concrete pedestal having the permissible bearing capacity of 9.0MPa. Assume any reasonable data, if required.	[15]
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