B E Civil Engineering Third Year Second Semester Examination – 2018

Subject: Design of structures –II

Time : Three hours Full Marks: 100

Use separate answer script for each part
Part – I (full marks = 60)
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

CO1 [20]	Q1. A 16 m X40 m steel factory building with side cladding is to be constructed near Chennai (within 60 Km from the coast). The steel sloped roof trusses resting on the steel columns are to be used. The spacing of the roof truss is 4.0 m and span of the truss is 16 m. 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 Pratt type roof truss and calculate the wind load at the nodal point for the design of truss **20**
CO2 [20]	Q 2 (a) Design member forces of the bottom chord (node to node distance =1.8 m) of a typical pitched Pratt truss of span 18 m of a factory shed are as follows: Compressive force (Factored) = 400 KN (DL + WL) Tensile force (Factored) = 400 KN (DL + LL) Design the member using double angle (having member thickness of 8mm) section. Longitudinal ties are provided at the alternate node of the bottom chord member. Design and detail the bolt connection at the ends also. Use limit state method of design. Assume 10 mm thick gusset plate. The height of the truss is 3.0m Use M16 black bolt of grade 4.6 **Or** (b) Check the adequacy of the column (fixed at base and hinged at top) of size HB300 subjected to a factored axial compressive load of 700 KN and factored moment of 50 KN-m at the base about major axis only. Height of the column is 4.0 m. The Buckling check against (i) bending and (ii) combined bending and axial compression is not needed. For HB300, Zpz =921x10^3 mm^3 Zpy=326 x 10^3 mm^3. **20**
CO3 [20]	Q3 (a) A Square Hollow Section (150 X 150X 6) is connected to the flange of a MB 600 as shown in fig A. The bracket is subjected to symmetrical horizontal and vertical load of each 50 KN (Factored) .Find the weld size required for the connection . (b) Draw the connection at the ridge of the truss in Q1 including purlins (ISA 100 X 100 X 8) and sheeting. Assume any suitable size (double angle with 10mm gusset) for the members. **15+5**

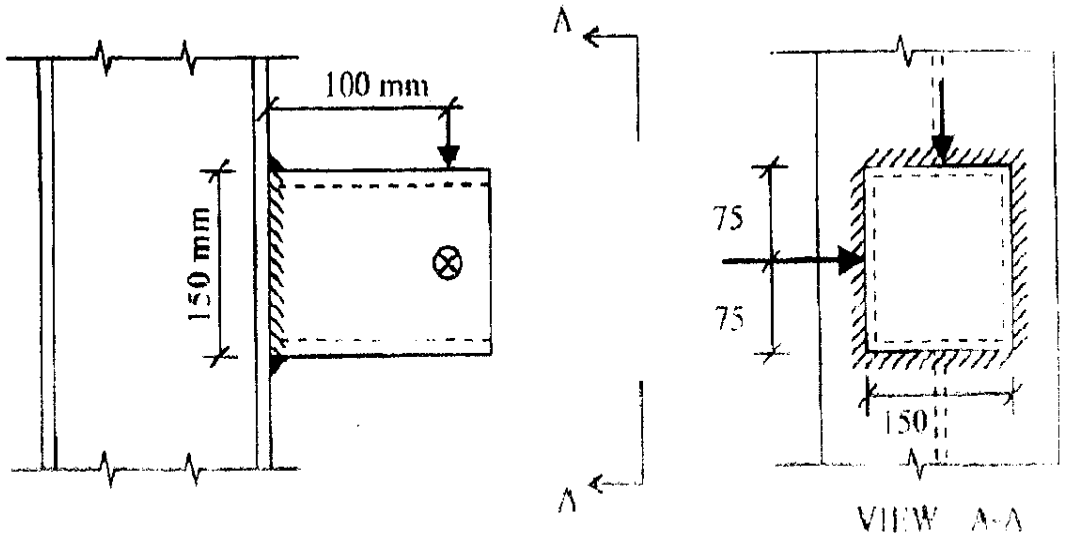

fig –A

.....B.E.Civil Engineering 3rd Year 2nd Semester..... EXAMINATION, *2018*

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 [Q1 or Q2] and Q3**	
1.	A steel floor beam is simply supported over a span of **5.25m**. It is subjected to two concentrated loads of magnitude **60kN** (50%D.L.+50%L.L.) each acting at a distance **1.5m** from either 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 = 20^0; b) Spacing of truss = **5.5 m** c/c; c) Span of truss = **20.0 m**; d) Spacing of purlins = **1.5 m** c/c; e) Net intensity of wind pressure = **1.5 kN/m²**; f) Weight of galvanized sheet = **150 N/m²**, g) Intensity of live load = **0.5 kN/m²**. Assume any reasonable data, if required.	[25]
3.	An ISMB 550 @103.7kg/m used as a column is subjected to an axial load of **1400kN**. Design a suitable '**welded gusseted base plate**' for the above mentioned column. The base plate is to rest on a concrete pedestal having the safe bearing capacity of 9.0MPa. Assume any reasonable data, if required. Draw a neat sketch to show the details of the column with base-plate. = = = E N D = = =	[15]