Printed Pages : 4

ECE-701

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 100701

Roll No.

B. Tech.

(SEM. VII) (ODD SEM.) THEORY EXAMINATION, 2014-15

DESIGN OF STEEL STRUCTURE

Time : 3 Hours] [Total Marks : 100

Note : (1) Answer all questions.
(2) Use of IS 800 and steel table is allowed.
(3) Assume any missing data suitabily if required.

1 Attempt any **FOUR** parts of the following : **5x4=20**

a) Write advantages of steel when used as a structural material.

b) Describe some of the mechanical properties of structural steel.

c) Discuss in brief a general chemical composition of steel and affect of carbon on steel.

d) Discuss stress strain behaviour of mild steel.

e) Describe various rolled structural shapes and their designation, which are used as structural elements in steel structures.

f) What is the importance of wind load ? How it is being calculated for design ?

2 Attempt any **two** parts of the following : **10x2=20**

a) Determine the strength and efficiency of the lap joint shown in fig.2(a). The bolts are of 20 mm diameter and of grade 4.6. The two plates to be jointed are 10 mm and 12 mm thick and steel is of grade Fe-410.

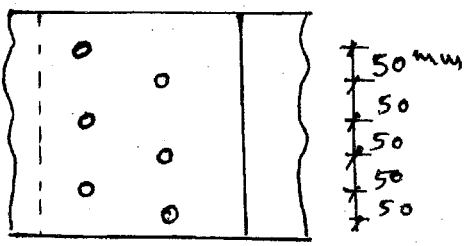

Fig.2(a)

b) A tie member of a truss consists of double angle section each 80mm × 80mm × 8mm welded on the opposite side of a 12mm thick gusset plate. Design a fillet weld for making connection in the workshop. The factored tensile force in the member is 300 kN.

c) (i) Explain some of the common defects in the welds.

(ii) Write advantages of welded joints over bolted joints.

3 Attempt any **TWO** parts of the following : **10x2=20**

a) A plate 225mm wide and 10mm thick is welded by fillet weld to a gusset plate. The lap length is 100mm. Determine the block shear strength of the welded tension member. Steel is of grade Fe 410.

b) A plate tension member is shown in fig.3(b). It is connected to a 16 mm thick gusset plate with 18 mm diameter bolts. Determine the block shear strength of the gusset plate.

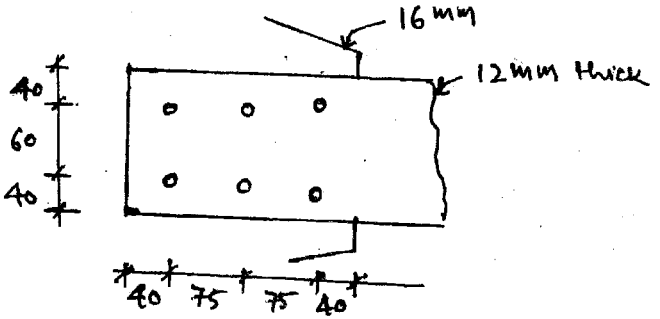

Fig.3(b)

c) Design a tension member to carry a pull of 830 kN. The member is 3.2 m between c/c of intersections. Design the member using channel section.

4 Attempt any **TWO** parts of the following : **10x2=20**

a) Calculate the design compressive load for a column made up of ISHB 350 @ 710.2 N/m, 3.5 m high. The column is restrained in direction and position at both the ends. Use steel of grade Fe 410.

b) Design a single angle discontinuous strut to carry a factored axial compressive load of 60 kN. The length of strut is 3m between intersections. It is connected to 12mm thick gusset plate by 20 mm diameter 4.6 grade bolts. Use steel of grade Fe 410.

c) Design a slab base for a column ISHB 350 @ 710.2 N/m subjected to an factored axial compressive load of 1500 kN. The column end and base plate are machined. The base rests on M-20 grade concrete pedastal.

5 Attempt any **ONE** part of the following : **20x1=20**

a) An ISLB 600 @ 976.1 N/m has been used as a simply supported beam over 7.20 m span. Determine the safe uniform load that the beam can carry in flexure. Assume Fe-410 steel. The beam is laterally unsupported.

b) Design an I section purlin to cover a span of 5m, subjected to an udl of 1.5 kN/m in the plane of minor axis and 0.5 kN/m in the plane of major axis under working loads. Assume that purlin is continuous over the supports and no lateral buckling occurs. Take $f_y = 250$ N/mm^2.
