Printed Pages: 03 **Subject Code: NCE701/ ECE701**

Paper Id: 100701 **Roll No:** | | | | | | | | | | |

B TECH

(SEM-VII) THEORY EXAMINATION 2018-19

DESIGN OF STEEL STRUCTURES

Time: 3 Hours ***Total Marks:100***

Note: 1.Attempt all Sections. If require any missing data; then choose suitably.
2. IS 800:2007 original copy is allowed. Use of steel table is allowed.
3. Assume any missing data suitably if required.

SECTION A

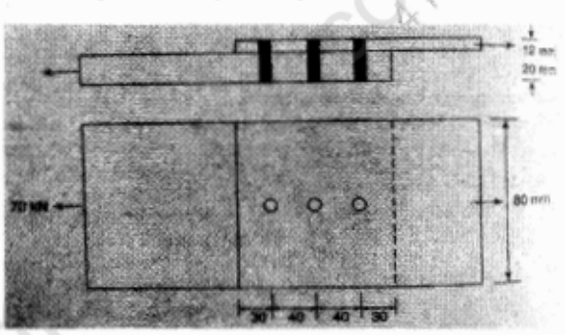
1. Attempt *all* questions in brief : **2 X 10 = 20**

a) Distinguish between: factor of safety and partial safety factor.
b) List the disadvantages of steel as a structural material.
c) What does 4 and 6 imply for bolts of grade 4.6.
d) Why fillet welds are preferred over butt welds.
e) What is shear lag effect?
f) What is lug angle.
g) What do you understand by inelastic buckling?
h) Define effective length of column.
i) Why is an I- section commonly used as a beam member even though its lateral buckling strength is low?
j) What is the main purpose of a gantry girder?

SECTION B

2. Attempt any *three* of the following: **10 X 3 = 30**

a) Draw a stress strain curve for mild steel and discuss salient points on it.
b) Design a lap joint between two plates as shown in fig below so as to transmit a factored load of 70 kN using M16 bolts of grade 4.6 and grade 410 plates.



c) Select a suitable angle section to carry a factored tensile force of 170 kN assuming a single row of M20 bolts and assuming design strength as f_y =250N/mm^2.

d) Design a column to support a factored load of 1050 kN.The column has an effective length of 7.0 m with respect to Z -axis and 5.0 m with respect to y-axis .Use steel of grade Fe 410.

e) Design a simply supported beam of span 5m carrying a reinforced concrete floor capable of providing lateral restraint to the top compression flange .The uniformly distributed load is made up of 20 kN/m imposed load and 20 kN/m dead load(section is stiff against bearing).assume Fe 410 grade steel.

SECTION C

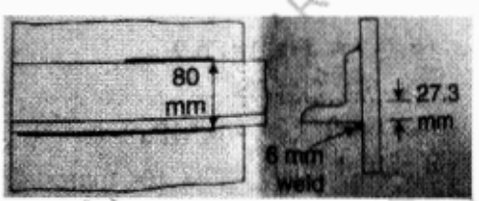
3. Attempt any *one* part of the following: 10 X 1 = 10

a) List various loads that may act on steel structures. Describe the environmental load briefly.

b) Distinguish between the working stress methods, ultimate strength design and limit state design.

4. Attempt any *one* part of the following: 10 X 1 = 10

a) A tie member consisting of an ISA 80mm X 50mmX8 mm (Fe 410 grade steel) is welded to a 12 mm thick gusset plate at site.Design welds to transmit load equal to the design strength of the member.

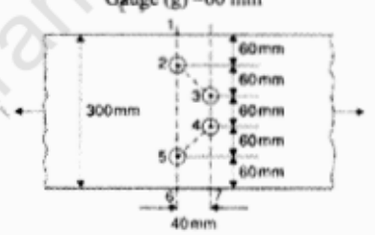


b) Two plates' 10-mm and 18-mm thick are to be joined by a double cover butt joint .Assuming cover plates of 8-mm thickness. Design the joint the joint to transmit a factored load of 500 kN.Assume Fe415 plate and grade 4.6 bolt.

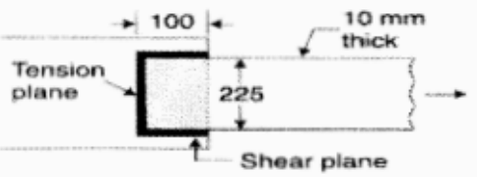
5. Attempt any *one* part of the following: 10 X 1 = 10

a) Determine the minimum net area of cross section of 300 X 12 mm as shown in figure below .The holes are of diameter 17.5mm.

Pitch (p) =40 mm Gauge (g) =60 mm



b) Determine the block shear strength of the welded tension member shown below .grade of steel is Fe 410.



6. Attempt any *one* part of the following: 10 X 1 = 10

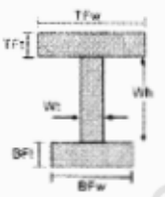
a) Calculate the design compressive load for a column made up of ISHB 350@710.2 N/m and 3.5 m high.The column is restrained in direction and position at both the ends. Use steel of grade Fe-410.

b) Design a slab base for a column ISHB 350 @ 710.2 N/m subjected to a factored axial load of 1500 kN.The column end and base is machined and grade of concrete used is M-20.

7. Attempt any *one* part of the following: 10 X 1 = 10

a) A simply supported steel joist of 4.0 m effective span is laterally supported throughout .it carries a total uniformly distributed load of 40 kN (inclusive self-weight).design an appropriate section using steel of grade Fe 410.

b) Determine the plastic moment capacity and plastic modulus of section of the unsymmetric section shown below



TFw=100mm, TFt=10mm, BFw=200mm, BFt=10mm, Wh=180mm, Wt=10mm All dimensions are in mm.