Registration no: | | | | | | | | | | |

Total Number of Pages: 02 **M.TECH**
CEPE208

2nd Semester Back Examination – 2016-17
ADVANCED STEEL STRUCTURES
BRANCH(S): STRUCTURAL & FOUNDATION ENGG, STRUCTURAL ENGG
Time: 3 Hours
Max Marks: 70
Q.CODE:Z1065
Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.
(IS:800-2007 and Steel Tables are allowed)

Q1 **Answer the following questions:** **(2 x 10)**

a) What are the defects in welding?
b) Sketch the bearing and rupture failure of plates.
c) Define 'Block shear'.
d) Explain the term, *plastic hinge* ?
e) Define *shear center* .
f) What do you mean by *web crippling*? Draw a figure to show it.
g) State the various types of beam connections.
h) With the help of a sketch, show the various elements of a plate girder.
i) State the important loads considered in the design of a *gantry girder*.
j) In what situation, unsymmetrical bending takes place?

Q2 **a)** Two plates each of 10 mm thickness are to be connected with each other using M_{20} bolts of grade 4.6 through a lap joint. Calculate the bolt value. Assume any other data if necessary. **(5)**

b) A tie member 75 mm x 8 mm is to transmit a factored load of 120kN. Design fillet welds and necessary overlap for an economic gusset size. The steel used is of FE_{410} grade. Assume gusset plate to be 10 mm thick and any other data if necessary. **(5)**

Q3 Design a column of effective length of 5.0 m. It is subjected to a factored axial compressive load of 2500 kN. Provide two channels back-to-back connected with battens by site welded connection. Use Steel of Grade Fe_{410}. Assume any other data necessary **(10)**

Q4 A column ISHB 350 @ 661.2 N/m carries an axial compressive factored load of 1400 kN. Design a suitable bolted gusset base. The base rests on M_{15} grade concrete pedestal. Use 20mm dia bolts of grade 4.6 for making the connection. Assume any data necessary. **(10)**

Q5 Design a bridge truss diagonal subjected to a factored tensile load of 350 kN. The length of the diagonal is 4.0m. The tension member is connected to a gusset plate 16 mm thick with one line of 20 mm dia bolts of grade 8.8 **(10)**

.

Q6 **a)** What are the advantages and disadvantages of welded connection? **(5)**

b) Design a double angle strut to carry an axial factored load of 240 kN. The length of strut is 3.0m. Bolted connections are to be used to connect it to 12 mm gusset plate. **(5)**

Q7 Design a laterally unsupported beam for the following data. Effective span: 4.2 m., Maximum Bending Moment: 500 kN-m, Maximum Shear Force: 220 kN, Use Steel of Grade Fe_{410}. Assume any other data necessary. **(10)**

Q8 **Write short notes on any two.** **(5 x 2)**

a) Shear Lag

b) Seat angle bolted connection.

c) Modes of failure of beam-column.

d) Single and Double lacing