* S E - 6 7 5 1 / 1 0 0 *

SE-6751

B. E. III (Sem. V) (Civil) Examination

April / May – 2011

Structural Design & Drawing - I

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

Instruction :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. - 3 (Sem. 5) (Civil)**

Name of the Subject :

☛ **Structural Design & Drawing - 1**

☛Subject Code No. : **6 7 5 1** ☛Section No. (1, 2,.....) : **Nil**

Seat No. :

Student's Signature

(2) Assume suitable data if necessary.

(3) Figures to the right indicate full marks.

(4) IS-800, IS-808 and IS-875 are permitted..

1 Answser the following : **10**

(i) Local buckling occurs if flanges are unrestrained, whether the statement is true of false.

(ii) In case of unrestrained beam the compression flange deflects laterally, whether the statement is true or false.

(iii) In case of plate girder, the width to thikness ratio to prevent local buckling for plastic section shall be _____.

(iv) Intermediate transverse stiffeners are provided on _____ of web.

(v) Elastic critical moment is the elastic moment fluctuations of stress, leading to progressive cracking of a structural element.

(vi) _____ is a damaged caused by repeated fluctuations of stress, leading to progressive cracking of a structural element.

(vii) _____ is a condition beyond which the structure ceases to fulfil its intended function.

(viii) _____ is a stage at which sufficient number of plastic hinges have formed due to the loads in a structure leading to failure.

(ix) The phenomenon of increase in stress with increase in strain beyond yielding is called _____.

(x) The load at which a structure as a whole collapses in service and develops excessive lateral deformation is called _____ load.

2 Solve the following : (any **two**) **20**

(a) A proposed cantilever beam is built in to concrete wall. It supports a dead load of 20 kN/m and live load of 10 kN/m. The length of beam is 5 m. select a suitable section with necessary checks. Assume stiff bearing length of 100 mm.

(b) Design a laterally unrestrained beam to carry a uniformly distributed load of 50 kN/m. The beam is unsupported for a length of 1.5 m and is simply placed on longitudinal beams at its [?][?][?] = 25.

(c) A bracket plate is used to tranfer the reaction of a beam to a column flange of ISHB 300 @ 576.8 N/m. The bracket plate 300×200 is connected to the column flange by a 6 mm filet weld. Compute the maximum load that can be placed over the bracket plates at a distance of 75 mm from the flange of the column section.

3 Design a 15 m long simply supported welded plate girder carrying a uniformly distributed load of 50 kN/m and two point loads of 300 kN at quarter points. The girder is laterally supported. Use Fe 410. **20**

OR

3 Design a gantry girder without lateral restraint along its span to be used in industrial building for the following data : **20**

C/C distance between the columns = 6 m
Crane capacity = 200 kN
Self weight of the crane girder excluding trolley = 150 kN
Self weight of trolley, electrical motor, hook, etc. = 30 kN
Minimum hook approach = 1 m
Distance between wheel centres = 2 m
C/C distance between gantry rails = 15 m
Self weight of rail section = 300 N/m
Yield stress of steel = 250 MPa.

4 Design a steel roof truss for the following data : 20

(i) Spom of truss = 15 m
(ii) Type of truss = Fan type
(iii) No. of ponds = Eight
(iv) Roof covering = corrugated G.I. sheets
(v) Rise of truss - 3.5 m
(vi) Spacing of roof truss = 4 m
(vii) Location of truss at BHOPAL
(viii) Size of the shed = 15 m × 35 m
(ix) The life of structure = 25 years
(x) The structure is in open terrian with no obstructions.
(xi) The building has 10% opening in the walls.
(xii) Height at eves level = 13 m

Calculate dead load, live load and wind load per panel point and design the purlin.

5 Design a built up column of two channels placed back to back to carry a factored load of 1200 kN. The column is 8 m long and restrained in position but not in direction. Design lacing system with riveted connections.

OR

5 Design the slab base of a column ISHB 350 carrying a factored axial load of 1800 kN. Safe bearing capacity of the soil is 220 kN/m^2. Permissible compressive stress in concrete of 4 N/mm^2. Draw a neat sketch of plan and sectional elevation.

6 Attempt any two :

(1) A single angle section ISA 75 × 75 × 8 is connected to a gusset plate of 10 mm thickness. Find out the load carrying, capacity of this angle in tension of 4 bolts of 16 mm diameter are provided at 50 mm pitch and edge distance. Take yield and ultimate stress of steel as 250 MPa and 410 MPa. **10**

(2) Design a suitable angle section to carry a tensile load of 180 kN if it is connected to a 10 mm thick gusset plate by 6 numbers of 16 mm diameter bolts. Assume the edge distance and pitch as 40 mm. **10**

(3) A tie member of a truss consisting of an angle section ISA 65 × 65 × 6 of Fe 410 grade is welded to an 8 mm gusset plate. Design a weld to transmit a load equal to the full strength of the member. Assume shop welding. **10**
