Roll No. ....

6th Sem / Civil, Brick Tech., Constr. Mgmt.
Subject:- Steel Structures Design and Drawing

Time : 6Hrs.   M.M. : 150

SECTION-A

Note: Multiple choice questions. All questions are compulsory
(10x1=10)

Q.1   The density of steel used in the structural members should be_____
   a) $1.00 \, g/m^3$ b) $7.85 \, g/m^3$
   c) $6.40 \, g/m^3$ d) $13.60 \, g/m^3$

Q.2   With a percentage increase of carbon in steel, decreases_____
   a)   Hardness   b)   Brittleness
   c)   Ductility   d)   Strength

Q.3   When one member is placed above the other and they are connected by means of rivets, the joint is known as _____
   a)   Lap joint   b)   Single cover butt joint
   c)   Double cover butt joint   d)   Both (a) and (b)

Q.4   The most economical section for a column is_____
   a)   Angle section   b)   Tubular section
   c)   I-section   d)   Solid round section

Q.5   Two structural members may be temporarily connected by which kind of connection_____
   a)   Welded   b)   Riveted
   c)   Bolted   d)   Pin

Q.6   As compare to riveting, welding is preferred due to _____
   a)   It is a silent process   b)   It is more economical
   c)   It has more efficiency   d)   All the above

Q.7   A tie is a_____
   a)   Compression member   b)   Tension member
   c)   Flexible member   d)   Torsion member

Q.8   The most economical section for a column is _____
   a)   Angle section   b)   Tubular section
   c)   I-Section   d)   Solid round section

Q.9   The maximum shear stress of steel beam shall not exceed_____
   a) $0.35f_y$ b) $0.45f_y$
   c) $0.55f_y$ d) $0.65f_y$

Q.10   The minimum spacing of vertical stiffeners in plate girder is given by_____
   a)   d   b)   0.7d
   c)   0.5d   d)   0.33 d

SECTION-B

Note: Objective type questions. All questions are compulsory.
(10x1=10)

Q.11   Expand the term ISJB.

Q.12   The continuous deformation of a material under a constant load at high temperature is known as _____ (Creep/Brittleness)

Q.13   Tracking rivets are provided at a pitch of not more than_____ (300 mm / 350 mm)

Q.14   Number of rivets required = Load in the member / _____ (Rivet value / Joint efficiency)

Q.15   Young's modulus of elasticity of steel is_____ ($2.0 \times 10^5 \, N/mm^2$) / ($2.0 \times 10^5 \, KN/mm^2$)

Q.16   The advantage of welding lies in_____ (Better appearance of joint / Non-rigid joints)

Q.17   A tie is a _____ (Compression member / Tension member)

Q.18   The effective length of a column depends upon_____ (End Conditions of the column / Load on a column)

Q.19   When one end of column is fixed and other end free, then effective length =_____ (L / 2L)

Q.20   The maximum shear stress of steel beam not exceed _____ ($0.45 \, f_y / 0.50 \, f_y$)

SECTION-C

Note: Short answer type questions. Attempt any twelve questions out of fifteen questions. (12x5=60)

Q.21 Find the efficiency of a single riveted lap joint with the given data: Diameter of rivet = 25mm, pitch of rivets = 90mm, Thickness of plates = 12 mm, s_{at} = 150N /mm^2, t_{vf} = 90 N/mm^2 and s_{pf} = 270 N/mm^2.

Q.22 Write the names of various types of butt weld along with their sketches.

Q.23 Enlist any five advantages of bolted connections.

Q.24 Describe the importance of net effective area in a tie member.

Q.25 Determine the strength of a tie member composed of 2 ISA 125mm x 75mm x 8 mm placed back to back and on both sides of the gussest plate and connected by 18 mm dia. rivets. Take d_{st} = 150 MPa.

Q.26 Write a short note on buckling of columns.

Q.27 Calculate the load carrying capacity of ISMB 350 @ 514 N/m to be used as a column. The effective of the column is 3.5m

Q.28 What are the factors which affect the selection of type of truss?

Q.29 How will you find out the economics spacing of roof trusses?

Q.30 Explain effective length of column, also list the types of end conditions.

Q.31 Write a short note on splicing of columns.

Q.32 Write the assumptions made in the theory of simple bending.

Q.33 Explain web crippling & web buckling of a beam.

Q.34 A simply supported steel beam carries a superimposed load of 38.5 kN/m over an effective span of 7.8m. Design the beam and check for shear. Take permissible bending stress 165 N/mm^2, shear stress 100 N/mm^2 and E = 2.1 x 10^5 N/mm^2.

Q.35 Write a short note on "Erection of Steel Columns" used as steel structures.

SECTION-D

Note: Long answer type questions. Attempt any two questions out of three questions. (2x10=20)

Q.36 A strut in a roof truss carries an axial compressive load of 180 KN. Design a suitable double angle section for the member. The length of strut between centre to centre of instersection is 2.5m

Q.37 Calculate the load carrying capacity of ISHB 250@ 536.6 N /m to be used as a column. The column is 4 m long and is effectively held in position at both ends and restrained against rotation bat one end. Take f$_y$= 250 Mpa. (CO6)

Q.38 a) Write the procedure for design of tension members.
b) Write the steps to be followed during the design of an axially loaded column.

SECTION-E

Note: Steel Structure Drawing. Attempt any two questions out of three questions. (2x25=50)

Q.39 Draw front and side elevation of splicing arrangement of two unequal columns having different flange width with the following data:
· Lower column = ISHB 250 @ 536.6 N/m
· Upper column = ISHB 200 @ 392.4 N/m.
· Distribution plate = 250 mm x 250 mm x 20 mm
· Packing plate thickness = 25 mm
· Cover plate = 400 mm x 250 mm x 20 mm
· Cleat angles = 60 x 60 x10 mm
· Nominal diameter of rivets = 18 mm

Q.40 Draw to a suitable scale the section plan, front elevation and cross section of a simple plate girder from the following given data:
Clear span = 8 m
Web plate = 800 mm x 12 mm
Depth over angle = 810 mm
Flange angle = 2 - ISA 80 x 80 x 8 mm
Top and Bottom cover plates = 200 mm x 12 mm
Bearing plate = 200 mm x 250 mm x 15 mm
Diameter of rivets = 20 mm
Pitch of rivets = 60 mm.

Q.41 Draw the heel joint of a steel roof truss with roof drainage arrangement.