Roll No. ....

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

Time : 3Hrs.   M.M. : 150

SECTION-A

Note: Multiple choice questions. All questions are compulsory

(10x1=10)

Q.1   Channel section consists of   (CO1)
    a)   Two web   b)   One web and two flange
    c)   Two flange   d)   One flange

Q.2   If nominal diameter of the rivet is 22mm, then gross diameter will be   (CO2)
    a)   20mm   b)   23.5 mm
    c)   22 mm   d)   18.5 mm

Q.3   As per unwin's formula, nominal diamter (D) is equal to (CO2)
    a) $6\sqrt{d}$ b) $6\sqrt{D}$
    c) $6\sqrt{t}$ d) $6\sqrt{P}$

Q.4   Net area of plate connected by chain riveting is   (CO3)
    a)   (b-nd) xt   b)   (b-d) xt
    c)   (b-nt) xd   d)   (b+nd) xt

Q.5   The effective throat thickness (t) for size of weld (s) for 90 degree fusion faces is given by   (CO4)
    a)   0.6S   b)   0.7S
    c)   0.8S   d)   0.9S

Q.6   Unit of radius of gyration is   (CO4)
    a) mm^2 b) mm^2
    c) mm^3 d) mm^4

Q.7   The most economical section for a column is   (CO6)
    a)   I-Section   b)   Round Section
    c)   Angle Section   d)   Tubular Section

Q.8   Trusses are used for   (CO6)
    a)   Workshop   b)   Industries
    c)   Warehouses   d)   All of the above

Q.9   Load carrying capacity is more in   (CO8)
    a)   Long column   b)   Medium column
    c)   Short column   d)   All of these

Q.10   Permissible average shear stress for steel is given by   (CO9)
    a)   0.3 fy   b)   0.4 fy
    c)   0.5 fy   d)   0.6 fy

SECTION-B

Note: Objective type questions. All questions are compulsory.

(10x1=10)

Q.11   80 ISF 10 means _____?   (CO1)
Q.12   The pitch of the rivet should not be less than_____?   (CO2)
Q.13   Number of Rivets = _____.   (CO2)
Q.14   Types of weld are (a) _____ (b) _____?   (CO5)
Q.15   Members subjected to direct tension are called _____?   (CO5)
Q.16   Bending stress at the neutral axis is _____.   (CO5)
Q.17   The member in a roof truss subjected to axial compression is called _____?   (CO6)
Q.18   Slenderness ratio is the ratio of _____ and _____?   (CO8)
Q.19   The strength of beam depends upon _____.   (CO9)
Q.20   The process of assembling fabricated components on site is called.   (CO10)

SECTION-C

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

Q.21   Explain the properties of structural steel of standard quality.
(Co1)

Q.22   Explain the following terms : (i)Head of rivet (ii) Shank of rivet (iii) Nominal diameter   (CO2)

Q.23   Calculate the rivet value of an 18mm diameter power driven field rivet (PDFR) which connect two 8mm thick plates to a 10mm thick plate, one either side of it.   (CO2)

Q.24   Describe the various failure of bolt joints.   (CO3)

Q.25 Enlist any five advantages of welded joints over riveted joints.
(CO4)

Q.26 Describe different types of welding processes. (CO4)

Q.27 Explain tension splice? Why design of tension splice is required.
(CO5)

Q.28 Calculate the strength of ISA 100 x 65 x 8mm when used as a tension member with its longer leg connected as its end by 16mm diameter rivets. (CO5)

Q.29 Explain single angle and double angle struts with their uses.
(CO6)

Q.30 Enlist the various steps involved in the design steps for axially loaded compression member. (CO6)

Q.31 Describe various parts of roof truss with diagram. (CO7)

Q.32 Explain the conditions under which roof truss are best suitable.
(CO7)

Q.33 Why load carrying capacity of short column is more than short column. (CO8)

Q.34 Explain plate girder with their various components. (CO9)

Q.35 Explain briefly the fabrication and erection of steel trusses.
(CO10)

SECTION-D

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

Q.36 An angle ISA 150x150x12mm is connected to a flange of a column ISHB 450@ 855.4 N/m through 3 rivets 16 mm diameter. Find the strength of the joint. Assume rivets to be PDSR. (CO2)

Q.37 Design a suitable section for a steel column to carry an axial load of 760 KN. The effective length of the column is 6.0m. use the following data if required. (CO8)

$$l : 110 \quad 120$$
$$s ac: 72 \text{ N/mm}^2 \quad 64 \text{ N/mm}^2$$

Q.38 Explain the various steps involve in the design of laterally restrained beam. (CO9)

SECTION-E
(Steel Structure Drawing)

Note: Attempt any two questions out of three questions. (25x2=50)

Q.39 Draw the front view of the ridge joint and connection of purlin with roof covering in a single fink Roof truss with the following design detail of various elements like. (CO1)
Principal rafter 2-ISA 60x60x6 mm
Main tie 2- ISA 60x60x6 mm
Upper tie member = Single angle ISA 60x60x6 mm
Struts - single angle ISA 60x60x6 mm
Cleat and purlin angle - single Isa 60x60x10 mm
Shoe angle - 2 Nos. ISA 60x50x6 mm
Bearing plate 400 mm x400mmx12mm
Rag bolts 15mm f 150 mm long
Cement concrete block (1:1.5:3) 400 mm x 400mm x 200 mm
Thickness of Wall = 400 mm
Gusset plate 8mm thick
Clear Span = 6mt.
Pitch of truss = 30 degree
Roof covering material : corrugated G. I sheets

Q.40 Draw the plan, front elevation and side elevation of a column with gusseted base from the following data: (CO2)
Column = ISHB 300 @ 618.0 N/m
Base plate = 800mm x 600 mm x 20 mm
Gusset plates = 600mm x300mm x15mm
Flange cleat angle = 2-ISA 150x115x10mm
Web cleat angle=2 ISA 150x115x10mm
RCC base slab=1000mm x 800mm x 400mm
Reinforcement in base slab=12mm ø@150mm c/c both ways
Holding down bolts = 4 no's 18mm ø 300 mm long
Nominal Diameter of rivets = 20 mm

Q.41 Draw to s suitable scale front elevation and side elevation of framed beam to beam connection from the following data (CO3)
Main beam = ISMB 500 @ 933.9 N/m
Secondary beam = ISLB 250 @ 365.9 N/m
Web cleat angle = ISA 90x90x10mm
Nominal Diameter of rivets = 20 mm
Use Steel Table for other details.