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Roll No. .....

**Branch : 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 With the increase in percentage of carbon in steel the decrease is in the value of
a) Brittleness b) Hardness
c) Ductility d) Strength

Q.2 The continues deformations of a material under a constant load at high temperature is known as
a) Fatique b) Hardness
c) Creep d) Ductility

Q.3 A riveted joint may fail in
a) Shearing b) Bearing
c) Tearing d) All of these

Q.4 The most commonly used rivet head is
a) Snap b) Pan
c) Flat d) None of these

Q.5 The effective throat thickness (&) for size of weld for $90^0$ fusion faces is given by
a) 0.6S b) 0.7S
c) 0.8S d) 0.9S

Q.6 Unit of slenderness ratio is
a) mm b) $mm^2$
c) $mm^3$ d) no unit

Q.7 A strut is a
a) Tension member
b) Compressive member of a truss
c) Compressive member of a crane
d) Torsion member

Q.8 Purlins consist of
a) angle section b) Channel section
c) I-section d) All of these



Q.9 The most economical section for a column is
a) Tubular section b) Angle section
c) I-section d) Round bars

Q.10 Minimum spacing of vertical stiffeners in plate girder is given by
a) 0.22 d b) 0.33 d
c) 0.44 d d) 0.55 d

**SECTION-B**

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

Q.11 The continuous deformation of a material under a constant load at high temperature is known as _____.

Q.12 When one member is placed above the other and the two are connected by means of rivet, then the joint is known as _____joint.

Q.13 _____number of bolts are necessary, then rivets for the same strength.

Q.14 The strength of a tension member depends upon its _____.

Q.15 _____is the distance b/w centre to centre of support

Q.16 A column is a vertical structural member subjected to _____forces

Q.17 The strength of beams depends upon _____.

Q.18 Web crippling is also known as _____.

Q.19 Sections modulus of a beam section is designated as _____.

Q.20 The out word bending of column due to applied loads is called _____.

**SECTION-C**

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

Q.21 What are the advantages of steels as a structural material.

Q.22 Define:
a) Nominal diameter of rivet
b) Gross diameter of rivet
c) Pitch of rivet
d) Edge distance

Q.23 What are the difference b/w lap joint and butt joint.

Q.24 Calculate rivet value of 30mm diameter rivet in a single riveted lap joint connecting two plates of thickness 20mm & 22 mm. use PDSR.

Q.25 What are the advantages of botted connection over riveted connections joints ?

Q.26 What are the advantages of welded joints over riveted joints?

Q.27 Explain how to calculate the strength of a butt weld joint.

Q.28 How will you calculate the net affected area of a tension member using two angles placed back to back and connected an opposite sides of the gusset plate

Q.29 Draw the sectional area and plan diagram of double angle discontinuous strut placed back to back and connected to the same side of gusset plate by one rivet only.

Q.30 Describe:

a) Slenderness ratio

b) Radius of gyration

Q.31 Define roof truss Enlist different parts of a roof truss with diagram.

Q.32 Define plate girder. Enlist various components of a plate girder

Q.33 Calculate the strength of ISA 75 x50x6 mm when it is used as a tension member with its longer leg connected by 16 mm diameter rivets.

Q.34 Calculate the safe load carrying capacity of a single angle discontinuous angle street ISA 150x150x12 mm and length of the member is 3.5m

Q.35 Calculate the load carrying capacity of ISMB 350 to be used as a column. the column is 4 m long and is effectively held in position at both ends but not restrained against rotation. take , fy= 250 Mpa.

## SECTION-D

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

Q.36 Calculate the strength & efficiency of a single riveted lap joint. The allowable stress in bearing and shearing in rivets is 300 Mpa and 100 Mpa Allowable tensile stress in plate is 150 Mpa . Thickness of plate is 16mm and diameter is rivet = 22 mm



Q.37 Calculate the tensile strength of a tension member ISA 100x65x8 mm when it is connected by its:

a) Longer leg

b) Shorter leg

Using 20mm diameter rivets. Permissible tensible stress is 150 $N/mm^2$.

Q.38 Calculate the safe compressive axial load carried by a double angle discontinuous strut composed of 2ISA 90x60x8 mm placed back to back and connected by two rivets on both sides of the gusset plate 8 mm thick. The actual length of strut is 2.40.

## SECTION-E

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

Q.39 Draw the front and side elevations of splicing arrangement of 2 columns of unequal sizes from the following data:
Lower column ISHB 350@ 661.2 N/m
Upper column ISHB 300@618 N/m
Thickness of packing Plates = 25mm
Size of cover plates= 400x250x25mm
Size of distribution plate = 250x250x20mm
Cleat angles = ISA 75x75x8mm

Q.40 Draw front and side elevations of a framed beam to beam connection from the following data
Main beam =ISWB 450@ 778.9 N/m
Secondary beam= ISLB 250@ 273.7 N/m
Web cleat angles = 2-ISA 80x80x80mm
Nominal diameter of rivets = 20mm

Q.41 Draw a suitable sectional plan & front elevation of a simple plate girder for the following data :
Clear span = 10m
Web plate =800x12mm
Bearing Plate = 200xx250x20 mm
Depth over angle = 810 mm
Flange angle = 2-ISA 80x80x8mm
Top and bottom cover = 200x12mm
Diameter of rivets = 20mm
Size of concrete block = 300x200x200mm
Expansion gap =12mm
Assume any other missing data.