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6th Sem / Civil / Brick Tech. (Elective) Constr. Mgmt. Civil Engg (Spl. Highway Engg.)
Sub.: 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 property of a material by virtue of which it can be rolled into thin sheets without rupture is called as
a) Elasticity b) Plasticity
c) Malleability d) Ductility

Q.2 Coefficient of thermal expansion or contraction of structured steel of standard quality is
a) 10×10^{-6} / ºC b) 11×10^{-6} / ºC
c) 12×10^{-6} / ºC d) 13×10^{-6} / ºC

Q.3 The size of the rivet is expressed by the
a) Type of head b) Diameter of shank
c) Length of shank d) None of these

Q.4 The minimum size of filled weld is
a) 5 mm b) 2 mm
c) 3 mm d) 1 mm

Q.5 Unit of radius of gyration is
a) mm b) mm^2
c) mm^3 d) mm^4

Q.6 Load carrying capacity is more in
a) Long column b) Medium column
c) Short column d) All of these

Q.7 Roof trusses are economical for spans
a) Greater than 3 meter
b) Greater than 6 mm
c) Grater than 10 mm
d) none of these

Q.8 Maximum deflection of a simply supported beam should not exceed
a) $\ell / 225$ b) $\ell / 325$
c) $\ell / 425$ d) $\ell / 525$

Q.9 Permissible average shear stress for steel is given by
a) 0.3 fy b) 0.4 fy
c) 0.5 fy d) 0.6 fy

Q.10 The maximum slenderness ratio of a compression members carrying compressive loads resulting from dead load & super imposed load should not exceed
a) 180 b) 250
c) 350 d) 400

SECTION-B

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

Q.11 The property of a material by virtue of which it can be drawn into thin wires without breaking by the application of tensile loads is called_____.

Q.12 ISMB 300 stands for _____.

Q.13 The pitch of the rivets should not be less than _____times the size of rivet.

Q.14 The strength of a tension member depends upon its_____.

Q.15 Slenderness ratio is expressed as the ratio of _____ to _____.

Q.16 Joint in the length of column is known as _____.

Q.17 A beam is defined as a structural member subjected to _____ loading.

Q.18 The ratio of rise to full span is called _____ of roof truss.

Q.19 Out word deflection of web of an I-section is called_____.

Q.20 Stiffeners are the members provided to prevent the _____.

SECTION-C

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

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

Q.22 Describe different rolled steel sections and uses.

Q.23 What are the failures of a riveted joint?

Q.24 What are the merits of welded joints over riveted joints?

Q.25 Find out the strength of the joint connected by two plates of sizes 150x12mm and 150x10mm by butt welding. Using single V-butt weld and grade of steel is Fe-410.

Q.26 Calculate the strength of a 20mm diameter rivet used in a double cover butt joint. The thickness of the main plates is 16mm and that of cover plates is 10mm each. Use power driven field rivets.

Q.27 How will you calculate the net affected area of a tensic member using two angles placed back to back and connecters on same side of the gusset plate?

Q.28 Calculate the strength of ISA 75x50x6 mm When it is used as a tension member with its longer leg connected 16mm diameter rivets.

Q.29 What are tacking rivets. Also write down the purpose of providing tacking rivets.

Q.30 Define

a) Column b) Strut c) Radius of gyration

Q.31 Explain roof tress and different parts of a roof truss with diagram.

Q.32 Define:

a) Span b) Pitch c) Principal rafter

Q.33 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 by = 250 Mpa.

Q.34 Calculate the strength of ISA 75x50x6 mm when it is used as a tension member with its longer leg connected by 18 mm diameter rivets.

Q.35 Write the assumptions in the theory of simple bending in case of flexural members.

SECTION-D

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

Q.36 Two plates of 15mm thickness are joined together by means of triple riveted double cover butt joint. The thickness of each cover plate is 10mm. The rivets used to join two plates are of 20 mm placed at a distance of 75 mm centre to centre. Calculate the strength of the joint per pitch length and find out its efficiency use power driven field rivets.

Q.37 In a roof truss, a diagonal consists of an ISA 60x60x8mm. It is connected to gusset plate by one leg only by 18mm diameter rivets in one chain line along the length of the member. Determine the tensile strength of the member. Take σ_{at} = 150 N/mm^2

Q.38 Design a suitable I-section for a steel column to carry an axial load of 600 KN. The effective length of the column is 4.55 m. Assume yield stress of steel = 250 N/mm^2 & safe compressive stress = 80N/mm^2.

SECTION-E

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

Q.39 Draw the front view of a ridge joint of a roof truss showing all details including gusset plate rigid sheet, A.C. roof coverings, rivets & cleats.

Principal rafters = 2-1SA 55x55x6mm inclined at 30^o to horizontal

Inclined ties (upper) meeting at ridge = 1-ISA 55x55x6mm at 60^o to horizantal

Cleats = ISA 100x75x6 mm

Purlins = 50x50x5 mm

Gussets plate = 6mm thick

Rivets = 20 mm diameter

Q.40 Draw the front and side elevation of an equal column splicing arrangement from th following dates

Columns = ISHB 350@ 710.2 N/m

Cover plates = 400 x 250 x 15 mm

Diameter of plates = 20 mm

Q.41 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 80x80x8 mm

Nominal die of rivets = 20 mm