01.

If a uniform beam shown in fig. has the plastic moment capacity M for span AB and 0.9 M for span BC, the correct virtual work equation is given by

a. $M_p.\theta + M_p\left(\theta + \frac{2\theta}{3}\right) = w.2\theta$

b. $M_p.\theta + M_p.\theta + 0.9M_p\frac{2\theta}{3} = w.2\theta$

c. $M_p.\theta + 0.9M_p\left(\theta + \frac{2\theta}{3}\right) = w.2\theta$

d. $M_p.\theta + 0.9M_p\left(\theta + \frac{2\theta}{3} + \frac{2\theta}{3}\right) = w.2\theta$

02. At a fully plastic section, infinite rotation can occur at

a. Zero moment
b. Constant elastic moment
c. Constant plastic moment
d. All of the above

03. A simply supported beam of rectangular section and span L is subjected to a uniformly distributed load at the centre. The length of elastoplastic zone of the plastic hinge will be

a. L/3
b. L/√3
c. L/2
d. L/8

04. The plastic design method is an advantageous replacement over elastic design method for the structure stressed primarily in bending in case of

i. Statically loaded structure
ii. Dynamically loaded structure
iii. Determinate structure
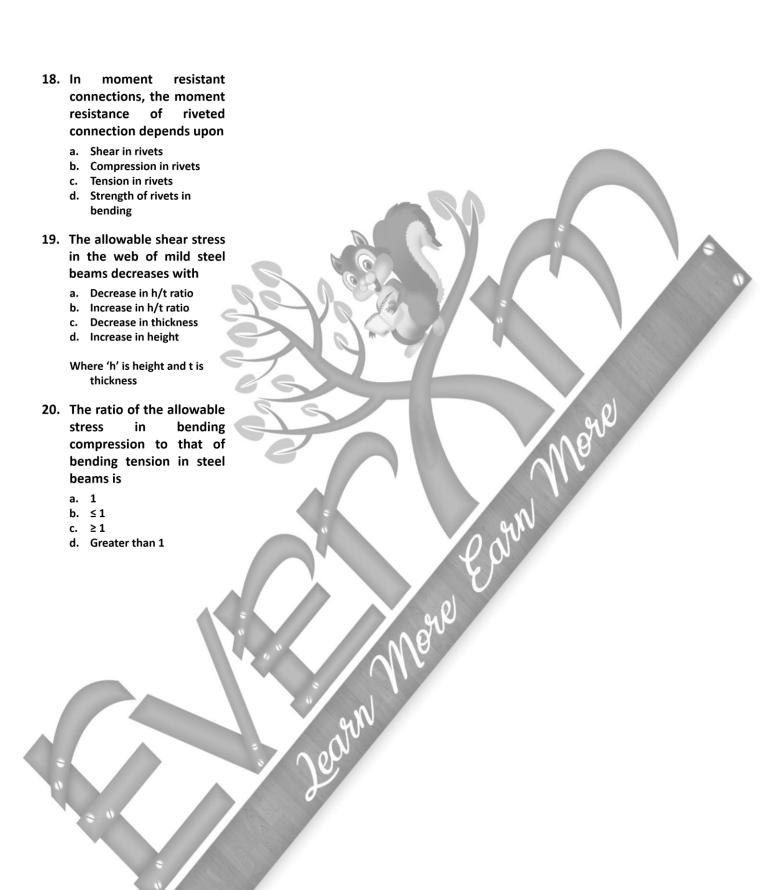iv. Indeterminate structure

Of these statements
a. (i) and (iii0 are correct
b. (i) and (iv) are correct
c. (ii) and (iii) are correct
d. (ii) and (iv) are correct

05. As per IS:800, in the plastic design, which of the following pairs are correctly matched ?

Working Loads	Load factor
(i) Dead load	1.7
(ii) Dead load + imposed load	1.7
(iii) Dead load + load due to wind or seismic forces	1.3
(iv) Dead load + imposed load + load due to wind or seismic forces	1.7

Of these statements
a. (i) and (ii) are correct
b. (i), (ii) and (iii) are correct
c. (ii) and (iii) are correct
d. Only (i) is correct

06. The shape factor of an isosceles triangle for bending about the axis parallel to the base is :

a. 1.5
b. 1.7
c. 2.0
d. 2.34

07. In case of plastic design, the calculated maximum shear capacity of a beam as per IS:800 shall be

a. $0.55\,A_w\,f_y$
b. $0.65\,A_w\,f_y$
c. $0.75\,A_w\,f_y$
d. $0.85\,A_w\,f_y$

Where, A_w = effective cross-sectional area resisting shear
f_y = yield stress of the steel

08. The allowable stresses for the design of steel tanks are taken as :

a. Given in IS : 800
b. 1.25 times the value given in IS : 800
c. 0.80 times the value given in IS : 800
d. 0.67 times the value given in IS : 800

09. The minimum thickness of a steel plate, which is directly exposed to weather and is not accessible foe cleaning and repainting should be :

a. 4.5 mm
b. 6 mm
c. 8 mm
d. 10 mm

10. The moment of inertia of the pair of vertical stiffeners about the centre line of the web should not be less than.

a. $1.5\,d^3\,t^2\,/C$
b. $1.5\,d^2\,t^3\,/C$
c. $1.5\,d^3\,t^3\,/C^2$
d. $1.5\,d^2\,t^4\,/C^3$

where , 't' is the minimum required thickness of the web and
'C' is the maximum permitted clear distance between vertical stiffener for thickness 't'

11. The connection of intermediate vertical stiffeners to the web, not subjected to external loads, shall be designed for a minimum shear force (kN/m) of

a. $75\,t^2\,/h$
b. $125\,t^3\,/h^2$
c. $125\,t^2\,/h$
d. $175\,t^2\,/h$

Where , t = the web thickness in mm
h = the outstand of stiffener in mm

12. When vertical intermediate stiffener are subjected to bending moments due to eccentricity of vertical loads, their moment of inertia (cm) is increased by

a. $\frac{125MD^2}{Et}$

b. $\frac{150MD^2}{Et}$

c. $\frac{175MD^2}{Et}$

d. $\frac{225MD^2}{Et}$

Where M = the applied bending moment kN.m
D = overall depth of girder in mm
E = Young's modulus in Mpa
t = Thickness of web, mm

13. For a compression member with double angle section, which of the following section will give larger value of minimum radius of gyration ?

a. Equal angle back to back
b. Unqual legged angles with long legs back to back
c. Unqual legged angles with short legs back to back
d. Both (b) or (c)

14. Lug angles

a. Are used to reduce the length of connection.
b. Are unqual angle
c. Increases shear lag
d. All the above

15. For rivets in tension with counter-sunk heads, the tensile value shall be

a. Reduced by 25%
b. Reduced by 33.3 %
c. Increased by 25 %
d. Increased by 33.3 %

16. A steel beam supporting loads from the floor slab as well as from Wall is termed as

a. Stringer beam
b. Lintel beam
c. Spandrel beam
d. Header beam

17. Pitch of tacking rivets, when double angles connected back to back and acting as tension members should not be more than

a. 500 mm
b. 600 mm
c. 1000 mm
d. 300 mm

18. In moment resistant connections, the moment resistance of riveted connection depends upon

   a. Shear in rivets
   b. Compression in rivets
   c. Tension in rivets
   d. Strength of rivets in bending

19. The allowable shear stress in the web of mild steel beams decreases with

   a. Decrease in h/t ratio
   b. Increase in h/t ratio
   c. Decrease in thickness
   d. Increase in height

   Where 'h' is height and t is thickness

20. The ratio of the allowable stress in bending compression to that of bending tension in steel beams is

   a. 1
   b. ≤ 1
   c. ≥ 1
   d. Greater than 1