Q : A beam of rectangular cross-section is 100 mm wide and 200 mm deep. If the section is subjected to a shear force of 20 kN, then the maximum shear stress in the section is:

A : 1 N/mm^2
B : 1.125 N/mm^2
C : 1.33 N/mm^2
D : 1.5 N/mm^2

Q : For the portions of a simply supported beam, over which uniformly distributed load is acting, the bending moment diagram will consist of:

A : Inclined lines
B : Third degree polynomials
C : Fourth degree polynomials
D : Parabolic lines

Q : The carry over factor in a prismatic member whose far end is fixed is:

A : 0

B : 1/2

C : 3/4

D : 1

Q : For a standard 45º fillet, the ratio of size of fillet to throat thickness is:

A : 1:1
B : 1:1.414
C : 1.414:1
D : 2:1

Q : A cantilever beam of rectangular cross-section is subjected to a concentrated load W at its free end. If the width of the beam is doubled, the deflection at the free end as compared to the earlier case will be:

A : 16 times
B : 8 times
C : 2 times
D : half

Q : Bearing stiffener in a plate grider is used to:

A : transfer the load from the top flange to the bottom one

B : prevent buckling of web

C : decrease the effective depth of web

D : prevent excessive deflection

Q : In a statically determinate plane frame the relationship between member of bars and joints can be expressed as:

A : $j = 2\eta - 3$
B : $\eta = 2j - 3$
C : $j = 3\eta - 2$
D : $\eta = 3j - 2$

Q : The minimum cement content in moderately exposed reinforced concrete with normal weight aggregates of 20 mm nominal maximum size is:

A : 220 kg/m^3
B : 240 kg/m^3
C : 280 kg/m^3
D : 300 kg/m^3

Q : The minimum spacing of stirrups is:

A : 6 cm
B : 10 cm
C : 12 cm
D : 15 cm

Q : It is usual not to provide thickness of floor slabs in buildings less than:

A : 7.5 cm
B : 10 cm
C : 12.5 cm
D : 15 cm

Q : A doubly reinforced beam is used when:

A : Extra safety is required

B : Large moment is experienced by the beam

C : Beam experiences tension in top as well as-bottom fibres

D : Depth and breadth of the beam have to be restricted for reason of appearance etc.

Q : In the heel slab of a cantilever retaining wall, main reinforcement is provided at:

A : Top of slab
B : Bottom of slab
C : Centre of slab
D : Sides of slab

Q : If a composite bar of steel and copper is heated, the copper bar will be under:

A : Tension
B : Compression
C : Shear
D : Torsion

Q : In a rectangular element subjected to like principal tensile stresses p_1 and p_2 in two mutually perpendicular directions x and y, the maximum shear stress would occur along the:

A : Plane normal to y-axis

B : Plane normal to x-axis

C : Planes at $45p_0$ and $135p_0$ to the y-direction

D : Plane at $45p_0$ to the y-direction

Q : Principle of superposition is applicable when:

A : Deflections are linear functions of applied forces

B : The action of applied forces will be affected by small deflections of the structure

C : Material obeys Hooke's law

D : None of these

Q : A simply supported beam with rectangular cross-section is subjected to a central concentrated load. If the width and depth of beam is doubled, the deflection at centre of the beam will be reduced to:

A : 0.5
B : 0.25
C : 0.125
D : 0.0625

Q : At a point 'P', the state of stress is $p_x = 6$ MPa, $p_y = 2$ MPa and $q_{xy} = 3$ MPa, the magnitude of principal stresses for this state of stress will be:

A : 9 MPa and - 1 MPa
B : 7 MPa and - 3 MPa
C : 7 MPa and - 1 MPa
D : 8 MPa and - 3 MPa

Q : The most appropirate failure theory for ductile materials is:

A : Maximum principal stress theory
B : Maximum shear stress theory
C : Maximum shear strain energy theory
D : Maximum principal strain theory

Q : A cantilever beam having length 'L' is subjected to a moment 'M' at its free end. If flexural rigidity of beam is EI, the deflection at free end will be:

A : $\dfrac{ML}{EI}$

B : $\dfrac{ML}{2EI}$

C : $\dfrac{ML^2}{EI}$

D : $\dfrac{ML^2}{2EI}$

Q : Which of the following methods of structural analysis is a force method?

A : Column analogy method
B : Slope deflection method
C : Moment distribution method
D : None of these

Q : For approximate analysis of building frames under vertical loads, the point of inflection is assumed at:

A : Centre of each beam
B : One-tenth of the span length from each end of the beam
C : Centre of each column
D : Both (a) and (c)

Q : Ratio of strain energy stored by solid shaft of diameeter 'D' and strain energy stored by hollow shaft (external diameter 'D' and internal diameter 'd') is given by:

A : $\dfrac{D^2}{(D^2-d^2)}$

B : $\dfrac{D^2}{(D^2+d^2)}$

C : $\dfrac{D^4}{(D^4+d^4)}$

D : $\dfrac{D^4}{(D^4-d^4)}$

Q : Castigliano's first theorem is applicable:

A : For statically determinate structure only

B : When the system behaves elastically

C : Only when principle of superposition is valid

D : None of these

Q : The deflection at any point of a perfect frame can be obtanined by applying a unit load at the joint in:

A : Vertical direction

B : Horizontal direction

C : Inclined direction

D : The direction in which the deflection is required

Q : A fixed beam AB is subjected to a triangular load varying from zero at end A to W per unit length at end B. The ratio of fixed end moment at B to A will be:

A : 1/2
B : 1/3
C : 2/3
D : 3/2

Q : In a slab, the minimum reinforcement for Fe 250 provided, is:

A : 0.10% of its gross sectional area

B : 0.12% of its gross sectional area

C : 0.15% of its gross sectional area

D : None of these

Q : Most common method of pre-stressing used for factory production is:

A : Freyssinet system

B : Long line method

C : Lee-Macall system

D : Magnel-Blaton system

Q : Which of the following losses occurs only in post-tensioning?

A : Shrinkage of concrete
B : Elastic shortening of concrete
C : Loss due to friction
D : Creep of concrete

Q : The vertical retaining wall of the RCC Counterfort is designed as a _____.

A : Cantilever

B : Simply supported slab

C : Continuous slab

D : None of these

Q : In T-shaped RCC retaining walls, the main reinforcement in the stem is provided on:

A : The front face in one direction

B : The front face in both direction

C : The inner face in one direction

D : The inner face in both direction