UPPSC AE

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Q :) The modulus of elasticity of high tensile steel is

A : Smaller than that of mild steel

B : Equal to that of mild steel

C : Larger than that of mild steel

D : Equal to that of aluminium

Q :) Consider the following statements concerning both the working stress design and ultimate strength design of reinforced concrete:

1. Plane section before bending remains plane after bending

2. The tensile strength of concrete is ignored of these statements

A : 1 alone is correct

B : 2 alone is correct

C : Both 1 and 2 are correct

D : Both 1 and 2 are false

Q :) The maximum strain in concrete at the outermost compression fibre in the limit state design of flexural member is (as per IS : 456-1978)

A : 0.0020

B : 0.0035

C : 0.0065

D : 0.0050

Q :) Deflections can be controlled by using the appropriate

A : Aspect ratio

B : Modular ratio

C : Span / depth ratio

D : Water / cement ratio

Q :) In limit state approach spacing of main reinforcement controls primarily

A : Collapse

B : Cracking

C : Deflection

D : Durability

Q :) Unequal top and bottom reinforcement in a reinforced concrete section leads to

A : Creep deflection

B : Shrinkage deflection

C : Long-term deflection

D : Large deflection

Q :) The final deflection due to all loads including the effects of temperature, creep and shrinkage and measured from as-cast level of supports of floors, roofs and all other horizontal members should NOT exceed

A : Span / 350

B : Span / 300

C : Span / 250

D : Span / 200

Q :) As compared to working stress method of design, limit state method takes concrete to

A : A high stress level

B : A lower stress level

C : The same stress level

D : Sometimes higher but generally lower stress level

Q :) The probability of failure implied in limit state design is of the order of

A : 10^{-2}

B : 10^{-3}

C : 10^{-4}

D : 10^{-5}

Q :) Long term elastic modulus in terms of creep coefficient (θ) and 28-day characteristic strength (f_{ck}) is given by

A : $\dfrac{5000\,\sqrt{f_{ck}}}{1+\theta}$ MPa

B : $\dfrac{50000\,\sqrt{f_{ck}}}{1+\theta}$ MPa

C : $\dfrac{5000\,f_{ck}}{1+\sqrt{\theta}}$ MPa

D : $\dfrac{5000\,\sqrt{f_{ck}}}{\sqrt{1+\theta}}$ MPa

Q :) Which one of the following statements is correct?

The characteristic strength of concrete is

A : Higher than the average cube strength

B : Lower than the average cube strength

C : The same as the average cube strength

D : Higher than 90% of the average cube strength

Q :) Which one of the following is the correct expression for the target mean strength f_t of concrete mix?

A : $f_t = Kf_{ck} + S$

B : $f_t = f_{ck} + KS$

C : $f_t = f_{ck} + S$

D : $f_t = Kf_{ck} + K$

Where f_{ck} is characteristic strength, K is probability factor and S is standard deviation

Q :) What is the minimum value of individual test results (in N/mm^2) for compressive strength compliance requirement for concrete M20 as per codal provision?

A : $f_{ck} - 1$

B : $f_{ck} - 3$

C : $f_{ck} - 4$

D : $f_{ck} - 5$

Q :) What is the ratio of flexural strength (f_{cr}) to the characteristic compressive strength of concrete (f_{ck}) for M25 grade concrete?

A : 0.08

B : 0.11

C : 0.14

D : 0.17

Q :) Grade of steel is designated as Fe 415, if

A : The upper yield stress of the steel is 415 N/mm^2

B : The ultimate stress of the steel is 415 N/mm^2

C : The partial safety factor is 1.15

D : The characteristic strength is 415 N/ N/mm^2

Q :) The additional cover thickness to be provided in reinforced concrete members that are totally immersed in seawater is

A : 25 mm

B : 30 mm

C : 35 mm

D : 40 mm

Q :) The minimum grade of reinforced concrete in seawater as per IS 456-2000 is

A : M 15

B : M 20

C : M 30

D : M 40

Q :) As per IS – 456 : 2000, the value of maximum compression strain in concrete in axial compression for limit state of collapse is

A : 0.001

B : 0.002

C : 0.003

D : 0.004

Q :) Fatigue in RCC beams will not be a problem if the number of cycles is less than

A : 20,000

B : 25,000

C : 30,000

D : 35,000

Q :) If the nominal shear stress (τ_v) at a section does not exceed the permissible shear stress (τ_c)

A : Minimum shear reinforcement is still provided

B : Shear reinforcement is provided to resist the nominal shear stress

C : No shear reinforcement is provided

D : Shear reinforcement is provided for the difference of the two

Q :) The chances of diagonal tension cracks in R.C.C. member reduce when

A : Axial compression and shear force act simultaneously

B : Axial tension and shear force act simultaneously

C : Only shear force act

D : Flexural and shear force act simulataneously

Q :) What is the adoptable maximum spacing between vertical stirrups in an RCC beam of rectangular cross-section having an effective depth of 300 mm?

A : 300 mm

B : 275 mm

C : 250 mm

D : 225 mm

Q :) In a reinforced concrete section, shear stress distribution is diagrammatically

A : Wholly parabolic

B : Wholly rectangular

C : Parabolic above NA and rectangular below NA

D : Rectangular above NA and Parabolic below NA

Q :) Which one of the following is correct?

When HYSD bars are used in place of mild steel bars in a beam, the bond strength

A : Does not change

B : Increases

C : Decreases

D : Becomes zero

Q :) What is the bond stress acting parallel to the reinforcement on the interface between bar and concrete?

A : Shear stress

B : Local stress

C : Flexural stress

D : Bearing stress

Q :) Lap length of reinforcement in compression shall not be less than.

A : 30 ϕ

B : 24 ϕ

C : 20 ϕ

D : 5 ϕ

Where ϕ is diameter of bar

Q :) The bond between steel and concrete is mainly due to

1. Mechanical resistance

2. Pure adhesive resistance

3. Frictional resistance

A : 1 and 2 only

B : 1 and 3 only

C : 2 and 3 only

D : 1, 2 and 3

Q :) If a beam is likely to fail due to high bonding stresses, then its bond strength can be increased most economically by

A : Providing vertical stirrups

B : Increasing the depth of the beam

C : Using smaller diameter bars in correspondingly More number

D : Using higher diameter bars by reducing their numbers

Q :) An R.C. structural member rectangular in cross section of width b and depth D is subjected to a combined action of bending moment M and torsional moment T. The longitudinal reinforcement shall be designed for a moment M_e given by

A : $M_e = M \dfrac{T(1+\frac{d}{b})}{1.7}$

B : $M_e = M \dfrac{T(1-\frac{b}{D})}{1.7}$

C : $M_e = \dfrac{T(1-\frac{b}{b})}{1.7}$

D : $M_e = \dfrac{T(1-\frac{b}{D})}{1.7}$

Q :) Shrinkage deflections in case of rectangular beams and slabs can be eliminated by putting

A : Compression steel equal to tensile steel

B : Compression steel more than tensile steel

C : Compression steel less than tensile steel

D : Compression steel 25% greater than tensile steel

Q :) In case of 2-way slab, the limiting deflection of the slab is

A : Primarily a function of the long span

B : Primarily a function of the short span

C : Independent of long or short span

D : Dependent on both long and short spans

Q :) Given that d = effective depth ; b = width and D = overall depth, the maximum area of compression reinforcement in a beam is

A : 0.03 bd

B : 0.04 bD

C : 0.12 bd

D : 0.12 bd

Q :) A reinforced concrete slab is 75 mm thick. The maximum size of reinforcement bar that can be used is

A : 12 mm diameter

B : 10 mm diameter

C : 8 m diameter

D : 6 mm diameter

Q :) In an RCC beam, side face reinforcement is provided if its depth exceeds

A : 300 mm

B : 500 mm

C : 700 mm

D : 750 mm

Q :) In the limit state method of design, the failure criterion for reinforced concrete beams and columns is

A : Maximum principal stress theory

B : Maximum principal strain theory

C : Maximum shear stress theory

D : Maximum strain energy theory

Q :) For the purpose of design as per IS : 456, deflection of RC slab or slab or beam is limited to

A : 0.2% of span

B : 0.25% of span

C : 0.4% of span

D : 0.45% of span

Q :) In the design of as masonry retaining wall, the

A : Vertical load should fall within the middle-third of base width

B : Horizontal thrust should act h/3 from base

C : Resultant load should fall within the distance of one-sixth of base width on either side of its midpoint

C : Resultant load should fall within a distance of one-eight of base width on either side of its midpoint

Q :) In case of deep beam or in thin webbed RCC members, the first crack from is

A : Flexural crack

B : Diagonal crack due to compression

C : Diagonal crack to tension

D : Shear crack

Q :) The reinforcement for tension, when required in members, shall consists of

A : Only longitudinal reinforcement in the tension face

B : Only longitudinal reinforcement in the compression face

C : Only two legged closed loops enclosing the corner reinforcement

D : Both longitudinal and transverse reinforcement

Q :) At T-beam behaves as a rectangular beam of width equal to its flange if its neutral axis

A : Coincides with centroid of reinforcement

B : Coincides with centroid of T-section

C : Remains within the flange

D : Remains in the web

Q :) In RCC beams, as the percentage areas of tensile steel increases

A : Depth of neutral axis increases

B : Depth of neutral axis decreases

C : Depth of the neutral axis does not change

D : Level arm increases

Q :) In the limit state method, balanced design of a reinforced concrete beam givens.

A : Smallest concrete section and maximum area of reinforcement

B : Largest concrete section and maximum area of reinforcement

C : Smallest concrete section and minimum area of reinforcement

D : Largest concrete section and minimum area of reinforcement

Q :) The maximum percent of moment redistribution allowed in RCC beams is

A : 10%

B : 20%

C : 30%

D : 40%

Q :) A simply supported beam has an effective span of 16 m. What shall be the limiting ratio of span to effective depth as per IS 456 – 20000?

A : 26

B : 20

C : 12.5

D : 7

Q :) A simply supported beam is considered as a deep beam if the ratio of effective span to overall depth is less than

A : 1

B : 2

C : 3

D : 4

Q :) Minimum clear cover (in mm) to the main steel bars in slab, beam, column and footing respectively are

A : 10, 15, 20, 25

B : 15, 25, 40, 75

C : 20, 25, 30, 40

D : 20, 35, 40, 75

Q :) Lateral ties in RC columns are provided to resist

A : Bending moment

B : Shear

C : Buckling of longitudinal steel bars

D : Both bending moment and shear

Q :) Cross sectional area of metal core in composite column should not be more than

A : 4%

B : 8%

C : 16%

D : 20%

Q :) In a pedestal, the factor by which the effective length should not exceed the least lateral dimension is

A : 2

B : 3

C : 4

D : 5

Q :) Which one of the following represents the ratio of volume of helical reinforcement to volume of core?

A : 0.36 $\left(\dfrac{A_g}{A_c} - 1\right)\dfrac{f_{ck}}{f_y}$

B : 0.36 $\left(\dfrac{A_g}{A_s} - 1\right)\dfrac{f_{ck}}{f_y}$

C : 0.36 $\left(\dfrac{A_s}{A_c} - 1\right)\dfrac{f_{ck}}{f_y}$

D : 0.36 $\left(\dfrac{A_c}{A_s} - 1\right)\dfrac{f_{ck}}{f_y}$

Q :) Design of foundation for a large generator is guided, primarily by

A : Frequency

B : Deformation

C : Strength

D : Stiffness

Q :) Given that 'ϕ' is angle of internal friction, 'p' is the safe bearing capacity and 'γ' is the unit weight of soil, the maximum depth of foundation of a masonry footing is given by

A : $\dfrac{p}{\gamma}\left(\dfrac{1+sin\,\phi}{1-sin\,\phi}\right)$

B : $\dfrac{p}{\gamma}\left(\dfrac{1-sin\,\phi}{1+sin\,\phi}\right)$

C : $\dfrac{p}{\gamma}\left(\dfrac{1+sin\,\phi}{1-sin\,\phi}\right)^{2}$

D : $\dfrac{p}{\gamma}\left(\dfrac{1-sin\,\phi}{1\mp sin\,\phi}\right)^{2}$

Q :) The critical section of maximum bending moment in the footing under masonry will is located at

A : The middle of the wall

B : The face of the wall

C : Mid-way between the face and the middle of the wall

D : A distance equal to the effective depth of footing from the face of the wall

Q :) In a combined footing for two columns carrying unequal loads, the maximum hogging moment occurs at

A : The inside face of the heavier column

B : A section equidistant from both the columns

C : A section subjected to maximum shear force

D : A section subjected to zero shear force

Q :) In case of pre-tensioned RC beams

A : Shrinkage of concrete is of the order of 3×10^{-4}

B : Relaxation of steel can be ignored

C : Only one wire can be stretched at a time

D : Even mild steel can be used for prestressing

Q :) Prestressed concrete is more desirable in case of

A : Cylindrical pipe subjected to internal fluid pressure

B : Cylindrical pipe subjected to external fluid pressure

C : Cylindrical pipe subjected to equal internal and external fluid pressure

D : Cylindrical pipe subjected to end pressure

Q :) The magnitude of loss of prestress due to relaxation of steel is in range of

A : Zero to 1%

B : 2 to 8%

C : 8 to 12%

D : 12 to 14%

Q :) Which one of the following systems of prestressing is suitable fir ore-tensioned members?

A : Freyssinet system

B : Magnel-Blaon system

C : Hoyer system

D : Gifford-udall system

Q :) Which one of the following method is employed to manufacture pre-stressed concrete sleepers for the railways?

A : Post-tensioning

B : Pre-tensioning

C : Pre-tensioning followed by post-tensioning

D : Partial pre-stressing

Q :) What is the allowable upward deflection in a prestress concrete member under serviceability limit state condition?

A : Span/250

B : Span/300

C : Span/350

D : Span/500

Q :) What is the limiting principle tension stress in prestress uncracked concrete member of M 25 grade?

A : 1 MPa

B : 1.5 MPa

C : 2 MPa

D : 2.5 MPa

Q :) In a cantilever retaining wall, the main steel reinforcement is provided

A : On the backfill side, in the vertical direction

B : On both, inner and outer, faces

C : In horizontal as well as in vertical directions

D : To counteract shear stresses

Q :) The recommended imposed load in staircase in residential buildings as per IS 875 is

A : 5.0 kN/m^2

B : 3.0 kN/ m^2

C : 1.5 kN/m^2

D : 1.3 kN/ m^2

Q :) The permissible of allowable compressive stress f_{ac} of brick masonry does not depend on

A : Type of strength of bricks

B : Efflorescence of bricks

C : Strength of mortar

D : Slenderness ratio

Result : SSC JE 2019

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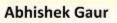
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