

CIVIL ENGINEERING COMPETITIVE QUESTIONS

S.No. Question

1 Concrete contains

- (i) Siliceous aggregates, having higher coefficient of expansion
- (ii) Igneous aggregates, having intermediate coefficient of expansion
- (iii) Lime stones, having lowest coefficient of expansion

- [A] i and iii
- [B] ii and iii
- [C] i and ii
- [D] i, ii and iii

Answer : D

2 Select the incorrect statement

- [A] R.C.C has better fire resistance than steel
- [B] R.C.C. structure is economical than steel structure
- [C] Strength of concrete decreases as age increases
- [D] R.C.C can be used for under water and marine structures

Answer : C

3 Water cement ratio is the ratio of

- [A] Water to cement by weight
- [B] Water to cement by volume
- [C] Cement to water by weight
- [D] Cement to water by volume

Answer : A

4 Concrete is

- [A] Weak in tension
- [B] Strong in tension
- [C] Strong in both tension and compression
- [D] Weak in compression

Answer : A

5 The entrained air in concrete

- [A] Increases the strength
- [B] Decreases the resistance to weathering
- [C] Increases the workability
- [D] Decreases the workability

Answer : C

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6 Concrete is unsuitable for compaction by vibration if it is

- [A] Semi – plastic
- [B] Plastic
- [C] Earth moist
- [D] Dry

Answer : B

7 The strength and quality of concrete depends upon

- (i)Grading of aggregates
- (ii)Shape of aggregates
- (iii)Surface area of aggregates
- (iv)Surface texture of aggregates

- [A] i, ii and iv
- [B] ii, iii and iv
- [C] i, iii and iv
- [D] i, ii, iii and iv

Answer : D

8 In order to avoid segregation, fresh concrete should be dropped from a height of

- [A] Less than one meter
- [B] Less than two metres
- [C] More than one metre
- [D] More than two metres

Answer : A

9 The process of hardening of concrete in the presence of water is called

- [A] Creep
- [B] Hydration
- [C] Shrinkage
- [D] Curing

Answer : B

10 The process of keeping the concrete structure moist is called

- [A] Hydration
- [B] Curing
- [C] Creep
- [D] Shrinkage

Answer : B

11 The separation of water or water cement mixture from the freshly laid concrete is known as

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- [A] Workability
- [B] Segregation
- [C] Bleeding
- [D] Creep

Answer : C

12 The continuous strain, which the concrete undergoes due to application of external loads is called

- [A] Creep
- [B] Bleeding
- [C] Workability
- [D] Segregation

Answer : A

13 The process of conversion of plastic concrete to solid stage is called

- [A] Hydration
- [B] Hardening
- [C] Setting
- [D] Curing

Answer : C

14 At 28 days of curing concrete attains a strength of

- [A] 20 to 25%
- [B] 60 to 70%
- [C] 65 to 80%
- [D] 90 to 95%

Answer : D

15 In a mass concrete, the aggregates occupy a space of

- [A] 25%
- [B] 75%
- [C] 40%
- [D] 60%

Answer : B

16 The coarse aggregate which possess the property of good interlocking are

- [A] rounded shape
- [B] elongated shape
- [C] angular shape
- [D] none of the above

Answer : C

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17 While placing of concrete the thickness of each layer for R.C.C. is

- [A] 150 to 300 mm
- [B] 450 mm
- [C] 500 to 750 mm
- [D] 500 mm

Answer : A

18 Increase in water content in a cement concrete

- (i) Increases workability
- (ii) Increases the strength

- [A] i
- [B] ii
- [C] both (i) and (ii)
- [D] neither (i) nor (ii)

Answer : A

19 Slump cone test is used to determine

- [A] Shrinkage of concrete mix
- [B] Creep of concrete
- [C] Workability of concrete mix
- [D] Soundness of concrete

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Answer : C

20 While determining the workability of concrete mix, the compaction factor test is -----than the slump cone test

- [A] Less accurate
- [B] More accurate
- [C] Approximate method
- [D] None of the above

Answer : B

21 Workability of concrete mix with low water cement ratio is determined by

- [A] Tensile strength test
- [B] Slump cone test
- [C] Compaction factor test
- [D] Flexural strength test

Answer : C

22 If the slump of a concrete mix is 50 to 100 mm, its workability is

- [A] Very low
- [B] Low

[C] Medium

[D] High

Answer : C

23 A compaction factor of 0.75 indicates _____workability

[A] Very low

[B] Low

[C] Medium

[D] High

Answer : A

24 Shrinkage in concrete can be reduced by using

(i) Low water cement ratio (ii) More amount of cement in the concrete

(iii) Presaturated aggregates

[A] i

[B] i and ii

[C] i and iii

[D] i, ii and iii

Answer : C

25 The process of proper and accurate measurement of concrete ingredients for uniformity of proportion, is known as

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[A] Curing

[B] Mixing

[C] Grading

[D] Batching

Answer : D

26 Select incorrect statement from the following

[A] With passage of time, the strength of cement decreases

[B] With passage of time, the strength of cement increases

[C] After a period of 24 months, the strength of cement reduces to 50%

[D] The concrete made with storage deteriorated cement; gains strength with time.

Answer : B

27 For compacting plain concrete road surface of thickness less than 20 cm, the following vibrator is used.

[A] Internal vibrator

[B] Screed vibrator

[C] Form vibrator

[D] None of the above

Answer : B

28 Slump test of concrete is a measure of its

- [A] Consistency
- [B] Compressive strength
- [C] Tensile strength
- [D] Impact value

Answer : A

29 Concrete gains strength due to

- [A] Chemical reaction of cement with sand and coarse aggregates
- [B] Evaporation of water from concrete
- [C] Hydration of cement
- [D] All the above

Answer : C

30 Minimum grade of concrete for R.C.C. should be _____ , as per IS. 456-2000

- [A] M10
- [B] M14
- [C] M20
- [D] M25

Answer : C

31 A concrete mass containing 5% of voids

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- [A] Increases its strength by 30%
- [B] Reduces its strength by 30%
- [C] Increases its strength by 5%
- [D] Reduces its strength by 5%

Answer : B

32 Workability of a concrete – mix is determined by

- (i) Slump cone test
- (ii) Compaction factor test
- (iii) Vee bee test

- [A] i
- [B] ii
- [C] i and ii
- [D] i, ii and iii

Answer : D

33 High strength of concrete requires a water cement ratio of

- [A] 0.10 to 0.15
- [B] 0.25 to 0.30

[C] 0.45 to 0.60

[D] 0.75 to 0.90

Answer : B

34 One bag of cement is equivalent to

[A] 50 litres

[B] 35 litres

[C] 28 litres

[D] 14 litres

Answer : B

35 One cubic metre of cement weights

[A] 1000 kg

[B] 1200 kg

[C] 1440 kg

[D] 1600 kg

Answer : C

36 As per IS: 456-2000, modulus of elasticity of concrete (in N/mm²) is given by

[A] $5700 \sqrt{f_{ck}}$

[B] $5000 \sqrt{f_{ck}}$

[C] $3700 \sqrt{f_{ck}}$

[D] $3000 \sqrt{f_{ck}}$

Answer : B

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37 In working stress method of design, the factor of safety for concrete and steel respectively are

[A] 3.0 and 1.8

[B] 3.0 and 1.18

[C] 3.0 and 1.15

[D] 1.5 and 1.5

Answer : A

38 In Limit state method of design, the factor of safety for concrete and steel respectively are

[A] 3.00 and 1.80

[B] 1.50 and 1.18

[C] 1.50 and 1.15

[D] 1.50 and 1.50

Answer : C

39 Specific weight of Reinforced cement concrete is

[A] 24 N/m³

[B] 24 kN/m³

[C] 25 N/m³

[D] 25 kN/m³

Answer : D

40 The tensile strength of concrete is about _____ of its compressive strength

[A] 10% to 15%

[B] 30% to 40%

[C] 50%

[D] 60% to 75%

Answer : A

41 The shrinkage strain of concrete is generally taken as

[A] 0.3

[B] 0.03

[C] 0.003

[D] 0.0003

Answer : D

42 The tensile strength of concrete is given by

[A] 0.45 $\sqrt{f_{CK}}$

[B] 0.60 $\sqrt{f_{CK}}$

[C] 0.70 $\sqrt{f_{CK}}$

[D] 0.90 $\sqrt{f_{CK}}$

Answer : C

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43 The ratio of bond stress for HYSD bars to that of plain bars

[A] 0.714

[B] 0.9

[C] 1.4

[D] 1.8

Answer : C

44 The proof stress in steel is the stress corresponding to the strain of

[A] 0.2

[B] 0.02

[C] 0.002

[D] 0.0002

Answer : C

45 In the mixer, the concrete should be mixed for at least

[A] 1 to 2 minutes

[B] 2 to 3 minutes

[C] 3 to 5 minutes

[D] 5 to 7 minutes

Answer : B

46 As per IS: 456-2000, the maximum size of aggregate is

[A] 1/4 of maximum thickness of member

[B] 1/4 of minimum thickness of member

[C] 1/5 of maximum thickness of member

[D] 1/5 of minimum thickness of member

Answer : B

47 Water used for mixing of concrete should be free from

(i)Oils

(ii)Salts

(iii)Acids

[A] i

[B] iii

[C] i and iii

[D] i, ii and iii

Answer : D

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48 Modulus of elasticity of concrete is primarily influenced by

[A] Elastic properties of aggregate

[B] Curing of concrete

[C] Age of concrete

[D] Mix proportion and type of cement

Answer : A

49 As the workability increases compaction factor

[A] Decreases

[B] Increases

[C] Remains same

[D] None of the above

Answer : B

50 Shrinkage of concrete is mostly influenced by

[A] Environmental conditions

[B] Size of member

[C] Cement in concrete

[D] The total amount of water present in concrete

Answer : D

- 51 During the process of hardening of cement, _____ will takes place
- [A] Bleeding
 - [B] Segregation
 - [C] Hydration
 - [D] All the above

Answer : C

- 52 Due to Bleeding action concrete becomes
- [A] Weak
 - [B] Strong
 - [C] Hard
 - [D] Durable

Answer : A

- 53 About 70% to 80% of cement is contributed by
- [A] Tricalcium silicate and Tricalcium aluminate
 - [B] Tricalcium silicate and Dicalcium silicate
 - [C] Tricalcium Aluminate and Dicalcium silicate
 - [D] Tricalcium Aluminate and Tetra calcium Aluminoferrite

Answer : B

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- 54 When compared to ordinary Portland cement, Rapid hardening Portland cement contains _____ amount of lime content
- [A] Equal
 - [B] Greater
 - [C] Lesser
 - [D] Zero

Answer : B

- 55 The following compound has the property of early strength as well as ultimate strength
- [A] C3S
 - [B] C2S
 - [C] C3A
 - [D] C4AF

Answer : A

- 56 Which of the following compounds is considered to be an undesirable compound for cement
- [A] C3S
 - [B] C2S
 - [C] C3A

[D] C4AF

Answer : D

57 Which of the following compound is susceptible to be attacked by alkalies and salts

[A] C3S

[B] C3S

[C] C3A

[D] C3AF

Answer : C

58 The heat generated in ordinary cement at the end of 3 days is about

[A] 60 cal/g

[B] 80 cal/g

[C] 100 cal/g

[D] 120 cal/g

Answer : B

59 Low heat cement contains more amount of _____ than that of ordinary Portland cement

[A] C3S

[B] C2S

[C] C3A

[D] None of the above

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Answer : B

60 In Portland Blast furnace slag cement, the blast furnace slag content shall not exceed

[A] 50%

[B] 65%

[C] 80%

[D] 90%

Answer : B

61 White cement contains less amount of _____

[A] Lime

[B] Silica

[C] Alumina

[D] Iron oxide

Answer : D

62 In fineness test on cement, residue left on I.S. sieve no.9 shall not exceed _____ by weight of the sample of cement

[A] 5%

[B] 10%

[C] 15%

[D] 20%

Answer : B

63 Ordinary Portland cement requires a specific surface of

[A] 1250 cm²/gm

[B] 2250 cm²/gm

[C] 3250 cm²/gm

[D] 3500 cm²/gm

Answer : B

64 The maximum percentage of chemical ingredient of cement is

[A] Iron oxide

[B] Silica

[C] Lime

[D] Magnesium oxide

Answer : C

65 The minimum percentage of chemical ingredient of cement is

[A] Iron oxide

[B] Silica

[C] Lime

[D] Magnesium oxide

Answer : D

66 Efflorescence in cement is caused due to an excess of

[A] Alkalies

[B] Silica

[C] Iron oxide

[D] Alumina

Answer : A

67 Dicalcium silicate (C₂S)

[A] rates rapidly

[B] Hardens rapidly

[C] Generates less heat of hydration

[D] Has less resistance to sulphate attack

Answer : C

68 Tricalcium aluminate (C₃A)

[A] Hydrating less rapidly

[B] Is a redundant compound

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[C] To be attacked by alkalis and salts

[D] None of these

Answer : C

69 For road pavements, the cement generally used, is

[A] Ordinary Portland cement

[B] Rapid hardening cement

[C] Low heat cement

[D] Blast furnace slag cement

Answer : A

70 For mass concrete work, the type of cement preferable is

[A] Ordinary Portland cement

[B] Rapid hardening cement

[C] Low heat cement

[D] Blast furnace slag cement

Answer : C

71 Le-chatelier apparatus is used for

[A] Fineness test

[B] Consistency test

[C] Soundness test

[D] Compressive strength test

Answer : C

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72 The diameter of the Vicat plunger is 10 mm and its length varies form

[A] 40 mm

[B] 50 mm

[C] 55 mm

[D] 60 mm

Answer : B

73 Inert material of a cement concrete mix, is

[A] Water

[B] Aggregate

[C] Cement

[D] None of these

Answer : B

74 An aggregate is said to be flaky, if its least dimension is less than

[A] $\frac{2}{3}$ mean dimension

[B] $\frac{3}{4}$ mean dimension

[C] 3/5 mean dimension

[D] 5/8 mean dimension

Answer : C

75 Workability of concrete for a given water content is good, if the aggregates are

[A] Rounded

[B] Irregular

[C] Angular

[D] Flaky

Answer : A

76 Setting time of cement increases by adding

(i)gypsum

(ii)sodium oxide

(iii)calcium chloride

[A] i

[B] i and ii

[C] i and iii

[D] i, ii and iii

Answer : A

77 The cement becomes useless if its absorbed moisture content exceeds annacivil.blogspot.in

[A] 1%

[B] 2%

[C] 3%

[D] 5%

Answer : D

78 The size of fine aggregates does not exceed

[A] 2.75 mm

[B] 3.75 mm

[C] 4.75 mm

[D] 5.75 mm

Answer : C

79 Water used for mixing concrete should be

[A] Slightly acidic

[B] Free from bacteria

[C] Distilled

[D] Potable

Answer : D

80 The workability of concrete is mostly influenced by its

- [A] Water cement ratio
- [B] Aggregate cement ratio
- [C] Cement content
- [D] Water content

Answer : A

81 Chief constituent of ordinary Portland cement is

- [A] Lime
- [B] Alumina
- [C] Magnesia
- [D] Iron oxide

Answer : A

82 The heat of hydration for low heat cement at the age of 7 days shall not exceed

- [A] 80 cal / gm
- [B] 75 cal / gm
- [C] 70 cal / gm
- [D] 65 cal / gm

Answer : D

83 Cement is obtained by burning a mixture of the following materials annacivil.blogspot.in

- [A] Siliceous materials
- [B] Argillaceous materials
- [C] Calcareous materials
- [D] All the above

Answer : D

84 For determining the compressive strength test on cement is, the percentage amount of water to be added as (P_a = Percentage of water for required consistency)

- [A] $0.25 P_a + 2.5$
- [B] $0.25 P_a + 3.5$
- [C] $0.35 P_a + 2.5$
- [D] $0.35 P_a + 3.5$

Answer : B

85 Minimum compressive strength of cement required at the age of 3 days for ordinary Portland cement of grade 33 is

- [A] 1.15 N/mm²
- [B] 11.5 N/mm²
- [C] 2.10 N/mm²
- [D] 21 N/mm²

Answer : B

- 86 Bulking of sand takes place due to
- [A] Surface tension
 - [B] Viscosity
 - [C] Capillarity
 - [D] None of the above

Answer : A

- 87 Creep coefficient is the ratio of
- [A] Ultimate Creep strain to elastic strain
 - [B] Elastic strain to ultimate Creep strain
 - [C] Elastic strain to plastic strain
 - [D] Plastic strain to elastic strain

Answer : A

- 88 Generally the strength of concrete is represented by the crushing stress of concrete cube of size
- [A] 50 mm
 - [B] 100 mm
 - [C] 150 mm
 - [D] 250 mm

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Answer : C

- 89 As per IS:1139, the characteristic yield strength for hot rolled High yield strength deformed bars is
- [A] 250 N/mm²
 - [B] 415 N/mm²
 - [C] 500 N/mm²
 - [D] 550 N/mm²

Answer : B

- 90 As per IS:1139, the characteristic yield strength for cold twisted deformed bars is
- [A] 250 N/mm²
 - [B] 415 N/mm²
 - [C] 500 N/mm²
 - [D] 550 N/mm²

Answer : C

- 91 For reinforced concrete work, aggregates having a nominal size of ----- are generally used
- [A] 20 mm
 - [B] 40 mm

[C] 50 mm

[D] 60 mm

Answer : A

92 The proportion of coarse aggregates to fine aggregates in structural concrete is usually

[A] 0.50 - 1.25

[B] 1.25 - 4.50

[C] 1.50 - 2.50

[D] 0.25 - 0.75

Answer : C

93 Fly ash when added to concrete

[A] Acts as aggregates

[B] Acts as pozzolona

[C] Improves appearance

[D] Reduces setting time

Answer : B

94 As per IS:456, the strength of concrete sample is less than

[A] The characteristic strength minus 1.35times the standard deviation

[B] 0.80 times the characteristic strength

[C] Greater of (a) and (b)

[D] None of the above

Answer : C

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95 Characteristic strength of steel has been defined as

[A] 0.1 % proof stress

[B] 0.2 % proof stress

[C] 0.4 % proof stress

[D] Equal to proof stress

Answer : B

96 For Ordinary Portland cement concrete exposed to dry and hot weather conditions, good moist curing period is

[A] 7 days

[B] 10 days

[C] 14 days

[D] None of the above

Answer : B

97 As per IS: 456-2000, recommended value for standard deviation for concrete mix from M30 to M50 is

[A] 1 N/mm²

[B] 2 N/mm²

[C] 4 N/mm²

[D] 5 N/mm²

Answer : D

98 As per IS: 456-2000, minimum grade of concrete in sea water constructions is

[A] M20

[B] M25

[C] M30

[D] M50

Answer : C

99 The section of a reinforced beam where most distant concrete fiber in compression and tension in steel attains permissible stresses simultaneously is called

(i) Balanced section

(ii) Economic section

(iii) Critical section

[A] i

[B] i and ii

[C] i and iii

[D] i, ii and iii

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Answer : D

100 As the percentage of steel increases

[A] Depth of neutral axis decreases

[B] Depth of neutral axis increases

[C] Lever arm increases

[D] None of the above are correct

Answer : B

101 In a Singly reinforced beam, if the permissible stress in concrete reaches earlier than that in steel, the beam section is called

[A] Under reinforced section

[B] Over reinforced section

[C] Balanced section

[D] Critical section

Answer : B

102 The neutral axis corresponding to balanced section condition is termed as

[A] Critical neutral axis

[B] Centroidal neutral axis

[C] Balanced neutral axis

[D] All the above

Answer : A

103 In a singly reinforced beam, if the permissible stress in steel reaches earlier than that of concrete, the beam section is called

[A] Under reinforced section

[B] Over reinforced section

[C] Balanced section

[D] Critical section

Answer : A

104 The depth of neutral axis for under reinforced section is ----- the depth of critical neutral axis

[A] Equal to

[B] Greater than

[C] Less than

[D] None of the above

Answer : C

105 The depth of neutral axis for over reinforced section is ----- the depth of critical neutral axis

[A] Equal to

[B] Greater than

[C] Less than

[D] None of the above

Answer : B

106 For a balanced section, the tensile stress in the reinforcement

[A] reaches its allowable stress

[B] is always less than its allowable stress

[C] may be greater than its allowable stress

[D] none of the above

Answer : A

107 The depth of neutral axis for a balanced section is ----- the depth of critical neutral axis

[A] equal

[B] always greater than

[C] always less than

[D] may be sometimes greater than

Answer : A

108 Moment of resistance for a under reinforced section ----- that of a critical section

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- [A] Is equal to
- [B] Is always greater than
- [C] Is less than
- [D] May be sometimes greater than

Answer : C

109 By over-reinforcing a beam, the moment of resistance can be increased not more than

- [A] 10%
- [B] 15%
- [C] 25%
- [D] 50%

Answer : C

110 The working stress method is also known as

- [A] Elastic method
- [B] Load factor method
- [C] Critical method
- [D] All the above

Answer : A

111 Working stress method of design results in ----- percentages of compression steel than that of a limit state method of design

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- [A] Equal
- [B] Larger
- [C] Smaller
- [D] Half of the

Answer : B

112 As per IS:456, in working stress method of design, permissible tensile stress for M20 grade concrete is given by

- [A] 1.2 N/mm²
- [B] 1.5 N/mm²
- [C] 2.0 N/mm²
- [D] 2.8 N/mm²

Answer : D

113 In working stress method of design, permissible compressive bending stress for M20 grade concrete is given by

- [A] 5.0 N/mm²
- [B] 7.0 N/mm²
- [C] 10.0 N/mm²
- [D] 20 N/mm²

Answer : B

114 As per IS: 456, permissible direct compressive stress M20 grade concrete in working stress method of designer

[A] 5.0 N/mm²

[B] 7.0 N/mm²

[C] 10.0 N/mm²

[D] 20.0 N/mm²

Answer : A

115 As per IS: 456, permissible bond stress for plain bars in tension, in working stress method, where M20, is the grade of concrete

[A] 0.6 N/mm²

[B] 0.8 N/mm²

[C] 1.0 N/mm²

[D] 1.2 N/mm²

Answer : B

116 The bond stress for plain bars in compression is more than that for bars in tension by

[A] 25%

[B] 40%

[C] 60%

[D] 50%

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Answer : A

117 The bond stress for deformed bars is more than that in plain bars by

[A] 25%

[B] 40%

[C] 60%

[D] 50%

Answer : B

118 As per IS:456, maximum shear stress for M20 grade concrete in working stress method is

[A] 1.6 N/mm²

[B] 1.8 N/mm²

[C] 2.0 N/mm²

[D] 2.2 N/mm²

Answer : B

119 When the nominal shear stress is less than permissible shear stress in concrete then

[A] Provide minimum shear reinforcement

[B] No shear reinforcement is necessary

[C] Provide design shear reinforcement

[D] None of the above

Answer : A

120 While compared with singly reinforced beams, the depth of doubly reinforced beam is

[A] Greater

[B] Lesser

[C] almost equal

[D] twice

Answer : B

121 If the depth of actual neutral axis is greater than the depth of critical neutral axis, then

[A] Concrete attains its permissible stress earlier

[B] Steel attains its permissible stress earlier

[C] Both concrete and steel reaches its permissible stresses simultaneously

[D] None of the above

Answer : A

122 Steel Beam theory is a method of designing

[A] Balanced sections

[B] Critical sections

[C] Singly reinforced beams

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[D] Doubly reinforced beams

Answer : D

123 According to steel Beam theory, stress in compressive steel is ----- stress in tension steel

[A] less than

[B] greater than

[C] equal to

[D] twice

Answer : C

124 According to revised elastic theory, the steel in the compression zone is ----- that which is calculated simple elastic theory

[A] equal to

[B] less than

[C] greater than

[D] half of

Answer : C

125 Maximum area of tension reinforcement shall not exceed

[A] $0.02 bd$

[B] 0.02 bD

[C] 0.04 bd

[D] 0.04 bD

Answer : D

126 Maximum area of compression reinforcement shall not exceed

[A] 0.02 bd

[B] 0.02 bD

[C] 0.04 bd

[D] 0.04 bD

Answer : C

127 Side face reinforcement is provided when the depth of beam exceeds

[A] 250 mm

[B] 450 mm

[C] 550 mm

[D] 750 mm

Answer : D

128 The area of side face reinforcement shall not be less than

[A] 0.10 percent of the web area on each vertical face

[B] 0.05 percent of the web area on each vertical face

[C] 0.15 percent of the web area on each vertical face

[D] 0.20 percent of the web area

Answer : B

129 The maximum of spacing of side face reinforcement shall not exceed

[A] 300 mm

[B] Web thickness

[C] Lesser of (a) and (b)

[D] Greater of (a) and (b)

Answer : C

130 A concrete block subjected to shear stresses, then the failure may result by

[A] Diagonal tension

[B] Longitudinal tension

[C] Diagonal compression

[D] None of the above

Answer : A

131 The anchorage value of the hook for a mild steel bar is generally considered as

(d = diameter of bar)

- [A] 8 d
- [B] 16 d
- [C] 32 d
- [D] 48 d

Answer : B

132 As per IS: 1139, permissible stress in compression steel reinforcement for High Yield strength deformed bars is

- [A] 140 N/mm²
- [B] 190 N/mm²
- [C] 230 N/mm²
- [D] 415 N/mm²

Answer : B

133 According to IS: 456-2000 spacing of vertical stirrups for shear reinforcement has been limited to

- [A] 0.75 d
- [B] 450 mm
- [C] lesser of 0.75 d or 300 mm
- [D] lesser of 0.75d or 450 mm

Answer : C

134 The maximum spacing of main steel in slabs has been limited to

- [A] 250 mm
- [B] 300 mm
- [C] 450 mm
- [D] 500 mm

Answer : B

135 Limit state of collapse deals with

- [A] strength and stability of the structure
- [B] conditions such as deflection, cracking
- [C] durability
- [D] all the above

Answer : A

136 Limit state method of design has _____ major limit state conditions

- [A] one
- [B] two
- [C] three
- [D] four

Answer : B

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137 In Limit state design, the maximum working load that the structure has to withstand is called

- [A] Service load
- [B] Factored load
- [C] Characteristic load
- [D] Ultimate load

Answer : C

138 The safe strengths for the materials are called their

- [A] Ultimate strength
- [B] Characteristic strength
- [C] Maximum strength
- [D] none of the above

Answer : B

139 Partial safety factor for strength of concrete in Limit state design is

- [A] 1.15
- [B] 1.25
- [C] 1.5
- [D] 1.65

Answer : C

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140 Partial safety factor for strength in steel in Limit state design is

- [A] 1.15
- [B] 1.25
- [C] 1.5
- [D] 1.65

Answer : A

141 The stress-strain curve concrete in compression follows

- [A] a straight line
- [B] a rectangular parabolic curve
- [C] a semi circular arc
- [D] a cubic parabola

Answer : B

142 The ultimate strain of concrete at failure is

- [A] 0.002
- [B] 0.0035
- [C] 0.0045
- [D] 0.006

Answer : B

143 The theoretical stress-strain curve of the concrete in the Limit State design of structures is correspondingly reduced by the factor

[A] 0.35

[B] 0.5

[C] 0.67

[D] 0.75

Answer : C

144 According to IS:456 minimum cement content inclusive of admixtures is

[A] 200 kg/m³

[B] 300 kg/m³

[C] 450 kg/m³

[D] 550 kg/m³

Answer : B

145 According to IS: 456, maximum water-cement ratio should be

[A] 0.45

[B] 0.55

[C] 0.65

[D] 0.75

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Answer : B

146 The reduction of the PH value, by the action of atmospheric carbon dioxide with the alkali of the cement paste is called

[A] atmospheric corrosion

[B] chloride corrosion

[C] oxidation

[D] carbonation

Answer : D

147 According to IS:456-2000, the maximum allowable crack width (in mm) for mild type of environmental condition

[A] 0.1

[B] 0.2

[C] 0.25

[D] 0.3

Answer : D

148 According to IS:456-2000, the following type of environments are considered for durability of concrete

[A] two

[B] four

[C] five

[D] six

Answer : C

149 Nominal cover for M30 grade concrete in moderate exposure is (as per IS:456-2000)

[A] 20 mm

[B] 30 mm

[C] 45 mm

[D] 50 mm

Answer : B

150 The main factors affecting the permeability of concrete are

(i)Grade of concrete

(ii)Minimum cement content

(iii)Maximum water cement ratio

[A] i

[B] i and ii

[C] ii and iii

[D] i, ii and iii

Answer : C

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151 The pH value of Pozzolanic concrete is _____ that of ordinary concrete

[A] lower than

[B] much lower than

[C] higher than

[D] equal

Answer : B

152 According to IS: 456-2000, the maximum cement content exclusive of admixtures is

[A] 200 kg/m³

[B] 300 kg/m³

[C] 450 kg/m³

[D] 550 kg/m³

Answer : C

153 The curing method is said to be good, when the relative humidity is kept

[A] Greater than 80%

[B] Less than 50%

[C] 50% - 80%

[D] None of the above

Answer : A

154 The maximum amount of chlorides and sulphates should not be more than

- [A] 0.15% and 4% by mass of cement respectively
- [B] 4% and 0.15% by mass of cement respectively
- [C] 0.30% and 2% by mass of cement respectively
- [D] 2% and 0.30% by mass of cement respectively

Answer : A

155 According to IS:456-2000, the total acid soluble chlorides in concrete is restricted to_____ of concrete

- [A] 0.2 kg/m³
- [B] 0.4 kg/m³
- [C] 2 kg/m³
- [D] 4 kg/m³

Answer : B

156 Minimum cover for fire resistance for a given simply supported beam, when the fire rating is 1 hour-----

- [A] 15 mm
- [B] 20 mm
- [C] 25 mm
- [D] 30 mm

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Answer : B

157 Modulus elasticity of steel is generally taken as

- [A] 2×10^5 N/mm²
- [B] 2×10^6 N/mm²
- [C] 2×10^6 N/mm²
- [D] 2×10^5 N/mm²

Answer : A

158 Which of the following sections are preferable for designing a member

- [A] under reinforced sections
- [B] over reinforced sections
- [C] both (a) and (b)
- [D] balanced sections

Answer : A

159 According to IS: 456-2000, limiting value of yield strain for Fe415 grade steel is

- [A] 0.031
- [B] 0.0031
- [C] 0.038

[D] 0.0038

Answer : D

160 According to IS:456-2000, Limiting value of yield strain for Fe250 grade steel is

[A] 0.031

[B] 0.0031

[C] 0.038

[D] 0.0038

Answer : B

161 For economical consideration, the ratio of overall depth to width should be

[A] less than 1.5

[B] between 1.50 and 2.0

[C] between 2.0 to 2.5

[D] greater than 2.5

Answer : B

162 The concrete is assumed to reach failure with a compression strain of

[A] 0.002

[B] 0.0035

[C] 0.0045

[D] 0.006

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Answer : B

163 In general in the design of a section by limit method, it is assumed that

[A] the stress in steel to reach its yield limit before concrete failure

[B] the stress in concrete to reach its permissible limit before to reach yield stress in steel

[C] stresses in both concrete and steel reach their permissible values simultaneously

[D] none of the above are correct

Answer : A

164 The expression for moment of resistance(M_u) of a singly reinforced section is, if the grade of steel in Fe415

[A] $0.149 f_{ck} b d^2$

[B] $0.138 f_{ck} b d^2$

[C] $0.125 f_{ck} b d^2$

[D] $0.0120 f_{ck} b d^2$

Answer : B

165 If the grade of steel is Fe250, then the expression for moment of resistance of a singly reinforced section is

[A] $0.149 f_{ck} b d^2$

[B] $0.138 f_{ck} b d^2$

[C] $0.125 f_{ck} b d^2$

[D] $0.012 f_{ck} b d^2$

Answer : A

166 Minimum percentage of tension steel for a singly reinforced section Fe415 grade is

[A] 0.2

[B] 0.35

[C] 2

[D] 3.5

Answer : A

167 Design yield stress for steel in tension and compression is

[A] $0.65 f_y$

[B] $0.87 f_y$

[C] $0.75 f_y$

[D] None of the above

Answer : B

168 Strain compatibility method is the method used for the analysis and design of

[A] singly reinforced sections

[B] doubly reinforced sections

[C] both (a) and (b)

[D] neither (a) nor (b)

Answer : C

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169 The spacing of stirrups in doubly reinforced beams should be least of the following

(i)Least Lateral dimension

(ii)Sixteen times the diameter of longitudinal steel

(iii)Forty eight times the diameter of transverse reinforcement

[A] i

[B] i and ii

[C] i and iii

[D] i, ii and iii

Answer : D

170 Development length is the length or extension that should be provided on either side from the

[A] face of the support

[B] point of maximum tension

[C] point of maximum compression

[D] point of minimum compression

Answer : B

- 171 The ultimate average anchorage bond stress for plain bars in tension is _____ if the grade of concrete is M20
- [A] 1.60 N/mm²
 - [B] 1.92 N/mm²
 - [C] 2.24 N/mm²
 - [D] 2.40 N/mm²

Answer : B

- 172 The length of bar necessary to develop the full strength of the bar is called
- [A] Bond
 - [B] Development length
 - [C] End anchorage
 - [D] Splicing

Answer : B

- 173 End anchorage of bars is taken as the greater of
- [A] Effective depth or 12 times the diameter of bar
 - [B] Effective depth or 16 times the diameter of bar
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 - [D] Effective depth of 48 times the diameter of bar

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Answer : A

- 174 Lap splicing are not usually allowed for bars more than
- [A] 25 mm
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 - [C] 36 mm
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Answer : C

- 175 Flanged beams are preferred when the concrete in the slab is on the
- [A] compression side of the beam
 - [B] tension side of the beam
 - [C] may be compression side or tension side of the beam
 - [D] none of the above

Answer : A

- 176 The development length of bars in compression is taken as
- [A] 30 times bar diameter
 - [B] 40 times bar diameter
 - [C] 50 times bar diameter

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177 Steel Beam theory is the method of analysis and a design of

[A] Singly reinforced sections

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[C] Both (a) and (b)

[D] Steel structures only

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182 Partial safety factor for strength of concrete in Limit state design is

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[C] 1.5

[D] 1.65

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187 According to IS:456 minimum cement content inclusive of admixtures is

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[D] 0.3

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Answer : C

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Answer : C

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[D] 550 kg/m³

Answer : C

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[C] 2 kg/m³

[D] 4 kg/m³

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Answer : B

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[C] 2×10^6 N/mm²

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Answer : A

201 Which of the following sections are preferable for designing a member

[A] under reinforced sections

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[C] both (a) and (b)

[D] balanced sections

Answer : A

202 According to IS: 456-2000, limiting value of yield strain for Fe415 grade steel is

[A] 0.031

[B] 0.0031

[C] 0.038

[D] 0.0038

Answer : D

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203 According to IS:456-2000, Limiting value of yield strain for Fe250grade steel is

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[B] 0.0031

[C] 0.038

[D] 0.0038

Answer : B

204 For economical consideration, the ratio of overall depth to width should be

[A] less than 1.5

[B] between 1.50 and 2.0

[C] between 2.0 to 2.5

[D] greater than 2.5

Answer : B

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[B] 0.0035

[C] 0.0045

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Answer : B

206 In general in the design of a section by limit method, it is assumed that

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[B] the stress in concrete to reach its permissible limit before to reach yield stress in steel

[C] stresses in both concrete and steel reach their permissible values simultaneously

[D] none of the above are correct

Answer : A

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[B] $0.138 f_{ck} b d^2$

[C] $0.125 f_{ck} b d^2$

[D] $0.0120 f_{ck} b d^2$

Answer : B

208 If the grade of steel is Fe250, then the expression for moment of resistance of a singly reinforced section is

[A] $0.149 f_{ck} b d^2$

[B] $0.138 f_{ck} b d^2$

[C] $0.125 f_{ck} b d^2$

[D] $0.012 f_{ck} b d^2$

Answer : A

209 Minimum percentage of tension steel for a singly reinforced section Fe415 grade is

[A] 0.2

[B] 0.35

[C] 2

[D] 3.5

Answer : A

210 Design yield stress for steel in tension and compression is

[A] $0.65 f_y$

[B] $0.87 f_y$

[C] $0.75 f_y$

[D] None of the above

Answer : B

211 Strain compatibility method is the method used for the analysis and design of

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- [A] singly reinforced sections
- [B] doubly reinforced sections
- [C] both (a) and (b)
- [D] neither (a) nor (b)

Answer : C

212 The spacing of stirrups in doubly reinforced beams should be least of the following

- (i)Least Lateral dimension
- (ii)Sixteen times the diameter of longitudinal steel
- (iii)Forty eight times the diameter of transverse reinforcement

- [A] i
- [B] i and ii
- [C] i and iii
- [D] i, ii and iii

Answer : D

213 Development length is the length or extension that should be provided on either side from the

- [A] face of the support
- [B] point of maximum tension
- [C] point of maximum compression
- [D] point of minimum compression

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Answer : B

214 The ultimate average anchorage bond stress for plain bars in tension is _____ if the grade of concrete is M20

- [A] 1.60 N/mm²
- [B] 1.92 N/mm²
- [C] 2.24 N/mm²
- [D] 2.40 N/mm²

Answer : B

215 The length of bar necessary to develop the full strength of the bar is called

- [A] Bond
- [B] Development length
- [C] End anchorage
- [D] Splicing

Answer : B

216 End anchorage of bars is taken as the greater of

- [A] Effective depth or 12 times the diameter of bar
- [B] Effective depth or 16 times the diameter of bar

[C] Effective depth of 24 times the diameter of bar

[D] Effective depth of 48 times the diameter of bar

Answer : A

217 Lap splicing are not usually allowed for bars more than

[A] 25 mm

[B] 32 mm

[C] 36 mm

[D] None of the above

Answer : C

218 Flanged beams are preferred when the concrete in the slab is on the

[A] compression side of the beam

[B] tension side of the beam

[C] may be compression side or tension side of the beam

[D] none of the above

Answer : A

219 The development length of bars in compression is taken as

[A] 30 times bar diameter

[B] 40 times bar diameter

[C] 50 times bar diameter

[D] 12 times bar diameter

Answer : A

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220 Steel Beam theory is the method of analysis and a design of

[A] Singly reinforced sections

[B] Doubly reinforced sections

[C] Both (a) and (b)

[D] Steel structures only

Answer : B

221 Bending shear is sometimes referred to as

[A] One way shear

[B] Punching shear

[C] Two way shear

[D] None of the above.

Answer : A

222 Design shear strength of concrete is a function of

i. Percentage of tension steel

ii. Grade of concrete

iii. Grade of steel

[A] i and ii

[B] ii only

[C] i and iii

[D] i, ii and iii

Answer : A

223 Maximum allowable shear stress for M25 grade concrete is

[A] 2.5 N/mm²

[B] 2.8 N/mm²

[C] 3.1 N/mm²

[D] 3.5 N/mm²

Answer : C

224 Minimum shear reinforcement is necessary to

[A] Prevent brittle shear failure

[B] Prevent failure due to shrinkage and thermal stresses

[C] Hold the reinforcements in place while pouring concrete

[D] All the above.

Answer : D

225 Maximum allowable spacing of shear reinforcement for vertical stirrups is restricted to

[A] d

[B] 0.45 d

[C] 0.75 d

[D] 0.90 d

Answer : C

226 According to IS: 456-2000 Maximum spacing of shear reinforcement in no case shall not exceed

[A] 250 mm

[B] 300 mm

[C] 350 mm

[D] 450 mm

Answer : B

227 Maximum allowable spacing of shear reinforcement for inclined stirrups with an inclination of 45° is restricted to

[A] 0.75 d

[B] 0.45 d

[C] 0.90 d

[D] d

Answer : D

- 228 The diameter of the stirrups according to IS : 456-2000 should not be less than
- [A] 5 mm
 - [B] 6 mm
 - [C] 8 mm
 - [D] 10 mm

Answer : B

- 229 The Maximum shear stress in Slabs should not exceed ----- the maximum values allowed for beams.
- [A] Half Of
 - [B] One-Fourth Of
 - [C] Twice
 - [D] Those Given In

Answer : A

- 230 The principle used for control of deflection in beams and slabs.
- [A] Maxwell method
 - [B] Mohr's theorem
 - [C] Span to effective depth ratio
 - [D] Span to overall depth ratio.

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Answer : C

- 231 Basic value .of Span to Depth ratio for cantilever to control deflection is
- [A] 7
 - [B] 20
 - [C] 26
 - [D] 35

Answer : A

- 232 Allowable crack width for reinforce concrete structure under normal conditions is
- [A] 0
 - [B] 0.1 mm
 - [C] 0.2 mm
 - [D] 0.3 mm

Answer : D

- 233 The Minimum bar spacing should not be less than
- [A] Diameter of the largest bar
 - [B] Maximum size of aggregate
 - [C] Greater of diameter of the largest bar and maximum size of aggregate

[D] Greater of diameter of the largest bar and maximum size of aggregate plus 5 mm

Answer : D

234 The Maximum spacing of Main reinforcement 'm' slabs shall be

[A] Less than three times of the effective depth

[B] Less than 300mm

[C] Smaller of (a) and (b)

[D] Greater of (a) and (b)

Answer : C

235 Basic value of span to depth ratio for simply supported beam to control deflection is

[A] 7

[B] 20

[C] 26

[D] 35

Answer : B

236 The Maximum spacing of Secondary reinforcement in slabs should be

[A] Less than 450 mm

[B] Less than 300 mm

[C] Smaller of three times the effective depth and 450 mm

[D] Smaller of five times the effective depth and 450 mm

Answer : D

237 The basic value of span to depth ratio for one way continuous slab is

[A] 20

[B] 26

[C] 35

[D] 40

Answer : B

238 The Minimum amount of steel for Main reinforcement in slab should be (Fe 415- grade of steel)

[A] 0.12 percent of gross cross sectional area

[B] 0.15 percent of gross cross sectional area

[C] 0.20 percent of gross cross sectional area

[D] 0.25 percent of gross cross sectional area.

Answer : A

239 The Maximum percentage of steel in tension allowed for beams

[A] 0.2

[B] 0.4

[C] 2

[D] 4

Answer : A

240 The Maximum diameter steel in slabs should not exceed ----- the total thickness of the slab

[A] One-half

[B] One-fourth

[C] One-eighth

[D] One-sixteenth

Answer : C

241 Minimum steel in the main direction of a slab when using high yield steel

[A] 0.12%

[B] 0.15%

[C] 0.20%

[D] 0.25%

Answer : B

242 Maximum percentage of steel in compression should be

[A] 0.20%

[B] 0.40%

[C] 2.00%

[D] 4.00%

Answer : D

243 Minimum percentage area of tension reinforcement , when the grade of steel is Fe-250

[A] 0.2

[B] 0.25

[C] 0.34

[D] 0.44

Answer : C

244 Select the incorrect from the following.

The combinations of loads for serviceability conditions should be

[A] 1.0 DL + 1.0 LL

[B] 1.0 DL + 1.0 WL

[C] 1.0 DL + 0.8 LL + 0.8 WL

[D] 0.8 DL + 0.8 LL + 0.8 WL

Answer : D

245 In moderate exposure , the allowable crack width at the surface of concrete should be

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- [A] 0.20 mm
- [B] 0.30 mm
- [C] 0.45 mm
- [D] 0.55 mm

Answer : A

246 For Fe- 415 steel and M20grade concrete, the balanced percentage of steel is

- [A] 0.65%
- [B] 0.75%
- [C] 0.86%
- [D] 0.96%

Answer : D

247 According to IS : 456-2000, clause 39.4, stirrups should be provided for a shear of

- [A] at least 75%
- [B] at least 50%
- [C] at least 25 %
- [D] none of the above.

Answer : B

248 For ductility consideration, the maximum percentage of steel used should not exceed ----- of the balanced steel

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- [A] 25%
- [B] 50%
- [C] 60%
- [D] 75%

Answer : D

249 Minimum steel required in slabs is mainly controlled by the following consideration

- [A] Cracking on the tension side
- [B] Shrinkage and creep
- [C] Both (a) and (b)
- [D] None of the above.

Answer : B

250 Secondary steel has to be provided across _____ of flanged beams

- [A] Full effective width of flange
- [B] The width of web
- [C] Half of the width of flange
- [D] None of the above.

Answer : A

251 The Percentage of steel in T-beam mainly based on

- [A] Flange width
- [B] Rib width
- [C] Flange depth
- [D] None of the above.

Answer : B

252 The span/effective depth ratio is ----- for control of deflection

- [A] An exact method
- [B] An empirical method
- [C] An accurate method.
- [D] Both (a) and (c)

Answer : B

253 Basic values of span/effective depth ratios to be used for beams and slabs with spans

- [A] Less than 10m
- [B] Less than 20 m
- [C] 10 m- 20 m
- [D] More than 20 m

Answer : A

254 In "Severe exposure" the allowable crack width at the surface of concrete should not exceed

- [A] 0.1 mm
- [B] 0.2 mm
- [C] 0.3 mm
- [D] 0.4 mm

Answer : A

255 The minimum percentage of tension steel is mainly based on the

- [A] Total depth
- [B] Effective depth
- [C] Both (a) and (b)
- [D] None of the above.

Answer : A

256 The Minimum percentage of secondary steel in slabs for Fe- 415 grade steel should be _____ of Gross cross-section area

- [A] 0.12%
- [B] 0.15%
- [C] 0.20%
- [D] 0.25%

Answer : A

- 257 In order to achieve economy, the spacing of stirrups at mid span section----- compared to that of support section
- [A] May be decreased
 - [B] May be increased
 - [C] Must be kept equal
 - [D] None of the above.

Answer : B

- 258 Side face reinforcement shall not exceed
- [A] 0.1% of total cross sectional area
 - [B] 0.2% of total cross sectional area
 - [C] 0.1% web area
 - [D] 0.2 % web area.

Answer : C

- 259 To develop complete yield line pattern the slab must be
- [A] Under reinforced
 - [B] Over reinforced
 - [C] Both (a) and (b)
 - [D] None of the above.

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Answer : A

- 260 Which of the following is not a characteristic feature of yield lines?
- [A] Yield lines end at a slab boundary
 - [B] Yield lines are of parabolical shape
 - [C] Axes of rotation generally lie along the lines of supports
 - [D] None of the above.

Answer : B

- 261 Negative yield line form
- i. Near the supports in the case of slabs fixed or continuous at the edge.
 - ii. At mid span in the case of slabs fixed.
 - iii. At mid span for simply supported circular slab
- [A] i
 - [B] i and ii
 - [C] i and iii
 - [D] i, ii and iii

Answer : A

- 262 The yield line ultimate moment is obtained when the yield line is ----- to the direction of the reinforcement

- [A] Parallel
- [B] At right angles.
- [C] Passes through
- [D] Crosses at an angle of 45°

Answer : B

263 The ultimate load capacity of slabs can be determined by using the principle of

- i. Super position
- ii. Virtual work
- iii. Equilibrium

- [A] i
- [B] ii
- [C] i and iii
- [D] ii and iii

Answer : D

264 Select incorrect statement from the following.

In the Virtual work method, it is generally assumed that

- [A] Elastic deformations in the slab are negligible
- [B] Plastic deformations in the slab are negligible
- [C] Plastic deformations takes place at the yield lines.
- [D] Both (a) and (b)

Answer : B

265 Virtual work method and equilibrium method gives ----- to the collapse load on the slab

- [A] Upper bound
- [B] Lower bound
- [C] Upper bound and lower bound respectively
- [D] None of the above.

Answer : A

266 It is essential that the all possible yield line patterns have to be investigated to find the -----

- [A] Highest value of the ultimate load
- [B] Lowest value of the ultimate load
- [C] Average value of all the loads.
- [D] None of the above.

Answer : B

267 The virtual work method is based on the principle

- [A] External work done = Internal work done.

- [B] External work done + Internal work done.
- [C] External work done - Internal work done.
- [D] None of the above.

Answer : A

268 Yield line analysis by equilibrium method gives ----- to that of obtained by virtual work method

- [A] Equal values
- [B] Lesser values
- [C] Higher values
- [D] None of the above.

Answer : A

269 Yield line theory results in

- [A] Elastic solution
- [B] Lower bound solution
- [C] Upper bound solution
- [D] Unique solution

Answer : B

270 The assumed yield line pattern is to be correct when the lower bound solution -----the upper bound solution

- [A] May be greater than
- [B] May be less than
- [C] Will coincide with
- [D] Must be less than

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Answer : C

271 The slab is said to be orthotropically reinforced , when the reinforcement is arranged in;

- [A] Single direction
- [B] Two directions at right angles with equal meshes
- [C] Two directions at right angles with unequal meshes
- [D] At the corners only

Answer : C

272 The percentage of reinforcement in slabs is generally in the range of

- [A] 0.3% to 0.5%
- [B] 0.5% to 1.0%
- [C] 1.0% to 1.5%
- [D] 1.5 % to 2.0%

Answer : A

- 273 In general, the depth of slab should be ----- the minimum depth required for balanced section.
- [A] Equal to
 - [B] Less than
 - [C] Greater than
 - [D] Half of

Answer : C

- 274 It is preferable, that the design of slab should result in
- [A] A balanced section
 - [B] An under reinforced section
 - [C] Over reinforced section
 - [D] None of the above.

Answer : B

- 275 In a two way slab flexural bending develops
- [A] Along short span
 - [B] Along long span
 - [C] In Mutually perpendicular directions
 - [D] At the center of short span

Answer : C

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- 276 Slabs which are supported in such a way that the corners are prevented from lifting are referred to as;
- [A] One way slabs
 - [B] Two way slabs
 - [C] Restrained slabs
 - [D] Unrestrained slabs.

Answer : C

- 277 The size of the mesh at each corner meant for torsion reinforcement in a rectangular slab of size ($L_x \times L_y$) is
- L_x = shorter span
 L_y = Longer span
- [A] $0.1 L_y \times 1 L_y$
 - [B] $0.2 L_y \times 0.2 L_y$
 - [C] $0.1 L_x \times 0.1 L_x$
 - [D] $0.2 L_x \times 0.2 L_x$

Answer : D

- 278 The span/over all depth ratio for a simply supported two-way slab according to IS : 456-2000 is given by

[A] 20

[B] 28

[C] 32

[D] 40

Answer : B

279 According to IS: 456-2000, the span/overall depth ratio for a continuous two-way slab in order to control deflection is given by

[A] 20

[B] 28

[C] 32

[D] 40

Answer : C

280 Reinforced concrete slab supported only on columns is said to be

[A] Rigid slab

[B] Flat slab

[C] Both(a) and (b)

[D] None of the above.

Answer : B

281 According to IS: 456-2000 the ultimate moment of resistance of a slab for Fe - 415 HYSD bars is;

[A] $M_u = 0.138 f_{ck} b d^2$

[B] $M_u = 0.145 f_{ck} b d^2$

[C] $M_u = 0.152 f_{ck} b d^2$

[D] $M_u = 0.165 f_{ck} b d^2$

Answer : A

282 In a limit state method of design, when shear reinforcement is not provided, the calculated shear stress at the critical section of a slab shall not exceed;

[A] $K_s 0.25 v f_{ck}$

[B] $k_s 0.20 v f_{ck}$

[C] $k_s 0.16 v f_{ck}$

[D] $k_s 0.10 v f_{ck}$

Answer : A

283 The moments developed in the slab are influenced by the following factors

i.Short span

ii.Long span

iii.Type of supporting edge.

iv.Magnitude and type of load on slab

- [A] i, iii and iv
- [B] ii ,iii and iv
- [C] i and iii
- [D] i, ii , iii and iv

Answer : D

284 Minimum reinforcement in slabs, when High yield strength deformed bars

- [A] 0.12% of gross cross sectional area
- [B] 0.15% of gross cross sectional area
- [C] 0.20% of gross cross sectional area
- [D] 0.25% of gross cross sectional area.

Answer : A

285 Permissible width of crack at the surface of concrete for 'moderate' environmental conditions according to IS : 456-2000 is

- [A] 0.1 mm
- [B] 0.2 mm
- [C] 0.3 mm
- [D] 0.4 mm

Answer : B

286 Limiting moment of resistance of a singly reinforced section for mild steel is

- [A] $M_u = 0.133 f_{ck} b d^2$
- [B] $M_u = 0.138 f_{ck} b d^2$
- [C] $M_u = 0.148 f_{ck} b d^2$
- [D] $M_u = 0.153 f_{ck} b d^2$

Answer : C

287 In slabs the Maximum horizontal distance between parallel main reinforcement should not exceed

- i. Three times effective depth
- ii Five times effective depth
- iii 300mm
- iv 450 mm

- [A] i and iii
- [B] i and iv
- [C] ii and iii
- [D] ii and iv

Answer : A

288 Slenderness ratio of the column is the ratio of

- [A] the effective length to width of column

- [B] the effective length to depth of column
- [C] the effective length to least lateral design
- [D] none of the above

Answer : C

289 A Column is said to be short, when the slenderness ratio is

- [A] Less than 6
- [B] Less than 12
- [C] Less than 18
- [D] None of the above

Answer : B

290 Columns in which lateral loads have to be resisted in addition to vertical loads by the strength of the columns themselves are considered as

- [A] Braced columns
- [B] Un braced columns
- [C] Slender columns
- [D] None of the above

Answer : B

291 The unsupported height of column (L_0) is generally

- [A] Clear height of the column
- [B] Less than the clear height of the column
- [C] More than the clear height of the column
- [D] None of the above

Answer : A

292 In order to avoid the material failure in a braced column, the clear distance between restraints should never exceed

- [A] 30 times the minimum dimensions of the column
- [B] 40 times the minimum dimensions of the column
- [C] 50 times the minimum dimensions of the column
- [D] 60 times the minimum dimensions of the column

Answer : D

293 For Unbraced column, the ratio of the clear height of the column to the minimum dimension of the column shall not exceed

- [A] 30
- [B] 40
- [C] 50
- [D] 60

Answer : A

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294 The ultimate failure is assumed to be reached when the section reaches a uniform compression strain of

- [A] 0.002
- [B] 0.0035
- [C] 0.0045
- [D] 0.005

Answer : A

295 The compression in concrete (f_c) at failure is given by

- [A] 0.30 f_{ck}
- [B] 0.45 f_{ck}
- [C] 0.50 f_{ck}
- [D] 0.75 f_{ck}

Answer : B

296 The compression in steel (f_s) at failure for Fe - 415 grade steel using stress-strain curve shall be

- [A] 0.87 f_y
- [B] 0.75 f_y
- [C] 0.45 f_y
- [D] 0.55 f_y

Answer : B

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297 According to IS:456-2000, the minimum eccentricity in no case

- [A] Shall be not less than 20mm
- [B] Shall be not greater than 30mm
- [C] Shall be 20mm-30mm
- [D] None of the above

Answer : A

298 The minimum diameter of longitudinal steel should be

- [A] 10 mm
- [B] 12 mm
- [C] 16 mm
- [D] 20 mm

Answer : B

299 Minimum number of bars for a column of rectangular section

- [A] Two
- [B] Four
- [C] Six
- [D] Eight

Answer : B

300 Minimum number of bars for a circular column

- [A] Four
- [B] Five
- [C] Six
- [D] Eight

Answer : C

301 Minimum percentage of longitudinal steel in a column should not be less than

- [A] 0.60%
- [B] 0.80%
- [C] 1.00%
- [D] 1.20%

Answer : B

302 Maximum percentage of longitudinal steel in a column should be less than

- [A] 6%
- [B] 8%
- [C] 9%
- [D] 10%

Answer : B

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303 Minimum cover to longitudinal steel in a column should be (if the diameter of bar, $\varnothing > 12\text{mm}$)

- [A] 25 mm
- [B] 30 mm
- [C] 40 mm
- [D] 50 mm

Answer : C

304 The Maximum spacing of the longitudinal bars measured long the periphery of the column should be

- [A] 250 mm
- [B] 300 mm
- [C] 400 mm
- [D] 450 mm

Answer : B

305 In any case, the minimum diameter of the link in a column, according to IS:456-2000 is

- [A] 5 mm
- [B] 6 mm
- [C] 8 mm

[D] 10 mm

Answer : B

306 The diameter of the Links in column should be at least.....of the largest diameter of the longitudinal steel

[A] One-half

[B] Three-fourth

[C] One eighth

[D] One – fourth

Answer : D

307 According to IS: 456 -2000, the spacing of links in a Column should be less than

[A] 16 x diameter of smallest longitudinal bar

[B] 24 x diameter of smallest longitudinal bar

[C] 48 x diameter of smallest longitudinal bar

[D] 48 x diameter of greatest longitudinal bar

Answer : A

308 A column said to be under uniaxial bending, when the eccentricity is

[A] with respect to one axis only

[B] with respect to two axes

[C] zero

[D] 20 mm

Answer : A

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309 Select the incorrect statement from the following

In eccentrically loaded columns,

[A] The tensile strength of concrete is ignored

[B] Design stress – strain curve for steel in compression is the same as in tension

[C] The strain at different points in the section will be same

[D] Plane section remain plane even after bending

Answer : C

310 The equilibrium equation for the condition that tension will be equal to the compression is given by

[A] Compression in concrete = Tension in steel

[B] Compression in concrete + Compression in steel = Tension in steel

[C] Compression in concrete = Compression in steel

[D] None of the above

Answer : B

311 The Effective length of a column is defined as the

[A] length between the fixed joints

[B] length between the points of contra flexure

[C] unsupported length of the column

[D] Both (a) and (c)

Answer : B

312 When the ratio of the effective length of the rectangular columns to its lateral dimension exceeds 12, then the column is said to be

[A] Short column

[B] Slender column

[C] Biaxial column

[D] All the above

Answer : B

313 According to IS:456, the diameter of the helices in circular a column shall be at least

[A] The diameter of longitudinal steel

[B] One-half the diameter of longitudinal steel

[C] One-fourth the diameter of longitudinal steel

[D] Three-fourth the diameter of longitudinal steel

Answer : C

314 The Maximum strength attained in concrete in limit state design is generally taken as

[A] f_{ck}

[B] $0.67 f_{ck}$

[C] $0.45 f_{ck}$

[D] $0.30 f_{ck}$

Answer : C

315 The Pitch of helices in circular columns shall not exceed

[A] 25 mm

[B] 50 mm

[C] 60 mm

[D] 75 mm

Answer : D

316 The Minimum pitch of the helical reinforcement in circular columns should be

[A] 25 mm

[B] 40 mm

[C] 50 mm

[D] 60 mm

Answer : A

317 Which of the following method that is used to taken into account the slenderness effect of columns according to IS:456 - 2000

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- [A] Reduction coefficient method
- [B] Slenderness method
- [C] Moment magnification method
- [D] None of the above

Answer : A

318 The Effective length of braced column generally varies.....the unsupported length of the column

- [A] 0.25 to 0.50 times
- [B] 0.50 to 1.00 times
- [C] 1.00 to 1.50 times
- [D] 2.00 to 2.50 times

Answer : B

319 The purpose of lateral ties in short reinforced concrete columns is to

- [A] Facilitate construction
- [B] Facilitate compaction of concrete
- [C] Increase the load carrying capacity of the columns
- [D] Avoid buckling of longitudinal bars

Answer : D

320 The load carrying capacity of helically reinforced column as compared to that of column with ties is about

- [A] 5% less
- [B] 5% more
- [C] 10% less
- [D] 10% more`

Answer : B

321 Due to Circumferential action of the spiral reinforcement in a column

- [A] Capacity of column is decreased but ductility of column increases
- [B] Both the capacity of column an ductility of column increases
- [C] Capacity of column increases
- [D] Ductility of the column reduces

Answer : B

322 According to IS:456-2000, the minimum slenderness ratio for a short column is

- [A] Less than 12
- [B] Between 12 and 18
- [C] Less than 18
- [D] Must be greater than 18

Answer : A

323 Select the incorrect statement from the following

- [A] Reinforcing bars in a column should not be less than 12 mm in diameter
- [B] The number of longitudinal bars in a circular column should not exceed four
- [C] The minimum percentage of longitudinal steel in columns should be 0.8%
- [D] None of the above

Answer : B

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