Concrete

Q.1 Initial setting time of concrete ceases at
(a) −10°C   (b) −4°C
(c) 0°C   (d) 4°C

Q.2 The function of fine aggregate is
(a) to assist in producing workability and uniformity in the mixture.
(b) to assist the cement paste to hold the coarse aggregate particles in suspension.
(c) to promote plasticity in the mixture and prevent possible segregation of paste and coarse aggregate.
(d) all of the above.

Q.3 The cyclopan aggregate has a size more than
(a) 4.75 mm   (b) 20 mm
(c) 40 mm   (d) 75 mm

Q.4 Bulking of sand is the
(a) rodding of the sand so that it occupies minimum volume.
(b) compacting of the sand.
(c) increase in the volume of sand due to moisture which keeps sand particles apart.
(d) segregating sand of particular size.

Q.5 Gap grading is one
(a) in which one or more intermediate size fractions are absent.
(b) in which the particles fall within a narrow limit of size fractions.
(c) which combines different fractions of fine and coarse aggregates.
(d) in which all the particles are of uniform size.

Q.6 Which of the following impurities in the mixing water is destructive?
(a) Calcium chloride   (b) Lead nitrate
(c) Alkalies   (d) Algae

Q.7 Admixtures can be used to
(a) accelerate initial setting of concrete.
(b) increase the strength of concrete.
(c) improve workability.
(d) any of the above.

Q.8 Adding an accelerator to concrete increases all of the following except
(a) resistance to alkali-aggregate reaction.
(b) rate of hydration of cement.
(c) shrinkage.
(d) rate of evolution of heat.

Q.9 Following compounds can be used as accelerators except
(a) $CaCl_2$ (b) $CaSO_4$
(c) $NaCl$ (d) Na_2SO_4

Q.10 Addition of pozzolana admixture results in
(a) improved workability.
(b) reduction in heat of hydration.
(c) increased resistance to sulphate attack.
(d) all of the above.

Q.11 Superplasticizers or super water-reducers
(a) result in greatly increased workability.
(b) result in decreased tendency to segregate.
(c) facilitate production of flowing concrete.
(d) all of the above.

Q.12 Slump test is the most widely used field test primarily because
(a) it indicates the behaviour of fresh concrete under-action of gravitational forces.
(b) of the simplicity of apparatus and test procedure.
(c) it measures consistency or wetness of the mix.
(d) all of the above.

Q.13 In case the concrete is to be transported by pumping, the slump should be
(a) more than 100 mm.
(b) between 75 mm to 100 mm.
(c) between 25 mm to 75 mm.
(d) more than 25 mm.

Q.14 If the slump of concrete mix is 75 mm, its workability is considered to be
(a) very high   (b) high
(c) medium   (d) low

Q.15 For a RCC slab, the slump of concrete should be
(a) 0-25 mm   (b) 25-50 mm
(c) 75-100 mm   (d) 50-125 mm

Q.16 Identify the correct combination.

	Degree of workability	Compacting factor	Slump
(a)	high	0.68	125-150 mm
(b)	medium	0.78	25-75 mm
(c)	low	0.84	10-50 mm
(d)	very low	0.90	

Q.17 The Vee-Bee test
(a) is suitable for concrete mixes of low and very low workabilities
(b) is a remoulding test.
(c) is unsuitable for concretes having a slump of 75 mm or above.
(d) any of the above.

Q.18 Bleeding of concrete is said to occur when
(a) finer particles settle down at the bottom.
(b) coarser particles get separated.
(c) cement paste rises to the surface of concrete.
(d) finer particles collect in isolated pockets.

Q.19 Workability of concrete is independent of
(a) mix proportions.
(b) water content.
(c) size, shape and texture of aggregate.
(d) none of the above.

Q.20 Segregation in concrete results in
(a) porous layers.   (b) honey-combing.
(c) sand streaks.   (d) all of the above.

Q.21 The conventional workability tests e.g. slump test, compacting factor test, Vee-Bee test and remoulding tests are termed single-point tests because
(a) they measure one parameter of workability.
(b) they are conducted at one place.
(c) each gives complete information about the workability.
(d) all of the above.

Q.22 Rheological or flow equation of fresh concrete is expressed by
(a) Newton's model
(b) Bingham model
(c) Le Chatelier's model
(d) Neville model

Q.23 The most appropriate method to specify the concrete mix is by
(a) the nominal mix ratio.
(b) the designed mix ratio.
(c) the degree of control.
(d) the grade of concrete.

Q.24 The stress-strain curve of concrete in compression is obtained by testing the cylindrical specimen under
(a) uniform rate of strain.
(b) uniform rate of stress.
(c) constant stress condition.
(d) constant strain condition.

Q.25 As compared to the static tests, the dynamic tests on concrete give
(a) higher value of Poisson's ratio.
(b) lower value of Poisson's ratio.
(c) the same value of Poisson's ratio.
(d) all of the above depending upon the test conditions.

Q.26 Permeability of concrete reduces
(a) with the carbonation of concrete.
(b) with the strength of cement paste.
(c) with the decrease in the porosity.
(d) all of the above.

Q.27 The inelastic behaviour of concrete is due to the
   (a) shrinkage in concrete.
   (b) propagation of bond and mortar cracks.
   (c) presence of macro and micro cracks.
   (d) use of aggregates.

Q.28 The thermal conductivity of concrete decreases with the
   (a) light weight concretes
   (b) increase in the water-cement ratio.
   (c) decrease in the cement content.
   (d) all of the above.

Q.29 For cement concrete the stress-strain curve is linear approximately up to
   (a) 1/4 of ultimate stress.
   (b) 1/3 of ultimate stress.
   (c) 1/2 of ultimate stress.
   (d) 5/8 of ultimate stress.

Q.30 The thermal coefficient of expansion of concrete is approximately
   (a) 3×10^{-8} per°C   (b) 3×10^{-6} per°C
   (c) 3×10^{-5} per°C   (d) 3×10^{-4} per°C

Q.31 The permissible stress for concrete subjected to fatigue should be
   (a) 25 per cent   (b) 50 per cent
   (c) 75 per cent   (d) 80 per cent

Q.32 The tensile strength of concrete is approximately what per cent of compressive strength of concrete?
   (a) 50%   (b) 20%
   (c) 10%   (d) 5%

Q.33 As per Indian Standard specifications, concrete is designated into
   (a) 3 grades   (b) 5 grades
   (c) 7 grades   (d) 10 grades

Q.34 The concrete for sea water application should not be leaner than
   (a) 1 : 2 : 6   (b) 1 : 2 : 4
   (c) 1 : 2 : 3   (d) $1 : 1\frac{1}{2} : 3$

Q.35 For compressive strength determination, the minimum number of cubes required in a sample are
   (a) 2   (b) 3
   (c) 5   (d) 6

Q.36 The unit weight of plain concrete is generally taken as
   (a) 20 kN/m^3 (b) 22 kN/m^3
   (c) 24 kN/m^3 (d) 25 kN/m^3

Q.37 The unit weight of reinforced cement concrete is generally taken as
   (a) 18 kN/m^3 (b) 22 kN/m^3
   (c) 24 kN/m^3 (d) 25 kN/m^3

Q.38 Which one of the following does not react with concrete?
   (a) Sewage water   (b) Sulphuric acid
   (c) Vegetable oil   (d) Alcohol

Q.39 Presence of algae in concrete
   (a) reduces its strength.
   (b) reduces its bond strength.
   (c) causes a large entrainment of air.
   (d) all of the above.

Q.40 Split tensile strength tests are better than the direct tensile strength tests because
   (a) the test gives more uniform results.
   (b) the results give values closer to the actual tensile strength values.
   (c) same moulds can be used for both compression and tension tests.
   (d) all the above.

Q.41 Larger the value of standard deviation
   (a) lower will be the variability.
   (b) better will be level of control.
   (c) poorer will be the level of control.
   (d) none of the above.

Q.42 The strength of concrete at 28 days as a percentage of strength at one year is
   (a) 98   (b) 90
   (c) 80   (d) 75

Q.43 The cube strength of concrete exceeds the cylinder strength by (in per cent)
   (a) 10 to 50   (b) 10 to 15
   (c) 15 to 20   (d) 20 to 25

Q.44 The choice of mix proportions of a concrete is independent of
   (a) grade designation.
   (b) maximum nominal size of aggregate.
   (c) minimum water-cement ratio.
   (d) batching, mixing, placing and compaction techniques.

Q.45 The maximum nominal size of the coarse aggregate is determined by sieve analysis and is designated by the sieve size higher than the largest size on which the material retained is more than
   (a) 5 per cent   (b) 15 per cent
   (c) 25 per cent   (d) 50 per cent

Q.46 The ACI method of mix proportioning
   (a) uses bulk volume of coarse aggregate estimated for maximum nominal size of aggregate and fineness modulus of sand.
   (b) takes into account the air-content of concrete.
   (c) is suitable for normal and heavy weight concretes in the workability range of 25-100 mm slump.
   (d) all of the above.

Q.47 In a concrete mix design, while making adjustments for the air-entrainment of amount e, the quantity of water is reduced by v, then the reduction in the solid volume of sand is given by
   (a) $e - v$ (b) $1/2(e - v)$
   (c) $1/2(e + v)$ (d) $e/2 - v$

Q.48 The nominal mix corresponding to M20 grade concrete is
   (a) 1 : 1 : 22   (b) $1 : 1\frac{1}{2} : 3$
   (c) 1 : 2 : 3   (d) 1 : 2 : 4

Q.49 The volume of sand per cubic metre of 1 : 2 : 4 (by volume) concrete would be approximately

   (a) 0.2 to 0.4   (b) 0.4 to 0.6
   (c) 0.6 to 0.9   (d) 0.8 to 1.0

Q.50 The number of bags of cement required per cubic metre of 1 : 2 : 4 concrete would be approximately
   (a) 5 to 6   (b) 4 to 5
   (c) 3 to 4   (d) 2 to 3

Q.51 For slab and beam structures, the normal mix generally used is
   (a) 1 : 1 : 2   (b) $1 : 1\frac{1}{2} : 3$
   (c) $1 : 1\frac{1}{2} : 4$ (d) 1 : 2 : 4

Q.52 When concrete is pumped by a pump of 60 HP, the maximum horizontal distance that can be covered would be
   (a) 10 m   (b) 5 m
   (c) 3 m   (d) 1.5 m

Q.53 Sometime when the concrete is partially mixed at the central plant and mixing is completed enroute, the concrete is known as
   (a) transit-mixed concrete
   (b) ready-mixed concrete
   (c) shrink-mixed concrete
   (d) any of the above

Q.54 Surface vibrator is effective only when the thickness of concrete member does not exceed
   (a) 100 mm   (b) 125 mm
   (c) 150 mm   (d) 200 mm

Q.55 The standard moist curing of concrete for the first 7 to 14 days may result in a compressive strength of _____ per cent of 28-days moist curing.
   (a) 60 to 70   (b) 70 to 80
   (c) 80 to 90   (d) 90 to 95

Q.56 The microstructure of the concrete can be improved by
   (a) application of high pressure during moulding.
   (b) moulding at a temperature up to 150°C.
   (c) application of high pressure during moulding at high temperature.
   (d) prolonged steam curing.

Q.57 Sulphur-impregnated concrete is obtained by
(a) emptying the pores in the conventional concrete under vacuum and sucking the liquid sulphur in the pores.
(b) mixing the sulphur powder as an ingredient of normal concrete and heating the cured concrete at high temperature.
(c) applying a coating of molten sulphur on the surface of the concrete.
(d) any of the above.

Q.58 The extent and propagation of cracks in concrete can be controlled by
(a) providing reinforcement bars.
(b) incorporating fibres in the concrete.
(c) polymer impregnation.
(d) all of the above.

Q.59 Light-weight concrete is used
(a) for reducing the dead weight of structures.
(b) for improving thermal insulation.
(c) in filler wall panels in multistorey buildings.
(d) any of the above.

Q.60 Aerated concrete is produced by addition of
(a) copper sulphate   (b) aluminium power
(c) sodium silicate   (d) zinc insulation

Q.61 Vacuum concrete
(a) is obtained by vacuum treatment of fresh concrete involving the removal of excess water and air by suction.
(b) is the normally cured hardened concrete involving removal of air from the voids of the concrete by suction.
(c) is no-fine-concrete where finer sizes are omitted from the aggregate grading producing uniformly distributed voids in the concrete mass.
(d) has a lower end abrasion.

Q.62 The cement-sand ratio in the ferrocement matrix should not be leaner than
(a) 1 : 1.5   (b) 1 : 2.0
(c) 1 : 3.0   (d) 1 : 4.0

Q.63 Fibre reinforced concrete
(a) is used for precast products, airport runways, blast and impact resistant structures, tunnel lining and hydraulic structures.
(b) has superior crack resistance, improved ductility, high impact resistance and toughness.
(c) uses indented, crimped or bent fibres for improved bond.
(d) all of the above.

Q.64 The following range of parameters is associated with commonly encountered steel fibre reinforced concrete mixes except
(a) water-cement ratios: 0.45 to 0.60
(b) cement content: 300-500 kg/m³
(c) fibre aspect ratio: 10 to 100
(d) fibre content: 1.0 to 2.5 per cent

Q.65 Polymer-impregnated concrete is obtained by
(a) impregnating low viscosity prepolymers or monomers into the pore systems of hardened concrete and polymerizing it by heating.
(b) replacing the cement-water matrix in cement concrete by pre-polymer and polymerizing it.
(c) incorporating a polymeric material into concrete during the mixing stage.
(d) any of the above process.

Q.66 Polymer concrete can be used
(a) for overlay.
(b) rapid repair of damaged airfield pavements and industrial structures.
(c) treating sluiceway and stilling basin of the dam.
(d) all of the above.

Q.67 Shotcrete
(a) is a mortar or very fine concrete deposited by jetting it with high velocity on to the prepared surface.
(b) is more economical than conventional concrete.
(c) is very useful for restoration and repair of the damaged concrete structures.
(d) all of the above.

Q.68 Shotcrete differs from conventional concrete with regard to
(a) materials, proportions and void system.
(b) consolidation or compaction.
(c) application procedure.
(d) all of the above.

Q.69 Special shotcretes can be obtained
(a) by adding up to 2 per cent of steel fibres (by volume).
(b) by using calcium aluminate cement (hydraulic cement) as binding agent.
(c) by using air-entraining cement.
(d) any of the above.

Q.70 Guniting
(a) is the technique of depositing very thin layers of mortar in each pass of nozzle than that available with the shotcrete.
(b) mix is 1 : 3 to 1 : 4.5 with a water-cement ratio of about 0.30.
(c) requires careful and skilful handling of nozzle for high quality finish work.
(d) all of the above.

Q.71 The corrosion of reinforcement can be prevented by the following except
(a) the use of corrosion inhibitors, coating on steel or concrete.
(b) proper design of concrete for the intended environmental exposure.
(c) limiting water cement ratio.
(d) impregnating the pores of concrete with a suitable polymer.

Q.72 The cracking due to weathering in structural concrete can be controlled by the following measures except
(a) use lowest practical water-cement ratio.
(b) use lowest practical water content.
(c) use non air-entrained concrete.
(d) reduce the temperature differences within a concrete structure.

Q.73 Microstructure cracks in concrete have a size, i.e. width/depth ranging from

(a) 0.01 to 0.05 mm
(b) 0.05 to 0.1 mm
(c) 0.1 to 0.3 mm
(d) 0.3 to 0.5 mm

Q.74 Wide and deep cracks in concrete members may be repaired by
(a) grouting.
(b) shotcreting or guniting.
(c) mortar replacement.
(d) epoxy injection.

Q.75 For sealing the cracks in concrete structures by using epoxy, the minimum width of grouting required is
(a) 3 mm   (b) 6 mm
(c) 9 mm   (d) 15 mm

Q.76 Jacketing
(a) is a process of fastening a durable material over concrete and filling the gap with grout.
(b) increases the section of an existing member by encasement in a new concrete.
(c) is used for compression members like columns and piles
(d) all of the above.

Q.77 The slump recommended for mass concrete is about
(a) 25 mm to 50 mm.
(b) 50 mm to 100 mm.
(c) 100 mm to 125 mm.
(d) 125 mm to 150 mm.

Q.78 The most common admixture which is used to accelerate the initial setting of concrete is
(a) gypsum.
(b) calcium chloride.
(c) calcium carbonate.
(d) none of the above.

Q.79 Distemper is used to coat
(a) external concrete surfaces.
(b) interior surfaces not exposed to weather.
(c) wood work
(d) compound walls.

Q.80 Assertion (A) : Addition of 5% to 6% of moisture content by weight increases the volume of dry sand from 1.8% to 38%.
Reason (R) : Bulking of sand is caused due to surface moisture on sand particles.
(a) both A and R are true and R is the correct explanation of A
(b) both A and R are true but R is not a correct explanation of A
(c) A is true but R is false
(d) A is false but R is true

Q.81 What is the volume of concrete mix produced if a batch type concrete mixer of 1500 litres capacity takes an effective time of 15 seconds for one batch of production
(a) 36 m³/hr   (b) 180 m³/hr
(c) 360 m³/hr   (d) 720 m³/hr

Q.82 Why is super plasticizer added to concrete?
1. To reduce the quantity of mixing water.
2. To increase the consistency.
3. To reduce the quantity of cement.
4. To increase resistance to freezing and thawing.
Select the correct answer using the codes given below.
(a) 1, 2 and 4   (b) 1, 3 and 4
(c) 2 and 3   (d) 4 only

Q.83 In the shape test of aggregate, which one of the following gives the correct slot for flakiness index for a material passing 50 mm sieve and retained on 40 mm sieve?
(a) 25 mm   (b) 27 mm
(c) 81 mm   (d) 30 mm

Q.84 Consider the following statements regarding the phenomenon of bulking of sand:
1. It is due to film of water around sand particles.
2. It is due to capillary action.
3. It is more in finer sands.
Which of these statements are correct?
(a) 1, 2 and 3   (b) 1 and 3
(c) 2 and 3   (d) 1 and 2

Q.85 Light-weight aggregates are produced by
(a) bloating clays with or without additives
(b) sintering fly ash
(c) using blast furnace slag
(d) any of the above

Q.86 Efflorescence in cement is caused due to an excess of
(a) Alumina   (b) Iron oxide
(c) Silica   (d) Alkalies

Q.87 Which one of the following aggregate gives maximum strength in concrete?
(a) Rounded aggregate
(b) Elongated aggregate
(c) Flaky aggregate
(d) Cubical aggregate

Q.88 Grading of aggregate in a concrete mix is necessary to achieve
(a) adequate workability.
(b) higher density.
(c) reduction in voids.
(d) better durability.

Q.89 For a given environment, the most significant factor that influences the total shrinkage of concrete is
(a) cement content of mix.
(b) total amount of water added at the time of mixing.
(c) size of the member concreted.
(d) maximum size of coarse aggregate used.

Q.90 Choose the correct alternative

Maximum allowable slumps for		Slump value
A. RC beams, slabs, walls	1.	7.5
B. Plain footing	2.	5.0
C. Vibrated concrete	3.	15.0
D. Heavy mass concrete	4.	10.0

Codes:

	A	B	C	D
(a)	4	3	2	1
(b)	3	4	2	1
(c)	3	4	1	2
(d)	3	4	1	2

Q.91 The lower water-cement ratio in concrete introduces
(a) smaller creep and shrinkage.
(b) improved frost resistance.
(c) greater density and smaller permeability.
(d) all of the above.

Q.92 Bleeding of concrete leads to which of the following?
1. Drying up of concrete surface.
2. Formation of pores inside.
3. Segregation of aggregate.
4. Decrease in strength.
Select the correct answer using the codes given below:
(a) 1 only   (b) 1 and 2
(c) 1 and 3   (d) 2 and 4

Q.93 Consider the following statements:
Ultrasonic pulse velocity test is
1. used to measure the strength of wet concrete.
2. used to obtain estimate of concrete strength of finished concrete elements.
3. a destructive test.
4. a non-destructive test.
Which of these statements are correct?
(a) 1, 2 and 3
(b) 2 and 3
(c) 2 and 4
(d) 1 and 3

Q.94 Match List-I (Aggregate) with List-II (Effect) and select the correct answer using the codes given below the lists:
List-I
A. Rounded aggregates
B. Crushed aggregates
C. Flaky aggregates
D. Irregular aggregates
List-II
1. Reduce workability appreciably because of a high ratio of surface area to volume.
2. Require more water than rounded aggregates and give strength lesser than crushed aggregates

3. Give concrete of higher compressive strength due to development of stronger aggregate-mortar bond.
4. Require lesser amount of water and cement paste for a given workability.
Codes:

	A	B	C	D
(a)	1	2	4	3
(b)	1	3	4	2
(c)	4	3	1	2
(d)	4	2	1	3

Q.95 Consider the following statements:
For increasing the workability of concrete, it is necessary to
1. increase the quantity of cement.
2. decrease the quantity of sand.
3. alter the proportion of fine and coarse aggregates.
4. decrease the quantity of water.
5. use angular aggregate.
Which of these statements are correct?
(a) 1, 2, 3, 4 and 5   (b) 2, 4 and 5
(c) 2 and 3   (d) 1 and 5

Q.96 The compacting factor test of cement concrete determines its,
(a) strength.
(b) porosity.
(c) degree of compaction under loads.
(d) workability.

Q.97 Consider the following statements :
The effect of air entertainment in concrete is to
1. increase resistance to freezing and thawing.
2. improve workability.
3. decrease strength.
Which of these statements are correct?
(a) 1 and 2   (b) 1 and 3
(c) 1 only   (d) 1, 2 and 3

Q.98 The optimum number of revolutions over which concrete is required to be mixed in a mixer machine is
(a) 10   (b) 20
(c) 50   (d) 100

Q.99 Match List-I with List-II and select the correct answer using the codes given below the lists:

List-I (Workability Test)
A. Slump Test
B. Compacting Factor
C. Vee Bee Test
D. Flow test

List-II (Measurements)
1. 300 mm to 500 mm
2. 75 mm to 125 mm
3. 0.80 to 0.98
4. 0 to 105

Codes:

	A	B	C	D
(a)	2	4	3	1
(b)	1	3	4	2
(c)	1	4	3	2
(d)	2	3	4	1

Q.100 The length of time for which a concrete mixture will remain plastic is usually more dependent on
(a) the setting time of cement than on the amount of mixing water and atmospheric temperature.
(b) the atmospheric temperature than on the amount of mixing water and the setting time of cement.
(c) the setting time of cement and the amount of mixing water than on atmospheric temperature.
(d) the amount of mixing water used and the atmospheric temperature than on the setting time of cement.

Q.101 The role of superplasticizer in a cement paste is to
(a) disperse the particles.
(b) disperse the particles and to remove air bubbles.
(c) disperse the particles, remove air bubbles and to retard setting.
(d) retard setting.

Q.102 A concrete cylinder of size 15 mm and 300 mm long is tested for split tensile strength of concrete. It failed at a load of 100 kN. The split tensile strength in N/mm² is
(a) 0.35
(b) 0.71
(c) 1.42
(d) 2.83

Q.103 The maximum mixing time of cement concrete in minutes is limited to
(a) 2
(b) 4
(c) 6
(d) 10

Q.104 A cube of concrete as compared to cylinder is expected to have compressive strength
(a) less by 5%
(b) less by 15%
(c) more by 5%
(d) more by 15%

Q.105 Match List-I (property) with List-II (characteristics) and select the correct answer using the codes given below the lists :

List-I
A. Specific heat of an aggregate
B. Thermal conductivity of aggregate
C. Thermal expansion
D. Durability of concrete

List-II
1. Breaks the bond between the aggregate and the paste.
2. Is a measure of its heat capacities.
3. Is affected by difference in thermal expansion of two different material.
4. Is a measure of its ability to conduct heat.

Codes:

	A	B	C	D
(a)	1	3	2	4
(b)	2	4	1	3
(c)	1	4	2	3
(d)	2	3	1	4

Q.106 The maximum bulking of sand is likely to occur at a moisture content of
(a) 5%
(b) 8%
(c) 11%
(d) 14%

Q.107 The aggregate crushing value of coarse aggregates, which is used for making concrete, which in turn is used for purposes other than wearing surfaces should not exceed
(a) 30%
(b) 40%
(c) 45%
(d) 50%

Q.108 The best reflection of strength of coarse aggregate is given by
(a) crushing.
(b) impact
(c) 10 percent fines.
(d) hardness.

Q.109 Which of the following pairs is not matched correctly with regards to coarse aggregates > 10 mm?
(a) Strength — 10 percent fine
(b) Toughness — Impact test
(c) Hardness — Abrasion set
(d) Specific Gravity — Pycnometer

Q.110 The maturity of concrete is expressed as
Maturity = Σ (time × temperature)
The temperature reckoned as origin as
(a) 0°C
(b) -5°C
(c) -11°C
(d) -16°C

Q.111 Consider following strengths of concrete
1. Cube strength
2. Cylinder strength
3. Split tensile strength
4. Modulus of rupture
The correct sequence in increasing order of these strengths.
(a) 3, 4, 2, 1
(b) 3, 4, 1, 2
(c) 4, 3, 2, 1
(d) 4, 3, 1, 2

■■■■

Answers Concrete

1. (c)	2. (d)	3. (d)	4. (c)	5. (a)	6. (b)	7. (d)	8. (a)	9. (b)	10. (d)
11. (d)	12. (d)	13. (b)	14. (c)	15. (d)	16. (c)	17. (d)	18. (c)	19. (d)	20. (d)
21. (a)	22. (b)	23. (d)	24. (a)	25. (a)	26. (d)	27. (b)	28. (d)	29. (c)	30. (d)
31. (b)	32. (c)	33. (c)	34. (b)	35. (b)	36. (c)	37. (d)	38. (d)	39. (d)	40. (d)
41. (c)	42. (c)	43. (d)	44. (d)	45. (b)	46. (d)	47. (a)	48. (b)	49. (a)	50. (c)
51. (c)	52. (d)	53. (c)	54. (c)	55. (b)	56. (c)	57. (a)	58. (b)	59. (b)	60. (b)
61. (a)	62. (c)	63. (d)	64. (c)	65. (a)	66. (d)	67. (d)	68. (d)	69. (d)	70. (d)
71. (c)	72. (c)	73. (c)	74. (a)	75. (b)	76. (b)	77. (a)	78. (b)	79. (b)	80. (a)
81. (c)	82. (a)	83. (b)	84. (b)	85. (b)	86. (d)	87. (d)	88. (c)	89. (b)	90. (d)
91. (d)	92. (d)	93. (c)	94. (c)	95. (c)	96. (d)	97. (d)	98. (b)	99. (d)	100. (c)
101. (c)	102. (c)	103. (a)	104. (d)	105. (b)	106. (a)	107. (c)	108. (a)	109. (d)	110. (c)
111. (a)									

Explanations Concrete

2. (d)
Fine aggregate is primarily used as filler for the purpose of providing bulk to the concrete. In case of concrete, the most important function of fine aggregate is to assist in producing workability and uniformity in mixture. Fine aggregate also assists the cement paste to hold the coarse aggregate particles in suspension. This action promotes plasticity in the mixture and prevents possible segregation of paste and coarse aggregate.

4. (c)

The increase in the volume of a given mass of fine aggregate caused by presence of water is known as bulking. The bulking of fine aggregate is caused by the films of water which repels the particles apart.

5. (a)

Gap-grading is defined as a grading in which one or more intermediate size fractions are absent.

19. (d)

The higher the aggregate-cement ratio, the leaner is concrete. In lean concrete, less quantity of paste is available for providing lubrication, per unit surface area of aggregate and hence the mobility of aggregate is restrained.

On the other hand, in rich concrete mix with lower aggregate cement ratio, more paste is available to make the mix cohesive to give better workability.

Workability also gets reduced at higher temperature.

32. (c)

Modulus of rupture $f_{cr} = 0.7\sqrt{f_{ck}}$

Tensile strength = $0.5 f_{cr}$ to $0.75 f_{cr}$
$$= 0.6 f_{cr}$$
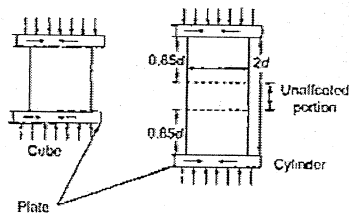$$= 0.6 \times 0.7\sqrt{f_{ck}} = 0.42\sqrt{f_{ck}}$$

For example, for M20 concrete

$$\frac{\text{Tensile strength}}{\text{Compressive strength}} = \frac{0.42\sqrt{f_{ck}}}{f_{ck}}$$

$$= 0.09 \simeq 0.1$$

∴ Tensile strength ≈ 10% of compressive strength.

43. (d)

59. (d)
$$f_{cube} = \frac{f_{cylinder}}{0.8}$$

Restraining effect of plates on the testing machine extends over the entire height of the cube but leaves unaffected part of test cylinder because of greater height. Normally the strength of cylinder is taken as 0.8 times the strength of cube.

⇒ $f_{cube} = 1.25$ for cylinder

The unit weight of light-weight concrete is about one-third of ordinary brick. High strength to weight ratio makes it a suitable binding material, particularly for construction of multi-storey buildings as it reduces the dead weight of the building. Its use leads to considerable saving in consumption of cement and steel. It is commonly used for walling in place of bricks and for roofing as a composite construction with concrete.

60. (b)

Cellular concrete, also called aerated concrete, is a light weight concrete produced by autoclaving the wet slurry consisting of a fine siliceous material and a binder with the addition of admixtures such as aluminium powder, zinc dust, etc.

61. (a)

In concreting thin sections like slabs and walls, a fluid mix with water-cement ratio of 0.50 to 0.65 is required to facilitate the placing and compaction. In such situations, the vacuum treatment of concrete, involving the removal of excess water and air by using suction can be of great help. An arrangement for vacuum dewatering of concrete using suction through a surface mat connected to a vacuum pump is used.

64. (c)

Aspect ratio not less than 30.

65. (a)

In polymer impregnated concrete, low viscosity liquid monomers or propolymers are partially or completely impregnated into the pore systems of hardened cement composites and are then polymerized. PIC does not have many applications in building construction.

67. (d)

Shotcrete is mortar or very fine concrete deposited by jetting or impacting it with high velocity on to a prepared surface. Shotcrete offers advantages over conventional concrete in a variety of new construction and repair works. It is more economical than conventional concrete because of less formwork requirements.

83. (b)

Slot size = 0.60 × average size

$$= 0.60 \times \left(\frac{50 + 40}{2} \right)$$

$$= 0.60 \times 45 = 27 \text{ mm}$$

85. (b)

One of the potential ways of bulk disposal and gainful use of flyash in an economical manner is to convert the flyash into more usable and manageable form such as lightweight aggregate. Sintered flyash lightweight aggregate is manufactured by sintering the flyash pellets in a vertical shaft kiln.

The aggregate is suitable for use in production of structural lightweight concrete and precast lightweight concrete units for the use as load bearing and nonload bearing units.

86. (d)

Efflorescence is a deposit of salts, usually white, on the surface of bricks and blocks after being laid. The salts usually come from ground water or out of the mortar, but may also come from within the masonry units themselves.

87. (d)

The rounded aggregate has minimum voids and minimum ratio of surface area to volume, thus requiring minimum cement paste to make good concrete. However due to absence of interlocking, these aggregates are not suitable for high strength concrete and pavements.

92. (d)

Bleeding or water gain is a particular form of segregation in which some of the water from the concrete comes out to the surface of the concrete, being of the lowest specific gravity among all the ingredients of concrete. It causes

(i) higher shrinkage cracks at top surface
(ii) water voids and reduction of bond between the aggregates and cement paste

95. (c)

The factors affecting workability are:

1. The higher the water content per cubic metre of concrete, the higher will be the fluidity of concrete.
2. Higher the aggregate-cement ratio, the leaner the concrete and lesser the workability. Lower aggregate-cement ratio gives cohesive and fatty mix with better workability.
3. The bigger the size of aggregate, higher will be the workability.
4. Angular, elongated or flaky aggregate makes the concrete very harsh compared to rounded or cubical aggregates.
5. Smooth textured aggregates contribute to higher workability.
6. Well graded aggregates with less void content, gives higher workability.
7. Admixture may increase workability.

102. (c)

Split tensile strength

$$= \frac{2P}{\pi DL}$$

$$= \frac{2 \times 100 \times 10^3}{\pi \times 15 \times 300} = 1.42$$

110. (c)

The strength of concrete depends upon both time as well as temperature during the early period of gain in strength.

The temperature is reckoned from −11°C as origin in computation of maturity.

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