*Basavarajeswari Group of Institutions*

# BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

| USN | | | | | | | | | | Course Code | 2 | 1 | A | C | V | 4 | 8 | 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

## Fourth Semester B.E. Degree Examinations, September/October 2023

# CONCRETE TECHNOLOGY

**Duration: 2 hrs** **Max. Marks: 100**

***Instructions to the Candidates:***

- ***All questions are compulsory***
- ***Each question carries 1 mark***
- ***Use only black ball point pen***
- ***Darkening two circles for the same question makes the answer invalid***
- ***Damaging/overwriting, using whiteners on the OMR are strictly prohibited.***



| ***Q. No*** | ***Question*** | | | |
|---|---|---|---|---|
| **1** | _____ is a binder, a substance that sets & hardens independently and can bind other materials together. | | | |
| | A) Fine aggregate | B) Coarse aggregate | C) Cement | D) None of these |
| **2** | The content of lime in cement is _____ | | | |
| | A) 62-67% | B) 35-50% | C) 50-60% | D) 70-80%. |
| **3** | The function of lime in cement is _____ | | | |
| | A) Shrinkage of Cement | B) Soundness of Cement | C) Quick Setting of Cement | D) Hardness of Cement. |
| **4** | The function of silica in cement is _____ | | | |
| | A) Hardness of Cement | B) Quick Setting of Cement | C) Strength of Cement | D) Colour of Cement. |
| **5** | The content & function of alumina in cement is _____ | | | |
| | A) 3-8% & Hardness of Cement | B) 3-8% & Quick Setting of Cement | C) 60% & Strength of Cement | D) 4% & Soundness of |
| **6** | Presence of _____ is required to form silicates & aluminates of calcium | | | |
| | A) Magnesia | B) Alumina | C) Silica | D) Lime |
| **7** | _____ is added to cement to retard the setting time of tri-calcium aluminate compound. | | | |
| | A) Metakaolin | B) Lime | C) Quartz | D) Gypsum |
| **8** | _____ content of gypsum is added in cement while grinding of clinkers. | | | |
| | A) 4-5% | B) 2-3% | C) 6-8% | D) 10% |
| **9** | The series of chemical reactions that takes place between cement & water is referred as _____ | | | |
| | A) Hydration of Cement | B) Strength of Cement | C) Soundness of Cement | D) All of these. |
| **10** | After hydration of cement four major chemical compounds are produced and those are known as _____ | | | |
| | A) Bogue's compounds | B) Vicat's compounds | C) Los Angele's compounds | D) Le- Chatelier's compounds. |
| **11** | _____ compound hydrates & hardens slowly and it is largely responsible for giving strength to cement. | | | |
| | A) Di-Calcium Silicate (C2S) | B) Tri-Calcium Silicate (C3S) | C) Tetra-Calcium Alumino Ferrite (C4AF) | D) Only B |

Note: (**RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)**

**12** _____ compound hydrates & hardens rapidly and it is largely responsible for giving early strength to cement.

A) Tri-Calcium Silicate (C3S) | B) Di-Calcium Silicate (C2S) | C) Tri-Calcium Aluminate (C3A) | D) Tetra Calcium Silicate (C4S)

**13** _____ compound hydrates rapidly and it contributes little strength to the cement.

A) Tri-Calcium Alumino Ferrite (C3AF) | B) Tri-Calcium Aluminate (C3A) | C) Tetra-Calcium Alumino Ferrite (C4AF) | D) Di-Calcium Alumino Ferrite(C2AF)

**14** In Rapid Hardening cement, rapid development of strength is due to _____.

A) Higher Tri-Calcium Silicate (C3S) | B) Lower Di-Calcium Silicate (C2S) | C) Higher fineness of grinding | D) All of these

**15** In Quick Setting cement the early setting properties brought out by reducing _____ at the time of clinker grinding.

A) Alumina | B) Lime | C) Gypsum | D) Silica

**16** Hydrophobic cement is obtained by adding water repellent film forming substances like _____ acids to OPC.

A) Calcium & Aluminium | B) Oleic & Stearic | C) Gypsum & Lime | D) None of these

**17** The proper amount of water required to make cement sample into paste form is known as _____.

A) Standard Consistency | B) Initial Setting time | C) Final Setting Time | D) None of these

**18** The time elapsed between the moment water is added to cement to the time cement starts losing its plasticity is referred as _____ test.

A) Standard Consistency | B) Initial Setting time | C) Final Setting Time | D) Normal Consistency.

**19** The time elapsed between the moment water is added to cement & the time when cement has completely lost its plasticity is known as _____ test.

A) Soundness Consistency | B) Initial Setting time | C) Final Setting Time | D) All of these

**20** In Soundness test on cement the expansion of cement paste is limited to _____

A) 20mm | B) 10mm | C) 15mm | D) 8mm

**21** _____ is defined as, it is the effort required to mix the concrete, transport, place and compact without losing its homogeneity.

A) Strength | B) Hardness | C) Workability | D) Mixability

**22** Select the appropriate test or method to measure the workability of concrete.

A) Compressive Strength test | B) Flow Table test | C) Split Tensile test | D) None of these.

**23** The dimensions of Slump cone with respect to top diameter, bottom diameter & height are _____.

A) 20cm,15cm & 30cm | B) 10cm,15cm & 25cm | C) 20cm,10cm & 25cm | D) 10cm,20cm & 30cm.

**24** If the concrete slumps evenly then it is called as _____.

A) Shear slump | B) True slump | C) Full slump | D) None of these

**25** The value for Compaction factor test is found by _____.

A) $W_2/W_1$ | B) $W_1/W_2$ X 100 | C) $W_1/W_2$ | D) $W_2-W_1/W_1$

**26** In flow table test, the flow percent of spread concrete is found by _____.

A) (Spread dia-30/25)X100 | B) (Spread dia-15/25)X100 | C) (Spread dia-25/25)X100 | D) (Spread dia-25/15)X100

**27** In flow table test, the table is raised & dropped _____ times to spread the concrete.

A) 15 | B) 25 | C) 18 | D) 30

**28** _____ is the time in seconds for concrete to change its shape from slump cone to cylindrical form attained by vibration.

A) Vee-Bee B) Slump C) Spread diameter D) All of these

**29** For each batch mix of concrete, the volume of one bag of cement is taken as ____ litres.

A) 15 B) 35 C) 25 D) 20

**30** _____ is a measure of resistance of concrete to flow under its own weight.

A) Compaction factor test B) Slump test C) Vee-Bee Consistometer test D) None of these

**31** The process of carrying concrete from the place of mixing to the place of deposition can be termed as _____ of concrete.

A) Transportation B) Lifting C) Pumping D) Dumping

**32** The precaution should be taken while transporting the concrete is that, _____ obtained at the time of mixing should be maintained till the final deposition of concrete.

A) Soundness B) Homogeniety C) Hardness D) Quick Setting

**33** _____ method of transporting concrete is labour intensive method which can be adopted for concrete works above or below ground level without much difficulties.

A) Wheel barrow B) Bucket & Ropeway C) Mortar Pan D) Transit Mixer

**34** _____ method of transporting concrete is fast and versatile to move concrete vertically & horizontally to place concrete at the exact point.

A) Bucket & Ropeway B) Transit Mixer C) Belt Conveyor D) Crane

**35** The process adopted for removing air voids or entrapped air from concrete is referred as _____ of concrete.

A) Stabilizing B) Segregation C) Curing D) Compaction

**36** Rodding of concrete is done with _____ long & _____ diameter rod to pack the concrete.

A) 2m & 16mm B) 2m & 16m C) 160mm & 2m D) 200mm & 16mm

**37** Tamping consists of _____ the top surface by wooden cross beam of suitable sizes to compact the concrete.

A) Tempering B) Beating C) Ramming D) Rodding

**38** Needle vibrator is also called as _____ vibrator

A) External B) Shutter C) Poker D) None of these

**39** The frequency of vibration caused by needle vibrator varies up to _____ cycles of vibration per minute.

A) 12500 B) 15050 C) 12000 D) 4000

**40** The separation of all ingredients of homogeneous mixture of concrete is known as _____.

A) Bleeding B) Segregation C) Honey Combing D) Spreading

**41** The separation of coarse aggregates from cement mortar leaves voids in concrete & is known as _____.

A) Honey Combing B) Segregation C) Curing D) Bleeding

**42** The process of rise of water along with cement particles to the surface of freshly placed concrete is known as _____.

A) Bleeding B) Honey Combing C) Shrinking D) Segregation

**43** Keeping concrete in moist condition so that the hydration process of cement is continued until desired properties are developed & is known as _____.

A) Compaction B) Hydration C) Curing D) All of these

**44** Steam curing is preferably used for _____.

A) Columns | B) Mass production of prefabricated elements | C) Beams | D) Mass Concreting

**45** _____ method of water curing is adopted for precast elements like concrete poles, railway sleepers etc.

A) Ponding | B) Immersion | C) Membrane curing | D) None of these.

**46** _____are additional ingredients which are added to concrete immediately before or during mixing process to improve the properties of concrete.

A) Cement | B) Gypsum | C) Aggregates | D) Admixtures

**47** The process of selecting suitable ingredients of concrete & determining their relative amounts with the objective of producing a concrete of required workability & strength economically is called _____.

A) Cement mix design | B) Mortar mix design | C) Concrete mix design | D) Cement mix proportioning.

**48** In mix design, the type of cement influences the rate of development of _____ strength of concrete.

A) Compressive | B) Tensile | C) Flexural | D) Split tensile

**49** Maximum nominal size of aggregates to be used in concrete may be as large as possible within the limits prescribed by IS _____.

A) 10262:2009 | B) 456:2000 | C) 9103:2019 | D) None of these.

**50** Air entraining agents are _____ type of admixtures.

A) Chemical | B) Mineral | C) Biological | D) All of these

**51** If the standard deviation (S) is 5 $N/mm^2$ and value of X is 6.5 then what is the maximum target strength that to be adopted for M-50 grade of concrete?

A) 58.25 $N/mm^2$ | B) 56.50 $N/mm^2$ | C) 58.50 $N/mm^2$ | D) 56.25 $N/mm^2$

**52** If the target strength is 48.25 $N/mm^2$, water-cement ratio is 0.36 and water content is 155kg then what is the cementitious content of the mix after the increase in 5%?

A) 430.55 $kg/m^3$ | B) 450.07 $kg/m^3$ | C) 452.07 $kg/m^3$ | D) 442.07 $kg/m^3$.

**53** As per table 5 of IS 456:2000 the maximum water-cement ratio for exposure condition **moderate** is _____.

A) 0.50 | B) 0.55 | C) 0.45 | D) 0.60

**54** As per table 5 of IS 456:2000 the minimum cement content for exposure condition **very severe** is _____.

A) 350 $kg/m^3$ | B) 320 $kg/m^3$ | C) 300 $kg/m^3$ | D) 340 $kg/m^3$

**55** Match the following:

| **Admixtures** | **Recommended Percentages as per IS 10262:2019** |
|---|---|
| **1)** GGBS | **(a)** 25-50 |
| **2)** Metakaolin | **(b)** 5-15 |
| **3)** Silica Fume | **(c)** 5-10 |

A) 1-a, 2-b, 3-c | B) 1-b, 2-c, 3-a | C) 1-c, 2-b ,3-a | D) 1-b, 2-a, 3-c

**56** _____ is defined as the ratio is calculated by dividing the mass of the mixing water by the combined mass of the cement and fly ash or other cementitious materials.

A) Water-Cement ratio | B) Cementitious-Water ratio | C) Water-Cementitious ratio | D) All of these

**57** What is the percentage increase in water content for 135mm slump when the water content is 186 kg for 20mm nominal maximum size of aggregates & for 50mm slump as per IS 10262:2019?

A) 10.2 % | B) 12.4 % | C) 10.4 % | D) 12.2 %

**58** As per table 5 of **IS 10262:2019**, The proportionate volume of coarse aggregate corresponding to 20 mm size aggregate and fine aggregate (Zone II) for water-cement ratio of 0.50 = 0.62. What will be the volume of coarse aggregate for water cement ratio 0.36?

A) 0.352 B) 0.648 C) 0.760 D) 0.700

**59** As per table 5 of IS 456:2000 the maximum water-cement ratio for exposure condition **extreme** is _____.

A) 0.45 B) 0.55 C) 0.40 D) 0.50

**60** As per table 5 of IS 456:2000 the minimum cement content for exposure condition **severe** is _____.

A) 340 kg/$m^3$ B) 300 kg/$m^3$ C) 450 kg/$m^3$ D) 320 kg/$m^3$

**61** Select the appropriate factor which affects or influences the strength of concrete.

A) Compaction B) Water-Cement Ratio C) Temperature D) All of these

**62** For most of the practical application the water-cement ratio should be in between _____.

A) 0.40 to 0.55 B) 0.50 to 0.60 C) 0.40 to 0.60 D) 0.50 to 0.65

**63** If there is 10% of air voids trapped in concrete then the strength will fall down to _____

A) 50% - 60% B) 20% - 30% C) 30% - 40% D) More than 60%

**64** The ability of the concrete to withstand specific compressive forces is known as _____ strength of concrete.

A) Split Tensile B) Compaction Factor C) Flexural D) Compressive

**65** In split tensile strength test the diameter & length of the specimen is _____ respectively.

A) 150mm & 300mm B) 300mm & 150mm C) 150cm & 300cm D) 300cm & 150cm

**66** In flexural strength test if "a" is greater than 200mm for 150mm specimen & greater than 130mm for 100mm specimen then flexural strength is calculated by _____

A) $f_b = PL/bd^2$ B) $f_b = 2PL/bd^2$ C) $f_b = PL/b^2d$ D) $f_b = 2PL/b^2d$

**67** In flexural strength test if "a" is less than 200mm & greater than 170mm for 150mm specimen and "a" is less than 133mm & greater than 110mm for 100mm specimen then flexural strength is calculated by ____

A) $f_b = Pa/bd^2$ B) $f_b = 3Pa/bd^2$ C) $f_b = Pa/b^2d$ D) $f_b = 3Pa/b^2d$

**68** _____ is the reduction in the volume of concrete exposed to temperature & humidity. It is mainly caused by the loss of water by evaporation or hydration.

A) Compaction B) Curing C) Shrinkage D) None of these

**69** An effective method of removing plastic shrinkage cracks is to _____ the concrete in a controlled manner.

A) Increase Curing for B) Increase in water content for C) Increase in temperature D) Re-vibrate

**70** In concrete, shrinkage is induced by _____ but restrained by _____ respectively.

A) Cement paste & Aggregate B) Aggregate & Cement paste C) Cement & Cement paste D) Cement paste & Admixtures.

**71** The rate of shrinkage generally decreases with the increase of the size of the aggregates.

A) True B) False C) Neither True nor False D) Only B

**72** Shrinkage is more at _____ relative humidity.

A) Higher B) Medium C) Lower D) All of these

**73** _____ is defines as volume of water to the volume of cement.

A) Water-Cement ratio B) Cementitious-Water ratio C) Water-Cementitious ratio D) Cement- Water ratio

**74** _____ is defined as the ratio of volume of hydrated cement paste to the sum of volumes of hydrated cement & Capillary pores .

A) Water-Cement ratio B) Water-Cementitious ratio C) Cement-Paste ratio D) Gel-Space ratio

**75** The equation to find gel-space ratio (x) is given by _____

A) $x=0.657C/0.319C+W_o$ B) $x=0.657/0.319C+W_o$ C) $x=0.657/0.319+W_o$ D) $x=0.657C/0.319+W_o$

**76** The strength is a function of summation of product of time & temperature & this summation is called as

A) Temperature of Concrete B) Age of Concrete C) Maturity of Concrete D) None of these

**77** The percentage strength of an identical concrete at any maturity is calculated by using _____ equation

A) $19800^oCh=A+B\log_{10}$[Maturity/1000] B) $19800^oCh=B+A\log_{10}$[Maturity/1000] C) $19800^oCh=A+B$[Maturity/1000] D) $19800^oCh=B+A$[Maturity/1000]

**78** The relationship between the strength and gel/space ratio is independent of age and its strength is given by $240x^3$, where 240 is _____ strength of gel in MPa.

A) Tensile B) Flexural C) Intrinsic D) All of these

**79** Instead of relating water-cement ratio to strength , the strength can be more correctly related to _____

A) Gel-Space ratio B) Gel-Paste ratio C) Water-Cementitious ratio D) Water-Gel ratio

**80** The rate of shrinkage decreases rapidly with _____.

A) Temperature B) Time C) Compaction D) Higher water-cement ratio

**81** _____ of concrete is defined as its ability to resist weathering action, chemical attack, abrasion or any other process of deterioration

A) Hardness B) Strength C) Workability D) Durability

**82** In durability requirements of concrete as per code IS 456:2000, corrosion of steel reinforcement can be controlled by

A) Adequate cover to reinforcement B) Proper water-cement ratio C) Proper compaction & curing D) All of these

**83** Sulphate attack is controlled by

A) Use of Sulphate Resisting Cement B) Use of lower water-cement ratio C) Providing adequate concrete thickness D) All of these

**84** Sulphate attacks on concrete whereas chloride attacks on _____ & causes _____ which creates durability problems.

A) Steel & Corrosion B) Cement & Low Strength C) Aggregates & Low Hardness D) None of these.

**85** Chloride attack is controlled by

A) Providing proper cover B) Proper compaction of concrete C) Limiting Chlorides in water to acceptable level D) All of these

**86** _____ testing of concrete is a method to obtain the compressive strength & other properties of concrete from the existing structure without breaking it.

A) Non-Destructive B) Destructive C) Semi-Destructive D) None of these.

**87** Select the appropriate non-destructive testing methods of concrete.

A) Penetration Resistance method B) Rebound Hammer method C) Ultrasonic Pulse velocity method D) All of these

**88** In penetration resistance testing method _____ is penetration resistance measurement equipment.

A) Windsor probe B) Rebound probe C) Pulse probe D) None of these.

**89** _____ test is a surface hardness tester for which an empirical correlation has been established between strength & a number

A) Ultrasonic Pulse velocity B) Penetration Resistance C) Pull Out D) Rebound Hammer

**90** _____ method is an ideal tool for determining the quality & uniformity of concrete.

A) Pull Out B) Rebound Hammer C) Ultrasonic Pulse velocity D) Penetration Resistance

**91** Pulse velocity above 15000 feet/sec readings are generally indicative of _____ quality of concrete.

A) Very good B) Excellent C) Good D) Medium

**92** Pulse velocity below 7000 feet/sec readings are generally indicative of _____ quality of concrete

A) Medium B) Poor C) Questionable D) Very Poor

**93** _____ is specialized concrete in which all ingredients are batched in batching plant & transported through transit mixer to the site

A) Ready Mix Concrete B) Normal Concrete C) Conventional Concrete D) All of these

**94** _____ is high fluidity concrete which can be easily placed & has ability to flow under its own weight in congested reinforcement without external vibration

A) Fibre Reinforced Concrete B) Self Compacting Concrete C) Light Weight Concrete D) Ready Mix Concrete

**95** Self-Compacting Concrete (SCC) is measured using the _____

A) Vicat's Apparatus B) Slump flow test C) Slump test D) Standard Consistency test

**96** Select the appropriate testing methods of self- compacting concrete.

A) V-funnel test B) U-box test C) J-ring test D) All of these

**97** In L-Box test the acceptable value of blocking ratio for SCC is ____

A) 0.50 B) 0.55 C) 0.80 D) 0.85

**98** In V-Funnel test the flow time for SCC should be in between _____ seconds.

A) 5 to 7 B) 8 to 12 c) 14 to 16 D) None of these

**99** The density of light weight concrete varies from _____

A) 300-500 $kg/cm^3$ B) 1200-1500 $kg/m^3$ C) 300-1850 $kg/m^3$ D) 300-1850 $kg/cm^3$

**100** About _____ litres of concrete is needed for L-Box test.

A) 6 B) 10 C) 12 D) 14



** ** **

Note: (**RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator)**