SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF

CIVIL ENGINEERING

(M.E-STRUCTURAL ENGINEERING)

QUESTION BANK

III SEMESTER

1917302- ADVANCED CONCRETE TECHNOLOGY

Regulation – 2019

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SUBJECT : 1917302- ADVANCED CONCRETE TECHNOLOGY

SEM / YEAR: III/ SECOND

UNIT-I: CONCRETE MAKING MATERIALS

Aggregates classification, IS Specifications, Properties, Grading, Methods of combining aggregates, specified gradings, testing of aggregates. Cement, Grade of cement, Chemical composition, testing of concrete, Hydration of cement, Structure of hydrated cement, special cements. Water Chemical admixtures, Mineral admixture.

PART - A

Q.No	Questions	BT Level	Competence
1.	Define : cement	BT-4	**understand**
2.	Why concrete is made most popular construction materials?	BT-3	**Creating**
3.	Write some of the major advantages of using Portland slag cement.	BT-1	**Application**
4.	What are the advantages of Portland pozzolana cement?	BT-2	**Evaluate**
5.	What are the properties of super sulphated cement?	BT-3	**Analyze**
6.	Mention some of the uses of white cement.	BT-1	**Evaluate**
7.	What constitutes concrete are?	BT-5	**understand**
8.	Define Bogue's compound?	BT-1	**Analyze**
9.	Short note on raw materials used for the manufacture of cement?	BT-6	**Analyze**
10.	Mention the four major Bogue's compounds.	BT-1	**Remember**
11.	When you will go for use of rediset cement?	BT-5	**understand**
12.	Mention some of the test to check the quality of cement after the opening of the at the field.	BT-6	**Application**
13.	Define hydration of cement.	BT-3	**Remember**
14.	Define setting time.	BT-2	**Remember**
15.	What is natural cement?	BT-1	**understand**
16.	What are the types of cement?	BT-2	**Remember**
17.	Classify aggregates according to its shape.	BT-1	**Application**

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18.	What are the various tests which are to be done on aggregates?	BT-2	**Creating**
19.	Mention the test adopted to test the quality of water?	BT-4	**Remember**
20.	Mention some mineral admixtures used in concrete?	BT-4	**Remember**
21.	What are accelerators?	BT-1	**Analyze**
22.	What is the purpose of retarders?	BT-3	**Remember**
23.	Mention some chemical admixtures used in concrete?	BT-1	**Analyze**
24.	Mention types of plasticizers.	BT-1	**Analyze**
25.	Name the admixtures available in India?	BT-3	**Remember**
	PART - B		
1.	What are the major compounds of cement? Explain the properties of cement?	BT-4	**Application**
2.	Describe the process of manufacture of cement by wet process.	BT-6	**Remember**
3.	Explain the following terms (a). Expansive cement (b). Portland blast furnace slag cement (c). sulphate resisting cement	BT-5	**understand**
4.	Describe the process of manufacture of cement by dry process.	BT-3	**Remember**
5.	How strength test on cement is performed?	BT-4	**Remember**
6.	Write short notes on manufacture, composition and application of high alumina cement and blast furnace slag cement.	BT-1	**Application**
7.	Explain in details of any three test of cement	BT-2	**understand**
8.	Explain in details of any three tests for aggregate.	BT-2	**Creating**
9.	Describe the importance of the quality of water used for concreting.	BT-2	**Evaluate**
10.	What are the requirements of water as per Indian standard for concreting?	BT-1	**Analyze**
11.	Write in detail about the grading of aggregates.	BT-3	**Remember**
12.	i) Classify the common aggregate used in concrete. Give examples. ii) Briefly state the important characteristics of aggregate and explain them briefly.	BT-1	**Remember**
13.	Discuss the need for workability agents and the admixtures used for improving workability?	BT-3	Applying
14.	Discuss in details about the various chemical admixtures used in concrete with their application in concrete	BT-4	Analyzing

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15.	Describe the hydration reaction of important Bogue compounds indicating the product of hydration.	BT-2	**Remember**
16.	Explain the impact test on aggregate highlighting its significance and BIS specification any.	BT-4	**understand**
17.	When are accelerators used in concrete? Explain their limitations? Mention the few compounds that are used as accelerators?	BT-5	**Application**
18.	When are retarders used in concrete? Explain their limitations? Mention the few compounds that are used as retarders?	BT-6	**Creating**

UNIT-II: TESTS ON CONCRETE

Properties of fresh concrete, Hardened concrete, Strength, Elastic properties, Creep and shrinkage – Durability of concrete.

PART - A

Q.No	Questions	BT	Competence
1.	What is meant by carbonation?	BT-3	**understand**
2.	List out the factors influencing the compressive strength of concrete.	BT-1	**Remember**
3.	State the effect of creep in concrete.	BT-1	**Remember**
4.	List out factors affecting durability of concrete.	BT-4	**Creating**
5.	What are the factors affecting fresh concrete properties.	BT-2	**Application**
6.	Define 'Durability of concrete'.	BT-2	**Application**
7.	What are the reasons for segregation in fresh concrete?	BT-2	**Remember**
8.	How does the shape and size of a specimen affect the compressive strength of concrete?	BT-5	**understand**
9.	Differentiate between: 'gap-grading' and 'bleeding' of concrete.	BT-1	**understand**
10.	Why 'age factor' not taken advantage of in is IS: 456-2000?	BT-6	**Application**
11.	What is metakaolin?	BT-1	**Creating**
12.	Write effects of GGBS on hardened concrete.	BT-6	**Remember**
13.	Write the effects of GGBS on fresh concrete.	BT-1	**Analyze**
14.	Write the effects of fly ash on fresh concrete.	BT-3	**Analyze**
15.	Write the effects of silica fume on fresh concrete.	BT-3	**Evaluate**
16.	Classify fly ash.	BT-4	**Remember**
17.	What is ground granulated blast furnace slag?	BT-2	**Analyze**
18.	Write short notes of creep effect of concrete.	BT-4	**understand**
19.	Compare physical properties for fresh and hardened concrete.	BT-5	**Remember**

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20.	Write short notes of shrinkage effect of concrete.	BT-1	**Evaluate**
21.	Classify types of shrinkage in concrete.	BT-5	**Remember**
22.	Write short notes on durability of concrete.	BT-4	**Remember**
23.	Define durability.	BT-1	**Analyze**
24.	What is silica fume?	BT-1	**Analyze**
25.	Write effects of fly ash on hardened concrete.	BT-4	**Remember**
	PART - B		
1.	Write the effect of silica fume on fresh and hardened concrete.	BT-1	**Application**
2.	Draw the typical stress strain curve for concrete and explain its salient features. And also explain how you would determine the various elastic moduli for concrete.	BT-1	**Evaluate**
3.	What are the factors that affect the shrinkage and creep of concrete? Explain in details.	BT-5	**Remember**
4.	Explain the properties of fresh concrete and relevant tests to be Performed to determine them.	BT-2	**Analyze**
5.	How creep, shrinkage and durability of concrete is determined?	BT-3	**Remember**
6.	i) Give a detailed account of the various tests carried out on fresh concrete. ii) Bring out the merits and demerits of each method.	BT-2	**understand**
7.	i) What are the factors influencing the elastic properties of concrete? ii) Explain how 'modulus of elasticity' of concrete is determined?	BT-3	**Evaluate**
8.	i) Explain how the modulus elasticity of concrete can be determined by experiment. ii) Explain about the various factors affecting permeability of concrete.	BT-6	**understand**
9.	Make a comparative study on the slump test and the compacting factor test and explain briefly the procedure and their limitations.	BT-4	**Creating**
10.	i) State the three important factors which affect the workability of concrete mix. ii) Compare the relative merits and demerits of various workability of concrete mix.	BT-2	**Remember**
11.	i) State the three parameters which are included in the specification for concrete work, to endure required impermeability of concrete. ii) Explain alkali-silica reaction in concrete, with emphasis on the reaction, circumstance and prevention of the above.	BT-4	**understand**
12.	Write short notes on metakaolin.	BT-1	**Application**
13.	Write the effect of fly ash on fresh and hardened concrete.	BT-1	**Remembering**
14.	What is fly ash? Write its uses, characteristics and classification.	BT-2	**Understanding**
15.	What are the effects of plasticizers on hardened and fresh concrete?	BT-2	**Evaluate**

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16.	What do you mean by fly ash? Write its characteristics and its effect briefly?	BT-6	**Application**
17.	Write short notes on metakaolin?	BT-5	**Analyze**
18.	Compare the advantages of silica fume and GGBS.	BT-4	**understand**

UNIT-III: MIX DESIGN			
Principles of concrete mix design, Methods of concrete mix design, IS Method, ACI Method, DOE Method – Statistical quality control – Sampling and acceptance criteria.			
Q.No	**Questions**	**BT**	**Competence**
1.	What are the factors influencing concrete mix proportioning?	BT-2	**Remember**
2.	Distinguish between 'mean strength' and 'target strength' of concrete.	BT-4	**Evaluate**
3.	What is the significance of "standard deviation" in mix design?	BT-1	**Remember**
4.	How sampling of concrete should be done for quality control tests?	BT-2	**understand**
5.	In mix proportioning, why is it desirable to use the minimum quantity of water?	BT-2	**Remember**
6.	What are the statistical parameters of cube strength?	BT-5	**Remember**
7.	Furnish the data required for ACI method of mix design.	BT-3	**Remember**
8.	What is concrete acceptance criteria as per IS code.	BT-6	**Remember**
9.	What is proportioning of concrete mix?	BT-1	**understand**
10.	List out the concepts of mix proportioning.	BT-3	**Analyze**
11.	Enumerate the significant variable affecting the workability of concrete.	BT-1	**Evaluate**
12.	What is mix design?	BT-4	**understand**
13.	What are the factors to be considered in the choice of mix proportioning?	BT-2	**Application**
14.	What are the factors that affect the workability of concrete?	BT-6	**Analyze**
15.	Write down the factors that affect the properties of concrete?	BT-1	**Creating**
16.	Mention the properties related to mix design?	BT-4	**understand**
17.	Mention the physical properties of martials required to mix design?	BT-5	**Application**
18.	Mention the requirements for concrete mix design?	BT-1	**Analyze**
19.	Define nominal mix.	BT-1	**Creating**
20.	Define design mix.	BT-3	**Application**
21.	Write short notes on standard mix.	BT-1	**Analyze**
22.	List out the advantages of design mix.	BT-1	**Analyze**

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23.	List out the disadvantages of nominal mix.	BT-4	**understand**
24.	Mention the basic steps in the mix design.	BT-4	**understand**
25.	Mention some of the methods of mix design.	BT-1	**Evaluate**
	PART-B		
1.	Design a concrete mix of M30 using ACI method for the following data: Standard deviation : 4 MPa Specific gravity of coarse aggregate : 2.6 Specific gravity of fine aggregate : 2.8 Fineness modulus of fine aggregate : 2.8 Slump required : 50 mm Maximum size of coarse aggregate : 20 mm Dry rodded density of coarse aggregate : 1600kg/m³ Bulk volume of dry rodded coarse aggregate per unit weight of concrete : 0.62 Absorption of coarse aggregate : 1% Surface moisture of sand : 2% Assume any other data required.	BT 1	**Remember**
2.	i) Explain statistical quality control method used while designing mix proportion for concrete. ii) Explain the acceptance criteria of concrete as per IS 456.	BT 1	**understand**
3.	List the methods used for mix proportioning indicating the drawbacks of each method.	BT 1	**Remember**
4.	i) What tests are necessary to check the adoptability of a particular mix proportion for field use? ii) Explain is the significance of characteristics strength with respect to probability factor R?	BT 2	**Remember**
5.	Write down the steps involved in ACI method of concrete mix design.	BT 2	**Application**
6.	Discuss in details the sampling and acceptance criteria of concrete as per ACI and IS codes.	BT 2	**understand**

7.	Design a concrete mix for M30 grade concrete by IS method using the following data. Characteristics compressive strength 30Kpa Maximum size of aggregates: 20mm angular Degree of quality of concrete: good Types of exposure: severe Compaction factor:0.87 Specific gravity of cement:3.15 Specific gravity of coarse aggregate:2.65 Specific gravity of fine aggregate:2.68 Water absorption of coarse aggregate:1.2% Water absorption of fine aggregates:1.5% Grading of coarse aggregate: confirms to table 2of IS:383-1970 Grading of fine aggregate: confirm to zone 111 of IS 383-1970.	BT 3	**Creating**
8.	Discuss in details about the statistical quality control of concrete.	BT 3	**Evaluate**
9.	What is mix design? Enumerate the step by step procedure for the design of concrete mixes using ACI method.	BT 4	**Analyze**
10.	i) Describe about the quality control of concrete. ii) Compare ACI and IS method of mix proportioning of concrete	BT 4	**Remember**
11.	Explain the design procedure for IS method of concrete mix design.	BT 5	**Remember**
12.	Explain the factors that influence the choice of mix design.	BT 6	Applying
13.	Design the concrete mix for grade M30 with suitable conditions. Find the quantities of constituents of the mix for a bag of cement.	BT 6	Analyzing
14.	Explain the properties of concrete related to the mix design.	BT 2	**Remember**

15.	Design of M20 Concrete mix as per IS: 10262-2009, Concrete mix portioning-guidelines. Grade designation: M20, Type of cement: OPC 43 grade confirming to IS 8112, Maximum nominal size of aggregates: 20mm, Minimum cement content: 320 kg/m^3 Maximum water cement ratio: 0.55 Workability: 75mm (slump), Exposure condition: mild Degree of supervision: good Types of aggregate: crushed angular aggregate Maximum cement content: 450kg/m^3 Chemical admixture: not recommended	BT 2	**Remember**
16.	Design of M30 Concrete mix as per IS: 10262-2009, Concrete mix portioning-guidelines. Grade designation: M30 Type of cement: OPC 43 grade confirming to IS 8112 Maximum nominal size of aggregates: 20mm Minimum cement content: 350 kg/m^3 Maximum water cement ratio: 0.50 Workability: 25mm-50mm (slump) Exposure condition: moderate Degree of supervision: good Types of aggregate: crushed angular aggregate Maximum cement content: 450kg/m^3 Chemical admixture: not recommended	BT 4	Applying
17.	Briefly explain the requirements for concrete mix design.	BT 5	Analyzing

18.	Design of M40 Concrete mix as per IS: 10262-2009, Concrete mix portioning-guidelines. Grade designation: M40 Type of cement: OPC 43 grade confirming to IS 8112 Maximum nominal size of aggregates: 20mm Minimum cement content: 320 kg/m^3 Maximum water cement ratio: 0.45 Workability: 100mm (slump) Exposure condition: severe (for reinforced concrete) Degree of supervision: good Types of aggregate: crushed angular aggregate Maximum cement content: 450kg/m^3 Chemical admixture: superplasticizer	BT 6	**Remember**

UNIT-IV: SPECIAL CONCRETE			
Light weight concrete, Fly ash concrete, Fiber reinforced concrete, Sulphur impregnated concrete, Polymer Concrete – High performance concrete. High performance fiber reinforced concrete, Self-Compacting - Concrete, Geo Polymer Concrete, Waste material based concrete – Ready mixed concrete.			
PART - A			
Q.No	**Questions**	**BT Level**	**Competence**
1.	Give the salient features of high performance concrete.	BT-1	**Remember**
2.	What is geo-polymer concrete?	BT-1	**Remember**
3.	Write the advantages of using ready mix concrete.	BT-2	**Remember**
4.	Where light weight concrete is preferred than the conventional one.	BT-2	**Remember**
5.	What is the function of plasticizers in concrete?	BT-5	**Application**
6.	What is the significant difference between mixture proportioning of normal-weight concrete and light –weight concrete	BT-4	**Analyze**
7.	List the difference between polymer-modified concrete and polymer concrete.	BT-4	**understand**
8.	Why should fiber reinforced concrete be used only with regular reinforcement?	BT-4	**understand**
9.	What are the advantages of ready mix concrete?	BT-3	**Remember**
10.	Define special concrete.	BT-6	**Creating**
11.	Define light weight concrete.	BT-3	**Application**

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12.	Name some of the natural lightweight aggregate.	BT-1	**understand**
13.	Name some of the artificial light weight aggregate.	BT-1	**understand**
14.	Mention the application of Sulphur infiltrated concrete.	BT-6	**Creating**
15.	What is high strength concrete?	BT-2	**Evaluate**
16.	List some of the factors affecting FRC.	BT-1	**Remember**
17.	What do you mean by aspect ratio?	BT-2	**Evaluate**
18.	Define fiber reinforced concrete (FRC).	BT-1	**Analyze**
19.	Write short notes on critical length of fiber?	ri	**Analyze**
20.	Define ferro cement.	BT-5	**Application**
21.	Mention some materials used for ferro cement.	BT-2	**Evaluate**
22.	Name the types of reinforcement used in ferro cement?	BT-3	**Analyze**
23.	Define SIFCON?	BT-5	**Application**
24.	Define geo polymer concrete.	BT-2	**Evaluate**
25.	Mention some of the advantages of geo polymer concrete.	BT-1	**Remember**
	PART – B		
1.	i) What are the advantages of using fly ash in concrete? ii) What are the types of fibers available in market? Explain how the use of fiber influences the properties of concrete.	BT-1	**Understand**
2.	i) Discuss the influences of utilization of waste in concrete in India. ii) Discuss the merits and demerits of RMC and In-situ concrete.	BT-4	**Remember**
3.	Write short notes on: i) Geopolymer concrete. ii) Sulphur impregnated concrete.	BT-1	**understand**
4.	i) Describe any two test procedure conducted for self-compacting concrete. ii) What are the factors affecting fiber reinforced concrete?	BT-4	**Application**
5.	What is meant by high performance concrete? Explain the properties, uses and manufacture of high performance concrete.	BT-4	**Creating**
6.	Discuss about geo-polymer concrete and self-compacting concrete.	BT-2	**understand**
7.	Highlight the derived characteristics of high performance concrete (HPC)	BT-3	**Creating**

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8.	State the important tests conducted in the case of specialized repairs, using polymer concrete.	BT-2	**Application**
9.	What is volume fraction and how does it affect the behavior in tension, flexure and shear?	BT-3	**Creating**
10.	What is self-compacting concrete (SCC) and state some of the advantages of SCC.	BT-1	**Application**
11.	What are the tests carried out in fresh stage of self-compacting concrete to determine its workability?	BT-2	**understand**
12.	Explain about fiber reinforcement concrete. State its applications.	BT-6	**Analyze**
13.	Explain the dry and wet mix process of shotcrete.	BT-3	Applying
14	What is high performance concrete? Explain the materials used, manufacture, advantages, disadvantages and applications of it?	BT-5	Evaluating
15.	With a stress-strain curves explain the properties of fiber reinforced concrete. Also explain the different types of fibers.	BT-2	**understand**
16.	Explain the properties of fibre reinforced concrete which can be made use of design of structural elements?	BT-6	**Evaluate**
17.	Discuss about the utilization of various forms of industrial wastes in concrete.	BT-3	**understand**
18.	Explain various types of polymer concrete? State its merits and demerits.	BT-5	**Evaluate**

UNIT-V: CONCRETING METHODS			
Process of manufacturing of concrete, methods of transportation, placing and curing. Extreme weather concreting, special concreting methods. Vacuum dewatering – Underwater Concrete.			
PART - A			
Q.No	**Questions**	**BT**	**Competence**
1.	Name the methods for transportation of concrete.	BT-2	**Remember**
2.	How to avoid cold joint while placing concrete in mass concrete construction?	BT-4	**Evaluate**
3.	What are the merits of vacuum dewatering in concrete?	BT-1	**Remember**
4.	What are the precautions to be taken during transportation of concrete?	BT-2	**understand**
5.	What are the precautions need to be taken for hot weather concreting?	BT-2	**Remember**
6.	List any two practices recommended for ensuring the durability of underwater construction.	BT-5	**Remember**
7.	When is high-pressure steam curing adopted?	BT-3	**Remember**

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8.	State the basic objectives of formwork.	BT-6	**Remember**
9.	Define vacuum dewatering.	BT-1	**understand**
10.	State the principle of curing.	BT-3	**Analyze**
11.	What are the factors affect the curing of concrete.	BT-1	**Evaluate**
12.	Mention the types of curing in concrete.	BT-4	**understand**
13.	Write short notes on methods of transportation.	BT-2	**Application**
14.	What are the factors should be consider transporting concrete.	BT-6	**Analyze**
15.	Define underwater concrete.	BT-1	**Creating**
16.	State the advantages of underwater concrete over normal concrete.	BT-4	**understand**
17.	Define extreme weather concreting.	BT-5	**Application**
18.	Draw a flowchart for manufacturing process of concrete.	BT-1	**Analyze**
19.	Write short notes on special concreting method.	BT-1	**Creating**
20.	What are the ways of water curing?	BT-3	**Application**
21.	What are the advantages for application of heat?	BT-1	**Analyze**
22.	List out the terms in exposure of concrete in higher temperature.	BT-1	**Creating**
23.	What are the considerations involved in steam curing?	BT-4	**understand**
24.	List the advantages derived from high pressure curing process.	BT-1	**Evaluate**
25.	What are the methods for making high strength concrete?	BT-4	**understand**
	PART-B		
1.	Explain under water concreting by tremie method.	BT-1	**understand**
2.	How curing condition influence the strength of concrete? What are the methods of curing?	BT-2	**Remember**
3.	Explain the concreting practices in hot weather condition.	BT-4	**understand**
4.	Explain the step by step procedure of vacuum dewatering for concrete.	BT-3	**Remember**
5.	Explain in detail the various techniques adopted for curing concrete.	BT-2	**Application**
6.	Discuss: i) Hot weather concreting ii) Cold weather concreting.	BT-5	**Analyze**
7.	Describe the process of vacuum dewatering method with their merits and demerits.	BT-6	**Creating**

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8.	Write a brief note on steam curing, infrared radiation curing and electrical curing of concrete.	BT-4	**Creating**
9.	What are the basic assumptions made in the design of formwork? Explain	BT-2	**Evaluate**
10.	List the various measures that should be taken for cold weather concreting.	BT-3	**Remember**
11.	State the principal techniques that have been used for placing concrete underwater. Briefly describe the 'placing in bags' and 'prepacked concrete' methods of underwater concreting.	BT-1	**understand**
12.	Discuss maturity of concrete? How is it measured? What are its practical uses in the concrete industry?	BT-1	**understand**
13.	Describe the importance of curing? When should it be commenced? For how long should it be continued?	BT-3	**Applying**
14.	What is meant by autogenous healing of concrete? Comment on its relevance.	BT-1	**Remember**
15.	Explain the various methods of underwater construction.	BT-6	**Remember**
16.	Explain the different methods of transportation, placing ad curing of concrete.	BT-2	**understand**
17.	Write a detailed notes on: i) Under water concreting ii) Extreme weather concreting	BT-1	**Evaluate**
18.	List out step by step process for manufacturing of concrete.	BT-4	**Creating**