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

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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-1	Remembering
2.	Why concrete is made most popular construction materials?	BT-1	Remembering
3.	Write some of the major advantages of using Portland slag cement.	BT-1	Remembering
4.	What are the advantages of Portland pozzolana cement?	BT-1	Remembering
5.	What are the properties of super sulphated cement?	BT-1	Remembering
6.	Mention some of the uses of white cement.	BT-1	Remembering
7.	What constitutes concrete are?	BT-1	Remembering
8.	Define Bogue's compound?	BT-1	Remembering
9.	Short note on raw materials used for the manufacture of cement?	BT-2	Understanding
10.	Classify four major Bogue's compounds.	BT-2	Understanding
11.	When you will go for use of rediset cement?	BT-2	Understanding
12.	Mention some of the test to check the quality of cement after the opening of the at the field.	BT-1	Remembering
13.	Discuss about hydration of cement.	BT-3	Applying
14.	Explain setting time.	BT-3	Applying
15.	Discuss about natural cement?	BT-3	Applying
16.	Classify the types of cement?	BT-2	Understanding
17.	Classify aggregates according to its shape.	BT-2	Understanding
18.	What are the various tests which are to be done on aggregates?	BT-1	Remembering
19.	Mention the test adopted to test the quality of water?	BT-1	Remembering
20.	List the some mineral admixtures used in concrete?	BT-2	Understanding
21.	What are accelerators?	BT-1	Remembering
22.	What is the purpose of retarders?	BT-1	Remembering
23.	Mention some chemical admixtures used in concrete?	BT-1	Remembering
24.	List the types of plasticizers.	BT-2	Understanding

25.	Name the admixtures available in India?	BT-2	Understanding
	PART - B		
1.	What are the major compounds of cement? Explain the properties of cement?	BT-4	Analyze
2.	Describe the process of manufacture of cement by wet process.	BT-4	Analyze
3.	Explain the following terms (a). Expansive cement (4) (b). Portland blast furnace slag cement (5) (c). sulphate resisting cement (4)	BT-4	Analyze
4.	Describe the process of manufacture of cement by dry process.	BT-3	Remember
5.	How strength test on cement is performed?	BT-4	Analyze
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-4	Analyze
8.	Explain in details of any three tests for aggregate.	BT-4	Analyze
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-5	Evaluate
11.	Write in detail about the grading of aggregates.	BT-4	Analyze
12.	Classify the common aggregate used in concrete. Give examples.	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
15.	Write in details about the various types of special cements and their uses	BT-5	Evaluate
16.	Explain the following: i) Structure of hydrated cement (4) ii) Factors affecting hydration of cement (4) iii) Heat of hydration be controlled (5)	BT-4	Analyze
17.	Briefly state the important characteristics of aggregate and explain them briefly.	BT-4	Analyze
	PART-C		
1.	Describe the hydration reaction of important Bogue compounds indicating the product of hydration.	BT-2	Remember
2.	Explain the impact test	BT-4	Analyze
3.	When are accelerators used in concrete? Explain their limitations? Mention the few compounds that are used as accelerators?	BT-5	Evaluate
4.	When are retarders used in concrete? Explain their limitations? Mention the few compounds that are used as retarders?	BT-5	Evaluate
5.	Describe the procedure of manufacturing cement by wet process.	BT-3	Applying

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-1	Remember
2.	List out the factors influencing the compressive strength of concrete.	BT-1	Remember
3.	State the effect of creep in concrete.	BT-2	Understand
4.	List out factors affecting durability of concrete.	BT-4	Analyze
5.	What are the factors affecting fresh concrete properties.	BT-4	Analyze
6.	Define 'Durability of concrete'.	BT-3	Application
7.	What are the reasons for segregation in fresh concrete?	BT-1	Remember
8.	How does the shape and size of a specimen affect the compressive strength of concrete?	BT-4	Analyze
9.	Differentiate between: 'gap-grading' and 'bleeding' of concrete.	BT-2	Understand
10.	Why 'age factor' not taken advantage of in is IS: 456-2000?	BT-3	Application
11.	What is metakaolin?	BT-3	Application
12.	Write effects of GGBS on hardened concrete.	BT-3	Application
13.	Write the effects of GGBS on fresh concrete.	BT-1	Remember
14.	Write the effects of fly ash on fresh concrete.	BT-2	Understand
15.	Write the effects of silica fume on fresh concrete.	BT-1	Remember
16.	Classify fly ash.	BT-2	Understand
17.	What is ground granulated blast furnace slag?	BT-2	Understand
18.	Write short notes of creep effect of concrete.	BT-1	Remember
19.	Compare physical properties for fresh and hardened concrete.	BT-1	Remember
20.	Write short notes of shrinkage effect of concrete.	BT-2	Understand
21.	Classify types of shrinkage in concrete.	BT-2	Understand
22.	Write short notes on durability of concrete.	BT-2	Understand
23.	Define durability.	BT-1	Remember
24.	What is silica fume?	BT-1	Remember
25.	Write effects of fly ash on hardened concrete.	BT-1	Remember
PART - B			
1.	Write the effect of silica fume on fresh and hardened concrete.	BT-4	Analyze
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-5	Evaluate
3.	What are the factors that affect the shrinkage and creep of concrete? Explain in details.	BT-4	Analyze

4.	Explain the properties of fresh concrete and relevant tests to be Performed to determine them.	BT-5	Evaluate
5.	How creep, shrinkage and durability of concrete is determined?	BT-4	Analyze
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	Application
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-2	Understand
9.	Make a comparative study on the slump test and the compacting factor test and explain briefly the procedure and their limitations.	BT-3	Application
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-3	Application
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	Analyze
12.	Write short notes on metakaolin.	BT-4	Analyze
13.	Write the effect of fly ash on fresh and hardened concrete.	BT-4	Analyze
14.	What is fly ash? Write its uses, characteristics and classification.	BT-3	Application
15.	(i) Explain Durability of concrete? (6) (ii) What are the Factor affecting durability of concrete? (7)	BT-4	Analyze
16.	Define the term workability. What are the various tests conducted to determine the Workability of concrete and explain them.	BT-4	Analyze
17.	Explain Under what circumstances is concrete subjected to fatigue stresses?	BT-3	Application
PART-C			
1.	What are the effects of plasticizers on hardened and fresh concrete?	BT-4	Analyze
2.	What do you mean by fly ash? Write its characteristics and its effect briefly?	BT-4	Analyze
3.	Write short notes on metakaolin?	BT-5	Evaluate
4.	Compare the advantages of silica fume and GGBS.	BT-4	Analyze
5.	What are the two non-destructive tests commonly used to assess the Compressive strength? Explain any one method.	BT-5	Evaluate

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.
PART A

Q.No	Questions	BT Level	Competence
1.	What are the factors influencing concrete mix proportioning?	BT-1	Remember
2.	Distinguish between 'mean strength' and 'target strength' of concrete.	BT-1	Remember
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-1	Remember
5.	In mix proportioning, why is it desirable to use the minimum quantity of water?	BT-1	Remember
6.	What are the statistical parameters of cube strength?	BT-1	Remember
7.	Furnish the data required for ACI method of mix design.	BT-1	Remember
8.	What is concrete acceptance criteria as per IS code.	BT-2	Understand
9.	What is proportioning of concrete mix?	BT-2	Understand
10.	List out the concepts of mix proportioning.		
11.	Enumerate the significant variable affecting the workability of concrete.	BT-2	Understand
12.	What is mix design?	BT-3	Application
13.	What are the factors to be considered in the choice of mix proportioning?	BT-1	Remember
14.	What are the factors that affect the workability of concrete?	BT-2	Understand
15.	Write down the factors that affect the properties of concrete?	BT-3	Application
16.	Mention the properties related to mix design?	BT-3	Application
17.	Mention the physical properties of martials required to mix design?	B	Understan
18.	Mention the requirements for concrete mix design?	BT-2	Understand
19.	Define nominal mix.	BT-3	Application
20.	Define design mix.	BT-2	Understand
21.	Write short notes on standard mix.	BT-1	Remember
22.	List out the advantages of design mix.	BT-1	Remember
23.	List out the disadvantages of nominal mix.	BT-2	Understand
24.	Mention the basic steps in the mix design.	BT-1	Remember
25.	Mention some of the methods of mix design.	BT-3	Application
PART-B			
1.	Design a concrete mix which is required to have a specified mean strength of 30 Mpa at 28 days. The presence of reinforcement requires a slump of 75mm and a maximum size of aggregate of 10mm. The aggregate are of normal weight and their grading conform to the approximate standard with a fineness modulus of 2.8. Assume negligible absorption and moisture content, bulk density of coarse aggregate 1600 Kg/m^3 and extreme exposure conditions. Use ACI method.	BT-3	Application

2.	(i) Explain statistical quality control method used while designing mix proportion for concrete. (7) (ii) Explain the acceptance criteria of concrete as per IS 456. (6)	BT-4	Analyze
3.	List the methods used for mix proportioning indicating the drawbacks of each method.	BT-4	Analyze
4.	(i) What tests are necessary to check the adoptability of a particular mix proportion for field use? (7) (ii) Explain is the significance of characteristics strength with respect to probability factor R? (6)	BT-3	Application
5.	Write down the steps involved in ACI method of concrete mix design.	BT-4	Analyze
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-4	Analyze
8.	Discuss in details about the statistical quality control of concrete.	BT-3	Application
9.	What is mix design? Enumerate the step by step procedure for the design of concrete mixes using ACI method.	BT-3	Application
10.	(i) Describe about the quality control of concrete. (8) (ii) Compare ACI and IS method of mix proportioning of concrete (5)	BT-2	Understand
11.	Explain the design procedure for IS method of concrete mix design.	BT-3	Application
12.	Explain the factors that influence the choice of mix design.	BT-4	Analyze
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-4	Analyze
14.	Explain the properties of concrete related to the mix design.	BT-4	Analyze
15.	Compare ACI and IS method of concrete mix design.	BT-2	Understand
16.	What are all the factors affecting proportioning of a concrete mix? Discuss each in detail.	BT-2	Understand

17.	Design the concrete mix for the following data: characteristic compressive strength=20Mpa, Maximum size of aggregate =20mm (angular), Degree of workability =0.9CF, Degree of quality control is good and Exposure is severe. Water absorption by CA =0.5% and moisture content FA=2.0%. Assume any suitable missing data.	BT-2	Understand
	PART-C		
1.	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-5	Evaluate
2.	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	Analyze
3.	Briefly explain the requirements for concrete mix design.	BT-4	Analyze
4.	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-5	Evaluate

5.	Discuss in detail about the various factors to be considered during transportation of concrete.	BT-5	Evaluate

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**	**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	Understand
4.	Where light weight concrete is preferred than the conventional one.	BT-1	Remember
5.	What is the function of plasticizers in concrete?	BT-1	Remember
6.	What is the significant difference between mixture proportioning of normal-weight concrete and light –weight concrete	BT-1	Remember
7.	List the difference between polymer-modified concrete and polymer concrete.	BT-1	Remember
8.	Why should fiber reinforced concrete be used only with regular reinforcement?	BT-2	Understand
9.	What are the advantages of ready mix concrete?	BT-1	Remember
10.	Define special concrete.	BT-2	Understand
11.	Define light weight concrete.	BT-2	Understand
12.	Name some of the natural lightweight aggregate.	BT-2	Understand
13.	Name some of the artificial light weight aggregate.	BT-2	Understand
14.	Mention the application of Sulphur infiltrated concrete.	BT-3	Application
15.	What is high strength concrete?	BT-3	Application
16.	List some of the factors affecting FRC.	BT-3	Application
17.	What do you mean by aspect ratio?	BT-3	Application
18.	Define fiber reinforced concrete (FRC).	BT-2	Understand
19.	Write short notes on critical length of fiber?	BT-2	Understand
20.	Define ferro cement.	BT-2	Understand
21.	Mention some materials used for ferro cement.	BT-3	Application
22.	Name the types of reinforcement used in ferro cement?	BT-3	Application

23.	Define SIFCON?	BT-3	Application
24.	Define geo polymer concrete.	BT-2	Understand
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? (5) ii) What are the types of fibers available in market? Explain how the use of fiber influences the properties of concrete. (8)	BT-3	Application
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	Analyze
3.	Write short notes on: i) Geopolymer concrete. (6) ii) Sulphur impregnated concrete. (7)	BT-3	Application
4.	i) Describe any two test procedure conducted for self-compacting concrete. (8) ii) What are the factors affecting fiber reinforced concrete? (5)	BT-3	Application
5.	What is meant by high performance concrete? Explain the properties, uses and manufacture of high performance concrete.	BT-2	Understand
6.	Discuss about geo-polymer concrete and self-compacting concrete.	BT-4	Analyze
7.	Highlight the derived characteristics of high performance concrete (HPC)	BT-4	Analyze
8.	State the important tests conducted in the case of specialized repairs, using polymer concrete.	BT-3	Application
9.	What is volume fraction and how does it affect the behavior in tension, flexure and shear?	BT-3	Application
10.	What is self-compacting concrete (SCC) and state some of the advantages of SCC.	BT-4	Analyze
11.	What are the tests carried out in fresh stage of self-compacting concrete to determine its workability?	BT-4	Analyze
12.	Explain about fiber reinforcement concrete. State its applications.	BT-4	Analyze
13.	Explain the dry and wet mix process of shotcrete.	BT-4	Analyze
14.	What is high performance concrete? Explain the materials used, manufacture, advantages, disadvantages and applications of it?	BT-4	Analyze
15.	Compare light weight concrete and high strength concrete in detail.	BT-4	Analyze
16.	Explain the Properties, Merits & Demerits of High performance fiber reinforced concrete in detail.	BT-2	Understand
17.	Explain the Properties, Merits & Demerits of Fly ash concrete in detail.	BT-2	Understand
	PART - C		

1.	With a stress-strain curves explain the properties of fiber reinforced concrete. Also explain the different types of fibers.	BT-4	Analyze
2.	Explain the properties of fibre reinforced concrete which can be made use of design of structural elements?	BT-5	Evaluate
3.	Discuss about the utilization of various forms of industrial wastes in concrete.	BT-4	Analyze
4.	Explain various types of polymer concrete? State its merits and demerits.	BT-4	Analyze
5.	Discuss the basic properties of fibre-reinforced concrete which can be advantageously made use of in the design of structural elements?	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-1	Remember
2.	How to avoid cold joint while placing concrete in mass concrete construction?	BT-1	Remember
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-1	Remember
5.	What are the precautions need to be taken for hot weather concreting?	BT-1	Remember
6.	List any two practices recommended for ensuring the durability of underwater construction.	BT-1	Remember
7.	When is high-pressure steam curing adopted?	BT-2	Understand
8.	State the basic objectives of formwork.	BT-2	Understand
9.	Define vacuum dewatering.	BT-2	Understand
10.	State the principle of curing.	BT-2	Understand
11.	What are the factors affect the curing of concrete.	BT-3	Application
12.	Mention the types of curing in concrete.	BT-3	Application
13.	Write short notes on methods of transportation.	BT-3	Application
14.	What are the factors should be consider transporting concrete.	BT-3	Application
15.	Define underwater concrete.	BT-2	Understand
16.	State the advantages of underwater concrete over normal concrete.	BT-2	Understand
17.	Define extreme weather concreting.	BT-1	Remember
18.	Draw a flowchart for manufacturing process of concrete.	BT-3	Application

19.	Write short notes on special concreting method.	BT-2	Understand
20.	What are the ways of water curing?	BT-2	Understand
21.	What are the advantages for application of heat?	BT-2	Understand
22.	List out the terms in exposure of concrete in higher temperature.	BT-3	Application
23.	What are the considerations involved in steam curing?	BT-1	Remember
24.	List the advantages derived from high pressure curing process.	BT-1	Remember
25.	What are the methods for making high strength concrete?	BT-2	Understand
	PART-B		
1.	Explain under water concreting by tremie method.	BT-3	Application
2.	How curing condition influence the strength of concrete? What are the methods of curing?	BT-3	Application
3.	Explain the concreting practices in hot weather condition.	BT-2	Understand
4.	Explain the step by step procedure of vacuum dewatering for concrete.	BT-2	Understand
5.	Explain in detail the various techniques adopted for curing concrete.	BT-2	Understand
6.	Discuss: i) Hot weather concreting (7) ii) Cold weather concreting. (6)	BT-3	Application
7.	Describe the process of vacuum dewatering method with their merits and demerits.	BT-3	Application
8.	Write a brief note on steam curing, infrared radiation curing and electrical curing of concrete.	BT-4	Analyze
9.	What are the basic assumptions made in the design of formwork? Explain	BT-4	Analyze
10.	List the various measures that should be taken for cold weather concreting.	BT-4	Analyze
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-3	Application
12.	Discuss maturity of concrete? How is it measured? What are its practical uses in the concrete industry?	BT-2	Understand

13.	Describe the importance of curing? When should it be commenced? For how long should it be continued?	BT-2	Understand
14.	What is meant by autogenous healing of concrete? Comment on its relevance.	BT-3	Application
15.	Explain in about the problems encountered in hot weather concreting? What are the precautions included in hot weather concreting?	BT-4	Analyze
16.	Explain the problems encountered in cold weather concreting? What are the Precaution included in cold weather concreting	BT-4	Analyze
17.	Explain in detail about special concreting methods	BT-2	Understand
PART - C			
1.	Explain the various methods of underwater construction.	BT-5	Evaluate
2.	Explain the different methods of transportation, placing ad curing of concrete.	BT-5	Evaluate
3.	Write a detailed notes on: i) Under water concreting (8) ii) Extreme weather concreting (7)	BT-4	Analyze
4.	List out step by step process for manufacturing of concrete.	BT-4	Analyze
5.	Explain the Properties, Merits & Demerits of Underwater Concrete in detail.	BT-4	Analyze