



**INSTITUTE OF AERONAUTICAL ENGINEERING**  
**(Autonomous)**  
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**M TECH STRUCTURAL  
 ENGINEERING  
 QUESTION BANK**

<b>Course Title</b>	:	<b>ADVANCED CONCRETE TECHNOLOGY</b>			
<b>Course Code</b>	:	BST205			
<b>Regulation</b>	:	R16			
<b>Class</b>	:	M. Tech, I Sem			
<b>Course Structure</b>	:	Lectures	Tutorials	Practical's	Credits
		3	-	-	3
<b>Course Coordinator</b>	:	Mr. N. Venkat Rao, Assoc Professor, Civil Engineering			
<b>Team of Instructors</b>	:	Mr. N. Venkat Rao , Assoc Professor, Civil Engineering			

<b>UNIT-I</b>	
<b>MATERIALS FORMING CONCRETE</b>	
<b>GROUP-I (Short Answer Questions)</b>	
1	The chemistry of concrete is essentially the chemistry of reaction between cement and water substantiate the statement
2	Explain various types of cements and how they are formed.
3	What is grade of cement? List any three grades of cement with their strengths.
4	Explain step by step method of manufacture of cement by wet process.
5	What is the common classification of aggregates?
6	What are the essential properties of Aggregate required to make good quality of concrete
7	What are the Physical Quality requirements of aggregates?
8	Distinguish between plasticizers and super plasticizers.
9	Distinguish between natural and chemical admixtures.
10	What is meant by hydration of cement?
11	What is the percentage of water required, if 1500 g of water is required to have a cement paste of 1875 g of normal consistency?
12	Which cement is preferred for construction in sea water and offshore structures
13	How does alkali aggregate reaction affect the concrete mix?
14	Why does hydration of cement occur?
15	At what temperature is slurry burnt in a rotary kiln?

<b>Group - II (Long Answer Questions)</b>	
1	Explain the different types of cements in detail.
2	Describe the setting time and soundness test of cement.
3	Explain the bulking phenomenon of aggregates.
4	Explain the procedure of determining '10 per cent fines value'. What is gap graded aggregate?
5	Describe the hydration reaction of Bogues compounds indicating the products of hydration.
6	How is compressive strength of cement determined?
7	Describe the test done to determine aggregate abrasion value.
8	Write briefly about Retarders and their importance in the strength of concrete
9	Write short notes on Damp proofing agents
10	Describe Dry process of cement manufacturing and what is the difference between wet and dry process
11	Write short notes on Air entraining agents
12	Describe Wet process of cement manufacturing.
13	Write briefly about Accelerators.
14	Explain shape and texture of the aggregate?
15	Explain different types of admixtures?
<b>Group III: Analytical Questions</b>	
1	Explain mechanical properties of aggregate? And how they influence the quality of concrete in detail
2	Explain Properties of mineral and chemical admixtures?
3	Explain Bond and Strength of the aggregate?
4	Write short note of thermal properties of aggregate?
5	What is grading of fine and coarse aggregate explain in detail
6	Explain mechanical properties of aggregate?
7	Explain Properties of mineral and chemical admixtures?
8	Explain Bond and Strength of the aggregate?
9	Write short note of thermal properties of aggregate?
10	What is grading of fine and coarse aggregate?
11	What is the maximum amount of dust which may be permitted in aggregates?
12	On which factors the bulk density of aggregates does not depend upon?
13	How does alkali aggregate reaction affect concrete?

14	If 20 kg of coarse aggregate is sieved through 80 mm, 40 mm, 20 mm, 10 mm, 4.75 mm, 2.36 mm, 1.18 mm, 600 micron, 300 micron and 150 micron standard sieves and the weights retained are 0 kg, 2 kg, 8 kg, 6 kg, 4 kg respectively, what is the fineness modulus of the aggregate?
15	If $X$ , $Y$ and $Z$ are the fineness moduli of coarse, fine and combined aggregates, what is the percentage ( $P$ ) of fine aggregates to combined aggregates?
<b>UNIT II</b>	
<b>TESTS ON FRESH AND HARDENED CONCRETE</b>	
<b>Group – I (Short Answer Questions)</b>	
1	What is meant by proportioning of concrete?
2	Can sea water be used for making concrete? Explain.
3	What is meant by curing of concrete?
4	What is meant by controlled concrete?
5	Define Workability of concrete
6	Mention the Properties of concrete at Early Ages.
7	What are the Causes of bleeding and segregation?
8	What are the Methods for Control of Bleeding?
9	Define segregation of concrete.
10	Define bleeding of concrete.
11	$W_p$ and $W_f$ are the weights of a cylinder containing partially compacted and fully compacted
12	How can shrinkage in concrete be reduced?
13	What is the process of hardening the concrete by keeping its surface moist known as?
14	Which grades of concrete not recommended by I.S. : 456 and why?
15	What does proper batching ensure?
<b>Group - II (Long Answer Questions)</b>	
1	What are the factors influencing workability of concrete discuss in detail
2	Explain Flow tests and their importance to control workability of concrete in detail.
3	What are the methods available for measuring air content in fresh concrete? Explain one of the methods in detail.
4	What are the various steps involved in concrete manufacturing explain in detail
5	What is segregation and its affect on the durability of concrete describe briefly?
6	What is bleeding and how can it be prevented?
7	How does freeze-thaw damage occur and how it can be controlled
8	What is Abram's law? How does it affect concrete?
9	What are the various factors affecting strength of hardened concrete?
10	What is curing? What are the different methods of curing?
11	Explain briefly about Tension and flexural tests on concrete
12	Write a short note on Flexural test
13	Explain nondestructive tests.

14	Write a short note on Elasticity of concrete
15	Write a short note on Creep
16	What is creep of concrete how it can be controlled
17	What is shrinkage explain various types of shrinkages
18	Explain briefly about Compression test?
19	Describe briefly about Split tensile test
20	What is the relation between creep & time?
<b>GROUP-III Analytical Questions</b>	
1	What is alkali-aggregate reaction? Explain how it can be controlled effectively
2	What are factors contributing to the alkali aggregate reaction
3	Describe the importance of the quality of water used for concreting.
4	Explain Compaction factor test in detail.
5	What are the factors affecting workability of concrete?
6	Define measurement of workability by different tests?
7	Explain how can we be prevented segregation?
8	Describe the setting time of concrete?
9	What are effects of creep?
10	What are the types of shrinkage?
11	What are the codal provisions for NDT?
12	Describe types of NDT tests?
13	Explain briefly about Compression test?
14	Describe briefly about Split tensile test
15	Write a short note on Shrinkage
16	Write a short note on Durability of concrete
17	What are the factors influencing creep?
<b>UNIT III</b>	
<b>HIGH STRENGTH AND HIGH PERFORMANCE CONCRETE</b>	
<b>Group - I (Short Answer Questions)</b>	
1	What is high strength concrete explain in detail
2	What is micro structure of high strength concrete concrete explain in detail
3	What is ultra high strength concrete and how it is different from high strength concrete
4	What are the guide lines for selection of materials for making high strength concrete explain in detail
5	What should be the size of coarse aggregate to produce high strength concrete of 100Mpa
6	Why high strength concrete is needed in the present scenario
7	What should be the quantity of total cementitious material to produce high strength concrete
8	How the autogenous shrinkage is reduced in high strength concrete explain in detail
9	What is ultra high strength concrete explain in detail

10	What is durability of concrete explain in detail
<b>Group - II (Long Answer Questions)</b>	
1	What are the advantages of high strength concrete over normal strength concrete explain in detail
2	What is the process involved in the manufacturing of high strength concrete
3	What are the applications of high strength concrete in the modern construction industry
4	Explain the pore the pore structure of high strength concrete and its influence on the strength of concrete
5	What are the properties of high strength concrete and how they differ from the properties of normal strength concrete
6	Critically examine the role of water/cement ratio and admixture on strength of and durability of high strength concrete
7	Explain the the process of mix designing of high strength concrete using Shaklok method
8	Explain stress-strain model for confined high strength concrete
9	Critically examine how brittleness and low tensile strength capacities of gigh strength concrete can be overcome
10	What are the mechanical properties of high strength concrete explain in detail
<b>GROUP-III Analytical Questions</b>	
1	Explain the effect on strength and pore structure of high strength concrete after exposed to temperature
2	Explain the necessity of high strength concrete in high rise buildings,bridges and offshore structures
3	Explain the mix proportion and process implications in high strength concrete
4	Explain the process of autogenous shrinkage in ultra high strength performance concrete and how it can be reduced
5	Explain durability and microstructural characteristics of ultra high performance concrete
6	Critically analyse nano-mechanical signature of ultra high performance concrete
7	Explain the tensile behavior of ultra high performance concrete
8	Critically study the fracture behavior of ultra high performance concrete
9	<del>What are the basic differences between high strength concrete and ultra high performance concrete</del>
10	Critically examine the role of chemical admixtures in imparting high strength to the concrete
<b>UNIT-IV</b>	
<b>SPECIAL CONCRETES</b>	
<b>Group - I (Short Answer Questions)</b>	
1	Define Aerated Concrete
2	What is the general use of Shotcrete?
3	What is meant by No fine concrete?
4	What do you mean by Fibre Reinforced Concrete?
5	Define ferro-cement.
6	What is self-compacting concrete?
7	What are the uses of polymer concrete?
8	What are the advantages of using high-strength concrete?
9	What is polymer – modified concrete?
10	What is SIFCON?
11	Where do we use Fibre Reinforced Concrete?
12	What are materials of self-compacting concrete?
13	What are the types of polymer concrete?
14	What is the aggregate cement ratio of No-fine Concrete?
15	Factors effecting properties of Fibre Reinforced Concrete?

16	What are minerals of self-compacting concrete?
17	What is the water cement ratio of No-fine Concrete?
18	What is the Aspect ratio of the fiber?
19	What polymer – impregnated concrete?
20	What are the types of self-compacting concrete
<b>GROUP-B(LONG QUESTION)</b>	
1	How can high-strength concrete be classified? Explain.
2	List the differences between polymer – impregnated concrete, polymer – modified concrete, polymer concrete, polymer – modified concrete, and polymer concrete.
3	What are the various quality control tests done to ensure good performance of polymer concrete?
4	What are the basic properties of fibre – reinforced concrete
5	which can be advantageously made use of in the design of structural elements?
6	In what way the behavior of FRC can be used for seismic – resistant design?
7	Explain in detail the method of design of light weight concreting.
8	Describe the procedure of Shotcrete& Grouting.
9	Explain the properties of polymer Impregnated Concrete.
10	Explain the design aspects of aerated concrete.
11	Explain the various methods of polymer concrete.
12	Distinguish between light weight concrete and high density concrete.
13	What are the different types of fibres used in FRC and how do they affect the properties of concrete?
14	Distinguish between high performance concrete and self compacting concrete.
15	Distinguish between self consolidating concrete and conventional concrete.
16	Explain briefly about the types of fiber reinforced concert?
17	Write a brief note on self compacting concrete?
18	What are the different types of polymer concrete?
19	Write brief note on polymer concrete?
20	Explain about polymer – modified concrete?
21	Explain about polymer – impregnated concrete?
<b>GROUP-C(ANALYTICAL QUESTION)</b>	
1	Distinguish between light weight concrete and high density concrete.
2	What are the different types fibres used in FRC and how do they affect the properties of concrete?
3	Distinguish between high performance concrete and self compacting concrete.
4	Distinguish between self consolidating concrete and conventional concrete.
5	Describe the procedure of Shotcrete& Grouting.
6	Explain the properties of polymer Impregnated Concrete.
7	Explain the design aspects of aerated concrete.
8	Explain the various methods of polymer concrete.
9	Explain the properties of self consolidating concrete
10	Explain the properties of self compacting concrete
UNIT-V	
<b>MIX DESIGN</b>	
<b>Group - I (Short Answer Questions)</b>	
1	Define Concrete Durability.
2	Define concrete mix design.
3	What are the factors influencing the selection of materials?
4	What are the factors Influencing Consistency?
5	What are the Factors affecting Strength of Hardened concrete?
6	What is the sequence of steps should be followed in ACI method?
7	Mention the Maximum aggregate size to be used in Mix Design as per ACI

8	What are the Requirements of concrete mix design as per BIS?
9	What are the Factors affecting the choice of mix proportions?
10	Describe about Sampling criteria
11	What is statistical quality control.
12	What is M20 Mix concrete.
13	Describe Acceptance criteria
14	Define Standard mixes.
15	What are the types of concrete mixes? Explain.
16	Define Nominal Mixes?
17	What is M30 Mix concrete.
18	What are Designed Mixes?
19	What is an acceptance criterion of concrete?
<b>GROUP-B (LONG QUESTION)</b>	
1	Describe ACI method of mix design in detail.
2	Describe Indian standard method of mix design in detail.
3	Describe about the Sampling criteria?
4	Design the concrete mix for grade M20 with suitable conditions.
5	Find the quantities of constituents of the mix for a bag of cement.
6	Explain the factors that influence the choice of mix design.
7	Explain in detail about the statistical quality control and acceptance criteria of concrete
8	Design the concrete mix for grade M30 with suitable conditions.
9	Find the quantities of constituents of the mix for a bag of cement.
10	Explain the procedure of selection of constituent materials of concrete.
11	Define Nominal Mixes and Standard mixes. What are Designed Mixes?
12	Describe the recent trends in concrete mix design.
13	Describe briefly about durability of concrete?
14	Describe quality control of concrete?
15	Describe about Acceptance criteria?
16	What is BIS method of mix design?
17	Design the concrete mix for grade M20 with suitable conditions.
18	Find the quantities of constituents of the mix for a bag of cement.
19	Design the concrete mix for grade M30 with suitable conditions.
20	Find the quantities of constituents of the mix for a bag of cement.
<b>PART-III</b>	
1	Design the concrete mix for the following data: characteristic compressive strength= 20MPa, maximum size of aggregate =20mm (angular), Degree of workability = 0.9 CF, Degree of quality control = good and type of exposure = severe. Waterabsorption by CA = 0.5% and moisture content in FA = 2.0%. Assume any suitable missing data
2	Design the concrete mix for the following data: characteristic compressive strength = 35MPa, maximum size of aggregate =20mm (angular), Degree of workability = 0.9 CF, Degree of quality control = good and type of exposure = severe. Water absorption by CA = 1% and moisture content in FA=1.5%.Assume any suitable missing data.
3	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=good and type of exposure=severe. Water absorption by CA =0.5% and moisture concrete FA=2.0%.Assume any suitable missing data.
4	Design the concrete mix for grade M20 with suitable conditions. Find the quantities of constituents of the mix for a bag of cement.Design the concrete mix for grade M30 with suitable conditions. Find the quantities of constituents of the mix for a bag of cement.

5	Design the concrete mix for the following data: characteristic compressive strength= 20MPa, maximum size of aggregate = 20mm (angular), Degree of workability = 0.9 CF, Degree of quality control good and type of exposure = severe. Water absorption by CA = 0.5% and moisture content in FA = 2.0%. Assume any suitable missing data.
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