# CONCRETE TECHNOLOGY (GR18A3071)

**Academic Year (2021-22)**

**III B.Tech – II Semester**

**Mr . PVVSSR KRISHNA**

**Mr.C.Vanadeep**

**Assistant Professor**


**Department of Civil Engineering**

**Gokaraju Rangaraju Institute of Engineering and Technology**

# Gokaraju Rangaraju Institute of Engineering and Technology

## Department of Civil Engineering

## CONCRETE TTECHNOLOGY

## Course File Check List

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**GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING AND TECHNOLOGY**
**CONCRETE TECHNOLOGY**
**(PROFESSIONAL ELECTIVE-II)**

**Course Code: GR18A3071** **L T P C**
**III Year II Semester** **3 0 0 3**

**Course Objectives:** The objectives of this course is to make the student to

- Identify the physical and chemical properties of concrete ingredients and able to conduct tests on cement and aggregates.
- Comprehend the workability of concrete, manufacturing processes of concrete and the behavior of fresh, hardened concrete.
- Gain the knowledge about NDT methods, quality control of concrete and how to conduct the tests on hardened concrete.
- Identify the properties like elasticity, creep, shrinkage; special concretes and their applications in the diverse construction field.
- Acquire the practical knowledge on mix design principles, concepts and methods

**Course Outcomes:** After completion of this course, students will be able to

- Illustrate the physical and chemical properties of concrete ingredients and able to conduct tests on cement and aggregates.
- Clarify the physical properties of fresh and hardened concrete and also about the manufacturing of concrete.
- Estimate the creep and shrinkage of concrete and how to conduct the different tests such as compression and tension on hardened concrete and also summarize the quality control of concrete under different conditions.
- Distinguish the special concretes like Self compacting concrete, Fibre reinforced concrete, Polymer concrete and light weight concrete etc.
- Design the mix proportions for the specific work for required strength and workability with available materials at workplace.

**UNIT I**

## Concrete Ingredients and its Properties:

**Cements & Admixtures:** Portland cement – Chemical composition – Hydration, setting of cement – Structure of hydrated cement – Tests on physical properties – Different grades of cement – Admixtures – Mineral and chemical admixtures.

**Aggregates:** Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregate – Specific gravity, bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded aggregate – Maximum size of aggregate.

**UNIT II**

**Fresh Concrete:** Production of concrete, mixing, compaction curing, Properties of fresh concrete. Workability – Factors affecting workability – Measurement of workability bydifferenttests– Settingtimesofconcrete–Effectoftimeandtemperatureonworkability– Segregation & bleeding.

**Hardened Concrete :** Water / Cement ratio – Abram's Law – Gel Space ratio – Nature of strengthofconcrete–Maturityconcept–Strengthintension&compression–Factorsaffecting strength – Relation between compression & tensile strength -Curing.

**UNIT III**

**Testing of Hardened Concrete:** Compression tests–Tension tests–Factors affecting strength –Flexure tests–Splitting tests–Non-destructive testing methods–codal provisions for NDT. **Quality control of Concrete**: Behavior of concrete in extreme environment; temperature problem in concreting, hot weather, cold weather and under water conditions, Resistance to freezing, sulphate and acid attack, efflorescence, fire resistance; Inspection and testing of concrete-Concrete cracking, types of cracks, causes and remedies.

**UNIT IV**

**Elasticity, Creep & Shrinkage:** Modulus of elasticity – Dynamic modulus of elasticity – Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – Types of shrinkage.

**Special concretes:** Light weight aggregates – Lightweight aggregate concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Different types of fibres– Factors affecting properties & Applications of F.R.C – Polymer concrete – Types of Polymer concrete – Properties of polymer concrete & Applications – High performance concrete – Self consolidating concrete – SIFCON.

**UNIT V**

**Mix Design:** Factors in the choice of mix proportions – Durability of concrete– Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – BIS method of mix design.

**TEXT/REFERENCE BOOKS :**

1. Concrete Technology by M. S. Shetty – S. Chand & Co. ;2004

2. Properties of Concrete by A. M. Neville – Low priced Edition – 4thedition

3. Concrete Technology by M.L. Gambhir – Tata Mc. Graw Hill Publishers, NewDelhi.

4. Concrete Technology by A.R. Santha Kumar, Oxford University Press, NewDelhi.

5. Concrete: Microstructure, Properties and materials by P Kumar Mehta, P J M Monteiro, MC Graw Hill Education Publisher, New Delhi.

# Gokaraju Rangaraju Institute of Engineering and Technology

## Department of Civil Engineering

### Online Time-Table AY: 2021-22 (II-Semester)

| Section: | III Year | | | | | wef: 17-01-2022 | |
|---|---|---|---|---|---|---|---|
| Day/Time | 09:00 - 9:55 | 9:55 - 10:50 | 10:50 - 11:45 | 11:45 - 12:25 | 12:25 - 1:15 | 1:15 - 2:05 | 2:05 - 2:55 |
| Monday | | | | BREAK | | | CT |
| Tuesday | | | | | | | |
| Wednesday | | | CT | | | | |
| Thursday | | | | | CT | CT | |
| Friday | | | CT | | | | |
| Saturday | | | | | | | |

| Course Code | Course Shortform | Course Name | Faculty Name (Short Code - Staff ID) |
|---|---|---|---|
| GR18A3071 | CT | Concrete Technology | Mr.PVVSSR Krishna (Mr.PVVSSRK-1562) |

# Gokaraju Rangaraju Institute of Engineering and Technology

## Department of Civil Engineering

### Online Time-Table AY: 2021-22 (II-Semester)

| Section: | III Year | | | | | wef: 17-01-2022 | |
|---|---|---|---|---|---|---|---|
| **Day/Time** | **09:00 - 9:55** | **9:55 - 10:50** | **10:50 - 11:45** | **11:45 - 12:25** | **12:25 - 1:15** | **1:15 - 2:05** | **2:05 - 2:55** |
| Monday | | | CT | BREAK | | | |
| Tuesday | CT | | | | | | |
| Wednesday | | | CT | | | | |
| Thursday | | | | | | | |
| Friday | CT | CT | | | | | |
| Saturday | | | | | | | |

| Course Code | Course Shortform | Course Name | Faculty Name (Short Code - Staff ID) |
|---|---|---|---|
| GR18A3071 | CT | Concrete Technology | Mr. C.Vanadeep (Mr.CV- 1645) |

**GOKARAJU RANGARAJU**
**INSTITUTE OF ENGINEERING AND**
**TECHNOLOGY**

## Programme Educational Objectives (PEO's)

1. Graduates of the programme will be successful career in technical and professional career.
2. Graduates of the programme will have proficiency in solving real time Civil Engineering projects.
3. Graduates of the programme will continue to engage in lifelong learning with ethical and social responsibility.

## Program Outcomes (PO's)

Graduates of the Civil Engineering programme will be able to

a. apply knowledge of mathematics, science and fundamentals of Civil Engineering.
b. analyse problem and interpret the data.
c. design a system component, or process to meet desired needs in Civil Engineering within realistic constraints.
d. identify, formulate, analyse and interpret data to solve Civil Engineering problems.
e. use modern engineering tools such as CAD and GIS for the Civil Engineering practice.
f. understand the impact of engineering solutions in a global, economic and societal context.
g. understand the effect of Civil Engineering solutions on environment and to demonstrate the need for sustainable development.
h. understanding of professional and ethical responsibility.
i. work effectively as an individual or in a team and to function on multi-disciplinary context.
j. communicate effectively with engineering community and society.
k. demonstrate the management principles in Civil Engineering projects.
l. recognize the need for and an ability to engage in life-long learning.

## Program Specific Outcomes (PSO's)

**PSO1**: Recognize the need for a sustainable environment and design smart infrastructure considering the global challenges.

**PSO2:** Create and develop innovative designs with new era materials through research and development.

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**Course Objectives:** The objectives of this course is to make the student to

| |
|---|
| • Identify the physical and chemical properties of concrete ingredients and able to conduct tests on cement and aggregates. |
| • Comprehend the workability of concrete, manufacturing processes of concrete and the behavior of fresh, hardened concrete. |
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| • Acquire the practical knowledge on mix design principles, concepts and methods |

**Course Outcomes:** After completion of this course, students will be able to

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| • Illustrate the physical and chemical properties of concrete ingredients and able to conduct tests on cement and aggregates. |
| • Clarify the physical properties of fresh and hardened concrete and also about the manufacturing of concrete. |
| • Estimate the creep and shrinkage of concrete and how to conduct the different tests such as compression and tension on hardened concrete and also summarize the quality control of concrete under different conditions. |
| • Distinguish the special concretes like Self compacting concrete, Fibre reinforced concrete, Polymer concrete and light weight concrete etc. |
| • Design the mix proportions for the specific work for required strength and workability with available materials at workplace. |

**GOKARAJU RANGARAJU**
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

# Student Roll List

| S.No | Reg No | Student Name |
|---|---|---|
| 1 | 18241A0151 | SOHEB PATEL |
| 2 | 18241A0152 | SRIAM SHIVA ADITYA |
| 3 | 19241A0101 | RUHAIL AHMAD LONE |
| 4 | 19241A0102 | AITHA SAI TEJA |
| 5 | 19241A0103 | BARISETTY SHIVA KARTHIK |
| 6 | 19241A0104 | BENDHI VARUN THEJA GOUD |
| 7 | 19241A0105 | BHUKYA VAMSHI |
| 8 | 19241A0106 | BOGE VENKAT ROHITH |
| 9 | 19241A0107 | BONTHA PRANEETHKUMAR |
| 10 | 19241A0108 | CHILUKA RAHUL |
| 11 | 19241A0109 | DANDI KIRAN |
| 12 | 19241A0110 | DAYYA RAGNESH |
| 13 | 19241A0111 | E MANISH GOUD |
| 14 | 19241A0112 | ERRAM SAI PRIYA |
| 15 | 19241A0113 | G DEEPIKA |
| 16 | 19241A0114 | GORANTALA SAI |
| 17 | 19241A0115 | GUGULOTHU SANTHOSH |
| 18 | 19241A0116 | GURIJALA SAI KUMAR |
| 19 | 19241A0117 | GURUJALA SRIDHAR |
| 20 | 19241A0118 | IRUVANTI HEMANTH KUMAR |
| 21 | 19241A0119 | JANGITI VYSHNAVI |
| 22 | 19241A0120 | JARUPLA CHERAN |
| 23 | 19241A0122 | JETTI SREEVANI |
| 24 | 19241A0123 | K SOWMYA |
| 25 | 19241A0124 | KADALI KRISHNASRI SAI |
| 26 | 19241A0125 | KAMAREDDY AKSHAY |
| 27 | 19241A0126 | KATTA SAI KUMAR |
| 28 | 19241A0127 | KOLLURI.TEJASWI |
| 29 | 19241A0128 | KONDAPURAM SRIJA |
| 30 | 19241A0129 | KOTTE VIVEK |
| 31 | 19241A0130 | KRUTHIKA VIJAY PALANGE |
| 32 | 19241A0131 | MADA AKHIL REDDY |
| 33 | 19241A0132 | MADARAM SHRAVAN KUMAR REDDY |
| 34 | 19241A0133 | MADDIGATLA AJAY SAGAR |
| 35 | 19241A0134 | CHANDANA MALPATEL |
| 36 | 19241A0135 | MANDALA CHINNI |
| 37 | 19241A0136 | MIREGILLA VIJAYAKUMAR |
| 38 | 19241A0137 | MOHD OBAID KASHIF |
| 39 | 19241A0138 | NARAPAKA MADHAV KUMAR |
| 40 | 19241A0139 | NIMMALA ARSHITHA |
| 41 | 19241A0141 | P SIDDARTHA |
| 42 | 19241A0142 | PAGIDIPALLY AJAY KUMAR |
| 43 | 19241A0143 | PALLAPU NAVEEN |
| 44 | 19241A0144 | PALLE SANATH KUMAR |
| 45 | 19241A0145 | PANTANGI PRANAY |
| 46 | 19241A0146 | PATIL SWAPNIL |
| 47 | 19241A0147 | POLISETTY SAAHAS |

| 48 | 19241A0148 | S.SAITEJA |
|---|---|---|
| 49 | 19241A0149 | SAI NEERAJ M |
| 50 | 19241A0150 | SATYA SAI PRASANNA REDDY SOLIPETA |
| 51 | 19241A0151 | SHAIK BILAL |
| 52 | 19241A0152 | SHAIK FIRDOUS AYESHA |
| 53 | 19241A0153 | SOORA VIKAS |
| 54 | 19241A0154 | TELLAM SRI SAI PAVANA ROSHINI |
| 55 | 19241A0155 | THALLAPALLY SWARANYA |
| 56 | 19241A0156 | THUMATI VENKATA VAYUNANDHAN |
| 57 | 19241A0157 | UDUMULA NIKHIL REDDY |
| 58 | 19241A0158 | VELISHALA GAYATHRI |
| 59 | 19241A0159 | VENKATA SIDDHARTHA RAJU VEGESNA |
| 60 | 19241A0160 | YASWANTH KURUVA |
| 61 | 19241A0161 | ABDUL RAHEEM |
| 62 | 19241A0162 | ANEMONI MURALI MANOHAR |
| 63 | 19241A0163 | ASKANY HARISH SAGAR |
| 64 | 19241A0164 | BODLA AKSHITH |
| 65 | 19241A0165 | BURRA VAMSHI KRISHNA |
| 66 | 19241A0166 | CHERLAKOLA AKHILA |
| 67 | 19241A0167 | CHINTAPALLI VIKRAM |
| 68 | 19241A0168 | CHIRRIBOYINA DHANYA |
| 69 | 19241A0169 | D SREE MADHURI |
| 70 | 19241A0170 | GADDAM SAHITHI |
| 71 | 19241A0171 | GAJJALA SUKENDHAR REDDY |
| 72 | 19241A0172 | YASHASWI GANGAVARAM |
| 73 | 19241A0173 | GINDHAM ADITYA KUMAR |
| 74 | 19241A0174 | GUDHETI NARENDAR REDDY |
| 75 | 19241A0175 | GUMMADI SAI PRATEEK REDDY |
| 76 | 19241A0176 | HANMAPUR DHEERAJ GOUD |
| 77 | 19241A0177 | JAVVAJI AISHWARYA |
| 78 | 19241A0178 | JULAPALLY NITHIN RAO |
| 79 | 19241A0179 | K NAVEEN |
| 80 | 19241A0180 | K RAJESHWARI |
| 81 | 19241A0181 | KACHAVA SURENDAR |
| 82 | 19241A0182 | KODATHALA INDU |
| 83 | 19241A0183 | KOTARU SRINIVASA VARAPRASAD |
| 84 | 19241A0184 | MALOTH RAHUL |
| 85 | 19241A0185 | MATURI SATHVIK |
| 86 | 19241A0186 | MD ABDUL MAAJID |
| 87 | 19241A0187 | MEDARI DAYANA |
| 88 | 19241A0188 | NARSINGA SANDEEP |
| 89 | 19241A0189 | PALANATI ROHITH |
| 90 | 19241A0190 | PURALASETTY BHAVANA |
| 91 | 19241A0191 | RODDA MALAVIKA REDDY |
| 92 | 19241A0192 | SAPRAM NAGA SRILOWKYA MUKTHA |
| 93 | 19241A0193 | SHAIK PARVEZ ANSARI |
| 94 | 19241A0194 | SIDDELA THARUN KUMAR |
| 95 | 19241A0195 | TALARI CHANDANA SREE |
| 96 | 19241A0196 | VALLEPU KALYAN |
| 97 | 19241A0197 | VRASHAB PATEL |

| | | |
|---|---|---|
| 98 | 19241A0198 | YELLAVULA NARENDER |
| 99 | 19241A0199 | BADDELA SAI THARUN |
| 100 | 20245A0101 | Aamanchi Bowmi |
| 101 | 20245A0102 | Aviraboina Sai Chaithanya |
| 102 | 20245A0103 | Bairy B S Anirudh |
| 103 | 20245A0104 | Daddu Tejasree |
| 104 | 20245A0105 | Dopathi Raviteja |
| 105 | 20245A0106 | Eruventi Niharika |
| 106 | 20245A0107 | Gaddamidi Aanil |
| 107 | 20245A0108 | Gandla Rishik Raj |
| 108 | 20245A0109 | Gone Naveen Kumar |
| 109 | 20245A0110 | Kota Vishal |
| 110 | 20245A0111 | Kummari Mahesh |
| 111 | 20245A0112 | Lakavath Anil |
| 112 | 20245A0113 | Madavaram Rohith |
| 113 | 20245A0114 | Mandala Akshitha |
| 114 | 20245A0115 | M Manjunath |
| 115 | 20245A0116 | Porandla Nagabhushanam |
| 116 | 20245A0117 | Pulishetty Bhavani |
| 117 | 20245A0118 | Racha Kranthi Ranadeer |
| 118 | 20245A0119 | S Manoj Kumar |
| 119 | 20245A0120 | Samudrala Manideep |
| 120 | 20245A0121 | Sangepaga Goutham |
| 121 | 20245A0122 | Sodadasi Rahul |
| 122 | 20245A0123 | Vanga Harshith |
| 123 | 20245A0124 | Choleti Vineetha |
| 124 | 20245A0125 | Gangula Grishma |
| 125 | 20245A0126 | Bollampalli Sai Poojith |
| 126 | 20245A0127 | Pamulapati Sumanth |
| 127 | 20245A0128 | T Sanghamithra |
| 128 | 20245A0129 | Abeda Akanksha |
| 129 | 20245A0130 | Doppalapudi Ramvineeth Sai |
| 130 | 20245A0131 | Pilly Uday Kiran |

**GOKARAJU RANGARAJU**
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**GUIDELINES TO STUDY THE COURSE/SUBJECT**

**A**cademic **Y**ear : 2021-22

Semester : II

Name of the Program: : B.Tech Year: III Section: A& B

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : P Krishna/C.Vanadeep Dept: Civil Engineering

Designation : Assistant Professor

## Guidelines to study the Course/ Subject: Concrete Technology

In Civil engineering Concrete Technology is one of the important subjects. This course helps the students to learn the properties of ingredients of concrete such as cement, aggregates and admixtures; this course also helps in how to design a mix proportion for the different grades of concrete for the different purposes with required strength, workability and economy. The test procedures to know the properties of fresh and hardened concrete can also be studied. The awareness on special concrete like light weight, FRC, SCC, bacterial and polymer concrete will be obtained.

**Students should have the following prerequisites**

1. Knowledge on Building Materials and Construction practice
2. Awareness on Design of reinforced concrete structures
3. Knowledge on Engineering Mathematics.

**Why will this subject help?**

1. This course will help the students to know the properties of ingredients of concrete.
2. Useful in understanding the test procedures to know the properties of fresh and hardened concrete can also be studied.
3. Let the students get the awareness on special concrete like light weight, FRC, SCC, bacterial and polymer concrete.
4. This course also helps how to design a mix proportion for the different grades of concrete for the different purposes with required strength, workability and economy.

**Books/Material**

**TEXT BOOK:**

1. Properties of Concrete by A.M.Neville Fourth Edition, Pearson.
2. Concrete technology (Theory and Practice) by M.S. Shetty, S.Chand & Co.; 2004.

**REFERENCES:**


1. Concrete Technology by M.L. Gambhir. Tata Mc. Graw Hill Publishers.
2. Concrete Technology by A.R. Santha Kumar, Oxford University Press, New Delhi.


**Websites**

1. NPTEL Lecture Notes and videos: **http://nptel.ac.in/courses/105102012**

2. NPTEL Videos: http://nptel.ac.in/courses/105102088

**Course Design and Delivery System (CDD):**

- The Course syllabus is written into number of learning objectives and outcomes.
- These learning objectives and outcomes will be achieved through lectures, assessments, assignments, experiments in the laboratory, projects, seminars, presentations, etc.
- Every student will be given an assessment plan, criteria for assessment, scheme of evaluation and grading method.
- The Learning Process will be carried out through assessments of Knowledge, Skills and Attitude by various methods and the students will be given guidance to refer to the text books, reference books, journals, etc.

The faculty be able to –

- Implement principles of Learning
- Comprehend the psychology of students
- Develop instructional objectives for a given topic
- Prepare course, unit and lesson plans
- Demonstrate different methods of teaching and learning
- Use appropriate teaching and learning aids
- Plan and deliver lectures effectively
- Provide feedback to students using various methods of Assessments and tools of Evaluation
- Act as a guide, advisor, counselor, facilitator, motivator and not just as a teacher alone

Signature of HOD Signature of faculty

Date: Date:

**GOKARAJU RANGARAJU**
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

# COURSE SCHEDULE

Name of the Program: : B.Tech Year: III Section: A

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : PVVSSR KRISHNA Dept: Civil

Engineering Designation : ASSISTANT PROFESSOR

The Schedule for the whole Course / Subject is:

| S. No. | Description | Duration (Date) | | Total No. Of Periods |
|---|---|---|---|---|
| | | From | To | |
| 1. | I-Unit: Concrete Ingredients and its Properties: | 17/01/22 | 09/02/22 | 14 |
| 2. | II-Unit: Fresh and Hardened concrete | 10/02/22 | 24/02/22 | 12 |
| 3. | III-Unit: Testing of Hardened concrete, Quality control of concrete | 25/02/22 | 25/03/22 | 17 |
| 4. | IV-Unit: Elasticity, Creep and Shrinkage & special concretes | 28/03/22 | 22/04/22 | 16 |
| 5. | V-Unit: Mix Design | 22/04/22 | 11/05/22 | 12 |
| | | Total Periods | | 71 |

Total No. of Instructional periods available for the course: 71 Hours / Periods

**A**cademic **Y**ear : 2021-22

Semester : II

**GOKARAJU RANGARAJU**
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

# COURSE SCHEDULE

Name of the Program: : B.Tech Year: III Section: B

Course/Subject : Concrete Technology Course Code: GR18A3071Name

of the Faculty : C.Vanadeep Dept: Civil Engineering

Designation : ASSISTANT PROFESSOR

The Schedule for the whole Course / Subject is:

| S. No. | Description | Duration (Date) | | Total No. Of Periods |
|---|---|---|---|---|
| | | From | To | |
| 1. | I-Unit: Concrete Ingredients and its Properties: | 17/01/22 | 10/02/22 | 12 |
| 2. | II-Unit: Fresh and Hardened concrete | 14/02/22 | 03/03/22 | 12 |
| 3. | III-Unit: Testing of Hardened concrete, Quality control of concrete | 04/03/22 | 24/03/22 | 10 |
| 4. | IV-Unit:Elasticity, Creep and Shrinkage & special concretes | 25/03/22 | 13/04/22 | 14 |
| 5. | V-Unit: Mix Design | 19/04/22 | 10/05/22 | 12 |
| | | Total Periods | | 60 |

Total No. of Instructional periods available for the course: 60 Hours / Periods

**A**cademic **Y**ear : 2021-22

Semester : II

**GOKARAJU RANGARAJU**
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

# COURSE PLAN

Name of the Program: : B.Tech Year: III Section: A

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : PVVSSR KRISHNA Dept: Civil

Engineering Designation : ASSISTANT PROFESSOR

| S.No | Date | Unit No | Session Duration | Objectives & Outcomes Nos. | Bloom's Taxonomy Knowledge Level | Topics |
|---|---|---|---|---|---|---|
| 1 | 17/01/22 | I | 1 | COB's:1 CO's:1 | 1 | Introduction to Concrete Technology |
| 2 | 18/01/22 | | 1 | COB's:1 CO's:1 | 2 | History of Portland cement and grades of cement |
| 3 | 20/01/22 | | 1 | COB's:1 CO's:1 | 2 | Chemical composition and Hydration of cement |
| 4 | 24/01/22 | | 1 | COB's:1, CO's:1 | 2 | Setting of cement,structure of hydrated cement |
| 5 | 25/01/22 | | 1 | COB's:1, CO's:1 | 2 | Tests on physical properties of cement, Manufacturing of cement |
| 6 | 27/01/22 | | 1 | COB's:1, CO's:1 | 2 | Admixtures in concrete. Mineral admixtures |
| 7 | 31/01/22 | | 1 | COB's:1, CO's:1 | 2&3 | Types of Mineral admixtures, Chemical admixtures |
| 8 | 02/02/22 | | 1 | COB's:1 CO's:1 | 2 | Aggregates-Classification of aggregates |
| 9 | 03/02/22 | | 2 | COB's:1 CO's:1 | 2&3 | Mechanical properties of aggregates, Sp.gravity,Bulk density, Porosity, Adsorption |
| 10 | 04/02/22 | | 1 | COB's:1 CO's:1 | 2 | Bulking of sand, Deleterious substance, Soundness, Alkali aggregate reaction, Thermal properties |
| 11 | 07/02/22 | | 1 | COB's:1 CO's:1 | 2&3 | Sieve analysis, Fineness Modulus (FM), Grading of Fine and Coarse aggregate |
| 12 | 09/02/22 | | 1 | COB's:1 CO's:1 | 2&3 | Grading curves,Gap graded aggregate, Maximum aggregate size. |
| 13 | 10/02/22 | II | 1 | COB's:2 CO's:2 | 2 & 3 | Fresh concrete, Manufacture of concrete, mixing, compaction curing |
| 14 | 11/02/22 | | 1 | COB's:2 CO's:2 | 2 & 3 | Workability-Factors affecting workability |
| 15 | 14/02/22 | | 1 | COB's:2 CO's:2 | 2 & 3 | Tests on workability ( slump test, compaction factor test, V Bee test) |
| 16 | 16/02/22 | | 1 | COB's:2 CO's:2 | 2 | Setting times of concrete, effect of time on workability |
| 17 | 17/02/22 | | 2 | COB's:2 CO's:2 | 2 | Segregation, bleeding, Mixing (hand and machine - mixing) |
| 18 | 18/02/22 | | 2 | COB's:2 CO's:2 | 2 | compaction of concrete |

| | | | | | | |
|---|---|---|---|---|---|---|
| 19 | 22/02/22 | | 1 | COB's:2<br>CO's:2 | 2 | Hardened concrete |
| 20 | 23/02/22 | | 1 | COB's:2<br>CO's:2 | 2 | Hardened concrete, w/c ratio, Abraham's law, Gel-space ratio |
| 22 | 24/02/22 | | 2 | COB's:2<br>CO's:2 | 2 | Factors effecting segregation and bleeding |
| 22 | 25/02/22 | III | 1 | COB's:3<br>CO's:3 | 2 | Maturity concept and problems |
| 23 | 28/02/22 | | 1 | COB's:3<br>CO's:3 | 2 & 3 | Strength in tension &compression, factors affecting strength |
| 24 | 02/03/22 | | 1 | COB's:3<br>CO's:3 | 2 & 3 | Relation between compression & tensile strength, curing |
| 25 | 03/03/22 | III | 2 | COB's:3<br>CO's:3 | 2 & 3 | Testing of hardened concrete |
| 26 | 04/03/22 | | 1 | COB's:3<br>CO's:3 | 2 & 3 | Compression and Tension tests |
| 27 | 07/03/22 | | 1 | COB's:3<br>CO's:3 | 2 & 3 | Flexure tests, Splitting tests |
| 28 | 09/03/22 | | 1 | COB's:3<br>CO's:3 | 2 & 3 | Non-Destructive Testing methods (NDT) |
| 29 | 10/03/22 | | 2 | COB's:3<br>CO's:3 | 2 & 3 | Codal provisions of NDT |
| 30 | 11/03/22 | | 1 | COB's:3<br>CO's:3 | 2 & 3 | Non-Destructive Tests – types |
| 31 | 14/03/22<br>15/03/22<br>16/03/22 | | | | | Mid 1 Exams |
| 32 | 17/03/22 | III | 1 | COB's:3<br>CO's:3 | 2 & 3 | Behavior of concrete in extreme environment; temperature problem in concreting |
| 33 | 22/03/22 | | 1 | COB's:3<br>CO's:3 | 2 & 3 | Resistance to freezing, sulphate and acid attack, efflorescence, fire resistance |
| 34 | 23/03/22 | | 1 | COB's:3<br>CO's:3 | 3 | Inspection and testing of concrete-Concrete cracking,types of cracks, causes and remedies |
| 35 | 24/03/22 | | 2 | COB's:3<br>CO's:3 | 2 & 3 | types of cracks, causes and remedies |
| 36 | 25/03/22 | | 1 | COB's:3<br>CO's:3 | 2 & 3 | Causes |
| 37 | 28/03/22 | IV | 1 | COB's:4<br>CO's:3 | 2 & 3 | Elasticity, Creep& Shrinkage of Concrete |
| 38 | 30/03/22 | | 1 | COB's:4<br>CO's:3 | 2 & 3 | Types of elasticity |
| 39 | 31/03/22 | | 2 | COB's:4<br>CO's:3 | 2 & 3 | Creep of concrete & Poisson's ratio |
| 40 | 01/04/22 | | 1 | COB's:4<br>CO's:3 | 2 & 3 | Factors influencing creep |
| 41 | 04/04/22 | | 1 | COB's:4<br>CO's:3 | 2 & 3 | Nature of creep, effects of creep |
| 42 | 06/04/22 | | 1 | COB's:4<br>CO's:3 | 2 & 3 | Shrinkage-Types of shrinkage |
| 43 | 07/04/22 | | 2 | COB's:4<br>CO's:4 | 2 & 3 | Introduction to Special concretes, Light weight aggregate and concrete, Cellular concrete |
| 44 | 08/04/22 | | 1 | COB's:4<br>CO's:4 | 2 & 3 | Fibre Reinforced Concrete (FRC), Different types of fibre, Factors affecting FRC, Applications of FRC |
| 45 | 11/04/22 | | 1 | COB's:4<br>CO's:4 | 2 & 3 | About polymer concrete, Types of polymer concrete Properties of polymer concrete and applications |
| 46 | 13/04/22 | | 1 | COB's:4<br>CO's:4 | 2 & 3 | High density concrete, No fines concrete, Applications of HDC and No fines concrete |

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|---|---|---|---|---|---|---|
| 47 | 18/04/22 | | 1 | COB's:4<br>CO's:4 | 2 & 3 | High performance concrete |
| 48 | 20/04/22 | | 1 | COB's:4<br>CO's:4 | 2 & 3 | Applications of High performance concrete |
| 49 | 22/04/22 | | 2 | COB's:4<br>CO's:4 | 2 & 3 | Self consolidating concrete and its applications |
| 50 | 22/04/22 | V | 1 | COB's:5<br>CO's: 5 | 5 | Mix Design, Factors in the choice of mix proportions |
| 51 | 25/04/22 | | 1 | COB's:5<br>CO's: 5 | 5 | Durability & Quality control of concrete |
| 52 | 27/04/22 | | 1 | COB's:5<br>CO's: 5 | 5 | Stastical methods and acceptance criteria |
| 53 | 28/04/22 | | 2 | COB's:5<br>CO's: 5 | 5 | Proportioning of concrete mixes by different methods |
| 54 | 02/05/22 | | 1 | COB's:5<br>CO's: 5 | 5 | Methods of Mix design |
| 55 | 04/05/22 | | 1 | COB's:5<br>CO's: 5 | 5 | BIS method of mix design |
| 56 | 05/05/22 | | 2 | COB's:5<br>CO's: 5 | 5 | BIS method of mix design (contd.) |
| 57 | 06/05/22 | | 1 | COB's:5<br>CO's: 5 | 5 | Problems - BIS method of mix design |
| 58 | 09/05/22 | | 1 | COB's:5CO's: 5 | 5 | Problems - BIS method of mix design |
| 59 | 11/05/22 | | 1 | COB's:5CO's: 5 | 5 | Miscellaneous Problems in mix design |
| 52 | 12/05/22<br>13/05/22<br>14/05/22 | | 1 | | | Mid -II Exams |

Signature of HOD

Signature of faculty

Date:

Date:

Note: 1. ENSURE THAT ALL TOPICS SPECIFIED IN THE COURSE ARE MENTIONED.
2. ADDITIONAL TOPICSCOVERED, IF ANY, MAY ALSO BE SPECIFIED IN BOLD
3. MENTION THE CORRESPONDING COURSE OBJECTIVE AND OUT COME NUMBERS AGAINST EACH TOPIC.

**GOKARAJU RANGARAJU**
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

# COURSE PLAN

Name of the Program: : B.Tech Year: III Section: B

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : C.Vanadeep Dept: Civil Engineering

Designation : ASSISTANT PROFESSOR

| S.No | Date | Unit No | Session Duration | Objectives & Outcomes Nos. | Bloom's Taxonomy Knowledge Level | Topics |
|---|---|---|---|---|---|---|
| 1 | 17/01/22 | I | 1 | COB's:1 CO's:1 | 1 | Introduction to Concrete Technology |
| 2 | 18/01/22 | | 1 | COB's:1 CO's:1 | 2 | History of Portland cement and grades of cement |
| 3 | 20/01/22 | | 1 | COB's:1 CO's:1 | 2 | Chemical composition and Hydration of cement |
| 4 | 24/01/22 | | 1 | COB's:1, CO's:1 | 2 | Setting of cement,structure of hydrated cement |
| 5 | 25/01/22 | | 1 | COB's:1, CO's:1 | 2 | Tests on physical properties of cement, Manufacturing of cement |
| 6 | 27/01/22 | | 1 | COB's:1, CO's:1 | 2 | Admixtures in concrete. Mineral admixtures |
| 7 | 31/01/22 | | 1 | COB's:1, CO's:1 | 2&3 | Types of Mineral admixtures, Chemical admixtures |
| 8 | 01/02/22 | | 1 | COB's:1 CO's:1 | 2 | Aggregates-Classification of aggregates |
| 9 | 03/02/22 | | 2 | COB's:1 CO's:1 | 2&3 | Mechanical properties of aggregates, Sp.gravity,Bulk density, Porosity, Adsorption |
| 10 | 07/02/22 | | 1 | COB's:1 CO's:1 | 2 | Bulking of sand, Deleterious substance, Soundness, Alkali aggregate reaction, Thermal properties |
| 11 | 08/02/22 | | 1 | COB's:1 CO's:1 | 2&3 | Sieve analysis, Fineness Modulus (FM), Grading of Fine and Coarse aggregate |
| 12 | 10/02/22 | | 1 | COB's:1 CO's:1 | 2&3 | Grading curves,Gap graded aggregate, Maximum aggregate size. |
| 13 | 14/02/22 | II | 1 | COB's:2 CO's:2 | 2 & 3 | Fresh concrete, Manufacture of concrete, mixing, compaction curing |
| 14 | 15/02/22 | | 1 | COB's:2 CO's:2 | 2 & 3 | Workability-Factors affecting workability |
| 15 | 16/02/22 | | 1 | COB's:2 CO's:2 | 2 & 3 | Tests on workability ( Slump test, compaction factor test, V Bee test) |
| 16 | 18/02/22 | | 2 | COB's:2 CO's:2 | 2 | Setting times of concrete, effect of time on workability |
| 17 | 18/02/22 | | 1 | COB's:2 CO's:2 | 2 | Segregation, bleeding, Mixing (hand and machine - mixing) |
| 18 | 21/02/22 | | 1 | COB's:2 CO's:2 | 2 | Compaction of concrete |
| 19 | 22/02/22 | | 1 | COB's:2 CO's:2 | 2 | Hardened concrete |

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|---|---|---|---|---|---|---|
| 20 | 23/02/22 | | 1 | COB's:2<br>CO's:2 | 2 | Hardened concrete, w/c ratio, Abraham's law, Gel-space ratio |
| 21 | 25/02/22 | | 1 | COB's:2<br>CO's:2 | 2 | Factors effecting segregation and bleeding |
| 23 | 25/02/22 | | 1 | COB's:2<br>CO's:2 | 2 | Maturity concept and problems |
| 24 | 02/03/22 | | 1 | COB's:2<br>CO's:2 | 2 | Strength in tension &compression, factors affecting strength |
| 25 | 03/03/22 | | 1 | COB's:2<br>CO's:2 | 2 | Relation between compression & tensile strength, curing |
| 22 | 04/03/22 | **III** | 1 | COB's:3<br>CO's:3 | 2 | Testing of hardened concrete |
| 23 | 04/03/22 | | 1 | COB's:3<br>CO's:3 | 2 & 3 | Compression and Tension tests |
| 24 | 08/03/22 | | 1 | COB's:3<br>CO's:3 | 2 & 3 | Flexure tests, Splitting tests |
| 25 | 09/03/22 | | 1 | COB's:3<br>CO's:3 | 2 & 3 | Non-Destructive Testing methods (NDT) |
| 26 | 10/03/22 | | 1 | COB's:3<br>CO's:3 | 2 & 3 | Codal provisions of NDT |
| 27 | 11/03/22 | | 1 | COB's:3<br>CO's:3 | 2 & 3 | Non-Destructive Tests – types |
| 28 | 14/03/22<br>15/03/22<br>16/03/22 | | | | | **Mid I Exams** |
| 29 | 17/03/22 | | 1 | COB's:3<br>CO's:3 | 2 & 3 | Behavior of concrete in extreme environment; temperature problem in concreting |
| 30 | 22/03/22 | | 1 | COB's:3<br>CO's:3 | 2 & 3 | Resistance to freezing, sulphate and acid attack, efflorescence, fire resistance |
| 31 | 23/03/22 | | 1 | COB's:3<br>CO's:3 | 2 & 3 | Inspection and testing of concrete-Concrete cracking, types of cracks |
| 32 | 24/03/22 | | 1 | COB's:3<br>CO's:3 | 2 & 3 | Types of cracks, causes and remedies |
| 37 | 25/03/22 | **IV** | 1 | COB's:4<br>CO's:3 | 2 & 3 | Elasticity, Creep & Shrinkage of Concrete |
| 38 | 25/03/22 | | 1 | COB's:4<br>CO's:3 | 2 & 3 | Elasticity |
| 39 | 29/03/22 | | 1 | COB's:4<br>CO's:3 | 2 & 3 | Types of elasticity |
| 40 | 30/03/22 | | 1 | COB's:4<br>CO's:3 | 2 & 3 | Creep of concrete & Poisson's ratio |
| 41 | 31/03/22 | | 1 | COB's:4<br>CO's:3 | 2 & 3 | Factors influencing creep |
| 42 | 01/04/22 | | 1 | COB's:4<br>CO's:3 | 2 & 3 | Nature of creep, effects of creep |
| 43 | 01/04/22 | | 1 | COB's:4<br>CO's:3 | 2 & 3 | Shrinkage-Types of shrinkage |
| 44 | 05/04/22 | | 1 | COB's:4<br>CO's:4 | 2 & 3 | Introduction to Special concretes, Light weight aggregate and concrete, Cellular concrete |
| 45 | 06/04/22 | | 1 | COB's:4<br>CO's:4 | 2 & 3 | Fibre Reinforced Concrete (FRC), Different types of fibre, Factors affecting FRC, Applications of FRC |
| 46 | 07/04/22 | | 1 | COB's:4<br>CO's:4 | 2 & 3 | About polymer concrete, Types of polymer concrete |
| 47 | 08/04/22 | | 1 | COB's:4<br>CO's:4 | 2 & 3 | Properties of polymer concrete and applications |
| 48 | 08/04/22 | | 1 | COB's:4<br>CO's:4 | 2 & 3 | High density concrete, No fines concrete, Applications of HDC and No fines concrete |
| 49 | 12/04/22 | | 1 | COB's:4 | 2 & 3 | High performance concrete |

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|---|---|---|---|---|---|---|
| | | | | CO's:4 | | |
| 50 | 13/04/22 | | 1 | COB's:4<br>CO's:4 | 2 & 3 | Self consolidating concrete and its applications |
| 50 | 19/04/22 | | 1 | COB's:5<br>CO's: 5 | 5 | Mix Design, Factors in the choice of mix proportions |
| 51 | 20/04/22 | | 1 | COB's:5<br>CO's: 5 | 5 | Durability & Quality control of concrete |
| 52 | 21/04/22 | **V** | 1 | COB's:5<br>CO's: 5 | 5 | Stastical methods and acceptance criteria |
| 53 | 22/04/22 | | 2 | COB's:5<br>CO's: 5 | 5 | Proportioning of concrete mixes by different methods |
| 54 | 26/04/22 | | 1 | COB's:5<br>CO's: 5 | 5 | Methods of Mix design |
| 55 | 28/04/22 | | 1 | COB's:5<br>CO's: 5 | 5 | BIS method of mix design |
| 56 | 29/04/22 | | 2 | COB's:5<br>CO's: 5 | 5 | BIS method of mix design (contd.) |
| 57 | 04/04/22 | | 1 | COB's:5<br>CO's: 5 | 5 | Problems - BIS method of mix design |
| 58 | 05/05/22 | | 1 | COB's:5CO's: 5 | 5 | Problems - BIS method of mix design |
| 59 | 06/05/22 | | 1 | COB's:5CO's: 5 | 5 | Miscellaneous Problems in mix design |
| 60 | 09/06/22 | | 1 | COB's:5CO's: 5 | 5 | Miscellaneous Problems in mix design |
| 61 | 10/05/22 | | 1 | COB's:5CO's: 5 | 5 | Miscellaneous Problems in mix design |
| 62 | 12/05/22<br>13/05/22<br>14/05/22 | | 1 | | | Mid -II Exams |

Signature of HOD

Signature of faculty

Date:

Date:

Note: 1. ENSURE THAT ALL TOPICS SPECIFIED IN THE COURSE ARE MENTIONED.
4. ADDITIONAL TOPICSCOVERED, IF ANY, MAY ALSO BE SPECIFIED IN BOLD
5. MENTION THE CORRESPONDING COURSE OBJECTIVE AND OUT COME NUMBERS AGAINST EACH TOPIC.

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY
UNIT PLAN

Name of the Program: : B.Tech Year: III Section: A

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : PVVSSR KRISHNA Dept: Civil

Engineering Designation : ASSISTANT PROFESSOR

| S.No | Date | Unit No | Session Duration | Objectives & Outcomes Nos. | Bloom's Taxonomy Knowledge Level | Topics |
|---|---|---|---|---|---|---|
| 1 | 17/01/22 | I | 1 | COB's:1 CO's:1 | 1 | Introduction to Concrete Technology |
| 2 | 18/01/22 | | 1 | COB's:1 CO's:1 | 2 | History of Portland cement and grades of cement |
| 3 | 20/01/22 | | 1 | COB's:1 CO's:1 | 2 | Chemical composition and Hydration of cement |
| 4 | 24/01/22 | | 1 | COB's:1, CO's:1 | 2 | Setting of cement,structure of hydrated cement |
| 5 | 25/01/22 | | 1 | COB's:1, CO's:1 | 2 | Tests on physical properties of cement, Manufacturing of cement |
| 6 | 27/01/22 | | 1 | COB's:1, CO's:1 | 2 | Admixtures in concrete. Mineral admixtures |
| 7 | 31/01/22 | | 1 | COB's:1, CO's:1 | 2&3 | Types of Mineral admixtures, Chemical admixtures |
| 8 | 02/02/22 | | 1 | COB's:1 CO's:1 | 2 | Aggregates-Classification of aggregates |
| 9 | 03/02/22 | | 2 | COB's:1 CO's:1 | 2&3 | Mechanical properties of aggregates, Sp.gravity,Bulk density, Porosity, Adsorption |
| 10 | 04/02/22 | | 1 | COB's:1 CO's:1 | 2 | Bulking of sand, Deleterious substance, Soundness, Alkali aggregate reaction, Thermal properties |
| 11 | 07/02/22 | | 1 | COB's:1 CO's:1 | 2&3 | Sieve analysis, Fineness Modulus (FM), Grading of Fine and Coarse aggregate |
| 12 | 09/02/22 | | 1 | COB's:1 CO's:1 | 2&3 | Grading curves,Gap graded aggregate, Maximum aggregate size. |

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY
UNIT PLAN

Name of the Program: : B.Tech Year: III Section: A

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : PVVSSR KRISHNA Dept: Civil

Engineering Designation : ASSISTANT PROFESSOR

| S.No | Date | Unit No | Session Duration | Objectives & Outcomes Nos. | Bloom's Taxonomy Knowledge Level | Topics |
|---|---|---|---|---|---|---|
| 1 | 10/02/22 | II | 1 | COB's:2 CO's:2 | 2 & 3 | Fresh concrete, Manufacture of concrete, mixing, compaction curing |
| 2 | 11/02/22 | | 1 | COB's:2 CO's:2 | 2 & 3 | Workability-Factors affecting workability |
| 3 | 14/02/22 | | 1 | COB's:2 CO's:2 | 2 & 3 | Tests on workability ( slump test, compaction factor test, V Bee test) |
| 4 | 16/02/22 | | 1 | COB's:2 CO's:2 | 2 | Setting times of concrete, effect of time on workability |
| 5 | 17/02/22 | | 2 | COB's:2 CO's:2 | 2 | Segregation, bleeding, Mixing (hand and machine - mixing) |
| 6 | 18/02/22 | | 2 | COB's:2 CO's:2 | 2 | compaction of concrete |
| 7 | 22/02/22 | | 1 | COB's:2 CO's:2 | 2 | Hardened concrete |
| 8 | 23/02/22 | | 1 | COB's:2 CO's:2 | 2 | Hardened concrete, w/c ratio, Abraham's law, Gel-space ratio |
| 9 | 24/02/22 | | 2 | COB's:2 CO's:2 | 2 | Factors effecting segregation and bleeding |

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY
UNIT PLAN

Name of the Program: : B.Tech Year: III Section: A

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : PVVSSR KRISHNA Dept: Civil

Engineering Designation : ASSISTANT PROFESSOR

| S.No | Date | Unit No | Session Duration | Objectives & Outcomes Nos. | Bloom's Taxonomy Knowledge Level | Topics |
|---|---|---|---|---|---|---|
| 1 | 25/02/22 | III | 1 | COB's:3 CO's:3 | 2 | Maturity concept and problems |
| 2 | 28/02/22 | | 1 | COB's:3 CO's:3 | 2 & 3 | Strength in tension &compression, factors affecting strength |
| 3 | 02/03/22 | | 1 | COB's:3 CO's:3 | 2 & 3 | Relation between compression & tensile strength, curing |
| 4 | 03/03/22 | | 2 | COB's:3 CO's:3 | 2 & 3 | Testing of hardened concrete |
| 5 | 04/03/22 | | 1 | COB's:3 CO's:3 | 2 & 3 | Compression and Tension tests |
| 6 | 07/03/22 | | 1 | COB's:3 CO's:3 | 2 & 3 | Flexure tests, Splitting tests |
| 7 | 09/03/22 | | 1 | COB's:3 CO's:3 | 2 & 3 | Non-Destructive Testing methods (NDT) |
| 8 | 10/03/22 | | 2 | COB's:3 CO's:3 | 2 & 3 | Codal provisions of NDT |
| 9 | 11/03/22 | | 1 | COB's:3 CO's:3 | 2 & 3 | Non-Destructive Tests – types |
| 10 | 17/03/22 | | 1 | COB's:3 CO's:3 | 2 & 3 | Behavior of concrete in extreme environment; temperature problem in concreting |
| 11 | 22/03/22 | | 1 | COB's:3 CO's:3 | 2 & 3 | Resistance to freezing, sulphate and acid attack, efflorescence, fire resistance |
| 12 | 23/03/22 | | 1 | COB's:3 CO's:3 | 3 | Inspection and testing of concrete-Concrete cracking,types of cracks, causes and remedies |
| 13 | 24/03/22 | | 2 | COB's:3 CO's:3 | 2 & 3 | types of cracks, causes and remedies |
| 14 | 25/03/22 | | 1 | COB's:3 CO's:3 | 2 & 3 | Causes |

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY
UNIT PLAN

Name of the Program: : B.Tech Year: III Section: A

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : PVVSSR KRISHNA Dept: Civil

Engineering Designation : ASSISTANT PROFESSOR

| S.No | Date | Unit No | Session Duration | Objectives & Outcomes Nos. | Bloom's Taxonomy Knowledge Level | Topics |
|---|---|---|---|---|---|---|
| 1 | 28/03/22 | IV | 1 | COB's:4 CO's:3 | 2 & 3 | Elasticity, Creep& Shrinkage of Concrete |
| 2 | 30/03/22 | | 1 | COB's:4 CO's:3 | 2 & 3 | Types of elasticity |
| 3 | 31/03/22 | | 2 | COB's:4 CO's:3 | 2 & 3 | Creep of concrete & Poisson's ratio |
| 4 | 01/04/22 | | 1 | COB's:4 CO's:3 | 2 & 3 | Factors influencing creep |
| 5 | 04/04/22 | | 1 | COB's:4 CO's:3 | 2 & 3 | Nature of creep, effects of creep |
| 6 | 06/04/22 | | 1 | COB's:4 CO's:4 | 2 & 3 | Shrinkage-Types of shrinkage |
| 7 | 07/04/22 | | 2 | COB's:4 CO's:4 | 2 & 3 | Introduction to Special concretes, Light weight aggregate and concrete, Cellular concrete |
| 8 | 08/04/22 | | 1 | COB's:4 CO's:4 | 2 & 3 | Fibre Reinforced Concrete (FRC), Different types of fibre, Factors affecting FRC, Applications of FRC |
| 9 | 11/04/22 | | 1 | COB's:4 CO's:4 | 2 & 3 | About polymer concrete, Types of polymer concrete Properties of polymer concrete and applications |
| 10 | 13/04/22 | | 1 | COB's:4 CO's:4 | 2 & 3 | High density concrete, No fines concrete, Applications of HDC and No fines concrete |
| 11 | 18/04/22 | | 1 | COB's:4 CO's:4 | 2 & 3 | High performance concrete |
| 12 | 20/04/22 | | 1 | COB's:4 CO's:4 | 2 & 3 | Applications of High performance concrete |
| 13 | 22/04/22 | | 2 | COB's:4 CO's:4 | 2 & 3 | Self consolidating concrete and its applications |

GOKARAJU RANGARAJU
INSTITUTE OF ENGINEERING AND TECHNOLOGY
UNIT PLAN

Name of the Program: : B.Tech Year: III Section: A

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : PVVSSR KRISHNA Dept: Civil

Engineering Designation : ASSISTANT PROFESSOR

| S.No | Date | Unit No | Session Duration | Objectives & Outcomes Nos. | Bloom's Taxonomy Knowledge Level | Topics |
|---|---|---|---|---|---|---|
| 1 | 22/04/22 | V | 1 | COB's:5 CO's: 5 | 5 | Mix Design, Factors in the choice of mix proportions |
| 2 | 25/04/22 | | 1 | COB's:5 CO's: 5 | 5 | Durability & Quality control of concrete |
| 3 | 27/04/22 | | 1 | COB's:5 CO's: 5 | 5 | Stastical methods and acceptance criteria |
| 4 | 28/04/22 | | 2 | COB's:5 CO's: 5 | 5 | Proportioning of concrete mixes by different methods |
| 5 | 02/05/22 | | 1 | COB's:5 CO's: 5 | 5 | Methods of Mix design |
| 6 | 04/05/22 | | 1 | COB's:5 CO's: 5 | 5 | BIS method of mix design |
| 7 | 05/05/22 | | 2 | COB's:5 CO's: 5 | 5 | BIS method of mix design (contd.) |
| 8 | 06/05/22 | | 1 | COB's:5 CO's: 5 | 5 | Problems - BIS method of mix design |
| 9 | 09/05/22 | | 1 | COB's:5 CO's: 5 | 5 | Problems - BIS method of mix design |
| 10 | 11/05/22 | | 1 | COB's:5 CO's: 5 | 5 | Miscellaneous Problems in mix design |

**GOKARAJU RANGARAJU**
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**
**UNIT PLAN**

Name of the Program: : B.Tech Year: III Section: B

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : C.Vanadeep Dept: Civil Engineering

Designation : ASSISTANT PROFESSOR

| S.No | Date | Unit No | Session Duration | Objectives & Outcomes Nos. | Bloom's Taxonomy Knowledge Level | Topics |
|---|---|---|---|---|---|---|
| 1 | 17/01/22 | I | 1 | COB's:1 CO's:1 | 1 | Introduction to Concrete Technology |
| 2 | 18/01/22 | | 1 | COB's:1 CO's:1 | 2 | History of Portland cement and grades of cement |
| 3 | 20/01/22 | | 1 | COB's:1 CO's:1 | 2 | Chemical composition and Hydration of cement |
| 4 | 24/01/22 | | 1 | COB's:1, CO's:1 | 2 | Setting of cement,structure of hydrated cement |
| 5 | 25/01/22 | | 1 | COB's:1, CO's:1 | 2 | Tests on physical properties of cement, Manufacturing of cement |
| 6 | 27/01/22 | | 1 | COB's:1, CO's:1 | 2 | Admixtures in concrete. Mineral admixtures |
| 7 | 31/01/22 | | 1 | COB's:1, CO's:1 | 2&3 | Types of Mineral admixtures, Chemical admixtures |
| 8 | 01/02/22 | | 1 | COB's:1 CO's:1 | 2 | Aggregates-Classification of aggregates |
| 9 | 03/02/22 | | 2 | COB's:1 CO's:1 | 2&3 | Mechanical properties of aggregates, Sp.gravity,Bulk density, Porosity, Adsorption |
| 10 | 07/02/22 | | 1 | COB's:1 CO's:1 | 2 | Bulking of sand, Deleterious substance, Soundness, Alkali aggregate reaction, Thermal properties |
| 11 | 08/02/22 | | 1 | COB's:1 CO's:1 | 2&3 | Sieve analysis, Fineness Modulus (FM), Grading of Fine and Coarse aggregate |
| 12 | 10/02/22 | | 1 | COB's:1 CO's:1 | 2&3 | Grading curves,Gap graded aggregate, Maximum aggregate size. |

**GOKARAJU RANGARAJU**
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**
**UNIT PLAN**

Name of the Program: : B.Tech Year: III Section: B

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : C.Vanadeep Dept: Civil Engineering

Designation : ASSISTANT PROFESSOR

| S.No | Date | Unit No | Session Duration | Objectives & Outcomes Nos. | Bloom's Taxonomy Knowledge Level | Topics |
|---|---|---|---|---|---|---|
| 1. | 14/02/22 | II | 1 | COB's:2 CO's:2 | 2 & 3 | Fresh concrete, Manufacture of concrete, mixing, compaction curing |
| 2. | 15/02/22 | | 1 | COB's:2 CO's:2 | 2 & 3 | Workability-Factors affecting workability |
| 3. | 16/02/22 | | 1 | COB's:2 CO's:2 | 2 & 3 | Tests on workability ( Slump test, compaction factor test, V Bee test) |
| 4. | 18/02/22 | | 2 | COB's:2 CO's:2 | 2 | Setting times of concrete, effect of time on workability |
| 5. | 18/02/22 | | 1 | COB's:2 CO's:2 | 2 | Segregation, bleeding, Mixing (hand and machine - mixing) |
| 6. | 21/02/22 | | 1 | COB's:2 CO's:2 | 2 | Compaction of concrete |
| 7. | 22/02/22 | | 1 | COB's:2 CO's:2 | 2 | Hardened concrete |
| 8. | 23/02/22 | | 1 | COB's:2 CO's:2 | 2 | Hardened concrete, w/c ratio, Abraham's law, Gel-space ratio |
| 9. | 25/02/22 | | 1 | COB's:2 CO's:2 | 2 | Factors effecting segregation and bleeding |
| 10 | 25/02/22 | | 1 | COB's:2 CO's:2 | 2 | Maturity concept and problems |
| 11 | 02/03/22 | | 1 | COB's:2 CO's:2 | 2 | Strength in tension &compression, factors affecting strength |
| 12 | 03/03/22 | | 1 | COB's:2 CO's:2 | 2 | Relation between compression & tensile strength, curing |

**GOKARAJU RANGARAJU**
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**
**UNIT PLAN**

Name of the Program: : B.Tech Year: III Section: B

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : C.Vanadeep Dept: Civil Engineering

Designation : ASSISTANT PROFESSOR

| S.No | Date | Unit No | Session Duration | Objectives & Outcomes Nos. | Bloom's Taxonomy Knowledge Level | Topics |
|---|---|---|---|---|---|---|
| 1. | 04/03/22 | **III** | 1 | COB's:3 CO's:3 | 2 | Testing of hardened concrete |
| 2. | 04/03/22 | | 1 | COB's:3 CO's:3 | 2 & 3 | Compression and Tension tests |
| 3. | 08/03/22 | | 1 | COB's:3 CO's:3 | 2 & 3 | Flexure tests, Splitting tests |
| 4. | 09/03/22 | | 1 | COB's:3 CO's:3 | 2 & 3 | Non-Destructive Testing methods (NDT) |
| 5. | 10/03/22 | | 1 | COB's:3 CO's:3 | 2 & 3 | Codal provisions of NDT |
| 6. | 11/03/22 | | 1 | COB's:3 CO's:3 | 2 & 3 | Non-Destructive Tests – types |
| 7. | 14/03/22 15/03/22 16/03/22 | | | | | **Mid I Exams** |
| 8 | 17/03/22 | | 1 | COB's:3 CO's:3 | 2 & 3 | Behavior of concrete in extreme environment; temperature problem in concreting |
| 9 | 22/03/22 | | 1 | COB's:3 CO's:3 | 2 & 3 | Resistance to freezing, sulphate and acid attack, efflorescence, fire resistance |
| 10 | 23/03/22 | | 1 | COB's:3 CO's:3 | 2 & 3 | Inspection and testing of concrete-Concrete cracking, types of cracks |
| 11 | 24/03/22 | | 1 | COB's:3 CO's:3 | 2 & 3 | Types of cracks, causes and remedies |

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**INSTITUTE OF ENGINEERING AND TECHNOLOGY**
**UNIT PLAN**

Name of the Program: : B.Tech Year: III Section: B

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : C.Vanadeep Dept: Civil Engineering

Designation : ASSISTANT PROFESSOR

| S.No | Date | Unit No | Session Duration | Objectives & Outcomes Nos. | Bloom's Taxonomy Knowledge Level | Topics |
|---|---|---|---|---|---|---|
| 1 | 25/03/22 | **IV** | 1 | COB's:4 CO's:3 | 2 & 3 | Elasticity, Creep & Shrinkage of Concrete |
| 2 | 25/03/22 | | 1 | COB's:4 CO's:3 | 2 & 3 | Elasticity |
| 3 | 29/03/22 | | 1 | COB's:4 CO's:3 | 2 & 3 | Types of elasticity |
| 4 | 30/03/22 | | 1 | COB's:4 CO's:3 | 2 & 3 | Creep of concrete & Poisson's ratio |
| 5 | 31/03/22 | | 1 | COB's:4 CO's:3 | 2 & 3 | Factors influencing creep |
| 6 | 01/04/22 | | 1 | COB's:4 CO's:3 | 2 & 3 | Nature of creep, effects of creep |
| 7 | 01/04/22 | | 1 | COB's:4 CO's:3 | 2 & 3 | Shrinkage-Types of shrinkage |
| 8 | 05/04/22 | | 1 | COB's:4 CO's:4 | 2 & 3 | Introduction to Special concretes, Light weight aggregate and concrete, Cellular concrete |
| 9 | 06/04/22 | | 1 | COB's:4 CO's:4 | 2 & 3 | Fibre Reinforced Concrete (FRC), Different types of fibre, Factors affecting FRC, Applications of FRC |
| 10 | 07/04/22 | | 1 | COB's:4 CO's:4 | 2 & 3 | About polymer concrete, Types of polymer concrete |
| 11 | 08/04/22 | | 1 | COB's:4 CO's:4 | 2 & 3 | Properties of polymer concrete and applications |
| 12 | 08/04/22 | | 1 | COB's:4 CO's:4 | 2 & 3 | High density concrete, No fines concrete, Applications of HDC and No fines concrete |
| 13 | 12/04/22 | | 1 | COB's:4 CO's:4 | 2 & 3 | High performance concrete |
| 14 | 13/04/22 | | 1 | COB's:4 CO's:4 | 2 & 3 | Self consolidating concrete and its applications |

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**INSTITUTE OF ENGINEERING AND TECHNOLOGY**
**UNIT PLAN**

Name of the Program: : B.Tech Year: III Section: B

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : C.Vanadeep Dept: Civil Engineering

Designation : ASSISTANT PROFESSOR

| S.No | Date | Unit No | Session Duration | Objectives & Outcomes Nos. | Bloom's Taxonomy Knowledge Level | Topics |
|---|---|---|---|---|---|---|
| 1 | 19/04/22 | V | 1 | COB's:5 CO's: 5 | 5 | Mix Design, Factors in the choice of mix proportions |
| 2 | 20/04/22 | | 1 | COB's:5 CO's: 5 | 5 | Durability & Quality control of concrete |
| 3 | 21/04/22 | | 1 | COB's:5 CO's: 5 | 5 | Stastical methods and acceptance criteria |
| 4 | 22/04/22 | | 2 | COB's:5 CO's: 5 | 5 | Proportioning of concrete mixes by different methods |
| 5 | 26/04/22 | | 1 | COB's:5 CO's: 5 | 5 | Methods of Mix design |
| 6 | 28/04/22 | | 1 | COB's:5 CO's: 5 | 5 | BIS method of mix design |
| 7 | 29/04/22 | | 2 | COB's:5 CO's: 5 | 5 | BIS method of mix design (contd.) |
| 8 | 04/04/22 | | 1 | COB's:5 CO's: 5 | 5 | Problems - BIS method of mix design |
| 9 | 05/05/22 | | 1 | COB's:5 CO's: 5 | 5 | Problems - BIS method of mix design |
| 10 | 06/05/22 | | 1 | COB's:5 CO's: 5 | 5 | Miscellaneous Problems in mix design |
| 11 | 09/06/22 | | 1 | COB's:5 CO's: 5 | 5 | Miscellaneous Problems in mix design |
| 12 | 10/05/22 | | 1 | COB's:5 CO's: 5 | 5 | Miscellaneous Problems in mix design |

**GOKARAJU RANGARAJU**
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# EVALUATION STRATEGY

**A**cademic **Y**ear : 2021-22

Semester : II

Name of the Program: : B.Tech Year: III Section: A& B

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : P Krishna/C.Vanadeep Dept: Civil Engineering

Designation : Assistant Professor

1. TARGET:

A) Percentage of pass: 95%

b) Percentage of class:

Total strength of the class (A & B ): 130

| Sl. No. | Class/Division | No. of Students |
|---|---|---|
| 1 | First class with distinction | 55 |
| 2 | First class | 65 |
| 3 | Pass class | 10 |

2. COURSE PLAN& CONTENT DELIVERY

| Sl.No. | Plan | Brief Description |
|---|---|---|
| 1 | Practice classes | 70 classes for A and 60 classes for B section |
| 2 | Presentations | Presentations of videos on different tests conducted on aggregate, fresh and hardened concrete. |

METHOD OF EVALUATION

3.1 Continuous Assessment Examinations

A). **Assignments:** Assignments to assess the knowledge of students on concrete Technology basics, cements, admixtures, aggregates, fresh concrete, hardened concrete,mix design and special concrete.

B).**Seminars:** To assess the knowledge of students on concrete technology of various new topics which are not covered under syllabus.

C) **Quiz:** To assess the knowledge of students on concrete technology basics, cements, admixtures, aggregates fresh concrete, hardened concrete, mix design and special concrete.

D) **Internal Examination**: Internal Examination to assess the overall knowledge on concrete Technology in two numbers, each on half syllabus.

3.2 Semester End Examinations: To test their abilities in concrete technology and to approve their abilities learnt during the course.

3. List out any new topic(s) or any innovation you would like to introduce in teaching the subjects in this Semester.

Introduce Geopolymer concrete, since it is a new trend of concrete for the research.

Signature of HOD

Date:

Signature of faculty

Date:

**GOKARAJU RANGARAJU**
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**
**MAPPING**

**A**cademic **Y**ear : 2021-22

Semester : II

Name of the Program: : B.Tech Year: III Section: A& B

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : P Krishna/C.Vanadeep Dept: Civil Engineering

Designation : Assistant Professo

| GR18A3071 Concrete Technology | **Course outcomes** | | | | |
|---|---|---|---|---|---|
| **Course Objectives** | 1 | 2 | 3 | 4 | 5 |
| 1 | X | | | | |
| 2 | | X | | | |
| 3 | | | X | | |
| 4 | | | | X | |
| 5 | | | | | X |

Assessments
1.Assignment
2.Internal Examination
3.External Examination
4.Practical Projects

| GR18A3071 Concrete Technology | **Course outcomes** | | | | |
|---|---|---|---|---|---|
| Assessments | 1 | 2 | 3 | 4 | 5 |
| 1 | X | X | X | X | X |
| 2 | X | X | X | X | X |
| 3 | X | X | X | X | X |
| 4 | | | | X | X |

| GR18A3071<br>Concrete Technology | **Course Objectives** | | | | |
|---|---|---|---|---|---|
| Assessments | 1 | 2 | 3 | 4 | 5 |
| 1 | X | X | X | X | X |
| 2 | X | X | X | X | X |
| 3 | X | X | X | X | X |
| 4 | | | | X | X |

| GR18A3071<br>Concrete Technology | **Program Outcomes** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Course Objectives** | **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** |
| 1 | X | X | | X | | X | X | X | | | | X |
| 2 | X | X | | X | | X | X | X | | | | X |
| 3 | X | X | | X | | X | X | X | | | | X |
| 4 | X | X | | X | | X | X | X | | | | X |
| 5 | X | X | X | X | | X | X | X | X | | | X |

| PEO's<br>CO's | 1 | 2 | 3 |
|---|---|---|---|
| 1 | X | X | X |
| 2 | X | X | X |
| 3 | X | X | X |
| 4 | X | X | X |
| 5 | X | X | X |
| 6 | X | X | X |
| 7 | X | X | X |

| PO's Assessments | a | B | c | d | e | f | g | h | i | j | k | l |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | X | X | X | X | | X | X | | X | X | | X |
| 2 | X | X | X | X | | X | X | | X | X | | X |
| 3 | X | X | X | X | | X | X | | X | X | | X |
| 4 | X | X | X | X | | X | X | | X | X | | X |
| 5 | X | X | X | X | | X | X | | X | X | | X |

| PEO's Assessments | 1 | 2 | 3 |
|---|---|---|---|
| 1 | X | X | X |
| 2 | X | X | X |
| 3 | X | X | X |
| 4 | X | X | X |
| 5 | X | X | X |

**GOKARAJU RANGARAJU**
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**TUTORIAL SHEETS**

**A**cademic **Y**ear : 2021-22

Semester : II

Name of the Program: : B.Tech Year: III Section: A& B

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : P Krishna/C.Vanadeep Dept: Civil Engineering

Designation : Assistant Professor

This Tutorial corresponds to Unit No. I

Q1. (a) Explain in detail the compressive strength test on cement.
(b) Explain the role of C3S and C3A on the properties of cement.

Q2. What are chemical admixtures? Explain different types of admixtures.

Q3. Explain about Bogues compounds. Given the chemical composition of cement and how the Bogues compounds are calculated?

Q4. Discuss about heat of hydration of cement.

Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the Objectives/Outcomes to which these Questions / Problems / Exercises are related.

Objective Nos.: 1

Outcome Nos.: 1

Signature of HOD Signature of faculty

Date: Date:

**GOKARAJU RANGARAJU**
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**TUTORIAL SHEETS**

**A**cademic **Y**ear : 2021-22

Semester : II

Name of the Program: : B.Tech Year: III Section: A& B

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : P Krishna/C.Vanadeep Dept: Civil Engineering

Designation : Assistant Professor

This Tutorial corresponds to Unit No. I

Q1. Explain classification of aggregates.

Q2. (a) Explain various deleterious materials in aggregates and their limits.
(b) Explain the method of determining aggregate crushing value of coarse aggregate.

Q3. Explain specific gravity test of fine aggregate.

Q4. Define Bulking of fine aggregate and Explain its practical significance.

Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the Objectives/Outcomes to which these Questions / Problems / Exercises are related.

Objective Nos.: 1

Outcome Nos.: 1

Signature of HOD Signature of faculty

Date: Date:

**GOKARAJU RANGARAJU**
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**TUTORIAL SHEETS**

**A**cademic **Y**ear : 2021-22

Semester : II

Name of the Program: : B.Tech Year: III Section: A& B

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : P Krishna/C.Vanadeep Dept: Civil Engineering

Designation : Assistant Professor

This Tutorial corresponds to Unit No.II

Q1. (a) Define workability of fresh concrete.
(b) Explain the factors affecting workability of concrete.

Q2. Explain how setting times of fresh concrete are determined.

Q3. Explain procedure for determination of workability of concrete using Vee Bee Consistometer test with neat diagram.

Q4. (a) Explain the Gel/Space ratio method of strength estimation of concrete.
(b) Explain the maturity concept method of estimating strength of concrete.

Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the Objectives/Outcomes to which these Questions / Problems / Exercises are related.

Objective Nos.: 2

Outcome Nos.: 2

Signature of HOD Signature of faculty

Date: Date:

**GOKARAJU RANGARAJU**
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**
**TUTORIAL SHEETS**

**A**cademic **Y**ear : 2021-22

Semester : II

Name of the Program: : B.Tech Year: III Section: A& B

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : P Krishna/C.Vanadeep Dept: Civil Engineering

Designation : Assistant Professor

This Tutorial corresponds to Unit No.III

Q1. (a) Explain the relation between tensile and compressive strengths of concrete.
(b) Explain the split tension tests on cylinders and cubes with neat sketches.

Q2. Explain about static and dynamic modulus of elasticity of concrete.

Q3. List out and explain the factors on which the properties of hardened concrete depends.

Q4. What are the effects of creep on concrete?

Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the Objectives/Outcomes to which these Questions / Problems / Exercises are related.

Objective Nos.: 3

Outcome Nos.: 3

Signature of HOD Signature of faculty

Date: Date:

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**INSTITUTE OF ENGINEERING AND TECHNOLOGY**

**TUTORIAL SHEETS**

**A**cademic **Y**ear : 2021-22

Semester : II

Name of the Program: : B.Tech Year: III Section: A& B

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : P Krishna/C.Vanadeep Dept: Civil Engineering

Designation : Assistant Professor

This Tutorial corresponds to Unit No.IV

Q1. (a) Explain the relation between tensile and compressive strengths of concrete.
(b) Explain the split tension tests on cylinders and cubes with neat sketches.

Q2. Explain about static and dynamic modulus of elasticity of concrete.

Q3. List out and explain the factors on which the properties of hardened concrete depends.

Q4. What are the effects of creep on concrete?

Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the Objectives/Outcomes to which these Questions / Problems / Exercises are related.

Objective Nos.: 4

Outcome Nos.: 4

Signature of HOD Signature of faculty

Date: Date:

**GOKARAJU RANGARAJU**
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**
**TUTORIAL SHEETS**

**A**cademic **Y**ear : 2021-22

Semester : II

Name of the Program: : B.Tech Year: III Section: A& B

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : P Krishna/C.Vanadeep Dept: Civil Engineering

Designation : Assistant Professor

This Tutorial corresponds to Unit No. V

Q1. Explain in detail about High strength and high performance concrete.

Q2. (a) Explain salient features of self-compacting concrete.
(b) Explain various test methods for assessing workability properties of self-compacting concrete.

Q3. What is no fines concrete? What are its advantages?

Q4. What is the procedure involved in BIS method of mix design?

Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the Objectives/Outcomes to which these Questions / Problems / Exercises are related.

Objective Nos.: 5

Outcome Nos.: 5

Signature of HOD Signature of faculty

Date: Date:

**GOKARAJU RANGARAJU**
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**
**ASSIGNMENT SHEETS**

**A**cademic **Y**ear : 2021-22

Semester : II

Name of the Program: : B.Tech Year: III Section: A& B

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : P Krishna/C.Vanadeep Dept: Civil Engineering

Designation : Assistant Professor

Designation : ASSISTANT PROFESSOR

This assignment corresponds to Unit No. I

Q1. Explain about the history of cement.

Q2. List out the Mineral admixtures? And explain any three.

Q3. Explain the manufacturing process of cement by Wet method.

Q4. Write down the testing procedure of fineness of cement.

Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the Objectives/Outcomes to which these Questions / Problems / Exercises are related.

Objective Nos.: 1

Outcome Nos.: 1

Signature of HOD Signature of faculty

Date: Date:

**GOKARAJU RANGARAJU**
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**
**ASSIGNMENT SHEETS**

**A**cademic **Y**ear : 2021-22

Semester : II

Name of the Program: : B.Tech Year: III Section: A& B

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : P Krishna/C.Vanadeep Dept: Civil Engineering

Designation : Assistant Professor

This assignment corresponds to Unit No. II

Q1. Discuss the classification of aggregates.

Q2. Write down about the grading curves and gap grading.

Q3. Write down the bulking phenomenon of sand.

Q4. Write down the test procedure to determine the silt content in sand.

Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the Objectives/Outcomes to which these Questions / Problems / Exercises are related.

Objective Nos.: 2

Outcome Nos.: 2

Signature of HOD Signature of faculty

Date: Date:

**GOKARAJU RANGARAJU**
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**
**ASSIGNMENT SHEETS**

**A**cademic **Y**ear : 2021-22

Semester : II

Name of the Program: : B.Tech Year: III Section: A& B

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : P Krishna/C.Vanadeep Dept: Civil Engineering

Designation : Assistant Professor

This assignment corresponds to Unit No. III

Q1. What are the advantages of concrete over other engineering materials?

Q2. Write down the procedure of measuring workability of concrete by flow test.

Q3. Explain the causes and remedies of bleeding of concrete.

Q4. Explain about Abraham's law.

Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the Objectives/Outcomes to which these Questions / Problems / Exercises are related.

Objective Nos.: 3

Outcome Nos.: 3

Signature of HOD Signature of faculty

Date: Date:

**GOKARAJU RANGARAJU**
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**
**ASSIGNMENT SHEETS**

**A**cademic **Y**ear : 2021-22

Semester : II

Name of the Program: : B.Tech Year: III Section: A& B

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : P Krishna/C.Vanadeep Dept: Civil Engineering

Designation : Assistant Professor

This assignment corresponds to Unit No. IV

Q1. Write down the flexure test procedure.

Q2. Explain the test core of concrete.

Q3. Write down the test procedure of Surface hardness and rebound hammer.

Q4. Explain the stress-strain relationship of concrete.

Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the Objectives/Outcomes to which these Questions / Problems / Exercises are related.

Objective Nos.: 4

Outcome Nos.: 4

Signature of HOD Signature of faculty

Date: Date:

**GOKARAJU RANGARAJU**
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**
**ASSIGNMENT SHEETS**

**A**cademic **Y**ear : 2021-22

Semester : II

Name of the Program: : B.Tech Year: III Section: A& B

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : P Krishna/C.Vanadeep Dept: Civil Engineering

Designation : Assistant Professor

Q1. . Explain about light weight concrete

Q2. What factors are affecting FRC

Q3. Explain about the high performance concrete.

Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the Objectives/Outcomes to which these Questions / Problems / Exercises are related.

Objective Nos.: 5

Outcome Nos.: 5

Signature of HOD Signature of faculty

Date: Date:

**GOKARAJU RANGARAJU**
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**
**RUBRIC TEMPLATE**

**A**cademic **Y**ear : 2021-22

Semester : II

Name of the Program: : B.Tech Year: III Section: A& B

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : P Krishna/C.Vanadeep Dept: Civil Engineering

Designation : Assistant Professor

**Objective:** To learn basics and concepts of Concrete Technology.

**Student Outcome**: List the grades of cement, the types of cement and the types of different admixtures. Classify the types and the physical properties of aggregates. Clarify the physical properties of fresh and hardened concrete and also about the manufacturing of concrete. Estimate the creep and shrinkage of concrete and how to conduct the different tests such as compression and tension etc. on hardened concrete. Design the mix proportions for the specific work for required strength and workability with available materials at work place.

| | | | **Beginning** | **Developing** | **Reflecting Development** | **Accomplished** | **Exemplary** | **Score** |
|---|---|---|---|---|---|---|---|---|
| **S. No** | **Name of the Student** | **Performance Criteria** | **1** | **2** | **3** | **4** | **5** | |
| | | The level of knowledge on basic properties and types cement and admixtures | Low level of knowledge on basic properties types of cement and admixtures | Able to discuss the basic properties and types of cement and admixtures | Ability to explain the basic properties and types of cement and admixtures | Full knowledge on basic properties and types of cement and admixtures | Analysing and implementing the knowledge of properties and types of cement and admixtures | 5 |
| | | The level of | Low level of | Able to discuss | Ability to explain | Full knowledge | Analysing and | 4 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 19241A0158 | knowledge on types of aggregates and their importance in civil engineering constructions | knowledge on types of aggregates and their importance in civil engineering constructions | types of aggregates and their importance in civil engineering constructions | types of aggregates and their importance in civil engineering constructions | on types of aggregates and their importance in civil engineering constructions | application of knowledge on types of aggregates and their importance in civil engineering constructions | |
| | | The level of knowledge to analyse various special concrete | Low level of knowledge to analyse various special concrete | Ability to discuss and to study the various special concrete | Ability to explain various special concrete and mix design. | Full knowledge on various special concrete and mix design. | Analysing and implementing the knowledge of various special | 3 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | and mix design | and mix design | and mix design. | | | concrete and mix design. | |
| | | | | | | | Average Score | 4 |
| 2 | 19241 A0188 | The level of knowledge on basic properties and types cement and admixtures | Low level of knowledge on basic properties types of cement and admixtures | Able to discuss the basic properties and types of cement and admixtures | Ability to explain the basic properties and types of cement and admixtures | Full knowledge on basic properties and types of cement and admixtures | Analysing and implementing the knowledge of properties and types of cement and admixtures | 4 |
| | | The level of knowledge on types of aggregates and their importance in civil engineering constructions | Low level of knowledge on types of aggregates and their importance in civil engineering constructions | Able to discuss types of aggregates and their importance in civil engineering constructions | Ability to explain types of aggregates and their importance in civil engineering constructions | Full knowledge on types of aggregates and their importance in civil engineering constructions | Analysing and application of knowledge on types of aggregates and their importance in civil engineering constructions | 3 |
| | | The level of knowledge to analyse various special concrete and mix design | Low level of knowledge to analyse various special concrete and mix design | Ability to discuss and to study the various special concrete and mix design. | Ability to explain various special concrete and mix design. | Full knowledge on various special concrete and mix design. | Analysing and implementing the knowledge of various special concrete and mix design. | 2 |
| | | | | | | | Average Score | 3 |

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**INSTITUTE OF ENGINEERING AND TECHNOLOGY**
**Mapping of CO's & PO's**

**A**cademic **Y**ear : 2021-22

Semester : II

Name of the Program: : B.Tech Year: III Section: A& B

Course/Subject : Concrete Technology Course Code: GR18A3071

Name of the Faculty : P Krishna/C.Vanadeep Dept: Civil Engineering

Designation : Assistant Professor

| **GR18A3071**<br>**Concrete Technology** | Program outcomes/Program Specific outcomes | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **COs/POs** | **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** | **l** | PSO1 | PSO2 |
| Illustrate the physical and chemical properties of concrete ingredients and able to conduct tests on cement and aggregates. | M | | | H | | M | H | | M | | | | M | H |
| Clarify the physical properties of fresh and hardened concrete and also about the manufacturing of concrete | H | | | M | | M | | | M | M | | | M | |
| Estimate the creep and shrinkage of concrete and how to conduct the different tests such as compression and tension on hardened concrete and also summarize the quality control of concrete under different conditions. | M | M | | H | | | H | | H | H | H | H | | M |
| Distinguish the special concretes like Self compacting concrete, Fiber reinforced concrete, Polymer concrete and light weight concrete etc. | H | M | M | M | | M | M | M | H | H | H | H | M | H |
| Design the mix proportions for the specific work for required strength and workability with available materials at workplace. | H | H | H | M | | M | H | M | M | H | H | M | | M |

Model question papers

CODE: GR18A3071 | GR 18 | SET -2

III B.Tech II Semester Regular Examinations, May/June 2022

# CONCRETE TECHNOLOGY

(Civil Engineering)

Time: 3 hours | Max Marks: 70

**Instructions:**

1. Question paper comprises of Part-A and Part-B
2. Part-A (for 20 marks) must be answered at one place in the answer book.
3. Part-B (for 50 marks) consists of **five questions with internal choice,** answer all questions.

## PART – A

**(Answer ALL questions. All questions carry equal marks)**

10 * 2 = 20 Marks

| | | | | |
|---|---|---|---|---|
| 1. a. | What are accelerators and mention its purpose? | CO 1 | [2] | BL 1 |
| b. | What is bulking of sand? | CO 1 | [2] | BL 1 |
| c. | Mention the effect of Water / Cement ratio on fresh and harden properties of concrete. | CO 2 | [2] | BL 2 |
| d. | Discuss importance of curing of concrete. | CO 2 | [2] | BL 2 |
| e. | What is sulphate attack and mention its affects? | CO 3 | [2] | BL 1 |
| f. | Mention the importance of Non-Destructive tests. | CO 3 | [2] | BL 2 |
| g. | List the types of Polymer concrete and its applications. | CO 4 | [2] | BL 1 |
| h. | Mention the Factors influencing creep of concrete. | CO 3 | [2] | BL 1 |
| i. | Distinguish nominal and design mix of concrete. | CO 5 | [2] | BL 4 |
| j. | Define durability of concrete. | CO 5 | [2] | BL 1 |

## PART – B

**(Answer ALL questions. All questions carry equal marks)**

5 * 10 = 50 Marks

| | | | | |
|---|---|---|---|---|
| 2. | (a) What are the different types of admixtures used in concrete and explain any two of them? | CO 1 | [10] | BL 2 |
| | (b) Explain about important reasons why it is desirable to use pozzolanic admixtures in concrete. | CO 1 | | |

OR

| | | | | |
|---|---|---|---|---|
| 3. | (a) Explain the classification of aggregates. | CO 1 | [10] | BL 2 |
| | (b) Explain about the fineness modulus of coarse aggregate. | CO 1 | | |

4. (a) Discuss about the importance of measuring the setting times of concrete. [10] BL5 CO2
   (b) Discuss about the Factors affecting workability of concrete. CO2

OR

5. (a) What are the factors affecting the strength of hardened concrete? Discuss in detail. [10] BL2 CO2
   (b) Discuss about the slump test for Measurement of workability. CO2

6. Explain UPV test on concrete and its importance. [10] BL2 CO3

OR

7. (a) Discuss about the reasons for cracking in concrete, explain how the cracks can be prevented. [10] BL4 CO3
   (b) Discuss about the method of inspection and testing of concrete. CO3

8. What is shrinkage and creep of concrete? Explain about the factors affecting shrinkage and creep of concrete. [10] BL2 CO3

OR

9. (a) What is Fibre reinforced concrete and write about its applications? [10] BL4 CO4
   (b) Explain about the factors which control the performance of HPC. CO4

10. Design a M25 grade concrete mix by BIS method with the following data: specific gravity of cement, Coarse aggregate and fine aggregate are: 3.10, 2.75 and 2.65 respectively. Water absorption for coarse aggregate and fine aggregate are 0.85 and 0.60 percentage respectively. Free moisture Nil. Degree of quality control good and exposure moderate. Determine the quantities of ingredients in kg/m$^3$ of concrete. [10] BL3 CO5
    Maximm size of aggregate is 20mm,
    FA: Zone II;
    Type of cement is OPC:43
    Aggregate is Gravel (crushed).

OR

11. (a) Explain statistical quality control of concrete and also common terminology used in statistical evaluation of concrete? [10] BL5 CO5
    (b) Identify the demands of different environments impose on design of concrete mix. CO5

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# III B. Tech I Semester Supplementary Examinations, Feb/Mar 2017
## Concrete Technology
(Civil Engineering)

**Time: 3 hours** **Max Marks: 70**

**PART – A**
**Answer ALL questions. All questions carry equal marks.**
*****

**10 * 2 Marks = 20 Marks**

1). a Mention the physical tests that determine the quality of Cement. [2]

b Give any four mineral admixtures used in Concrete making. [2]

c What does the Fineness modulus of Aggregate indicate? [2]

d What are the controlling measures of Alkali Aggregate Reaction? [2]

e Define Curing. [2]

f Mention the limitations of Compaction Factor Test. [2]

g List different strength–related tests conducted on Concrete. [2]

h List out various types of Shrinkage. [2]

i What is Cellular Concrete? [2]

j Distinguish between characteristic and target mean strengths. [2]

**PART – B**
**Answer any FIVE questions. All questions carry equal marks.**
*****

**5 * 10 Marks = 50 Marks**

2. a Give the chemical composition of OPC explaining the need of each compound. [5]

b Explain in detail any two types of Mineral Admixtures. [5]

3. a Mention different tests that are conducted on Aggregates for Concrete making and explain any one in detail. [5]

b Explain the classification of Aggregates. [5]

4. a Explain any two methods of measuring workability of Concrete. [5]

b Discuss Gel-Space Ratio in detail. [5]

5. a Explain procedure of conducting tension test on cylindrical and cubical specimen of hardened Concrete. [5]

b Explain in detail various factors affecting the strength of Concrete. [5]

6. a Explain various fresh state requirements and applications of Self compacting Concrete. [5]

b Explain the stepwise procedure of Concrete mix design using IS 10262-2009. [5]

7. a Distinguish between Segregation & bleeding. Also mention the causes and controlling measures. [5]

b Explain the thermal properties of aggregates. [5]

8. a Explain different types of fibres used in making FRC. [5]

b The strength of sample of fully matured Concrete is found to be 50 MPa. Find the strength of identical Concrete at the age of 7 days, when cured at an average temperature during day time at 20° C and night time at 10° C. [5]

*****

**Gokaraju Rangaraju Institute of Engineering and Technology**
**Department of Civil Engineering**
**Objective Paper (2020-21)**
**III B.Tech. II Semester, I Mid Examinations, May, 2021**
**Concrete Technology (Sub Code: GR18A3071)**

**Time: 10 Minutes** **Date of Exam: 06-05-2021 (FN)** **Max Marks: 10**
**Answer All Questions** **All Questions Carry Equal Marks**

**Name: _____** **Hall Ticket No.** | | | | | | A | | | |

I.**Choose the correct answer**:

1. The commonly used material in the manufacture of cement is [ ]
   A. sandstone B. Limestone C. slate D. graphite
2. The process of proper and accurate measurement of concrete ingredients for uniformity of proportion, is known [ ]
   A. Grading B. curing C. mixing D. batching
3. Vicat's apparatus is used to measure_____of cement [ ]
   A.Fineness B. Compressive strength C. Soundness D. Setting time
4. Workability of concrete is measured by [ ]
   A.Vicat apparatus B. Le-chatlier Apparatus C. Slump test D. Pycnometer
5. Separation of coarse aggregates from mortar during transportation, is known [ ]
   A. Segregation B. Bleeding C. Creep D. Shrinkage
6. The size of fine aggregates does not exceed [ ]
   A. 2.75mm B. 3.75mm C. 4.75mm D. 4.0 mm
7. Strength of concrete with passage of time [ ]
   A. Increases B. Decreases C. Constant D. None of above
8. The factor which affects workability, is [ ]
   A. water content B. shape C. Size D. All of the above
9. The process of hardening the concrete by keeping its surface moist is known [ ]
   A. Placing B. Curing C. Mixing D. Compacting
10. Specified compressive strengh of concrete is obtained from cube tests at the end of [ ]
    A. 7 days B. 14 days C. 21 days D. 28 days

**Gokaraju Rangaraju Institute of Engineering and Technology**
**Department of Civil Engineering**
**III B.Tech. II Semester, I Mid Examinations (Descriptive), March, 2022**
**Concrete Technology (GR18A3071)**

**Time: 90 Minutes** **Date of Exam: 15-03-2022 (AN)** **Max Marks: 15**

**Answer Any Three Questions**

| | | | |
|---|---|---|---|
| 1 | a) Illustrate the Hydration process and demonstrate the significance of Bogue's Compounds in it.<br>b) List out the durability tests conducted on aggregate and describe any one of the tests in detail. | BL2<br>BL1 | CO1 **3M**<br>CO1 **2M** |
| 2 | Contrast the degree of workability of Slump test and Compaction Factor test and explain the Test procedure for the same. | BL4 | CO2 **5M** |
| 3 | Elaborate briefly about Ultrasonic pulse velocity NDT Method & Rebound hammer NDT method. | BL5 | CO3 **5M** |
| 4 | a) Classify the aggregates based on shape, size and texture.<br>b) Identify the various factors affecting the strength of concrete. | BL2<br>BL3 | CO1 **2M**<br>CO2 **3M** |

**Gokaraju Rangaraju Institute of Engineering and Technology**
**Department of Civil Engineering**
**III B.Tech. II Semester, I Mid Examinations (Descriptive), March, 2022**
**Concrete Technology (GR18A3071)**

**Time: 90 Minutes** **Date of Exam: 15-03-2022 (AN)** **Max Marks: 15**

**Answer Any Three Questions**

| | | | |
|---|---|---|---|
| 1 | a) Discuss the sulphate attack and list the various internal and external chemical attacks.<br>b) What are the factors affecting creep in concrete | BT2<br>BT1 | CO3 **3M**<br>CO3 **2M** |
| 2 | Describe in detail about Fiber Reinforced Concrete and Polymer Concrete | BT4 | CO4 **5M** |
| 3 | Design M35 grade concrete using IS 10262 method of mix design for the following data:<br>Size and shape of aggregate: 20 mm Rounded<br>Exposure condition: moderate<br>Required slump: 25 mm<br>Specific Gravity- Cement: 3.11, FA: 2.62, CA: 2.84<br>Water absorption: CA: 0.5%, FA: 1.0%<br>Free (surface) moisture: CA : Nil , FA: 2%<br>Fine aggregate conforming to zone III<br>Cement - OPC 43 | BT3 | CO5 **5M** |
| 4 | a) Summarize the factors affecting choice of mix design.<br>b) Elaborate briefly about Light weight concrete and High Density Concrete | BT2<br>BT5 | CO5 **2M**<br>CO4 **3M** |

**Gokaraju Rangaraju Institute of Engineering and Technology**
**Department of Civil Engineering**
**III B.Tech. II Semester, II Mid Examinations (Objective), May, 2022**
**Concrete Technology (GR18A3071)**

**Time: 10 Minutes** **13-05-2022 (AN)** **Max Marks: 5**

**Choose the correct answer**:

Name: _____ Roll No.: _____

1. The value of Poisson's ratio of concrete [ ]

A. 1 - 2 B. 0.13 - 0.21 C. 0.25 - 0.40 D.2 - 5

2. Plastic Shrinkage is seen in _____ [ ]

A. Wet Concrete B. Hardened Concrete C. Both D. None

3. Aggregate used for Light Weight Aggregate Concrete can be [ ]

A. Pumice B. Granite C. Gravel D. Steel

4. Which of the following is NOT the property of SCC [ ]

A. Resistance to Segregation B. Filling Ability C. Passing Ability D. Low Slump

5. Which of the following is the code for Mix Design [ ]

A.IS 456-2000 B.IS 10262-2019 C.IS 800-2007 D.IS 875(part 3)

6. For every 25mm increase in slump, the water value should be [ ]

A. ± 3 mm B. ± 3 % C. +3% D. +3mm

7. Which of the following is the Internal Chemical Attack [ ]

A. Chloride Attack B. Sulphate Attack C. Carbonation D. AAR

8. Which of the following is considered as a Fiber in FRC [ ]

A. Silica Fumes B. Plasticizers C. GGBS D. Steel

9. Entrapped Air % for 20mm m.s.a. Coarse Aggregate [ ]

A. 0.8 B. 1 C. 1.5 D. none

10. Target mean Strength is [ ]

A. $f_{ck} + 1.65(\sigma)$ B. $f_{ck} - 1.65(\sigma)$ C. $f'_{ck} + 1.65(\sigma)$ D. $f'_{ck} - 1.65(\sigma)$

**Gokaraju Rangaraju Institute of Engineering and Technology**
**Department of Civil Engineering**
**Objective Paper (2021-22)**
**III B.Tech. II Semester, I Mid Examinations, March, 2022**
**Concrete Technology (Sub Code: GR18A3071)**

**Time: 10 Minutes** **Date of Exam: 15-03-2022 (AN)** **Max Marks: 5**

**Answer All Questions** **All Questions Carry Equal Marks**

**Name: _____ Hall Ticket No :**

I. **Choose the correct answer**

1. The most commonly used material in the manufacture of cement is [ ]
   B. sandstone B. Limestone C. slate D. graphite
2. The process in which the proper and accurate measurement of concrete ingredients is done in manufacturing to attain the uniformity of proportion, is [ ]
   B. Grading B. curing C. mixing D. batching
3. Le-chatelier apparatus is used to measure _____ of cement [ ]
   A. Fineness B. Compressive strength C. Soundness D. Setting time
4. Tensile strength of concrete is measured by [ ]
   A. Compressive Test B. Soundness Test C. Slump test D. Specific Gravity Test
5. Accumulation of water on the surface of concrete, is known [ ]
   B. Segregation B. Bleeding C. Creep D. Shrinkage
6. The size of fine aggregates does not exceed [ ]
   B. 2.75mm B. 3.75 mm C. 4.75mm D. 4.0 mm
7. Strength of concrete with passage of time [ ]
   B. Increases B. Decreases C. Constant D. None of above
8. The IS Code specified for Non Destructive Tests on concrete, is [ ]
   B. IS 13311 B. IS 456 C. IS 800 D. IS 10262
9. The Hardening the Concrete by keeping its surface moist is known [ ]
   B. Placing B. Curing C. Mixing D. Compacting
10. 95% of characteristic compressive strength of concrete is obtained from cube tests at the end of _____ days [ ]

    B. 7 B. 14 C. 21 D. 28

**Gokaraju Rangaraju Institute of Engineering & Technology**

**Bachupally, Nizampet Road, Kukatpally, Hyderabad-500009**

**B.Tech Civil Engg. III Yr-I Sem- Section A- GR18 2020 -21**

GR18 2021-22 B.Tech CE 320, Section: A GR18A3071 Concrete Technology Sessional Marks

| S.No | Roll No | MID-I Marks | MID-II Marks | Tutorial Marks | Assessment Marks | Sessional Marks |
|---|---|---|---|---|---|---|
| 1 | 18241A0151 | 5 | 4 | 3 | 2 | 10 |
| 2 | 18241A0152 | AB | AB | 1 | 2 | 3 |
| 3 | 19241A0101 | AB | AB | 1 | 2 | 3 |
| 4 | 19241A0102 | 15 | 12 | 4 | 5 | 23 |
| 5 | 19241A0103 | 3 | 8 | 1 | 4 | 11 |
| 6 | 19241A0104 | 9 | 11 | 3 | 4 | 17 |
| 7 | 19241A0105 | 7 | 10 | 3 | 3 | 15 |
| 8 | 19241A0106 | 1 | 3 | 2 | 2 | 6 |
| 9 | 19241A0107 | 11 | 4 | 2 | 4 | 14 |
| 10 | 19241A0108 | 6 | 3 | 2 | 4 | 11 |
| 11 | 19241A0109 | 14 | 11 | 3 | 5 | 21 |
| 12 | 19241A0110 | 5 | 2 | 1 | 3 | 8 |
| 13 | 19241A0111 | 5 | 6 | 1 | 3 | 10 |
| 14 | 19241A0112 | 16 | 8 | 5 | 5 | 22 |
| 15 | 19241A0113 | 14 | 8 | 4 | 5 | 20 |
| 16 | 19241A0114 | 17 | 15 | 2 | 5 | 23 |
| 17 | 19241A0115 | 14 | 9 | 3 | 5 | 20 |
| 18 | 19241A0116 | AB | AB | 2 | 2 | 4 |
| 19 | 19241A0117 | 4 | 4 | 2 | 3 | 9 |
| 20 | 19241A0118 | 18 | 5 | 2 | 5 | 19 |
| 21 | 19241A0119 | 16 | 15 | 5 | 5 | 26 |
| 22 | 19241A0120 | 14 | 11 | 3 | 4 | 20 |
| 23 | 19241A0122 | 17 | 11 | 5 | 5 | 24 |
| 24 | 19241A0123 | 16 | 17 | 5 | 5 | 27 |
| 25 | 19241A0124 | 10 | 10 | 5 | 5 | 20 |
| 26 | 19241A0125 | AB | AB | 1 | 2 | 3 |
| 27 | 19241A0126 | 12 | 9 | 2 | 3 | 16 |
| 28 | 19241A0127 | 15 | 13 | 4 | 5 | 23 |
| 29 | 19241A0128 | 12 | 8 | 3 | 3 | 16 |
| 30 | 19241A0129 | 2 | 6 | 2 | 3 | 9 |
| 31 | 19241A0130 | 17 | 19 | 5 | 5 | 28 |
| 32 | 19241A0131 | 12 | 7 | 2 | 4 | 16 |
| 33 | 19241A0132 | 15 | 11 | 3 | 4 | 20 |
| 34 | 19241A0133 | 5 | 2 | 1 | 3 | 8 |
| 35 | 19241A0134 | 11 | 8 | 3 | 3 | 16 |
| 36 | 19241A0135 | 4 | 3 | 1 | 3 | 8 |
| 37 | 19241A0136 | 9 | 4 | 2 | 3 | 12 |
| 38 | 19241A0137 | 12 | 9 | 2 | 3 | 16 |
| 39 | 19241A0138 | 3 | 2 | 2 | 3 | 8 |
| 40 | 19241A0139 | 12 | 8 | 5 | 5 | 20 |
| 41 | 19241A0141 | AB | AB | 1 | 2 | 3 |
| 42 | 19241A0142 | 10 | 8 | 2 | 4 | 15 |
| 43 | 19241A0143 | 7 | 14 | 3 | 4 | 18 |
| 44 | 19241A0144 | 13 | 12 | 3 | 3 | 19 |
| 45 | 19241A0145 | 14 | 11 | 3 | 4 | 20 |
| 46 | 19241A0146 | 7 | 4 | 2 | 3 | 11 |
| 47 | 19241A0147 | 10 | 7 | 3 | 5 | 17 |
| 48 | 19241A0148 | 7 | 7 | 2 | 3 | 12 |
| 49 | 19241A0149 | 7 | 7 | 2 | 3 | 12 |
| 50 | 19241A0150 | AB | AB | 1 | 2 | 3 |
| 51 | 19241A0151 | AB | AB | 1 | 2 | 3 |
| 52 | 19241A0152 | 12 | 9 | 4 | 4 | 19 |
| 53 | 19241A0153 | 4 | 6 | 2 | 3 | 10 |
| 54 | 19241A0154 | 16 | 15 | 4 | 3 | 23 |
| 55 | 19241A0155 | 16 | 12 | 5 | 5 | 24 |
| 56 | 19241A0156 | 7 | 3 | 3 | 3 | 11 |
| 57 | 19241A0157 | 7 | 5 | 2 | 3 | 11 |
| 58 | 19241A0158 | 20 | 18 | 5 | 5 | 29 |
| 59 | 19241A0159 | 6 | 4 | 2 | 4 | 11 |
| 60 | 19241A0160 | 13 | 9 | 2 | 3 | 16 |

# Gokaraju Rangaraju Institute of Engineering & Technology

## Bachupally, Nizampet Road, Kukatpally, Hyderabad-500009

## B.Tech Civil Engg. III Yr-I Sem- Section B- GR18 2021 -22

GR18 2021-22 B.Tech CE 320, Section: B GR18A3071 Concrete Technology Sessional Marks

| S.No | Roll No | MID-I Marks | MID-II Marks | Tutorial Marks | Assessment Marks | Sessional Marks |
|---|---|---|---|---|---|---|
| 1 | 19241A0161 | 13 | 11 | 3 | 4 | 19 |
| 2 | 19241A0162 | 7 | 8 | 2 | 3 | 13 |
| 3 | 19241A0163 | 5 | 6 | 1 | 3 | 10 |
| 4 | 19241A0164 | 15 | 11 | 3 | 4 | 20 |
| 5 | 19241A0165 | 18 | 20 | 5 | 5 | 29 |
| 6 | 19241A0166 | 18 | 17 | 5 | 5 | 28 |
| 7 | 19241A0167 | 10 | 11 | 2 | 2 | 15 |
| 8 | 19241A0168 | 17 | 18 | 5 | 5 | 28 |
| 9 | 19241A0169 | 13 | 16 | 3 | 4 | 22 |
| 10 | 19241A0170 | 10 | 8 | 3 | 4 | 16 |
| 11 | 19241A0171 | 8 | 9 | 1 | 3 | 13 |
| 12 | 19241A0172 | 10 | 7 | 2 | 3 | 14 |
| 13 | 19241A0173 | 11 | 7 | 2 | 3 | 14 |
| 14 | 19241A0174 | 11 | 7 | 2 | 3 | 14 |
| 15 | 19241A0175 | 4 | 5 | 2 | 3 | 10 |
| 16 | 19241A0176 | 4 | 6 | 4 | 3 | 12 |
| 17 | 19241A0177 | 14 | 15 | 3 | 5 | 23 |
| 18 | 19241A0178 | 6 | 3 | 3 | 3 | 11 |
| 19 | 19241A0179 | 7 | 7 | 1 | 4 | 12 |
| 20 | 19241A0180 | 18 | 18 | 5 | 5 | 28 |
| 21 | 19241A0181 | 18 | 20 | 4 | 5 | 28 |
| 22 | 19241A0182 | 19 | 16 | 4 | 5 | 27 |
| 23 | 19241A0183 | 13 | 14 | 1 | 4 | 19 |
| 24 | 19241A0184 | 7 | AB | 2 | 4 | 10 |
| 25 | 19241A0185 | 18 | 18 | 4 | 4 | 26 |
| 26 | 19241A0186 | 6 | 9 | 1 | 3 | 12 |
| 27 | 19241A0187 | 17 | 17 | 4 | 5 | 26 |
| 28 | 19241A0188 | 7 | 3 | 1 | 3 | 9 |
| 29 | 19241A0189 | 5 | 6 | 3 | 3 | 12 |
| 30 | 19241A0190 | 14 | 17 | 3 | 5 | 24 |
| 31 | 19241A0191 | 13 | 11 | 4 | 4 | 20 |
| 32 | 19241A0192 | 15 | AB | 2 | 4 | 14 |
| 33 | 19241A0193 | AB | AB | 1 | 1 | 2 |
| 34 | 19241A0194 | 5 | 6 | 1 | 3 | 10 |
| 35 | 19241A0195 | 9 | 4 | 1 | 5 | 13 |
| 36 | 19241A0196 | 12 | 8 | 2 | 4 | 16 |
| 37 | 19241A0197 | 17 | 17 | 4 | 4 | 25 |
| 38 | 19241A0198 | 12 | 14 | 2 | 4 | 19 |
| 39 | 19241A0199 | 11 | 10 | 4 | 4 | 19 |
| 40 | 20245A0101 | 20 | 19 | 4 | 5 | 29 |
| 41 | 20245A0102 | 16 | 14 | 2 | 4 | 21 |
| 42 | 20245A0103 | 14 | 16 | 2 | 4 | 21 |
| 43 | 20245A0104 | 17 | 19 | 5 | 4 | 27 |
| 44 | 20245A0105 | 19 | 19 | 4 | 5 | 28 |
| 45 | 20245A0106 | 17 | 17 | 4 | 5 | 26 |
| 46 | 20245A0107 | 13 | 11 | 1 | 4 | 17 |
| 47 | 20245A0108 | 16 | 15 | 4 | 4 | 24 |
| 48 | 20245A0109 | 15 | 15 | 4 | 5 | 24 |
| 49 | 20245A0110 | 15 | 9 | 3 | 3 | 18 |
| 50 | 20245A0111 | 10 | 6 | 3 | 3 | 14 |
| 51 | 20245A0112 | 13 | 15 | 4 | 3 | 21 |
| 52 | 20245A0113 | 13 | 9 | 2 | 3 | 16 |
| 53 | 20245A0114 | 18 | 17 | 3 | 4 | 25 |
| 54 | 20245A0115 | 9 | AB | 2 | 4 | 11 |
| 55 | 20245A0116 | 13 | 17 | 4 | 5 | 24 |
| 56 | 20245A0117 | 15 | 15 | 1 | 5 | 21 |
| 57 | 20245A0118 | 16 | 17 | 3 | 5 | 25 |
| 58 | 20245A0119 | 19 | 17 | 3 | 5 | 26 |
| 59 | 20245A0120 | 17 | 16 | 4 | 5 | 26 |
| 60 | 20245A0121 | 12 | 10 | 1 | 4 | 16 |
| 61 | 20245A0122 | 19 | 15 | 1 | 4 | 22 |
| 62 | 20245A0123 | 13 | 13 | 3 | 4 | 20 |
| 63 | 20245A0124 | 18 | 16 | 3 | 5 | 25 |
| 64 | 20245A0125 | 17 | 18 | 2 | 4 | 24 |
| 65 | 20245A0126 | 10 | 9 | 3 | 4 | 17 |
| 66 | 20245A0127 | 10 | 5 | 3 | 4 | 15 |
| 67 | 20245A0128 | 15 | 16 | 4 | 5 | 25 |
| 68 | 20245A0129 | 13 | 10 | 2 | 4 | 18 |
| 69 | 20245A0130 | 10 | 5 | 2 | 3 | 13 |
| 70 | 20245A0131 | 10 | 6 | 2 | 4 | 14 |

**GOKARAJU RANGARAJU**
**INSTITUTE OF ENGINEERING AND TECHNOLOGY**
**Sample Answer scripts**

# Gokaraju Rangaraju Institute of Engineering & Technology

(Autonomous College Affiliated to JNTUH) (12 Pages)

Bachupally, Kukatpally, Hyderabad - 500090

| ✓ I | II | MID TERM EXAMINATION |
|---|---|---|

No. 919772

| H.T. No. | 1 | 9 | 2 | 4 | 1 | A | 0 | 1 | 5 | 8 |
|---|---|---|---|---|---|---|---|---|---|---|

Name of the Examination III. B.Tech II semester Mid-I Examination

Course Concrete technology Branch civil Engineering Date 15-03-2022.

Signature of the Invigilator

| Q.NO. | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | a | b | a | b | a | b | a | b | a | b | a | b | |
| MARKS | | | 5 | | 5 | | 3 | 3 | | | | | 15 |

START WRITING FROM HERE

4(a) Classification of aggregates based on shape, size and texture

→ Classification of aggregates based on shape

1) Rounded aggregates
2) Angular aggregates
3) Elongated and flaky aggregate

1) Rounded aggregates :-

The rounded aggregates has the minimum voids. When we use the rounded aggregates in the concrete. It may not give good strength. but the disadvantage is no interlocking between the rounded aggregate.

2) Angular aggregates :-

When we use angular aggregate voids between the aggregates is more. Angular aggregates are used for high strength of the concrete.

3) Elongated and flaky aggregates :-

→ Elongated aggregates and flaky aggregates mostly not advised to use. They does not provide strength for the concrete

(A) Factors affecting on testing method:-

a) Type of specimen:-

As per the code generally we cast the cube of dimensions 150mm x 150mm x 150mm. It is the standard one which gives the 100% strength.

But we are using different dimension which may not give 100% strength.

b) Moisture content of the specimen:-

If the specimen (or) mould is dry the strength of concrete is more.

If the mould is wet strength of concrete is less.

→ moisture content is important factor which affects the strength of concrete.

c) Type of specimen related to the size of aggregate:-

When we use larger size aggregates but the dimensions of the specimen is less. which may affects the strength of the concrete.

d) Type of loading:-

3 Type of loading may effects the strength of concrete. Single point loading may increase the type of strength of concrete.

e) Rate of application of loading may affects the strength of concrete

(f) Type of testing machine may affects the strength of concrete.

(B) Factors affecting the strength of Concrete (Independent on testing methods):-

a) Cement - Water - cement ratio

As the water-cement ratio increases the strength of the concrete decreases.

b) Mix - proportions:-

→ Aggregate - cement ratio

If aggregate - cement ratio is more which means the aggregate

→ classification based on size.

The maximum size of the aggregate is 80mm which can be used in the concrete. Use of larger aggregate gives the workability more. because the surface area of the aggregate is less it absorbs the less water which increases the strength workability.

When we use larger aggregate

a) reduces the cement
b) reduces the shrinkage.
c) reduces the water.

There is a limitation for usage of larger dia. size aggregate

1) Cover for the reinforcement
2) spacing of the reinforcement is less we cannot use larger size aggregate

✓ The size of coarse aggregate should ≥ 4.75mm

size of fine aggregate should < 4.75mm

→ classification based on. texture:-

→ Smoothy
→ Glassy.
→ rough.
→ when the aggregate texture is smooth. The bond between the aggregate is less.

4(b) Factors affecting the strength of concrete.

factors affecting on the strength of concrete based on two catageries

a) factors affecting on the strength of concrete by testing method.
b) factors affecting independent of testing method.

Advantage of Ultrasonic pulse velocity

→ To findout the strength and Quality me of Concrete structure

→ To find elastic modulus and cracks developed in the structure

Disadvantage

→ The surface must be smooth.

→ Before performing the test we need to apply lubricants to the transluders.

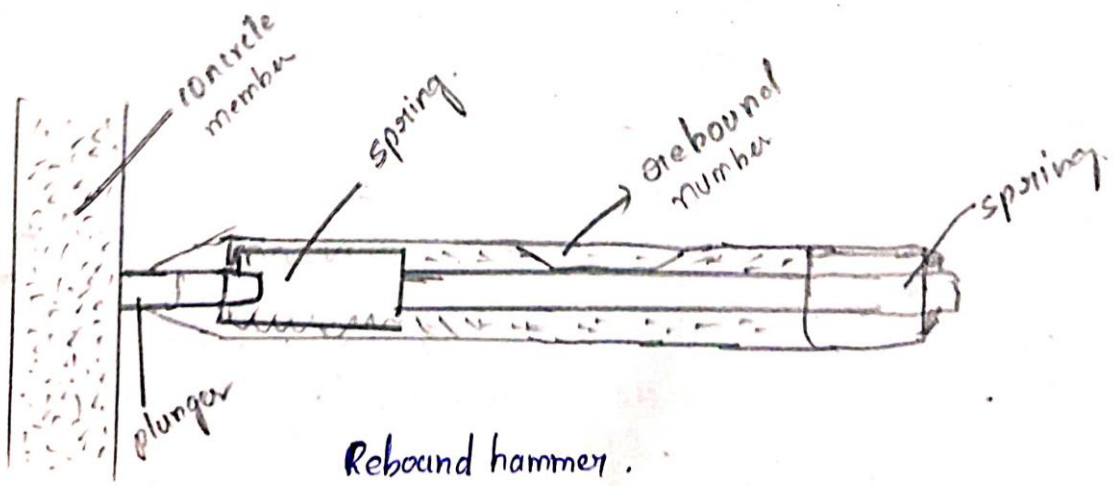
→ Hard to carry in to the field.

→ Rebound hammer NDT method :-

→ Rebound hammer test is used to find the strength of the Concrete members. for Before conducting this test surface must be smooth.

Rebound hammer consists of plunger ; pe spring. when we place rebound hammer on the surface. we need peress the spring. again peressing against surface we need to the plunger. So, that the readings are displayed.

→ On rebound hammer. It is consist of rebound numbers. Using that rebound member we can directly calculate the strength of the member.




Rebound hammer.

1A) Sulphate attack

→ while mixing the concrete sulphate attack takes place.

→ when in concrete hydrated components are present that components react & makes concrete sulphate attack

→ The sulphate can be checked when on the when we scratch white pitch of cement comes in that by that we can conform the concrete with sulphate attack.

There are various of internal & chemical attacks

| internal attacks | chemical attacks |
|---|---|
| - Sal - gypsm gypsm. | - admixtures |
| - aggregates | |

4)a The factors affecting choice of mix design

→ water - cement ratio - If the water cement ratio higher then it affects mix design

→ Coarse aggregates - It is also a factor in affect in mix design

→ Fine aggregates - It is also a factor affect in mix design.

# Gokaraju Rangaraju Institute of Engineering & Technology

(Autonomous College Affiliated to JNTUH) (12 Pages)

Bachupally, Kukatpally, Hyderabad - 500090

I. sreevanj.

| I | II | MID TERM EXAMINATION |
|---|---|---|

No. 139833

| H.T. No. | 1 | 9 | 2 | 4 | 1 | A | 0 | 1 | 2 | 2 |
|---|---|---|---|---|---|---|---|---|---|---|

Name of the Examination II Mid Exams (Concrete technology)

Course B.tech. Branch civil/A Date 13/09/22

Signature of the Invigilator

| Q.NO. | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | a | b | a | b | a | b | a | b | a | b | a | b | |
| MARKS | 1 | 2 | | | 3 | | 2 | | | | | | 8 |

START WRITING FROM HERE

1b) Factors affecting Creep in Concrete.

1. Aggregates :- Stronger the aggregate lesser the Creep.

2. Modules of ~~elasity~~ elasticity :- Higher the modules of elasticitisty lesser the Creep. It is the important factor affeting the Creep.

3. Mix properties :- The cement paste also affects the Creep higher the Creep increases with increase in water - cement ratio

2

4. Age of Concrete :- Higher of the age of Concrete lesser the Creep

5. grade of concrete :- Higher the grade of concrete lesser the Creep.

3A) M35 grade concrete using IS 10262 Method of mix design of the for the data

Size & shape of aggregate : 20mm rounded

Exposure condition : moderate

Required slump : 25 mm

Specific gravity - Cement : 3.11, FA : 2.62, CA : 2.84

water absorption : CA : 0.5%, FA : 1.0%.

free moisture : CA : Nil, FA : 2%

fine aggregate conforming to zone III

Cement - opc 43.

$f'_{ck} = f_{ck} + 1.65\,S$

or

$f'_{ck} = f_{ck} + x$.

from table 2 standard deviation $S' = 5\ N/mm^2$

from table 1, $x = 6.5$

therefore target strength using both equations

a) $f'_{ck} = f_{ck} + 1.65S$

$40 + 1.65 \times 5 = 48.25\ N/mm^2$

b) $f'_{ck} = f_{ck} + 6.5$

$40 + 6.5 = 46.5\ N/mm^2$

the higher value is to be adopted. therefore target mean strength will be $48.25\ N/mm^2$

as $48.25\ N/mm^2 > 46.5\ N/mm^2$

a) Direct transmission:-

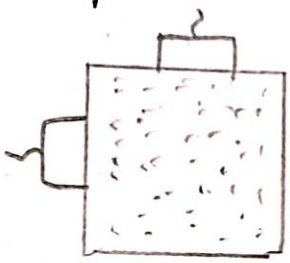
→ Where the transluders are placed in the opposition direction ~~top & bo~~ left and right. when we place the transluders they transmits the signals in to the structure. The time taken for travel is displayed on the PUNDIT (Instrument).

→

Direct transmission.

b) Indirect transmission:-

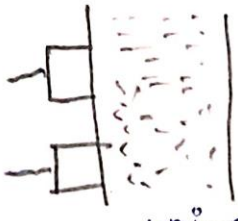
→ where the transluders are placed one at the top and another at the ~~botto~~ left (or) right.



Indirect transmission.

c) semi-direct transmission:-

→ where the transluders are placed on the surface of the Concrete members.



semi-direct transmission.

→ when we pass the pulse signals through the concrete member. we need measure the length of the concrete member. and time taken to travel the velocity is calculated $\boxed{V = \frac{S}{t}}$

→ The position of the rebound hammer can be held in any direction
1) Vertical (or)
2) Horizontal
3) inclined.

→ Rebound hammer can be easily ~~carrie~~ carried any where.

2Ans:- Workability of slumptest and Compaction factor test.

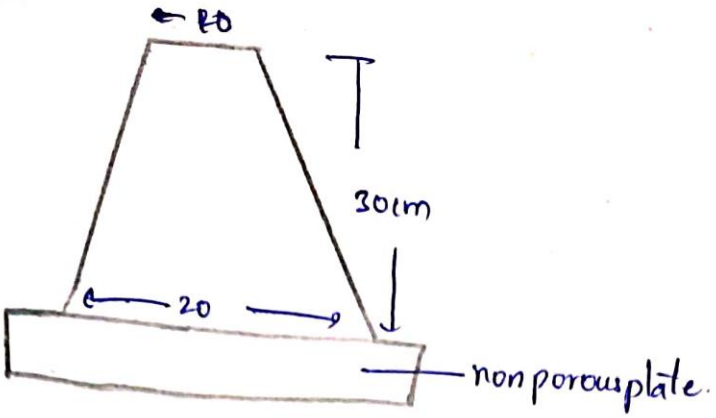
Degree of workability of slumptest and Compaction factor test

generally workability using slump cone test is used for the higher water cement ratio. where workability is higher.

But incase of Compaction factor test. we perform low workable concrete like less water cement ratio. ~~co~~Concrete.

Workability of slump cone test :-

1. Firstly, we need to fix the mix proportion. after that. using slump cone. of length 30cm an, upper diameter of 10cm and base diameter of 20cm.
2. Mix the concrete well [It consist of coarse aggregate, fine aggregate, cement and sand].
3. Place the concrete in three layers. for each layer ~~no~~ give 25 blows. after that measure the height.
4. Again. remove the cone. ~~to~~ measure the height of the slump. difference between two ~~is~~ gives the slump.




→ Slump may be three types:

a) True slump
b) collapse slump.
c) shear slump.

→ For high workability of concrete. the slump must be in between (100-125mm).

→ Compaction factor test :-

→ Firstly, ~~mate the~~ to prepare the concrete according to the mix proportion.

→ place the concrete in first hopper A. remove the door of ~~the~~ hopper A. allow it to pass into the hopper B.

→ After that allow the concrete ~~to flow~~ pass on the cylinder.

→ The concrete which present in the cylinder it partially compacted.

Now. remove the concrete from cylinder again the Concrete in three layers. fo by giving 25 blows for each layer.

$$\text{Compaction factor} = \frac{\text{Partially Compacted concrete}}{\text{Completly compacted concrete.}}$$

From table 3, the approximate amount of entrapped air to be expected in normal concrete is 1.0 percent for 20 mm nominal maximum size of aggregate

selection of water - cement ratio.

0.36 < 0.45, hence ok.

selection of water content

= 186 kg (for 50 mm)

$= 186 + \frac{84}{100} \times 180 = 201.62$ kg.

Hence the water content = 201.62 × 0.77

155.25 kg ≃ 155 kg.

Calculation of cement content

water cement ratio = 0.36 $\frac{w}{c}$ = 155/0.36.

= 430.55 kg/m³ ≃ 431 kg/m³

CA = 0.62 × 0.9 from table 5 is 456

CA. = 0.558

1 - FA = CA. = 320 kg/m³

431 kg/m³ > 320 kg/m³ hence ok.

Therefore volume of coarse aggregates

= 0.648 × 0.9

= 0.5832 say 0.58 m³

volume of fine aggregates content

= 1 - 0.58 = 0.42 m³

— continued.

→ Grade of Cement - If the cement grade is good then not good it affects the mix design.

→ grade of Cement / Aggregates - Lesser strength of Aggregates affect the mix design.

→ Size and shape of aggregate

→ Exposure condition

→ Water absorption

→ Specific gravity of cement

→ Temperature :- If the temperature is too high it affects the mix design.

→ climate

→ humidity

→ placing of concrete

→ lower coarse aggregate content
→ increased paste content
→ low water/cement ratio
→ increased super-

2

Continuation

Mix calculation.

a) total volume = $1 m^3$

b) volume of entrapped air in wet concrete = 0.01

c) volume of cement $= \frac{\text{mass of Cement}}{\text{Specific gravity of Cement}} \times \frac{1}{1000}$

$= \frac{259}{3.15} \times \frac{1}{1000} = 0.0822 m^3$

d) volume of water

$$\frac{\text{mass of water}}{\text{specific gravity of water}} \times \frac{1}{1000}$$

$$= \frac{155}{1} \times \frac{1}{1000} = 0.155\ m^3$$

e) volume of total aggregate

$$[(a-b) - (c+d+e+f)$$

$$(1-0.01) - (0.0882 + 0.0573 + 0.155 + 0.0038)$$

$$= 0.6917\ m^3$$

f) mass of coarse aggregate

g x volume of coarse aggregates x specific gravity of coarse aggregates x 1000

$$= 0.6917 \times 0.58 \times 2.74 \times 1000$$

$$= 1099\ kg$$

g) mass of fine aggregates

= g x volume of fine aggregate x specific gravity of fine aggregate x 1000

$$= 0.6971 \times 0.42 \times 2.65 \times 1000$$

$$= 719.86 \simeq 720\ kg.$$

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Bachupally, Kukatpally, Hyderabad - 500090

(12 Pages)

| I | II | MID TERM EXAMINATION |
|---|---|---|

No. 2[illegible]353

H.T. No. 1 9 2 4 1 A 0 1 1 1

Name of the Examination CT - MID-II

Course III - Btech Branch CE Date 13/05/22

13/5/22

Signature of the Invigilator

| Q.NO. | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | a | b | a | b | a | b | a | b | a | b | a | b | |
| MARKS | 1/2 | 1 | | | | | 1/2 | 0 | | | | | 2 |

START WRITING FROM HERE

1.) a.) Sulphate attacks happens when the sulphate content become more or sulphate in the chemicals & concrete got more by the sulphate attack the concrete gets bulged and the strength & the concrete 1/2 get low sulphate attacks happens like this We can reduce this sulphate attack by air pumping or water mixes by this we can

Protect the concrete by sulphate attack.

b) → Factors which are affecting creep in concrete are.

- If the water is less than than usual then it effects the concrete.
- Quality of the aggregates and cement
- Grade of the cement
- Sizes of the aggregates.
- Minimum size and the Maximum sizes of the aggregates.
- Combined sizes of the aggregates.
- durability, workability of concrete.

4) a) → Factors affecting choice of mix design.

- Quality
- durability
- Workability
- grade.
- Min size and Max size
- Combined size
- Sizes of aggregates

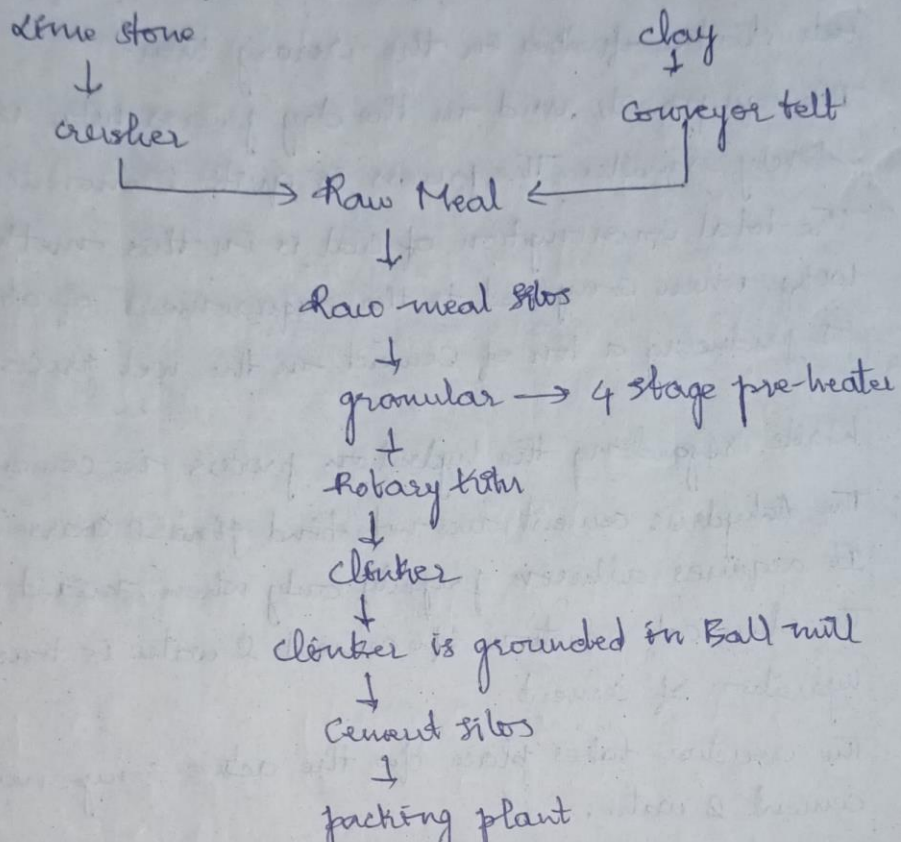
b) Light weight concrete bricks is the one where one can make bricks or we can use it on a non-much weightable areas. This are light, easy. This can be travelled easily. We use this on a side walls of a building. This workabilitys will be more but durabsility will be less. whereas Heavy weight concrete is the one we make it using cement, water, aggregates etc. This concrete can be used on slabs, Footings etc. Main parts of the building or any other site we use Heavy weight concrete. Travelli is hard. Workabilitys and durabilits is more to this concrete.

# CONCRETE TECHNOLOGY

T.SWARANYA
CE-A
155

## ASSIGNMENT-1

1. Explain the manufacturing process of cement (dry process) with flow chart.




In the dry & semi-dry process the raw materials are crushed dry & fed in correct proportions into a grinding mill where they are dried & reduced to a very fine powder. The dry powder called the raw meal is then further blend-ed & corrected for its right composition & mixed by means of compressed air.

The aerated powder tends to behave almost like liquid & in about one hour of aeration a uniform mixture is obtained.

The blended meal is further sieved & fed into a rota-ting disc called granulator.

A quantity of water about 12% by weight is added to make the blended meal into pellets.
This is done to permit air flow for exchange of heat for further chemical reactions & Conversion of the same into clinker further in the rotary kiln.
The equipments used in the dry process kiln is Comparatively smaller. The process is quite economical.
The total consumption of coal is in this method is only 100kg. when compared to the requirement of about 350kg for producing a ton of Cement in the wet process.

2. Write regarding the hydration process in cement.

- The Anhydrous cement does not bind fine & coarse aggregate. It acquires adhesive property only when mixed with water.
- The chemical reaction b/w cement & water is known as hydration of cement.
- The reaction takes place b/w the active components of cement & water.
- During the hydration the heat will be ~~provided~~ generated & the reaction takes place.
- The reaction b/w cement & water is exothermic
- The hydration of cement can be visualised in 2 ways.

The mechanics of hydration :-

1) Solution mechanism

In this cement compounds dissolve to produce a super saturated soln from which different hydrated products get precipitated.

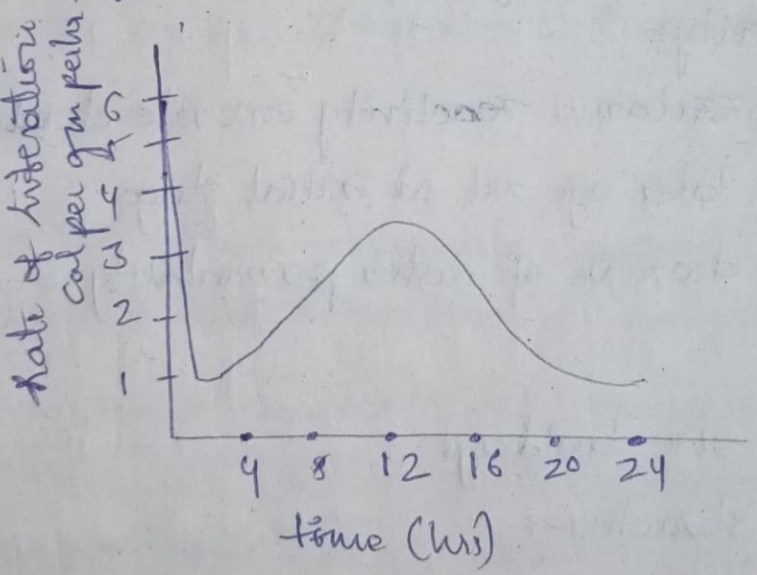
Converting the compounds into hydrated products starting from the surface & proceeding to the interior of the compounds with time.

This mechanism may operate during the later stage of hydration.

The reaction of cement with water is exothermic. The reaction liberates a considerable quantity of heat. This liberation of heat is called heat of hydration.

On mixing cement with water a rapid heat evolution occurs & lasting for a few minutes. This heat evolution is probably due to the reaction of the soln of aluminates & sulphates. [ascending].

This initial heat evolution ceases quickly by gypsum [descending]



# Mix design.

(1) Design M35 grade concrete using IS 10262 method of mix design for the following data.

→ Size and shape of aggregate : 20mm rounded
→ Exposure condition : moderate
→ Required slump : 25 mm
→ Specific gravity of cement - 3.11, fine aggregate 2.62 and coarse aggregate - 2.84
→ Water absorption : Coarse aggregate : 0.5%
fine aggregate : 1.0%
→ Free surface moisture : Coarse aggregate : nil
fine aggregate : 2%.
→ Fine aggregate conforming to zone III.

(i) Target Strength.

$f'_{ck} = f_{ck} + 1.65\,S$ (or) $f_{ck} + X$ which is high

$f'_{ck}$ → target mean compressive strength at 28 days.

S → Standard deviation [Table 2, Pg 3, IS 10262]

X → Factor based on grade of concrete [Table 1]

$f'_{ck} = 35 + 1.65 \times 5$ (or) $35 + 6.5$

$= 43.25\ N/mm^2$ (or) $41.5\ N/mm^2$

$f'_{ck} = 43.25\ N/mm^2$

Appropriate air content : From table 3 of IS 10262 the appropriate amount of entrapped air to be expected in normal concrete is 1% for 20 mm size aggregate.

(ii) Water Cement Ratio.

Exposure : Moderate.

IS-456-2000, Table -3 & 5. → Max w/c ratio is 0.6.

Free water cement ratio required for the target mean strength of 43.25 N/mm² is 0.38.

0.38 < 0.6, we adopt w/c ratio = 0.38

(iii) Water Content [Table 4, Pg 5, IS 10262]

20 mm aggregate - 186 kg (for 50 mm slump)

Required slump - 25 mm

For every 25 mm - remove 3% (Cl.5.3 IS 10262)

186 - 3% of 186 = 180.42 kg.

∴ Water Content = 180.42 kg.

(iv) Calculation of Cement content

w/c ratio = water content / cement content

⇒ Cement content = 474.8 kg/m³ > 240 kg/m³

min cement content given in table 5 of IS 456-2000.

∴ Cement Content = 474.8 kg/m³.

(v) Aggregate proportion between C.A & F.A

IS 10262, Table 5, Pg 6, Cl.5.5.1

Zone III - 0.62 (w/c - 0.5)

For every 0.05 decrease increase by 0.01.

0.64 + 0.024 = 0.664 → Volume of coarse aggregate.

1 - 0.664 = 0.336 → Volume of fine aggregate.

(v) Mix Calculation

→ Volume of concrete = $1 m^3$.

→ Volume of entrapped air in wet concrete = $0.01 m^3$

→ Volume of cement = $\frac{\text{Mass}}{\text{Sp. gravity}} \times \frac{1}{1000}$

$= \frac{474.8}{3.11} \times \frac{1}{1000} = 0.152 m^3$

→ Volume of water = $\frac{\text{Mass}}{\text{Sp. gravity} \times 1000}$

$= \frac{180.42}{1 \times 1000} = 0.18 m^3$

→ Volume of all in aggregate

$(1 - 0.01) - (0.152 + 0.18) = 0.658$

→ Volume of coarse aggregate.

Vol of all in aggregate × Vol of CA × Sp. gravity of CA × 1000

$0.658 \times 0.664 \times 2.84 \times 1000 =$ ~~1259.6 kg~~ 1248 kg.

→ Volume of fine aggregate.

Vol of all in aggregate × Vol of FA × Sp. gravity of FA × 1000

$0.658 \times 0.336 \times 2.62 \times 1000 =$ ~~588 kg~~. 579.2 kg.

(vi) Site Corrections

Absorption of fine aggregate = 1.0% = 5.79 kg.

Absorption of coarse aggregate = 0.5% = 6.24 kg.

Total absorption = 12.03 kg.

Actual amount of water to be used = 180.42 + 12.03
= 192.45 kg.

Actual wt of fine aggregate used = 579 - 5.79
= 573.21

Actual wt of coarse aggregate used = 1248 - 6.24
= 1241.76.

∴ Proportion of material at site.

Cement - 474.8 kg/m³

Water - 192.45 kg/m³.

Coarse aggregate - 1241.76 kg/m³

Fine aggregate - 573.21 kg/m³.

Site Proportion

| Cement | FA | CA | Water |
|---|---|---|---|
| 474.8 | 573.21 | 1242 | 192. |
| 1 | 1.2 | 2.61 | 0.4 |

# Assignment-3

## Concrete Technology

1. Difference between High Strength concrete and high performance concrete.

| High performance concrete | High-strength concrete |
|---|---|
| → High-performance concrete is defined as concrete meeting special combinations of performance and uniformity requirements that cannot always be achieved routinely when using conventional constituents and normal mixing, placing and curing practices, as per ACI Code. | → High Strength concrete is defined as concrete that has compressive of 55MPa or greater. |
| → Chemical resistant concrete, early daying concrete, ultra-water resistant concrete, heat resistant concrete, and impact and abrasion resistant concrete. | → High-strength concrete [50-100MPa], ultra high strength concrete [100-150MPa], especial concrete [>150 MPa]. |
| → High strength, modulus of elastic, low creep and shrinkage. | → It has high strength but does not necessarily possess superior characteristic as high-performance concrete. |
| → Resist scaling, freezing and thawing, chloride and carbonation, and prohibit bacterial and mold growth. | → Durability of high strength is commonly improved by adding pozzolanic materials. |
| → Low ductility but can be improved by adding steel fibers. | → It is brittle. |
| → Cement, fine aggregate, coarse aggregate, water, aggregate mineral admixtures: fine filler and/or pozzolanic supplementary cementation materials, chemical admixtures; plasticizers, superplasticizers, retarders, air-entraining agents]. | → Cement, fine and coarse aggregate: fine aggregates with higher fineness modulus of around 3 is recommended, water, water reducing admixtures. |

→ It is sensitive to changes in constituent material properties, hence great degree of quality control is required for the successful production of high-performance concrete.

→ High-performance concrete is produced by careful selection of raw materials such chemical admixtures and appropriate mix design to achieve the desired performance objectives.

→ Easy to pour and can be compacted without segregation.

→ Need extensive quality control, costly, need special constituents and need to be manufactured and placed careful.

→ High quality control is needed in order to maintain the special properties desired.

→ High-strength concrete is achieved at low water to cement ratio which is obtained by acting water reducing plasticizer or high range water reducing plasticizer. It is also essential to select a high-quality portland cement, and optimize aggregates, then optimize the combination of materials by varying the proportions of cement, water, aggregates, and admixtures.

→ placement would not be easy unless superplasticizer is used.

→ Low resistance to fire i.e damage at high temperature, and need great expertise in selection of constituents.

2. Write about precast concrete and shotcrete and their applications:-

Ans:- Precast Concrete:-

→ Precast concrete is simply concrete that is cast some where otherthan where it will be used. Most precast products are cast in a factory using a wet cast method, but others are cast on site - such as tilt up panels

→ There are lots of reasons - mostly advantages in precast concrete structures

Advantages of precast concrete:-

→ Since precast is manufactured in a controlled casting environment it is easier to control the mix, placement and curing.

→ Quality can be controlled and monitored much more easily.

→ Since a precaster can buy materials for multiple projects, quantity discounts can lower costs.

→ weather is eliminated as a factor - you can cast in any weather and get the same results, which allows you to perfect mixes and methods.
→ less labour is required and that labour can be less skilled.
→ On site, precast can be installed immediately, there is no waiting for it to gain strength and the modularity of precast products makes installation go quickly.
→ Repeatability :- It's easy to make many copies of the same precast product by maximizing repetition, you can get plenty of value from a mold and a set up.
→ Accelerated curing, by heating the precast parts, greatly increases strength gain, reducing the time between casting the part and putting it into service.
→ With the ability to so tightly control the process, from materials to consolidation to curing, you can get extremely durable concrete.

Shotcrete & Applications :-

→ Shotcrete is a method of applying ~~concrete~~ concrete projected at high velocity primarily on to a vertical or overhead surface. The impact created by the application consolidates the concrete.
→ Although the hardened properties of shotcrete are similar to those of conventional cast-in-place concrete, the nature of the placement process results in an excellent bond with most substrates and rapid or instant capabilities; particularly on complex forms or shapes. The shotcrete process requires less formwork and can be more economical than conventionally placed concrete
→ Shotcrete is applied using a wet - or dry-mix process. The wet mix shotcrete process mixes all ingredients, including water, before introduction into the delivery hose.
→ The dry-mix shotcrete process adds water to the mix at the nozzles. Shotcrete is used in new construction and repairs and is suitable for curved and thin elements [ACI 506R].

Applications :-

1. It can reduce manpower
2. Minimal formwork only required
3. Economically good compared to the conventional concrete.
4. we can easily control the water-cement ratio.
5. cost friendly for the repair and rehabilitation work.