R.K.D.F. UNIVERSITY, BHOPAL

M.TECH **(Construction Technology & Management)**

First YEAR (**Semester – I**

Course Content & Grade

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
M.TECH (Const.Tech. & Mgmt)	**ADVANCE MATHEMATICS**	**MTCTM-1001**	**3L-1T-0P**	**4**

Course Objective:

CO1:-To solve the numerical solution of partial differential equation give tool and technic to solve numerical of various problem pertaining to hyperbolic, parabolic and elliptic types by finite difference method.

CO2:- To solve the real life application of transforms to boundary value problem in engineering by integral transform

CO3:-To solving Integral equations for Conversion of Linear Differential equation (LDE) to an integral equation (IE) which applicable for solving real life problems.

CO4:- Application of calculus of variation to various engineering problems

CO5: -To solve various problems in the field of engineering by finite elements

Syllabus:

Unit 1: Introduction of operation-research, Mathematical Programming Techniques Linear programming (formulation, Graphical solution). Simplex method, BIG-M method. Duality theory in linear programming, Transportation & Assignment Problem.

Unit 2: Network Methods: CPM, PERT, Dynamic Programming, Bellmon's Principle of optimality, Non linear Programming. Fibonacci method.

Unit 3: Game theory, Queuing system, Genetic algorithm, ANN methods, Evolutionary algorithms.

Unit 4: Probability concepts, Additive and Multiplicative laws of Probability, Boye's theorem, statistical frequency distribution, Binomial, Poisson, Normal Distribution, confidence intervals, Tests of Significance for small & large samples. Testing of Hypothesis, Linear and Non linear regression.

Unit 5: Reliability Engineering: Basic concepts of Reliability, Design for Reliability constraints and consideration Reliability and Mathematics, Components Reliability and Hazard models, System Reliability models. Books & References Recommended:

Reference Books:

1. Operation Research by Phillips & Ravindran
2. Operation Research by TAHA
3. Probability, Statistics & Decision in Civil Engineering by Benjamin &Cornell
4. Optimization by S.S.Rao
5. B.V. Rammana, Higher Engineering Mathematics, Tata McGraw Hill Pub. Company, 2007.
6. C.B. Gupta, Engineering Mathematics I & II, McGraw Hill India, 2015
7. S.D. Sharma & Kedarnath, Operations Research, Ramnath & Co.
8. M. K. Jain, Iyengar, Numerical Methods for Scientific and Engineering Computation, New Age

R.K.D.F. UNIVERSITY, BHOPAL

M.TECH **(Construction Technology & Management)**

First YEAR (**Semester – I**

Course Content & Grade

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
M.TECH (Const.Tech. & Mgmt)	**Construction Materials**	**MTCTM-1002**	**3L-1T-0P**	**4**

Course Outcomes

After studying this subject, the students will be able to:

CO1: Understand the various types of material used for Construction.

CO2: Understand the various properties of material & its effect.

CO3: Understand the quality control in construction.

CO4: Understand the quality control in construction.

CO5: Analyze the various concept of using new construction materials

Syllabus:

Unit 1: Material Science: Classification; Standardization; Codification and Variety. Details of Micro Structure of Different construction Materials; Different effects on materials of construction.

Unit 2: Properties of Materials : Environmental Influences : Thermal effects : Effect of Chemicals ; Fire resistance ; Corrosion and Oxidation ; Radiation. Properties of fresh & hardened concrete. Shrinkage & creep of concrete.

Unit 3: Concrete: Design and production of concrete ingradients ; Additives and admixtures. Special concretes e.g. light weight; Heavy weight ; Ready mix concrete ; Fibre Reinforced concrete etc.

Unit 4: New Construction Materials: Polymer materials ; Thermo - Plastic ; Polymer Concrete ; Composite materials ; Ferro cement ; Ferroconcrete ; Building materials from Agricultural & Industrial wastes.

Unit 5: Quality control in construction: Various aspects; Principle of statistical quality control. Different techniques of materials and process Quality control; Destructive and non destructive Testing of Materials; I.S. and international procedures of testing.

References Books

1. Ammer D.A. (1972): Material Management, Illionis: Irwin Publishers.
2. White A.H. (2019): Engineering material: MC Graw - Hill.
3. Deb. A. (2017): Engineering materials: world press.
4. Billmeyer Jr. F.W.(2009): Text Book of Polymer Science: Interscience Publishers Inc.
5. Golding Brage ; (2003). Polymers and Resins ; Nortrand.
6. Schmidt A.X. ; Marties CA ;(2015). Principle of High Polymer Theory & Practice MC Graw – Hill.
7. Stille ; J.K.(2016). Introduction to Polymer Chemistry Johwiley.

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M.TECH **(Construction Technology & Management)**

First YEAR (**Semester – I**

Course Content & Grade

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
M.TECH (Const.Tech. & Mgmt)	**Advanced Geotechnical Engineering**	**MTCTM-1003**	**3L-1T-0P**	**4**

Course Objectives:

After studying this subject, the students will be able to:

CO1: Learn principles of Structural Design.

CO2: Design different types of structures and to detail the structures.

CO3: Evaluate performance of the structures.

CO4: Evaluate the Stability analysis of slope

CO5: Analyze the plane and develop analytical skills.

Syllabus:

Unit 1 Site Investigations & Stress Distribution in soils:

Brief review of various methods of subsurface explorations, soil sampling, subsurface soundings, Geophysical explorations. Stress distribution beneath loaded areas by Boussinesq Westergaard's and Steinbrenner methods. Newmark's influence chart. Contact pressure distribution. Settlement analysis.

Unit 2 Well Foundations & Coffer Dams:

Types of caissons, Wells, and their design criteria. IS and IRC codes and their provisions. Tilt and Shift in wells and their rectifications. Types, Design data for cellular dams, stability analysis. interlock Stresses, Methods of design of cellular coffer dams.

Unit 3 Machine Foundations:

Theory of Vibrations. Single and double degree of freedom system. Damped and undamped vibrations. Types of machine foundations, mass spring model of analysis. Apparant mass of soil. Design of block foundations for impact type of machinery. Indian standard on Design and Construction of Foundations for Reciprocating machines.

Unit 4 Foundations on Expansive Soils:

Characteristics and treatment of expansive soils. Construction techniques in expansive soils. Use of under-reamed piles and their design criteria, CNS Layer techniques. Construction on collapsible soil.

Unit 5 Rock Mechanics:

Problems in Rock mechanics, Classification of rocks, physical, geological and Mechanical properties of rocks, mechanics of rock, deformation and fracture under load. The range and scope of Rock mechanics in relation to civil engineering projects.

Reference Books:

1. Soil Mechanics and Foundations by Dr.B.C.Punamia, Er. Ashok K.Jain
2. Geotechnical Engineering by Saurabh Kumar Soni
3. Advance Geotechnical Engineering: Soil-Structure by C.S Desaiand Musharraf Zaman
4. Advance Soil Mechanies by Braja M. Das
5. Soil Mechanics in Engineering Practice by Karl Terzaghi, RalphB.Peck,Gholamreza Mesri
6. Foundation Engineering by Ralph Brazelton
7. Fundamental of Soil Behaviour by James Mitchell

R.K.D.F. UNIVERSITY, BHOPAL

M.TECH **(Construction Technology & Management)**

First YEAR (**Semester – I**

Course Content & Grade

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
M.TECH (Const.Tech. & Mgmt)	**Construction Technology**	**MTCTM-1004**	**3L-1T-0P**	**4**

Course Objectives

After studying this subject, the students will be able to:

CO1 :To study different methods of construction to successfully achieve the structural design with recommended specifications.

CO2 : To involve the application of scientific and technological principles of planning, analysis, design and management to construction technology.

CO3 : To study of construction equipment's, and temporary works required to facilitate the construction process

CO4 : To provide a coherent development to the students for the courses in sector of Advanced construction technology.

CO5 : To present the new technology of civil Engineering and concepts related Advanced construction technology.

Syllabus:

Course Contents

Unit 1: Advanced Pavement Construction Techniques:

Pavement Construction using Bitumen, Hot mix plant, Concrete Road Construction, Fibre Reinforced Pavement Construction, Low-Cost Road Construction Techniques.

Unit 2: Form Work and Temporary Structures:

Design and construction features of different types of Temporary Structures. Stationary and slip form work Techniques, Special features of insitu construction. Stripping and Removal of form works, Form works for special structures e.g. shells, bridges, towers etc.

Unit 3: . Steel Construction:

Shop and insitu construction techniques, different connections. High strength bolts, Clearances and Tolerances, Erection of steel structures like Bridges, Trusses Chimneys, Power Houses.

Unit 4: Prestressing: Plants, Equipment for Prestressed Construction, Different Techniques of Prestressing. Prestressing of Bridge girders, water tanks and special structures.

Unit 5: Construction Techniques of Heavy and Special Structures:

Dams, Bridges, large span roofs, high rise Buildings, off shore Platforms, Pipelines, Tunnels and other underground structures, Safety measures in Construction.

Reference Books:

1. Construction Technology by Mr. Roy Chudley & Roger Greend
2. Introduction to Construction – Building by Stephen Emmitt
3. Construction Technology by Roy Chudley
4. Introduction to building by Derek Osbourn
5. Principle of Construction by Roger Greeno

R.K.D.F. UNIVERSITY, BHOPAL

M.TECH **(Construction Technology & Management)**

First YEAR (**Semester – I**

Course Content & Grade

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
M.TECH (Const.Tech. & Mgmt)	**Low-cost Building materials & construction Technology**	**MTCTM-1005(A)**	**3L-1T-0P**	**4**

Course Objectives

After studying this subject, the students will be able to:

CO1 :To learning the concepts of using low cost materials in construction

CO2 : To involve concept of using low cost building materials products in construction

CO3: To involve concept low cost construction techniques and equipment in construction

CO4: To provide tools and technic for low cost sanitation for rural area

CO5: To present the low technology of civil Engineering and compare related to Advanced construction technology.

Unit 1: . Concepts of low cost materials

Soil, Fly ash, ferrocement, Lime, Fibers, Stone Dust, Boulders and oversize metal, Bitumen

Unit 2: Low-cost building material products: -

(a) Walls - Stabilized and sun dried, soil blocks & bricks, Hollow concrete blocks, stone masonry blocks, Ferro-cement partitions.

(b) Roofs - Precast R.C. Plank & Joists roof, Precast channel roof, Precast L-panel roof, Precast Funicular shells, Ferrocement shells, Filler Slab, Seasal Fibre roof, Improved country tiles, Thatch roof.

Unit 3: Low cost construction Techniques and Equipment :-

(a) Techniques:- Rat trap bond construction, Precast R.C. and Ferrocement technique, Mud Technology.

(b) Equipment's :- Brick moulding machine, Stablilised soil block making machine and plants for the manufacturing of concrete blocks.

(c) Low Cost Roads :-

Unit 4: Low cost sanitation :-

(a) Waste water disposal system

(b) Low cost sanitation for rural and urban areas

(c) Ferrocement Drains

Unit 5: Cost analysis and comparison:-

(a) Low cost materials

(b) Low-cost techniques.

Reference Books

1. Hand Book of Low Cost Housing by A.K. Lal
2. Low-Cost Building Construction by Ralph Wolfe
3. Low Cost Housing by Deepak Kumar
4. Building an Affordable House by Fernan do Pages Ruiz
5. Project Cost Construction Control by Roy Pilcher

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M.TECH **(Construction Technology & Management)**

First YEAR (**Semester – I**

Course Content & Grade

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
M.TECH (Const.Tech. & Mgmt)	**Advance Construction Equipment**	**MTCTM-1005(B)**	**3L-1T-0P**	**4**

Course Objectives

After studying this subject, the students will be able to:

CO1 :To learning the concepts of using Modern Construction Materials: in construction

CO2 : To involve concept of using Polymers in civil Engineering and its products in construction

CO3: To involve concept construction techniques for construction Precast flat panel system

CO4: To provide knowledge of various construction equipment's for equipment for excavating

CO5: To provide knowledge and concept of Smart Materials such as sensors based technic

Unit 1 Modern Construction Materials:

Study of advance building materials like, aluminium, glass, fabric, various types of finishes & treatments, construction chemicals – sealants, engineering grouts, mortars, admixtures and adhesives

Unit 2 Polymers in civil Engineering-

Structural plastics and composites- polymer membranes coatings-adhesives, non - weathering materials-flooring and facade materials- glazed brick, photo catalytic cement, acid etched copper and composite fiber metals-metals and special alloys of steel - water jet cut stainless steel, mill slab steel, tension rods assemblies and cast iron, heat treatment in steels, tendons.

Unit 3 Construction methods:

Precast flat panel system, 3d volumetric construction, tunnel boring methods, slip form work, precast foundations. fabrication of pre cast and pre stressed components, reinforcing steel: types, bending, placing, splicing and spacing, tendons- soil improvement - mechanical, thermal and chemical.

Unit 4 Construction Equipment's:

equipment for excavating, dredging, trenching, tunnelling, drilling, blasting-equipment for compaction-erection equipment- types of pumps used in construction-equipment for dewatering and grouting-foundation and pile driving equipment, forklifts and related equipment-portable material -conveyors-hauling equipment.

Unit 5 Smart Materials:

Concept and types, sensing technology-types of sensors -physical measurement using piezoelectric strain measurement, piezoelectric and electro strictive material - magneto structure material, shape memory alloys, electro rheological fluids

Reference Books

1. Mahesh Varma ;(2009). Construction Equipment and its Planning and Applications ; Metropolitan Book Co.Pvt.Ltd. New Delhi. India.
2. Sharma S.C ;(1991). Construction Machinery and Equipment in India . Khanna Publication.
3. Sharma S.C. (1988). Construction Equipment and Management ; Khanna Publishers ; Delhi ;
4. Peurifoy R L ;(2014). Construction Planning ; Equipment and Methods ; Mc Graw Hill
5. James F Russell ; (2012). Construction Equipment ; Prentice Hall.

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M.TECH **(Construction Technology & Management)**

First YEAR (**Semester – I**

Course Content & Grade

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
M.TECH (Const.Tech. & Mgmt)	**Rural Construction Technology**	**MTCTM-1005(C)**	**3L-1T-0P**	**4**

Course Objectives

After studying this subject, the students will be able to:

CO1 :To learning the concepts of Rural Development Planning and Concept of Appropriate Technology for infrastructure.

CO2 : To involve concept of Rural Housing using low cost construction material

CO3: To provide knowledge of Water Supply and Rural Sanitation:

CO4: To provide knowledge and concept of Low Cost Roads and Transport

CO5: To knowledge of Low Cost irrigation and its utilization for better and sustainable irrigation

Unit-1 Rural Development Planning and Concept of Appropriate Technology.

Scope, Development Plans; Various approaches to rural development planning Concept of Appropriate technology; Role of Civil Engineering in Rural Development; Organizational structures & management rural development programmes/projects.

Unit 2:- Rural Housing :- Low cost construction materials for housing low cost housing designs-architectural considerations for individual and group housing ; composite material-ferrocement & flay ash, Autoclaved Calcium silicate bricks and soil-stabilized unburnt brick; Plinth protection of Mud Walls; Design Consideration and Construction of: Non-erodable Mud Plaster, water-proof and fire-retardent roof treatement for thatch roofs, Precast stone Masonry Block walling scheme; rat-trap bond for walls; Prefab Brick Panels for roof, ferrocement flooring /roofing units, Thin R.C.Ribbed slab font floors & roofs, Precast R.C. Channel Unit for flooring/roofing scheme, Precast R.C. cored unit for flooring/roofing scheme, Precast R.C. Plank flooring/roofing scheme, L-Pan roofing scheme; Glued Plywood Web Beams and Roof Panels; manual & Power Scaffold hoist, lifting device for prefab components; solar passive building design; Building economics and management.

Unit-3:- Water Supply and Rural Sanitation:

Epidemiology sources of water, BIS & WHO wate standards. Quality, Storage and distribution for rural water supply works; Basic Design principles of treatment-Low Cost water treatment technologies; Hand pumps-types, installation operation, and maintenance of

Mark-II hand pumps; Conservation of water; Rainwater, Harvesting; Drainage in rural areas, Design of low cost waste disposal systems; Design and constructions of low cost latrines: 2 pit pour flush water seal VIP latrines, septic tank etc; Biogas technology: Low cost community & individual Garbage disposal systems, Recycling of organic/agricultural wastes: Development of village ponds; Ferro cement water storage tanks & latrines. Cattle shed management; Sewage farming-standards for disposal and use for irrigation.

Unit-4. Low Cost Roads and Transport :-

Low cost pavement materials-testing suitability criteria processing materials; factors affecting pavement thickness & composition of various layers; CRRI Design for rural roads-Traffic Index, strength Index, CBR curve Intermediate Technology & Technology options for specify areas. Labour intensive techniques of road construction Mechanical stabilization; lime stabilization; water bound Macadam Construction; utilization of waste in rural construction one/two coat surface dressing; bitumen premix carpet; low cost improved transport system rural areas.

5. Low Cost irrigation:

Design & Construction of Tube well, Drip & Sprinkle irrigation systems; Water logging Reclamation land watershed and catchment area development-problem and features of watershed Management, Management Plans watershed structures and their basic design catchment treatment and Rehabilitation Plans; Types of M Hydel Plants, site selection, Advantages of Mini & Mi Hydel projects, structures required for plants.

i) Field visits to any 3-4 of the following to arranged and prepare the reprot of the visit.

- CBRI Rookee UP.
- CDC, Govt. Polytechnic, Sundernagar,HP.
- CDC,Thapar Polytechnic, Patials,Pb.
- Bunga villages and Sukhomajri Villages (HR).
- Central Soil-water Management Research and Trail.

Institute, Sector 27, Chandigarh. UT.

- Central Road Research Institute (CRRI), Mathura Delhi, UT.

R.K.D.F. UNIVERSITY, BHOPAL

M.TECH **(Construction Technology & Management)**

First YEAR (**Semester – I**

Course Content & Grade

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
M.TECH (Const.Tech. & Mgmt)	Construction Quality and Safety	**MTCTM-1005(D)**	**3L-1T-0P**	**4**

Course Outcomes

After studying this subject, the students will be able to:

CO1: Understand the elements of quality planning and the implication

CO2: Become aware of objectives and advantage of quality assurance

CO3: Study the relationship between quality and safety management

CO4: Study the types of injuries; Factors affecting safety

CO5: Analyse the inspections & investigations of site safety programmes

Course Contents

Unit 1:

Construction Quality; Inspection and Testing; Quality control; Quality Assurance; Quality Certification for companies and laboratories (ISO Certification; NABL certification)

Unit 2:

Total Quality Management; Critical factors of TQM ; TQM in Projects ; Benchmarking ; concepts of quality policy ; standards ; manual

Unit 3:

Third Party Certification: Construction Safety-meaning and scope ; Safety in construction-Technological aspects ; organizational aspects and behavioural aspects ; Safety legislation and Standards ; Contract conditions on safety in Civil Engineering projects

Unit 4:

Safety in Construction: Causes; classification; cost and measurement of an accident; safety programme for construction; protective equipment; accident report; safety measure: (a) For storage and handling of building materials. (b) Construction of elements of a building (c) In demolition of buildings Safety lacuna in Indian Scenario

Unit 5:

Types of injuries ; Factors affecting safety ; Strategic Planning for safety provisions. Personal & Structural safety - Safety 12 21 consideration during construction ; demolition and during use of equipment. Recording injuries and accident indices. Method statement ; SOPs ; PPE ; Inspections ; Investigations. Site safety programmes - JSA ; JHA ; Root cause analysis ;

meetings ; safety policy ; manuals ; training & orientation. Safety legislation regard to violation

Reference Books

1. N. Logothetis ;(2009). Management for Total Quality ; Prentice Hall
2. David Gold Smith ;(2016). Safety Management in construction and Industry ;Mc Graw Hill
3. D S Rajendra Prasad ;(2017). Quality Management System in Civil Engineering ; Sapna Book House ; Bangalore
4. Juran Frank ; J.M. and Gryna ; F.M.(2002). "Quality Planning and Analysis" ; Tata McGraw Hill.
5. K N Vaid ; (2019). Construction Safety Management ; NICMAR ;Bombay
6. James ; J.O Brian ;(2009). Construction Inspection Handbook –Quality
7. Robert (QMP) ; (1988). Bench Marking ; " The search for industry Best Practices that led to superior performance" American Society of Quality
8. Break Joseph and Susan Joseph ;(1995). Total Quality Management ; Excel Books ; New Delhi.

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M.TECH **(Construction Technology & Management)**

First YEAR (**Semester – I**

Course Content & Grade

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
M.TECH (Const.Tech. & Mgmt)	**Lab – I, Geotechnical Engineering Laboratory**	**MTCTM—1007**	**0L-0T-6P**	**6**

Course objectives:

This course will enable students to

1. Determine the type and properties of the soil.

2. Determine the compaction strength of the soil.

3. Determine the strength characteristics of the soil.

4. Determine the permeability of the soils.

5. Determine the amount of consolidation occurring the soil.

Content

1. Identification of gravel type, sand type, silt type and clay types soils; Tests for determination of Specific gravity (for coarse and fine grained soils) and Water content (Oven drying method).

2. Grain size analysis of soil sample (sieve analysis).

3. In situ density by core cutter and sand replacement methods.

4. Consistency Limits – Liquid Limit (Casagrande and Cone Penetration Methods), plastic limit

and shrinkage limit.

5. Standard Proctor Compaction Test and Modified Proctor Compaction Test.

6. Coefficient of permeability by constant head and variable head methods.

7. Strength Tests

a. Unconfined Compression Test

b. Direct Shear Test

c. Triaxial Compression Test (undrained)

8. Consolidation Test- Determination of compression index and coefficient of consolidation.

9. Laboratory vane shear test

10. Determination of CBR value

11. a) Demonstration of miscellaneous equipments such as Augers, Samplers, Rapid Moisture

meter, Proctor's needle.

b) Demonstration of Hydrometer Test.

c) Demonstration of Free Swell Index and Swell Pressure Test

d) Demonstration of determination of relative density of sands.

12. Preparing a consolidated report of index properties and strength properties of soil

REFERENCE BOOKS:

1. Soil Mechanics and Foundation Engg.- Punmia B.C. (2005), 16th Edition Laxmi

Publications Co. , New Delhi.

2. BIS Codes of Practice: IS 2720(Part-3/Sec. 1) – 1987; IS 2720 (Part – 2)- 1973; IS 2720 (Part

– 4) – 1985; IS 2720 (Part – 5) – 1985; IS 2720 (Part – 6) – 1972; IS 2720 (Part –7) – 1980; IS

2720 (Part – 8) – 1983; IS 2720 (Part – 17) – 1986; IS 2720 (Part - 10) – 1973; IS 2720 (Part –

13) – 1986; IS2720 (Part 11) – 1971; IS2720 (Part 15) – 1986; IS 2720 (Part 30) – 1987; IS 2720

(Part 14) – 1977; IS 2720 (Part – 14) – 1983; IS 2720 (Part – 28) – 1974; IS 2720 (Part – 29) –1966, IS 2720 (Part-60) 1965.

4. Soil Testing for Engineers- Lambe T.W., Wiley Eastern Ltd., New Delhi.

5. Manual of Soil Laboratory Testing- Head K.H., (1986)- Vol. I, II, III, Princeton Press,London.

6. Engineering Properties of Soil and Their Measurements- Bowles J.E. (1988), - McGrawHill Book Co. New York.

Course outcomes:

After a successful completion of the course, the students will be able to

1. Draw the particle size distribution curve and to find the particle size.

2. To find the MDD and OMC.

3. To find the CBR of the soil.

4. To find the SBC of the soil.

5. To find the consistency limits of the soil

R.K.D.F. UNIVERSITY, BHOPAL

M.TECH **(Construction Technology & Management)**

First YEAR (**Semester – I**

Course Code:

Course Content & Grade

Branch	Subject Title	Subject Code	Contact Hours per Week	Total Credits
M.TECH (Const.Tech. & Mgmt)	**Lab – II, Advance Concrete Lab**	**MTCTM—1007**	**0L-0T-6P**	**6**

Lab – I, Advance Concrete Lab

Course Outcomes

After studying this subject, the students will be able to:

CO1: Perform the various laboratory tests on cement, fine aggregates, coarse aggregates and reinforcement steel bars.

CO2: Perform the various laboratory tests on fresh and hardened concrete.

CO3: Mix Design of concrete and various special concretes.

List of Experiments:

Laboratory work shall be based on the topics of Advanced Concrete and as per the facility available in the institution.

1. To study and perform the important physical tests on various types of cement.
2. To study and perform the important physical tests on fine aggregates.
3. To study and perform the important physical tests on coarse aggregates.
4. To study and perform the physical tests on reinforcement steel bars.
5. To study and perform the various tests on fresh and hardened concrete.
6. To carry out the mix design of concrete as per IS 10262:2019 or latest version.
7. To carry out the mix design of special concretes such as:

- High strength concrete (HSC) (such as M40, M50 and so on)
- Self-compacting concrete (SCC)
- Pumpable concrete
- Mass concrete
- OPC with fly ash
- OPC with GGBS
- OPC with industrial or agricultural wastes