

Advanced Construction Material

COURSE OBJECTIVES:

The course provides basic knowledge of the properties of essential construction materials, especially steel, concrete, heat insulation materials, composites procedure & uses, components of Construction Industry, principles and methods to be followed in constructing various components of a building.

Course Content

Branch	Subject Title	Subject Code	Credit allotted subject wise		
			L	T	P
M.E.(CTM)	Advanced Construction Material	MECTM-2211	3	-	-

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 ingredients, Additives and admixtures. Special concretes e.g., light weight, Heavy weight, Ready mix concrete, Fiber Reinforced concrete etc.

Unit 4. New Construction Materials:

Polymer materials, Thermo - Plastic, Polymer Concrete, Composite materials, Ferrocement, 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.

COURSE OUTCOMES:

After completion of this course, the student will be able to:

1. To identify various building materials and select suitable type of building material for given situation and also the emerging materials in the field of Civil Engineering construction.

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COURSE OUTCOMES:

After completion of this course, the student will be able to:

1. Select different types of foundations based on site conditions and suggest remedial measures against foundation failures.
2. Analyze bearing capacity and settlement of foundations.
3. Design shallow and deep foundations

Reference Books :

1. J. E. Bowles, "Foundation Analysis & Design", Mc.Graw Hill Book Co.
2. W. C. Teng, "Foundation Design", Prentice Hall of India Ltd.
3. Tomlinson, "Foundation Design and Construction", ELBS, Longman Group Ltd.
4. Winterkorn and Fang, "Foundation Engineering Hand Book", Van Nostrand Reinhold Co, New York.
5. Kurian, N.P. Modern Foundations, Tata McGraw Hill, 1982.
6. Fang H.Y. Foundation Engineering Handbook, Van Nostrand Reinhold, 23, 1991.
7. Kaniraj Shenbaga R, Design Aids in Soil Mechanics and Foundation Engineering, Tata McGraw Hill,
8. Fleming etal, Piling Engineering, Surrrey Univ. Press/John Wiley and Sons,
9. Chellis, Robert D, Pile Foundations, MCGraw Hill, 1961
10. Tomlinson MJ, Pile Design and Construction Practice, a view point publication, 3e, 1981.
11. IS : 6403 Determination of bearing capacity of Shallow foundations
12. IS 8007- Part -I Calculation of Settlement of Foundation

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Advanced Concrete Technology

COURSE OBJECTIVE:

The objective of this course is to define and understand concept related concrete. Proportioning of concrete including principle for fresh and hardened concrete.

To Basic concept of fibre reinforce concrete, To identify and comprehend ideas connected to concrete technology which include the various type and properties of concrete as well as various adhesive materials and their critical application in the construction of safe and cost effective structure. To knowledge of pre-stressed concrete.

Course Content

Branch	Subject Title	Subject Code	Credit allotted subject wise		
			L	T	P
M.E.(CTM)	Advanced Concrete Technology	MECTM-2213	3	-	-

Unit 1

Principles of concrete mix design: concrete materials, mix proportioning and early age properties, strength, permeability and durability.

Concrete mix design procedures by: IS/ACI British Standards, mix design procedures using fly ash, fibers and design of high-performance concrete.

Unit 2.

Concreting operations - practices and equipment, batching; mixing; transporting; shuttering and staging; placing and compacting; curing, accelerated curing; finishing and jointing.

Properties and techniques of construction for concrete, admixtures, polymers, epoxy resins, pozzolanic materials and fly ash, fibre reinforced concrete, light weight concrete, heavy weight concrete, foam concrete, high performance concrete.

Unit 3.

Special concrete operations, shotcrete, grouting, guniting, under water concreting, hot and cold weather concrete, pumpable concrete, ready mixed concrete.

Unit 4.

Construction techniques for reinforced concrete elements - materials, principles and procedures for beams, slabs, columns, foundations, walls and tanks, design and fabrication of formwork for R.C.C elements, features of slip forming and precautions, details of special shuttering required for lining of tunnel, procedures and precautions.

Unit 5.

Pre-stressed concrete construction-principle, methods, materials, tools and equipment for the construction of a pre-stressed concrete.

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P. Ramesh

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Cost Effective Building Technology

COURSE OBJECTIVE:

To Understand the Definition, Concept & Objectives of the terms cost effective construction and green building. Apply cost effective techniques in construction. Apply cost effective Technologies and Methods in Construction.

Course Content

Branch	Subject Title	Subject Code	Credit allotted subject wise		
			L	T	P
M.E.(CTM)	Cost Effective Building Technology	MECTM-2214	3	-	-

Unit 1.

Concepts of low-cost materials

Soil, Fly ash, Ferrocement, Lime, Fibres, Stone Dust, Boulders and over size metal, Bitumen etc.

Unit 2.

Low-cost building material products: -

- (a) Walls - Stabilized and sun dried, soil blocks & bricks, Hollow concrete blocks, stone masonry blocks, Ferrocement partitions.
- (b) Roofs - Precast R.C. Plank & Joists roof, Precast channel roof, Precast L-panel roof, Precast Funicular shells, Ferrocement shells, Filler Slab, Seasal Fiber 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, Stabilized soil block making machine and plants for the manufacturing of concrete blocks.

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

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COURSE OUT COMES:

After completion of this course, the student should be able to:

1. Understand the Definition, Concept & Objectives of the terms cost effective construction and green building.
2. Apply cost effective techniques in construction.
3. Apply cost effective Technologies and Methods in Construction.

Reference books:

1. Alternative Building Materials and Technologies – K S Jagadeesh, B V Venkatta Rama Reddy & K S Nanjunda s Rao –New Age International Publishers
2. Integrated Life Cycle Design of Structures – AskoSarja –CRC Press
3. Non-conventional Energy Resources –D S Chauhan and S K Sreevasthava –
4. New Age International Publishers
5. Buildings How to Reduce Cost – Laurie Backer - Cost Ford
6. Lynne Elizabeth, Cassandra Adams Alternative Construction: Contemporary Natural Building Methods”, Softcover, Wiley & Sons Australia, Limited, John,2005
7. Givoni, “Man, Climate, Architecture, Van Nostrand, New York, 1976.
8. Charles J. Kibert, Sustainable Construction: Green Building Design and Delivery, John Wiley & Sons,2005.
9. Eugene Eccli- Low Cost, Energy efficient shelter for owner & builder, Rodale Press, 1976

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ELECTIVE- I (A)

Rural Construction Technology

COURSE OBJECTIVE:

To learn about the construction process of building and other important infrastructure.

Course Content

Branch	Subject Title	Subject Code	Credit allotted subject wise		
			L	T	P
M.E.(CTM)	Rural Construction Technology	MECTM-2215(A)	3	-	-

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 programme/projects.

Unit 2.

Type of Rural Housing: Brief study about rural housing and design of RCC, pattern of bamboo house, mud house, wooden house, and other low-cost housing structure. Govt. schemes for rural housing.

Unit 3.

Rural Road – Type of rural road, condition of rural roads, manufacturing process of rural road, Practices adopted for construction of rural roads. Culverts- Types of culverts, design, construction, piers, types of piers, bridges, types of bridges, waterway.

Unit 4.

Water harvesting structures: Gabian structure, percolation tank, Contour trench, check dam, stop dam, Bench Terracing, Zing terracing, trenching, Gully control.

Unit 5.

Rural Sanitation, health and hygiene: Design of low-cost rural toilets, design of pan, selection of site and disposal of waste. Sanitation and govt. Schemes like, Swachh Bharat Mission, Nirmal Bharat Abhiyan.

COURSE OUTCOMES:

Students get to know about the various constructions related skills that are necessary for self-employment and job opportunity.

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ELECTIVE- I (B)

Computer programming and applications

Course Content

Branch	Subject Title	Subject Code	Credit allotted subject wise		
			L	T	P
M.E.(CTM)	Computer programming and applications	MECTM-2215(B)	3	-	-

Unit 1.

Introduction to Computers:

An overview of the functioning of computer, block diagram of computer system, I/O and auxiliary storage devices, machine, assembly and high-level languages, assemblers, compilers, interpreters.

Representation of information: Number systems-binary, octal, hexadecimal systems, character and codes-ASCII and EBCDIC.

Need for operating system, concepts of operating system, disk storage and its characteristics.

Unit 2.

Programming Language C:

Introduction: History of C, Variable, Constants & Keywords in C, Operators in C, data types in C, instruction in C., Control Structures-Decision control structures, Loop control structures, case control structures., Functions - Scope rule of functions, parameter passing techniques.

Storage Classes in C, Introduction to C preprocessor-features of C, preprocessor, macro expansion, file inclusion, conditional compilation., Introduction to Pointers, Arrays - Initialization, arrays in terms of pointers, passing array to a function, multidimensional arrays, array of pointers., Strings- standard library string functions, two-dimensional array of characters., Structures - accessing structure elements, representation of structures in memory.

Enumerated data types, Fundamentals computer graphics, Points plotting, lines, curves, circles, fill in C.

Unit 3.

Simulation:

Basic concepts of simulation and modelling. Types of simulations - deterministic and stochastic and continuous and discrete simulations and their application. Monte-Carlo simulations, design methodology of a simulation system. Overview of simulation languages.

Unit 4.

Measurement and Control:

Overview of measurement system- transducer, signal conditioning and display/recording sub-systems. Output standards of signal conditioning systems. basic principles of digitizing the analog signals, facilities available and specifications of analog

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to digital converter cards in PC environment, programming for data acquisition and processing, outlines of digital control.

Unit 5.

CAD:

Familiarization with the use of drafting tool.

Laboratory work:

1. Exercises on C programming.
2. Exercise on Graphics programming.
3. Design of Simulation for an Engineering System
4. Interfacing equipment for measurement of standard physical parameters.
5. Programming for data acquisition and analysis.

Reference Books:

1. P.K.Sinha; Computer Fundamentals -, BPB Publications
2. P.K.Sinha ; Let Us C - P.K.Sinha, BPB Publications
3. Byron S.Gottfried ; Programming with C - Schaum's Outline Series, Tata McGraw Hill
4. Geoffrey Gordon; System Simulation -
5. Mikell T.Groover; CAD/CAM -

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ELECTIVE- I (C)
Advanced Mathematics

Course Content

Branch	Subject Title	Subject Code	Credit allotted subject wise		
			L	T	P
M.E.(CTM)	Advanced Mathematics	MECTM-2215(C)	3	-	-

Unit 1.

Numerical solution of Partial Differential Equation (PDE): Numerical solution of PDE of hyperbolic, parabolic and elliptic types by finite difference method.

Unit 2.

Integral transforms: general definition, introduction to Mellin, Hankel and Fourier transforms and fast Fourier transforms, application to transforms to boundary value problems in engineering.

Unit 3.

Integral equations: Conversion of Linear Differential equation (LDE) to an integral equation (IE), conversion of boundary value problems to integral equations using green's function, solution of Integral equation, IE of convolution type, Abel's IE, Integral differential equations, IE with separable variable, solution of Fredholm Equation with separable kernels, solution of Fredholm and Volterra equations by method of successive approximations.

Unit 4.

Calculus of Variation: Functionals and their Variational, Euler's equation for function of one and two independent variables, application to engineering problems.

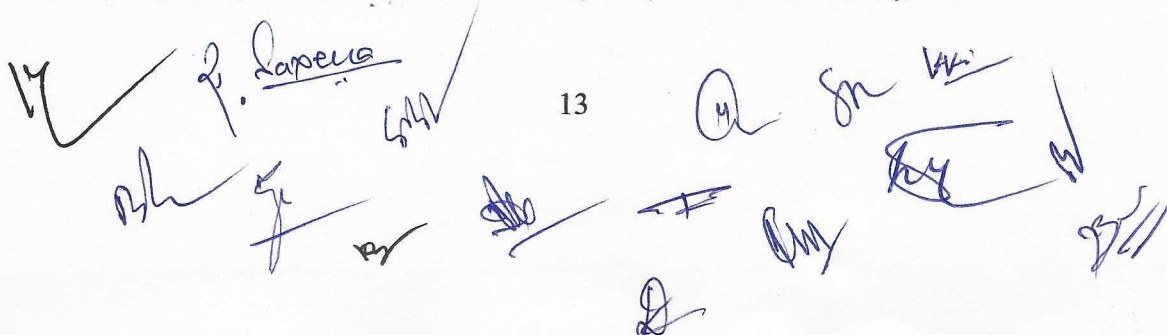
Unit 5.

FEM: Variational functional, Euler Lagrange's equation, Variational forms, Ritz methods, Galerkin's method, discretization, finite elements method for one dimensional problem.

Reference Books:

1. CF Froberg, Introduction to numerical analysis.
2. SS Sastry, Introductory methods of numerical analysis
3. Krasnov, Kiselevand Makarenho, Integral equations
4. Buchanan, Finite element Analysis (Schaum Outline S), TMH
5. Krishnamurthy, Finite element analysis, TMH
6. Higher Engineering Mathematics by B.V. Ramana, Tata Mc Hill.
7. Advance Engineering Mathematics by Ervin Kreszig, Wiley Eastern Edd.
8. Applied Numerical Methods with MATLAB by Steven C Chapra, TMH
9. Numerical Methods in Engineering, Salvadori and Baron
10. Theory and problems of Numeric analysis (Schaum Outline S), TMH

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Lab. I

Course Content

Branch	Subject Title	Subject Code	Credit allotted subject wise		
			L	T	P
M.E.(CTM)	Lab. I	MECTM-2216	-	-	4

- Auto-CAD
- STAAD-Pro.
- Primavera
- Other Related Software's

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