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Programme: **M. Tech. (Construction Technology & Management)** **Semester -I**

Subject Title	Subject Code	Credit			Theory		
		L	T	P	External (70)	Internal (30)	Total (100)
Advanced Mathematics	MTH-181	3	1	-			Min: 40 (D Grade)

Duration of theory (External): 3 hours
Theory internal - max marks: 30
Best of two mid semester test – Max. Marks: 15
Assignment / Quiz/ Regularity – Max. Marks: 15

Unit	Contents (Theory)
I	Solution of Partial Differential Equation (PDE) by separation of variable method, numerical solution of PDE (Laplace, Poisson's, Parabola) using finite difference methods, Elementary properties of FT, DFT, WFT, Wavelet transform, Haar transform.
II	Probability, compound probability and discrete random variable. Binomial, Normal, Poisson's distribution. Sampling distribution, elementary concept of estimation and theory of hypothesis, recurred relations.
II	Stochastic process, Markov process transition probability transition probability matrix, just and higher order Markov process, Markov chain. Queuing system, transient and steady state, traffic intensity, distribution queuing system, concepts of queuing models (M/M/1: Infinity/ Infinity/ FC FS), (M/M/1: N/ Infinity/ FC FS), (M/M/S: Infinity/ Infinity/ FC FS)
IV	Operations of fuzzy sets, fuzzy arithmetic & relations, fuzzy relation equations, fuzzy logics. MATLAB introduction, programming in MATLAB scripts, functions and their application.
V	Introduction and definition of reliability, derivation of reliability functions, Failure rate, Hazard rate, mean time t future & their relations, concepts of fault tolerant analysis, Elementary idea about decision theory and goal programming.

References:

1 Higher Engineering Mathematics by B.V. Ramana, Tata Mc Hill.
2 Advance Engineering Mathematics by Ervin Kreszig, Wiley Easten Edd.
3 Applied Numerical Methods with MATLAB by Steven C chapra, Tata Mc Graw Hill.
4 Introductory Methods of Numerical Analysis by S.S. Shastry,
5 Introduction of Numerical Analysis by Forberg
6 Numerical Solution of Differential Equation by M. K. Jain
7 Numerical Mathematical Analysis By James B. Scarborogh
8 Fourier Transforms by J. N. Sheddon
9 Fuzzy Logic in Engineering by T. J. Ross
10 Fuzzy Sets Theory & its Applications by H. J. Zimmersoms

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Subject Title	Subject Code	Credit			Theory		
		L	T	P	External (70)	Internal (30)	Total (100)
Composite Materials	MTCM-102	3	1	-			Min: 40 (D Grade)

Duration of theory (External): 3 hours
Theory internal - max marks: 30
Best of two mid semester test –Max. Marks: 15
Assignment / Quiz/ Attendance – Max. Marks: 15

Unit	Contents (Theory)
I	**Fibre Reinforced Concrete:** Properties of Constituent Materials, Mix Proportions, Mixing and Casting Procedures, Properties of Freshly mixed FRC, Mechanics and properties of Fibre reinforced concrete, Composite Material approach, Application of fibre reinforced concrete.
II	**Fly Ash Concrete & Polymer Concrete:** Classification of Indian Flyashes, Properties of Flyash, Reaction Mechanism, Proportioning of Flyash concretes, Properties of Flyash concrete in fresh and hardened state, Durability of flyash concrete. Terminology used in polymer concrete, Properties of constituent materials, Polymer impregnated concrete, Polymer modified concrete, Properties and applications of polymer concrete and polymer impregnated concrete.
III	**Ferro Cement & High Performance Concrete:** Constituent materials and their properties, Mechanical properties of ferro-cement, Construction techniques and application of ferro-cement. Materials for high performance concrete, Supplementary cementing materials, Properties and durability of high performance concrete, Introduction to silica fume concrete, Properties and applications of silica fume concrete.
IV	**Sulphur Concrete & Sulphur Infiltrate Concrete:** Process technology, Mechanical properties, Durability and applications of sulphur concrete, Sulphur infiltrated concrete, Infiltration techniques, Mechanical properties, Durability and applications of sulphur infiltrated concrete.
V	**Light Weight Concrete:** Properties of light weight concretes Pumice concrete, Aerated cement mortars, No fines concrete, Design and applications of light weight concrete.

References:

1 Concrete, its Properties and Microstructure by P.K. Mehta, and P.J.M. Monterio.
2 Flyash in Concrete by Malhotra and Ramezanianpour
3 Fibre Reinforced Concrete by Bentur and Mindess
4 Ferrocement by B.K. Paul, and R.P. Pama.

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Subject Title	Subject Code	Credit			Theory		
		L	T	P	External (70)	Internal (30)	Total (100)
Geotechnical Engineering	MTCM-103	3	1	-			Min: 40 (D Grade)

Duration of theory (External): 3 hours
Theory internal - max marks: 30
Best of two mid semester test –Max. Marks: 15
Assignment / Quiz/ Attendance – Max. Marks: 15

Unit	Contents (Theory)
I	**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.
II	**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.
III	**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, Apparent mass of soil, Design of block foundations for impact type of machinery, Indian standard on Design and Construction of Foundations for Reciprocating machines.
IV	**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.
V	**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.

References:

1 Soil Mechanics & Foundation Engg. by Dr. K.R. Arora - Std. Publishers Delhi
2 Soil Mechanics & Foundation Engg. by B.C. Punmia - Laxmi Publiscations Delhi
3 Modern Geotech. Engg. by Dr. Alam Singh-IBT Publishers Delhi.
4 Geotech. Engg. by C.Venkatramaiah-New AGe International Publishers, Delhi
5 Found. Engg. by GALeonards McGraw Hill Book Co. Inc.
6 Relevant IS Code

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Subject Title	Subject Code	Credit			Theory		
		L	T	P	External (70)	Internal (30)	Total (100)
Concrete Construction Technology	MTCM-104	3	1	-			Min: 40 (D Grade)

Duration of theory (External): 3 hours
Theory internal - max marks: 30
Best of two mid semester test –Max. Marks: 15
Assignment / Quiz/ Attendance – Max. Marks: 15

Unit	Contents (Theory*)
I	Introduction of Concrete materials, Admixtures, Fly Ash, Polymers, Early Age Properties, Strength, Permeability & Durability. Principles of Concrete mix design, Concrete Mix Design procedure by: IS/ACI/British Standards.
II	Concreting Operations-Practices and Equipment, Batching; Mixing; Transporting; Placing and Compacting, curing, Properties and technique of construction for concrete, Fiber reinforced concrete, light weight concrete, Heavy weight concrete, Foam concrete, High performance Concrete.
II	Special concrete operations, shotcrete, grouting, Guniting, under water concreting, hot and cold weather concrete, pumpable concrete, Construction techniques for reinforced concrete elements-materials, Principles and procedures for beams, slabs, columns, Foundations, walls and tanks, design and fabrication of form work for R.C.C elements.
IV	Prestressed concrete construction-Principle, methods, materials, Tools and equipment for the construction of a prestressed bridge.
V	Inspection and Quality Control of Concrete Construction-Stages, Principles, Checklist, Statistical Controls, procedures.

References:

1 Concrete Technology by M.L. Gambhir
2 Concrete Technology, by Neville and Brooks
3 Properties of Concrete by Neville.
4 Concrete Microstructure, Properties and Materials P.K. Mehta and PJM Monteiro
5 Concrete Technology – M.S. Shetty.

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Subject Title	Subject Code	Credit			Theory		
		L	T	P	External (70)	Internal (30)	Total (100)
Low Cost Housing Materials and Construction Technology	MTCM-105	3	1	-			Min: 40 (D Grade)

Duration of theory (External): 3 hours
Theory internal - max marks: 30
Best of two mid semester test –Max. Marks.: 15
Assignment / Quiz/ Attendance – Max. Marks.: 15

Unit	Contents (Theory)
I	**Concepts of low cost materials:** Soil, Fly ash, ferrocement, Lime, Fibers, Stone Dust, Boulders and oversize metal, Bitumen etc.
II	**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.
III	**Low cost construction Techniques and Equipment:** (a) Techniques: Rat trap bond construction, Precast R.C. and Ferrocement technique, Mud Technology. (b) Equipments: Brick moulding machine, Stablilised soil block making machine and plants for the manufacturing of concrete blocks. (c) Low Cost Roads: Murrum road, WBM road, earthen road, GSB road.
IV	**Low cost sanitation:** (a) Waste water disposal system (b) Low cost sanitation for rural and urban areas (c) Ferrocement Drains
V	**Cost analysis and comparison:** (a) Low cost materials (b) Low cost techniques

References:

1 Hand book of Low cost Housing by A.K. Lal.

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Subject Title	Subject Code	Credit			Practical		
		L	T	P			Total (150)
Lab-I (Material Testing-I)	MTCM-106	-	-	2	External (105)	Internal (45)	Min: 60 (D Grade)

Practical internal - max marks: 15

Lab work & sessional – Max. Marks: 40

Assignment / Quiz/ Regularity – Max. Marks: 05

List of Experiments:

1. Indian Standard Light Compaction Test/Std. Proctor Test.
2. Indian Standard Heavy Compaction Test/Modified Proctor Test.
3. Determination of field density by Core Cutter Method.
4. Determination of field density by Sand Replacement Method.
5. Determination of field density by Water Displacement Method.
6. CBR Test.
7. Tests on Aggregates.
8. Design of concrete mix.

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Subject Title	Subject Code	Credit			Practical		
		L	T	P	External (105)	Internal (45)	Total (150)
Lab-II (Software lab-I)	MTCM-107	-	-	2			Min: 60 (D Grade)

Practical Internal - Max Marks: 50

Lab work & Sessional – Max. Marks: 40

Assignment / Quiz/ Regularity – Max. Marks: 05

List of Experiments/ Programs:

1. Plan a Hostel building using Auto CAD.
2. Analyse a Portal frame using STAAD Pro.
3. Prepare a building drawing using 3 D max.
4. Prepare a building drawing using 3 D Studio.

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