Annexure-II

SYLLABUS

AND

SCHEME OF TEACHING

MASTER OF ENGINEERING

IN

CIVIL ENGINEERING

(CONSTRUCTION TECHNOLOGY & MANAGEMENT)

REGULAR & MODULAR PROGRAMME
(2023 – 2025)

CIVIL ENGINEERING DEPARTMENT
NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING & RESEARCH
CHANDIGARH

Program Outcomes

POs	Details
PO-1	An ability to independently carry out research/investigation and development to solve practical problems and apply analytical tools

TABLE – I

STUDY & EVALUATION SCHEME OF
M.E. IN CIVIL ENGINEERING (CONSTRUCTION TECHNOLOGY & MANAGEMENT)

REGULAR PROGRAMME

CODE	SUBJECT

TABLE-I Continued

CODE	SUBJECT	SCHEDULE FOR TEACHING			Credits	Marks		
		L	P/T	Total		Theory	Sessional	Total

SECOND SEMESTER

CORE SUBJECTS

TABLE-I Continued

CODE	SUBJECT	SCHEDULE FOR TEACHING				Credits	Marks		
		L	P	T	Total		Theory	Sessional	Total
THIRD SEMESTER **CORE SUBJECT**									
MCT 7104	Transportation Engineering	3	2		5	4	50	50	100
ELECTIVE SUBJECTS (ANY ONE)									
MCT 6207	Design and Construction of Hydraulic Structures	3	2		5	4	50	50	100
MCT 7101	Steel								

MCT-6101 CONSTRUCTION MANAGEMENT
(Core Course)

	L	P/T
Maximum marks: 50		
Time Allowed : 3 hours	**3**	**2**

Note: Examiner shall set eight questions covering the whole syllabus. The candidate will be required to attempt any five questions.

OBJECTIVES

After going through the course on Construction Management the students shall be able to:

i) Understand the concepts and principles of Modern dayConstruction
ii) Understand the Network Techniques, Construction Planning andManagement.
iii) Find the time cost optimization of theprojects.
iv) Understand the site layout, inspection, supervision and qualitycontrol.
v) Implement the safety inconstruction.
vi) Implement the labour laws and Acts

IMPLEMENTATION:

This subject shall be conducted through lecture-cum-discussion sessions, expert lectures by working professionals, field visits, practice tasks/assignments and educational films.

EVALUATION STRATEGY:

1.	Two class test of 15 marks each(regular) (One class test forModular)	**:**	30
2.	Assignments, seminars&quizzes	**:**	20
3.	Final Examination	**:**	50
4.	TotalMarks	**:**	100

CONTENTS

UNIT-I

Introduction:

Definition, functions and scope

UNIT-III

Labour Laws and Acts

[3] CO-6

Project Management:

Feasibility study; project reports; progress reports; monitoring and controlling project activities.

[10] CO-6

UNIT-IV

Site Layout:

Principles governing site lay out; factorseffectingsite lay out; preparation of site layout.

Supervision, Inspection and Quality Control: [3] CO-4

Supervisor's responsibilities; keeping records; control of field activities handling disputes and work stoppages; storage and protection of construction materials and equipment; testing and qualitycontrol.

[5] CO-4

Purpose of inspection:

Inspection of various components of construction; reports and records; statistical quality control.

[6] CO-4

UNIT-V

MCT -6102 CONCRETE CONSTRUCTION TECHNOLOGY
(Core

UNIT-III

Properties and Techniques of Construction for Conventional and Special Concretes

Admixtures, polymers, epoxy resins, pozzolanic materials and fly ash, fibre reinforced concrete, light weight concrete, heavy weight concrete, foam concrete, high performance concrete.

(04) CO-3

Operations, shotcrete, grouting, guniting, under water concreting, hot and cold weather concrete, pump able concrete, ready mixed concrete.

(02) CO-4

UNIT-IV

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

Course Title: CONCRETE CONSTRUCTION TECHNOLOGY Course Code: MCT -6102					
CO	**PO**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**
CO1: Knowledge of various ingredients, their physical and chemical					

MCT- 6103 PAVEMENT DESIGN, CONSTRUCTION AND MAINTENANCE
(Core Course)

	L	P/ T
Maximum marks:50		
Time Allowed : 3 hours	**3**	**2**

Note: Examiner shall set eight questions covering the whole syllabus. The candidate will be required to attempt any five questions.

OBJECTIVES

After going through this course, of the subject of pavement design, construction and pavement design,36 maintenance, students will be able to:

i) Understand the basic principles of

UNIT-III

Airport Pavements

Difference between design approach between Highway& Airport Pavements.Thicknessdesign ,FAA method for Flexible and Rigid pavements, Soil Classification for FAA, ESWL Concept design data of various aircrafts, CBR method (USACE), LCN system of pavement design, problem solving on all these methods. Introduction to ACN method PCN. Software applications (Introductiononly)

(10) CO-7

UNIT-IV

Construction of Highways:

Types of Highway Construction and their selection, materials for construction, Types of binders and their grades e.g. Emulsion, Bitumen, CRMB, Cut-back PMB, NRMB etc. need for modifying binders. Brief Specifications and Construction procedure of differentGranularlayers: G.S.B., WBM and W.M.M.,

Introduction to various Equipment used for highway construction. Hot mix plant, Paver, Rollers.

Bituminous pavements, Brief Specifications and Constructional features for Pre-Mix Carpet, Mix Seal Surfacing, B.M. , SDBC. Other higher quality pavement layers DBM, BC (introduction only). Prime coat and Tack coat- their application and brief specifications, Seal coat

Cement concrete pavements, Joints in cement concrete pavements,

(14) CO-3, CO-4, CO-5

UNIT-V

Maintenance of Highways:

Types of highway maintenance: routine, periodic and special type .Need for Inspection and schedule of maintenance. Pavement failures, their causes and remedial measures typical flexible and rigid pavement failures

Defects/ Failures in Flexible Pavement- their types and causes:7Design and Construction lapses. Surfaction

COURSE OUTCOMES:

CO1: Apply the basic design principles for flexible pavements.
CO2: Determine thickness of various layers using IRC-37 (2012) and other methods.
CO3: Evaluate various types of materials used in construction of flexible roads and their classification.
CO4: Know specifications of common types of granular and bituminous layer.
CO5: Outline procedure for execution of granular and bituminous works.
CO6: Identify types of defects in flexible pavements and rigid pavements and their causes and rectification measures.
CO7: Classify the soil and determine sub-grade class of soils and Design the Airport pavement by FAA method, LCN method and CBR method.

Course Title: PAVEMENT DESIGN, CONSTRUCTION AND MAINTENANCE **Course Code:MCT- 6103**			
CO	**PO**		
	PO1	**PO2**	**PO3**

MCT-6105 CONSTRUCTION COSTING AND FINANCIAL MANAGEMENT
(Core Course)

Maximum marks:50 **L P/ T**
Time Allowed :3hours **3-**

Note: Examiner shall set eight questions covering the whole syllabus. The candidate will be required to attempt any fivequestions.

OBJECTIVES

After going through this course, of the subject of Construction Costing and Financial Management, students will be able to:

i) List various methods of costing and make cost estimates of simple items of construction works.
ii) To list various methods of measurements of quantities of various construction works and their applications.
iii) Determine factors of cost variations
iv) Understand cash flow and funding methods of project.
v) List and describe various types of payments in a project and their implementation.
vi) Know various methods of material classification, their inventory, management and safety aspects.
vii) Know techniques of cost benefit analysis and comprehend elements of financiarious

UNIT-III

Cash and Payment of Works :

Precautions in custody of cash, imprest account and temporary advance; maintenance of temporary advance; and advance account; different types of payment ,first, running, advance and final payments.

[10] CO-4, CO-5

UNIT-IV

MaterialManagement:

Objectives and scope of material management classification, codification, ABC analysis, standardization and substitution; introduction to inventory control; stores management; organization and lay out; receipt, inspection and issue; care and safety; store records and storeaccounting.

UNIT-V

Financial Management

Meaning and scope; financial statement analysis; funds flow analysis; capital budgeting; cost-benefitanalysis.

Course Title: CONSTRUCTION COSTING AND FINANCIAL MANAGEMENT Course Code: MCT 6105	
CO	**PO**
	PO1

MCT- 6107 PAVEMENT LAB.
(Core Course)

Maximum marks:50 **L P/ T**
Time Allowed :3hours **3**

OBJECTIVES
After going through this course, it is intended to acquire necessary knowledge and develop skills and practical competencies for the following:
i) List of Appropriate machinery used in construction of highways and their applicationareas
ii) Evaluate existing strengths of flexible pavements by various commonmethods.
iii) Determine sub-grade strength by suitablemethods.
iv) Carry out analysis of mixes high quality bituminousmixes.

IMPLEMENTATION :
The subject involves instruction mainly through demonstration, laboratory and field work. In addition education films may be used for demonstration purpose and teaching correct practices. Attempts shall be made to conduct visits to sites of relevant nature.

EVALUATION STRATEGY :

1.	Practicetasks	**:**	15
2.	Practice tasksinField	**:**	20
3.	Quizzes/viva, Record & Presentation of Reports etc.	**:**	15
4.	**TotalMarks**	**:**	50

No theory examination shall be conducted.

CONTENTS

PRACTICAL EXERCISES:

i)	Determination of CBR value of sub-gradesoils.	CO-3
ii)	Determination of stripping value of roadaggregate.	CO-4
iii)	Determination of Marshall Stabilityvalue.	CO-4
iv)	Evaluation of pavement strength by using Benkelman'sBeam.	CO-2
v)	Determination of strength of existing pavement by Dynamic Cone PenetrationTest.	CO-3
vi)	Roughness measurement of road surface(Demonstarion)	CO-2
vii)	Determination of Hardness Number of Mastic Asphalt by Hardnesstester	CO-2

STUDY VISITS:

i)	Study of Sensor- paver and other constructionmachinery	CO-1
ii)	Study of batching and mixing plant for construction of roads (Hot mix plant/WMMplant	CO-1

COURSE OUTCOMES:
CO1:AppMpppBT/F3 11.04 Tf1 0 0 1 240.34 451.1 Tm[Q0GA&0J"et"ccqt"cffa'PSt7g

MCT- 6171 COMPUTER APPLICATIONS IN CIVIL ENGINEERING
(Elective Course)

	L	P / T
Maximum marks:50		
Time Allowed :3hours	**2**	**4**

Note: Examiner shall set eight questions covering the whole syllabus. The candidate will be required to attempt any fivequestions.

OBJECTIVES

The subject will enable students to understand the application of computers in various fields like CAD,

MCT- 6106 ADVANCED STRUCTURAL DESIGN AND DETAILING
(Elective Course)

Maximum marks:50	**L P / T**
Time Allowed :3hours	**3 2**

Note: Examiner shall set eight questions covering the whole syllabus. The candidate will be required to attempt five questions.

MCT 7103 DESIGN OF PRESTRESSED CONCRETE STRUCTURES
(Elective Course)

	L	P /T
Maximum marks :50		
Time Allowed :3hours	**3**	**2**

Note: Examiner shall set eight questions covering the whole syllabus. The candidate will be required to attempt any five questions.

OBJECTIVES

After going through course on Design of Pre-stressed Concrete Structures students are expected to :

i) Understand the concept of pre-stressinganalysis.

ii)

UNIT-IV

Method of load balancing and its applications to particular problems of slabs, beams and portals. (6) CO-3

Design of pre-stressed members subjected to tension and compression, Circular pre-stressing. (5) CO-3

Discussion of various provisions in the code for pre-stressed concrete members. (4) CO-3

REFERENCE BOOKS

i) Krishna Raju, N. (2012) Pre-stressed Concrete, New Delhi. Tata McGrawHill.

ii) Nilson, Arthur H. (1987). Design of Pre-stressed concrete, Canada, Jon Wiley &Sons

iii) Dayaratnam, P. (1996). Pre-stressed Concrete Structures, New Delhi, Oxford &IBHPublishers.

iv) Gerwick, Ben C. (1997) Construction of Pre-stressed Concrete Structures, WileyProfessional

v) Ramamurtham S. (2015) Pre-stressed concrete.Nodia, Uttar Pradesh, DhanpatRai Publishing Company (P)Ltd.

COURSE OUTCOMES:

CO1: Acqiure Knowledge of the concept of pre-stressing and its importance for civil engineering structures.

CO2: Apply knowledge of pre-stressing for analysis and design of structure.

CO3: Use techniques, skills and tools for construction of pre- stressed structures using modern techniques.

CO4: Apply various

MTE- 7103 TECHNOLOGY MANAGEMENT
(Elective Course)

	L	P / T
Maximum marks:50		
Time Allowed :3hours	**4**	**-**

Note: Examiner shall set eight questions covering the whole syllabus. The candidate will be required to attempt any fivequestions.

OBJECTIVES

After going through the course on Technology Management the learner are expected to know various issues related to :

i) Business Strategies for implementing New Technologies
ii) Technology forecasting and Management Pertaining to Research & Development.
iii) Management of Intellectual Property Rights.
iv) Management

REFERENCE BOOKS

i) Technology and Management, Cassell Educational Ltd.,London

ii) John Humbleton Elsevier ; Management of High Technology Research andDevelopmentCharles W.L. Hill/Gareth R. Jones,

MMT 6109 OPTIMIZATION TECHNIQUES
(Elective Course)

MaximumMarks:50	**LP/T**
Time Allowed:3Hours	**4 ---**

OBJECTIVES

After going through the course on Optimization Techniques the students shall be able to:
Understand the optimization Techniques for

MCT-6201 ENVIRONMENTAL ENGINEERING &

Air Pollution

COURSE OUTCOMES:

CO1: Analyse the harmful effects of pollution with respect to water, air, noise

MCT- 6202 BUILDING MAINTENANCE
(Core Course)

Maximum

Materials

COURSE OUTCOMES:

CO1: Acqiure Knowledge of the principles of maintenance for maintenance of structures.
CO2: Diagnose the causes of various types of defects in structures.
CO3: Plan and schedule the maintenance of structures as per maintenance management techniques.
CO4: Carry put repair and strengthening of structures in field.

Course Title: BUILDING MAINTENANCE **Course Code: MCT- 6202**					
CO	**PO**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**

MCT- 6208 FOUNDATION DESIGN AND

COURSE OUTCOMES:

CO1: Estimate bearing capacity for different types of shallow foundations under different soil conditions and placement of footing.
CO2: Know construction aspects of various types of shallow foundations and their suitability under various conditions.
CO3: Identify various types of pile foundations and estimate the carrying capacity of pile(s) or design pile/pile group.
CO4: Select a suitable soil improvement methods for given conditions.
CO5: Describe various methods of rectification of foundations

Course Title: FOUNDATION DESIGN AND CONSTRUCTION
Course Code: MCT- 6208

CO	PO				
	PO1	PO2	PO3	PO4	PO5
CO1: Estimate bearing capacity for different types of shallow foundations under different soil conditions and placement of footing.	3	2		1	2
CO2: Know construction aspects of various types of shallow foundations and their suitability under various conditions.	2		3		
CO3: Identify various types of pile foundations and estimate the carrying capacity of pile(s) or design					

UNIT-III

Drilling, Blasting and Tunneling Equipment:

Definition of terms ,bits, jackhammers, drifters, wagon drills, churn drills, piston drills, blast hole drills, shot drills, diamond drills; Tunneling equipment; selecting the drilling method and equipment; selecting drilling pattern; rates for drilling rock, aircompressors.

(6) CO-1, CO-2

UNIT-IV

PilingEquipment:

Pile hammers, selecting a pile hammer loss of energy due to impact, energy losses due to causes other thanimpact.

Equipment for bored and cast in-situ piles

Pumping Equipment:

Pumping equipment in construction, Classification of pumps; Selection of pumps Air

UNIT-III

Eco-friendly Materials

Various types of eco-friendly materials, use of recycled materials like: flyash bricks, recycled ceramic tiles, recycled glass tiles, porcelain tiles, natural terracotta tile, wood, steel, aluminium and renewable materials, agrifibre, linoleum, salvaged material properties and applications.Recycling of aggregate, use of plastic, recycled material

Indoor Air Quality

Natural air ventilation systems, different types of low VOC materials, day lighting.

UNIT-IV

Rating Systems and Certification for Green

Course Title: GREEN BUILDINGS AND SERVICES
Course

Course Title: BRIDGE ENGINEERING Course Code: MCT 6205					
CO	**PO**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**
CO1: Identify and describe the components, classifications and importance of bridges.		**2**		**2**	
CO2: Knowledge of bridge code w.r.t. width, clearances, loads, different forces and their impact on design of superstructures and substructures.	**2**	**3**	**3**		**3**
CO3: Understand the MORTH specifications and drawings highlighting general arrangement and suitability for different types of bridges.		**2**	**2**	**2**	
CO4: Design piers and abutments, including their stability and checking for different factor of safety.	**3**	**3**			**3**
CO5: Design different types of foundation including their installation, stability checks and construction designs.	**3**	**04 Tf1**			

MCT- 7104 TRANSPORTATION ENGINEERING
(Core Course)

Maximum marks:50 **L P/ T**
3 2

Time Allowed: 3 hours

Note: Examiner shall set eight questions covering the whole syllabus. The candidate will be required to attempt any five questions.

OBJECTIVES:
After going through the course of Transportation Engineering the learners are expected to
i) Understand the traffic flowcharacteristics
ii) Understand the principles governing highway capacity and level ofservices
iii) Design the intersections, interchanges and rules pertaining to placement of Road signs and signals.
iv) Know the urban highway utilities for smooth movement of traffic and mitigate the road accidents.
v) Understand the Environmental impact Assessment of Highway Projects &Softwares used for Planning & Designing of HighwayProjects.

IMPLEMENTATION
Instruction will focus on relevant knowledge on Basic concepts of traffic flow characteristics and highway capacity, Design of various components e.g. intersections, and other highway facilities shall be learnt. The instructions strategies will include lecture-cum-discussion sessions, field visits and practical exercise/assignments/seminarsetc.

EVALUATION STRATEGY

1.	Two class test of 15 marks each(regular) (One class test forModular)	**:**	30
2.	Assignments, seminars&quizzes	**:**	20
3.	Final Examination	**:**	50
4.	TotalMarks	**:**	100

CONTENTS

UNIT-1
Traffic Flow Characteristics :
i) Nature of TrafficFlow
ii) Various Parameters e.g speed, rate of flow, density, spacing and headway, lane occupancy, clearance etc.
iii) Categories of traffic flow, uninterrupted and interruptedflow.
iv) Analysis of speed, flow and densityrelationship.

Course Title: TRANSPORTATION ENGINEERING Course Code: MCT- 7104					
CO	**PO**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**
CO1: Analysis of traffic flow which includes uninterrupted and interrupted flow and density relationship with general model of vehicle stream flow.	**2**	**1**		**1**	**3**
CO2: Determine of level of service for free -ways, multi lane highways, including use of highway capacity manual.	**3**	**1**	**2**	**1**	**2**

MCT-6207- DESIGN AND CONSTRUCTION OF HYDRAULIC STRUCTURES

(Elective Course)

Maximum marks:50	**L P/T**
Time Allowed :3hours	**3 2**

Note: Examiner shall set eight questions covering the whole syllabus. The candidate will be required to attempt any five questions.

OBJECTIVES

The subject of "Design & Construction of Hydraulic Structures" will enable the students to :

i) Acquire knowledge concerning construction of various types of dams,lining of irrigation channels, construction of wells provision of various energy dissipation works and construction river training worksetc.

ii) Acquire relevant knowledge for construction of various types of hydraulicstructures.

IMPLEMENTATION:

Instruction will focus on providing relevant knowledge in construction of concrete dam, earth dams and rock fill dams, construction of water wells and lining of irrigation channels. The instructional strategies will include lecture-cum-discussion sessions, field visits, and practicalexercises/assignments/seminars.

EVALUATION STRATEGY:

1.	Two class test of 15 marks each(regular) (One class test forModular)	**:**	30
2.	Assignments, seminars&quizzes	**:**	20
3.	Final Examination	**:**	50
4.	TotalMarks	**:**	100

CONTENTS

UNIT-I

Elements of Dam Engineering.:

Embankment dam types and characteristics, concrete dam types and characteristics sp 0 61[( )] T.912 0 0 G[(a)-12(n) 1

UNIT

Course Title: DESIGN AND CONSTRUCTION OF HYDRAULIC STRUCTURES Course Code: MCT-6207					
CO	**PO**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**
CO1: Execute construction of various types of dams, lining of irrigation channels, construction of wells provision of various energy dissipation works and construction river training works etc.	**1**	**1**	**3**	**2**	**2**
CO2: AcquireKnowledge for construction of various types of hydraulic structures.	**1**		**3**		**2**

(4) CO-5

PRACTICAL EXERCISES:

i) Structural detailing exercise for an industrialbuilding
ii) Practical exercises on cutting, drilling, bolting, welding,riveting
iii) Study and demonstration of erection of steel components in a constructionsite.

REFERENCE BOOKS:

i) Ramachandra (2011). Design of steel structures. New Delhi. Standard BookHouse,
ii) Subramanian, N (2008) Design of Steel Structures, Oxford UniversityPress.
iii) Singh,Gurcharan;Singh,Jagdis (2013) Estimating, Costing and Valuation, Delhi,Lomous offset Press
iv) Guidebook for Fabrication and Erection of Steel Structures (2005)KolkataINSDAG
v) Syal, I.C.; Singh, Satinder (2013). Design of Steel Structures. Delhi. StandardPublishers Distributors.

COURSE OUTCOMES:

MCT-6104 RURAL CONSTRUCTION TECHNOLOGY
(Elective Course)

	L	P/ T
Maximum marks:50		
Time Allowed :3hours	**3**	**--**

Note:- Examiner shall set eight questions covering the whole syllabus. The candidate will be required to attempt any fivequestions.

OBJECTIVES

The subject of Rural Construction Technology will expose the students to learning

REFERENCE BOOKS:

i) Madhav Rao A.G., D.S.Ramachandra Murthy, Appropriate Technologies for Low cost Housing Oxford and IBH Publishing Co. Pvt.Ltd.

ii) CBRI, Roorkee, Advances in Building Materials andConstruction.

iii) Satyanarayana Murthy C., Design of Minor Irrigation 6ETy11884 0 61BRI,

3 Hrs CO-3

UNIT-II

Methods of Research

Descriptive Research: Survey, Case Study and Content Analysis Concept, types, procedure for conducting descriptive research.

Correlation Rese

CODE	SUBJECT	SCHEDULE FOR TEACHING	CREDITS	MARKS