



**GURU KASHI  
UNIVERSITY**

# **Program Syllabus Booklet**

**Masters of Technology in Construction Technology &  
Management  
(M. Tech CTM-145)**



**Session: 2019-20**

**Guru Gobind Singh College of Engg. & Tech.  
Guru Kashi University, Talwandi Sabo**

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**Program Name: Masters of Technology in Construction Technology & Management**  
**Program Code: 145**

The Program Outcomes (POs) for the Program Masters of Technology in Construction Technology & Management are as given below:

M.tech CTM post graduates will be able to:

PO	Statement
1	<b>Knowledge:</b> Apply the advance knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
2	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex and advanced engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	<b>Design/development of solutions:</b> Design advanced solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4	<b>Conduct investigations of complex problems:</b> Effectively Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6	<b>The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7	<b>Environment and sustainability:</b> Understand the impact of the advance professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8	<b>Individual and team work:</b> An ability to independently carry out advance research /investigation and development work to solve the practical problems.
9	<b>Communication:</b> An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
10	<b>Project management and finance:</b> Students should be able to demonstrate a



	degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.
11	<b>Life-long learning:</b> Ability to Analyze, evaluates, and select computer applications for the purpose of efficient and effective construction project management.
12	<b>Ethics:</b> Enhance the ability to Analyze construction projects related to fundamental aspects of construction management (i.e., cost, schedule, quality, safety, ethics) and develop appropriate solutions

**The Program Specific Outcomes (PSOs) for the Program Masters of technology in Construction Technology & Management are as given below:**

PSO	Statement
1	Enhance employability and/or entrepreneur skills through in-house and onsite training.
2	Provide solutions/procedures to societal and rural development problems through research and innovative practices.
3	Enforcement of environmental legislation and Public awareness related to civil engineering.



**Annexure -2**

<b>Semester: Ist</b>										
<b>Sr . No.</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Type of Cours e T/P</b>	<b>(Hours Per Week)</b>			<b>No. of Credi ts</b>	<b>Intern al Marks</b>	<b>Extern al Marks</b>	<b>Total Mar ks</b>
				<b>L</b>	<b>T</b>	<b>P</b>				
1	145101	Construction Management & Equipment	T	4	0	0	4	50	50	100
2	145102	Concrete Construction Technology	T	4	0	0	4	50	50	100
3	145103	Computation Techniques	T	4	0	0	4	50	50	100
4	145104	Building Planning & Design	T	4	0	0	4	50	50	100
5		<b>Elective-I</b>	T	4	0	0	4	50	50	100
<b>Total No. of Credits</b>							20			
<b>Elective-I</b>										
1	145105	Environment Engineering & Management								
2	145106	Bridge Engineering								



Study Scheme										
Semester: 2nd										
Sr.	Course Code	Course Name	Type of Course T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks
				L	T	P				
1	145201	Foundation Design & Construction	T	4	0	0	4	50	50	100
2	145202	Maintenance of Building Structure	T	4	0	0	4	50	50	100
3	145203	Computer Aided Design	T	4	0	0	4	50	50	100
4	145204	Building Cost and Quality	T	4	0	0	4	50	50	100
5		<b>Elective-II</b>	T	4	0	0	4	50	50	100
<b>Total No. of Credits</b>							20			

<b>Elective-II</b>		
1	145205	Pavement Design, Construction and Maintenance
2	145206	Rural Construction Technology



**Study Scheme**

**Semester: 3rd**

Sr.	Course Code	Course Name	Type of Course T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks
				L	T	P				
1		<b>Elective-III</b>	T	4	0	0	4	50	50	100
2		<b>Elective-IV</b>	T	4	0	0	4	50	50	100
3	145305	Project	P	0	0	8	4	60	40	100
4	145306	Seminar	P	N A	N A	N A	2	100	N.A	100
<b>Total No. of Credits</b>										

<b>Elective-III</b>		
1	145301	Advanced Structural Design and Detailing
2	145302	Composite Materials

<b>Elective-IV</b>		
1	145303	Disaster Reduction and Management
2	145304	Construction Costing and Financial Management



<b>Semester: 4th</b>										
<b>Sr.</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Type of Course T/P</b>	<b>(Hours Per Week)</b>			<b>No. of Credits</b>	<b>Internal Marks</b>	<b>External Marks</b>	<b>Total Marks</b>
				<b>L</b>	<b>T</b>	<b>P</b>				
1	145401	Dissertation	T/P	N A	N A	N A	20	500	500	1000
<b>Total No. of Credits</b>							<b>20</b>			
<b>1: Each theory paper examination will be of three hours duration.</b>										
<b>2: Seminar will be independent study on the related topic &amp; will be evaluated internally.</b>										
<b>3: Thesis will be evaluated by External Examiner and internal guide the candidate is required to make presentation on required thesis work and viva voce will be held.</b>										





Credits- 04

L T P

4 0 0

**Course Outcomes: On successful completion of this course, the students will be able to:**

CO	Statement
CO1	Understand the construction equipment practices and techniques to be used in the field.
CO2	Apply theoretical and practical aspects of project management techniques to achieve project goals.
CO3	Become familiar with construction equipment and their capabilities
CO4	Learn to utilize construction equipment on site work and heavy civil projects
CO5	Properly select heavy equipment based on applications, utilization, productivity, and other factors

## Course Contents

### UNIT 1

Engineering Economy: Principle of Engineering Economy, Minimum cost point analysis, breakeven point analysis, Depreciation and depletion.

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



## UNIT II

Construction Planning: Need of construction planning, Constructional Resources, construction team, stages in construction, preparation of construction schedule, Job layout, inspection and quality control.

4. General Management: Introduction and characteristics of management, Principle and function of management, Scientific management.

## UNIT III

5. Materials Management: Scope, Objective and functions of material management, Procurement and store management, Materials handling management, Inventory control and management. Disposal of Surplus Materials

6. Earth Moving Equipment : Crawler and wheel tractors their functions, types and specifications; Gradability Bull dozers and their use; tractor pulled scrapers, their sizes and output; effect of grade and rolling resistance on the output of tractor pulled scrapers Earth loaders; Placing and compacting earth fills. Power shovels-functions, selection, sizes, shovel dimension and clearances, output. Draglines-functions, types sizes, output clamshells; Safe lifting capacities and working ranges cranes; Hoes, Trenching machine types and production rate calculation of producing rates of equipment ; examples.

## UNIT IV

7. Hauling Equipment : Truck's; Bottom, dump wagons; capacities of trucks and wagons Balancing the capacities of hauling units with the size excavator; effect of grade, rolling resistance and altitude on the cost/performance of hauling equipment; balancing excavating hauling equipment examples.

Drilling, Blasting and Tunneling Equipment: Definition of terms, bits, Jackhammers, Drifters, wagon drills, che drills, piston drills, blast hole drills, shot drills, diamond drills, tunneling equipment, selecting the drilling method equipment; selecting drilling pattern; Rates for drilling rock, compressors.

Pile Driving Equipment: Pile hammers, selecting a pile hammer, loss of energy due to impact, Energy losses due to causes other than impact.



1. Verma, Mahesh. (1964), *Construction equipment and its planning and application*. Metropolitan Book Company.
2. Peuripo, RL. (2010). *Construction Planning equipment and Methods*. Tata McGraw Hill.
3. Singh, Jagman. 1993. *Heavy construction planning equipment and methods*. Oxford and IBH.
4. Franklin, John (2004). A. Dusseault, Maurice B. *Rock Engineering*. Tata McGraw Hill.
5. John, Christan.(1981). *Management Machines and Methods in Civil Engineering*. John Wiley and Sons

**The mapping of PO/PSO/CO attainment is as follows:**

PO/PSO /CO	PO 1	PO 2	PO 3	PO 4	PO5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	2	3	3	2	1	1	2	1	2	2	2	2	2	2
CO2	3	3	3	3	2	1	1	1	2	3	1	2	3	3	3
CO3	3	3	3	3	2	1	1	2	1	3	1	2	3	2	3
CO4	3	3	3	3	2	1	1	2	1	3	1	2	2	2	3
CO5	3	3	3	3	2	1	2	1	2	3	1	2	3	3	3
<b>Average</b>	<b>2.8</b>	<b>2.8</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>1.2</b>	<b>1.6</b>	<b>1.6</b>	<b>2.8</b>	<b>1.2</b>	<b>2</b>	<b>2.6</b>	<b>2.4</b>	<b>2.8</b>

The correlation levels are: “1” – Low Correlation, “2” – Medium Correlation, “3” – High Correlation and “-” indicates there is no correlation.



**Course Name: Concrete Construction Technology**

**Course Code: 145102**

**Semester: 1st**

**Credits- 04**

**L T P**

**4 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

<b>CO</b>	<b>Statement</b>
CO1	Learn about the special ingredients of concrete
CO2	Know different property ingredients of concrete.
CO3	Understand the use of various admixtures to be used in Preparation of Mixes.
CO4	Estimate the properties of fresh and harden concrete.
CO5	Prepare the design concrete mixes.

## **Course Contents**

### **UNIT 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.

### **UNIT 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.

Special concrete operations, shot Crete, grouting, grunting, under water concreting, hot and cold weather concrete, pump able 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.

#### **UNIT IV**

Prestressed concrete construction- Principle, methods, materials, Tools and equipment for the construction of a prestressed bridge.

Inspection and Quality Control of Concrete Construction-Stages, Principles, Checklist, Statistical Controls, procedures.

#### **Practical Exercises:**

Testing of aggregates-fine and coarse as per BIS procedure.

Testing of cement with reference to IS specifications and Cement Grade.

Concrete Mix Design for desired grade from given materials.

a) Design and testing of workability of concrete for a given C.C. proportion.

Design and determination of Cube Strength with given materials and proportions.

Design of Concrete Mix proportions.

Study of effect of compaction of strength of concrete.

Study of effect of plastic mixers on workability of concrete.

Study of permeability of concrete.

Conduct chemical analysis of hardened concrete to determine the cement content.

Inspection of a concrete construction site and preparation of report showing correct and incorrect practices.

#### **Reference Books:**

1. Gambhir, M.L. (2007). *Concrete Technology*. Tata McGraw-Hill Education.



**The mapping of PO/PSO/CO attainment is as follows:**

PO/PSO /CO	PO 1	PO 2	PO 3	PO 4	PO5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO12	PSO 1	PSO 2	PSO 3
CO1	2	2	3	3	2	1	1	2	1	2	2	2	2	2	2
CO2	3	3	3	3	2	1	1	1	2	3	1	2	3	3	3
CO3	3	3	3	3	2	1	1	2	1	3	1	2	3	2	3
CO4	3	3	3	3	2	1	1	2	1	3	1	2	2	2	3
CO5	3	3	3	3	2	1	2	1	2	3	1	2	3	3	3
<b>Average</b>	<b>2.8</b>	<b>2.8</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>1.2</b>	<b>1.6</b>	<b>1.6</b>	<b>2.8</b>	<b>1.2</b>	<b>2</b>	<b>2.6</b>	<b>2.4</b>	<b>2.8</b>

The correlation levels are: “1” – Low Correlation, “2” – Medium Correlation, “3” – High Correlation and “-” indicates there is no correlation.

**Course Name: Computational Techniques**

**Course Code: 145103**

**Semester: 1st**

**Credits- 04**

**L T P**

**4 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

<b>CO</b>	<b>Statement</b>
CO1	Articulate the tradeoffs between easy computation and accuracy.
CO2	Execute basic commands and scripts in a mathematical programming language
CO3	Demonstrate proficiency in the use of input/output commands including: command line, file, and graphical.
CO4	Create changes in program flow using control structures.
CO5	Modularize program construction and increase code re-uses using functions.

### **Course Contents**

#### **UNIT I**

Equations: Roots of Algebraic, Transcendental equations, Solution of linear simultaneous Equations by different methods using - Elimination, Inversion, Gauss - Jordan methods. Homogeneous Problems and Eigen Value Problems. Nonlinear Equations, Interpolation.

Finite Difference Technique: Initial and Boundary Value Problems of Ordinary and Partial differential equations, Solution of Various types of Plates.

#### **UNIT II**



Statistical Methods: Method of Correlation and Regression Analysis.

## UNIT III

Initial Value Problems: Galerkin's Method of Least Square, Initial Value problem by Collocation points, Runga Kutta Method.

Newmark's Implicit and Explicit Solutions for Non Linear Problems and Convergence Criteria.

### Reference Books:

1. Jain, M.K. & Jain, R.K. (2014). *Numerical Method Problems and Solutions*. Jain, M.K. & Jain, R.K publishers.
2. Tenkolsky, A. Vellerling, W.T. (2009). *Numerical Recipes in Fortran*, S. W.H. Press
3. Syal & Gupta. (2005). *Computer Programming & Numerical Analysis*. Khanna Publishers.

**The mapping of PO/PSO/CO attainment is as follows:**

PO/PSO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	2	3	2	1	2	-	2	2	2	2	2	2	2
CO2	3	3	3	2	2	1	-	1	2	3	2	3	3	3	3
CO3	2	3	3	2	2	2	1	-	1	2	1	2	2	3	2





CO4	P 2	J 3	A 3	I 2	N 3	A 1	-	2	2	2	3	2	3	2	1	3
CO5	3	2	2	2	2	2	2	1	2	-	3	-	3	2	2	2
Average	<b>2.4</b>	<b>2.6</b>	<b>2.4</b>	<b>2.4</b>	<b>1.8</b>	<b>1.5</b>	<b>1.5</b>	<b>1.6</b>	<b>2.2</b>	<b>2.6</b>	<b>2.2</b>	<b>2.6</b>	<b>2.2</b>	<b>2.2</b>	<b>2.2</b>	<b>2.4</b>

The correlation levels are: “1” – Low Correlation, “2” – Medium Correlation, “3” – High Correlation and “-” indicates there is no correlation.

## Course Name: Building Planning and Design

Course Code: 145104

Semester: 1st

Credits- 04

L T P

4 0 0

**Course Outcomes: On successful completion of this course, the students will be able to:**

CO	Statement
CO1	Understand basic principles of building design and planning.
CO2	Explore building drawing as a way of discovering and developing ideas for designing residential, commercial and public buildings.
CO3	Develops basic drawing skills; create multilayer architectural and working drawing drawings.
CO4	Implement planning strategies and policies.
CO5	Apply fundamentals of management to utilize functions of management in construction. Like Demonstrate leadership qualities by implementing construction project processes with control

## Course Contents

### UNIT I – Architecture



# GURU KASHI UNIVERSITY

Land Acquisition Act 1894 (short titles, extent & definitions only) Municipality act 1911 (short titles, extent & definitions only, Power of committee for making bylaws, for punishment, to sanction). Architectural Planning and Layout: Principles of planning a building, Factors affecting selection of site for building, Sun & the building

## UNIT II – Soil

Soil formation, particle size analysis, Indian Standard Soil Classification, time-settlement curve, Proctor test, compaction of sand, factors affecting compaction, field compaction methods, calculation of Bearing Capacity of soil by Standard Penetration Test, soil investigation report, types of shear failures, effect of water table on B.C., Settlement cases, calculation of B.C. by Plate Load Test.

Note: IS: 6403 is allowed in Exam

## UNIT III – Structure

Earthquake: Hazardous effects on structures & Ground, General guidelines for earthquake resistance buildings. Liquid faction, factors affecting liquefaction & prevention,

Various Loading Conditions and Analysis of Multistoried Complex (Kani's Method for vertical loads and Portal Method for Lateral loads)

Structural Design of Beams, Columns, Slabs, Foundations and Stairs.

Structural Drawings

## Reference Books

1. Arora, K R. (2011). *Soil Mechanics and Foundation Engg.* Standard Publishers.
2. Verma, Mahesh. (2005). *Construction equipment and its planning and application.* S.chand Publishers.
3. Peurify RL. (1995). *Construction Planning equipment and Methods.* Tata McGraw Hill.
4. IS- 1888 (1978): Plate Load Test. BIS. New Delhi.
5. IS – 6403 (1981): Bearing capacity of shallow Foundation. BIS. New Delhi.
6. **The mapping of PO/PSO/CO attainment is as follows:**

PO/PSO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	2	3	2	1	2	-	2	2	2	2	2	2	2



CO2	P	JUN	A	B	I	ND	A										
	3	3	3	3	3	3	3	2	2	1	-	1	2	3	2	3	3
CO3	2	3	3	3	2	2	2	2	2	1	-	1	2	1	2	2	3
CO4	2	3	2	3	3	1	-	2	2	2	2	3	2	3	2	1	3
CO5	3	2	2	2	2	2	2	2	1	2	-	3	-	3	2	2	2
Average	<b>2.4</b>	<b>2.6</b>	<b>2.4</b>	<b>2.4</b>	<b>2.4</b>	<b>1.8</b>	<b>1.5</b>	<b>1.5</b>	<b>1.6</b>	<b>2.2</b>	<b>2.6</b>	<b>2.2</b>	<b>2.6</b>	<b>2.2</b>	<b>2.2</b>	<b>2.2</b>	<b>2.4</b>

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### Course Name: Environmental Engineering & Management

**Course Code : 145105**

**Semester: 1st**

(Elective-I)

**Credits- 04**

**L T P**

**4 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

<b>CO</b>	<b>Statement</b>
CO1	Understood Sewage quantity and quality for better treatment so as to reduce scarcity by recycling waste water
CO2	Learn about industrial waste water quantity and quality for achieving better sanitation in society
CO3	Use population forecasting methods.
CO4	Design various water treatment units and plan their operations on the basis of raw water quality and water demand.
CO5	Apply knowledge of advanced water treatment processes for individual water purification

### Course Contents

## **UNIT I**

### **Environment & Ecology:**

Definition and understanding of concepts. Ecosystem, Energy flow in ecosystem, water, carbon and nitrogen cycle community's inter-relationships in and ecosystem.

### **Type of Pollutants and Protection of Environment :**

Environmental Protection Importance of clean Environment, Control of Environment pollution w.r.t. air, land and water.

### **Water pollution:**

Sources, causes and measurement of water pollution surface water and underground water, water Quality criteria for various uses of fresh water, river basis studies for surface water pollution control biochemical oxygen demand, effect of oxygen demanding wastes on rivers.

### **Domestic and industrial wastes :**

Sources, standards for disposal of waste water Industrial effluents, Basic unit operation. In control of waste water pollution, design features for treatment for disposal of sewage effluents; guidelines of CPCB for abatement of industrial pollution technologies for control of water pollution from industries.

### **Air and Noise pollution:**

Definition Principle materials causing pollution types of air contaminants. Their sources and effects on living and nonliving materials permissible limits. Air pollution control-Basis principles, natural self cleansing, pollution control methods and various engineering devices to control particulate and gaseous pollutants, controlling and pollution from automobiles.

### **Noise Pollution:**

Definition, sources of noise and its units, adverse effects of noise pollution, sound pressure level and its measurement, octave band and its importance; noise pollution control measures.

## **UNIT II**

Land damage due to Mining: Open cast mining and its ill effects, Environmental protection practices in Mining and Environment Management Plans. City and Housing Environment: Introduction, stage of



Housing/city environment, Environmental consideration in town-planning, Measures for improving city environment.

## UNIT III

Current issues in Environmental Engineering:

Global warming Ozone depletion, Acid Rain, Oil pollution, Radiation Hazard and Control, Role of non-convention sources of energy in environment.

Acts/Legislation Provisions:

Need for laws various acts, Rules and notifications. Salient features of various acts: The water (Prevention and Control of pollution) Act 1974. The water (prevention and Control of pollution) Cass Act, 1977. Air (Prevention and control of Pollution) Act 1981. The Environment (Protection) Act 1986, The Public liability insurance Act, 1991. The forest Act 1927, the wild life (Protection) Act 1927, The Forest (Conservation) Act, 11980, various other Rules and notification for control of pollution.

## UNIT IV

Environmental Impact Assessment: Definition and its importance for Environment Management, Constituents of Environment. Impact Assessment Report, Steps involved in preparing EIA, EIA methodologies Projects under EIA, Environment Impact Statement, Constraint in implementation of EIA. Impact prediction water, Resources Projects and other relevant case studies. Application of Biotechnology for Environmental Management: Basic concepts and techniques, Application for industrial effluent: Solid waste management, Bio-fertilizers and Bio-pesticides; Plant tissue culture in forestry. Bio safety aspects, Bio-remedial.

### **Laboratory Work/Field Tasks:**

1. Testing of water for various parameters such as PH, DO, conductivity.
2. Determination of BOD for Domestic Waste/Industrial Waste.
3. Determination of MPN of given sample.
4. Air sampling to particulate matter and other gaseous contaminants.
5. Determination of concentration of Metallic pollutants by using Atomic Absorption spectrometer.
6. Monitoring of vehicular pollution emission.
7. Enervations of noise levels for indoor and outdoor noise levels.
8. Visit and submission of Report for treatment of waste water plant of any industry.

### **Reference Books**



1. Peavy, Rowe, Techobanoglous,(2009) *Environmental Engg.* McGraw-Hill.
2. L Davis, Mackenzie. *Environmental (1990). Engg.* Tata McGraw-Hill.
3. H.Msters, Glibert.(1997). *Environmental Engineering.* Sc Prentice Hall of India Pvt. Ltd.
4. Panday, GN. Carney, GC.(2006). *Environmental Engineering.* McGraw-Hill.
5. Sharma, P.D. (2004). *Ecology and Environment.* Rastogi Publication.

**The mapping of PO/PSO/CO attainment is as follows:**

PO/PSO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	2	3	2	1	2	-	2	2	2	2	2	2	2
CO2	3	3	3	2	2	1	-	1	2	3	2	3	3	3	3
CO3	2	3	3	2	2	2	1	-	1	2	1	2	2	3	2
CO4	2	3	2	3	1	-	2	2	2	3	2	3	2	1	3
CO5	3	2	2	2	2	2	1	2	-	3	-	3	2	2	2
Average	<b>2.4</b>	<b>2.6</b>	<b>2.4</b>	<b>2.4</b>	<b>1.8</b>	<b>1.5</b>	<b>1.5</b>	<b>1.6</b>	<b>2.2</b>	<b>2.6</b>	<b>2.2</b>	<b>2.6</b>	<b>2.2</b>	<b>2.2</b>	<b>2.4</b>

The correlation levels are: “1” – Low Correlation, “2” – Medium Correlation, “3” – High Correlation and “-” indicates there is no correlation.



Credits-04

L T P

4 0 0

**Course Outcomes: On successful completion of this course, the students will be able to:**

CO	Statement
CO1	Discuss the IRC standard live loads and design the deck slab type bridges.
CO2	Analyze the box culverts for the given loading and detail the box culverts.
CO3	Design and detail of T-Beam bridges.
CO4	Understand the design and check the stability of piers and abutments.
CO5	Discuss the bridge foundations and prepare the bar bending schedule

## Course Contents

### UNIT I

Introduction: Definition and components of a bridge, Classification of bridges, Choice of a bridge type.

Investigation for Bridges: Need for investigation, Selection of bridge site, Determination of design discharge for River Bridge, Linear waterway, Economical span, Vertical clearance, scour depth, Afflux, Traffic projection.

### UNIT II

Standard Specifications for Road Bridges: Indian Road Congress Bridge Code, Width of carriageway, Clearances, Loads to be considered; Dead load, I.R.C. standard live loads, Impact effect, Application of Live load on decks, Wind load, Longitudinal forces, Centrifugal forces, Horizontal forces due to water current, Buoyancy effect, Earth pressure, Deformation stresses, Erection stresses, Temperature effects, and Seismic force.



Reinforced Concrete Bridges: General, Types of bridges; balanced cantilever bridges, Continuous girder bridges, rigid frame bridges, Portal Frame and Arch bridges. Detailed design of solid slab and T-beam bridges,

## UNIT III

Steel Bridges: General, Type of Steel bridges; Plate girder bridges, Box girder bridges, Truss bridges, Cantilever bridges, Cable stayed bridges, and Suspension bridges.

Sub-structure and Foundation: Design of piers and abutments (Masonry & R.C.C.). Types of foundations; Shallow, Pile, and Well foundations including their construction details.

## UNIT IV

Bearings & Appurtenances: Different types of bearings, joints and handrails.

Construction and Maintenance of Bridges: Methods of construction of concrete bridges. Causes of Bridge failures, Inspection and maintenance.

**Instructions to the Examiner:** Total eight questions are to be set, covering the complete syllabus, out of which, the students are required to attempt any five questions.

## Reference Books

### Reference Books:

1. Reddy, C.S. (2011). *Basic structural Analysis*. Mittal Publications. New Delhi.
2. Vazirani & Ratwani, (2002). *Bridge Engineering Vol- I and Vol.-II* Khanna Publishers. New Delhi.
3. Ramamurtham, S. (2011). *Bridge Engineering*. Dhanpat Rai Publishing Co. (P) Limited.
4. Concrete Bridge Design SP-23 (ACI Publication)

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PO/PSO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	2	2	1	2	1	2	2	1	1	1	2	1	1
CO2	2	1	2	1	2	1	1	2	2	1	1	-	1	2	2
CO3	2	2	2	2	1	2	1	2	2	1	-	1	2	1	1
CO4	1	2	1	2	1	1	2	2	2	2	1	1	1	2	2
CO5	1	2	1	2	2	1	2	1	2	1	1	1	1	2	2
Average	1.75	1.75	1.75	1.75	1.25	1.5	1.25	2	2	1.25	1	1	1.5	1.5	1.5

The correlation levels are: “1” – Low Correlation, “2” – Medium Correlation, “3” – High Correlation and “-” indicates there is no correlation





**Course Name: Foundation Design and Construction**

**Course Code: 145201**

**Semester: 2<sup>nd</sup>**

**Credits- 04**

**L T P**

**4 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

<b>CO</b>	<b>Statement</b>
CO1	Know the importance of soil investigation and determine various soil properties.
CO2	Understand the significance and determine the load bearing capacity for shallow and deep foundations
CO3	Learn the settlement behavior of different type of soil under different foundation.
CO4	Understand the concept of earth pressure behind earth retaining structures for different conditions.
CO5	Understand the concepts behind various ground improvement techniques.

## **Course Contents**

### **UNIT I**

General principle of foundation Design.

Functions of foundations, Essential requirements of a good foundation, Types of foundations,

Principal modes of failure, Estimation of allowable bearing pressures, calculation of ultimate bearing capacity by theoretical and empirical methods: Terzaghi's Method, Skempton's analysis for clays, Meyerhof's analysis BIS Method (IS: 6403) settlement of foundations, Factors to be considered in foundation design; Environmental considerations.

Shallow Foundations:

Introduction, Essential requirements Type and depth of footings, contact Pressure below

footing strip footing, Isolated footing or Pad footing, Eccentrically loaded footings, Grillage foundations; Design features and construction details of combined footing, Strap footing or Cantilever footing Problem of frost heave, its causes and prevention effect of ground water Raft footing.

## **UNIT II**

Pile Foundations:

Purpose/Uses of pile foundations, Classification of piles based on different criteria, Details of

Timber, Concrete, Steel Piles their advantages and disadvantages selection of Pile Type, Pile action behavior of pile and pile groups under load. Definition of failure load.

Estimation of carrying capacity: Single driven pile in cohesion less soils-methods based of on SPT and CPT, ultimate load on Driven and cast-in-place piles and Bored and cast-in place piles in cohesion less soils. Factors affecting pile capacity. Ultimate capacity of single pile driven in cohesive soils. Modification for driven and cast-in-place piles and Bored and Cast-in-place piles. Carrying capacity of piles on rocks. Piles in fills-negative skin friction. Carrying capacity of Pile groups in cohesive soil and cohesion less soils, efficiency of pile group. piles subjected to horizontal or inclined loads.

## **UNIT III**

Soil Stability.

Retaining walls-Types Elements for design, construction of cantilever and counter fort retaining walls. Unbraced excavations, braced excavations. Sheet Piles and Bulkheads-Types and design of cantilever and Anchored sheet piles; Anchors and Tie backs. Shorting and Underpinning- Necessity and methods.

Improvement of Foundation Soils.

Purpose: Improvement of Granular Soils : Terms used to describe degree of compactness-Relative Density, Density Ratio and Degree of Compaction ;

Methods - Vibration at ground surface, factors influencing, roller compaction; Deep Dynamic Compaction, Vibro compaction, Impact at depth.

Improvement of Cohesive soils: Preloading or Dewatering, Methods of installing sand drains, drain wicks, Electrical and Thermal methods.



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Grouting: Purpose, Functions Types of grouts; Soil Bentonite-cement mix, cement mix, emulsions, solutions: Grout Injection methods.

d) Geosynthetics : Types, Functions, Manufacturing of geotextiles, Classification of geotextiles.

Specific Applications: Bearing capacity improvement, Reinforcement, Retaining walls, Embankment etc. Testing of Geosynthetics usage in India and a case study.

## UNIT IV

Special Considerations in Foundation Design and construction: Elementary Principles of design and construction of foundations subjected to earthquake or dynamic loads Special measures for foundations constructed under water.

### **Practical Exercises :**

Conduct of standard Penetration Test and estimation of bearing capacity.

Determination of shear strength characteristics by field tests like in situ vane shear test, pocket penetrometer etc.

Computation of bearing capacity and settlement for given conditions of soil depth and type of foundation and loading.

Recommend a field investigation program to obtain design data.

Design of shallow foundations.

Recommend suitable dimensions. Depth and spacing of pile/pile group for given loading conditions.

### **Reference books:**

1. Tomlinson, Mj. (1996). *Foundation Design and Construction*. ELBS Longman.
2. Joseph E, Bowles. (2000). *Foundation Analysis and Design*. McGraw Hill.
3. Brahma, SP. (1985). *Foundation Engineering*. Tata McGraw Hill.
4. Robert M, Koerner. (1985). *Construction and Geotechnical Methods in Foundation Engineering*. McGraw Hill.
5. Mohan, Dinesh. (1998). *Pile foundations*. oxford & IBH,.
6. Kurian, N.P. (1982). *Modern Foundations*. Tata McGraw Hill,



## LIST OF B.I.S. CODES

<b>Title</b>	<b>I.S.No.</b>
1. Code of practice for design and construction of pile foundations : Part 1 Concrete Piles, Section Driven cast in-situ concrete piles (first revision)(With Amendment No.2)	2911(Part-1-Section 1979)
2. Code of practice for design and construction of pile foundations : Part 1 concrete piles, Section 2 Bored cast-in-situ piles (first revision) (With Amendment No.3)	2911(Part 1-Section 1979)
3. Code of practice for design and construction of pile foundations : Part-1 concrete piles, Section 3 Driven precast concrete piles. (first revision)(With Amendment No.3)	2911(Part 1-Section 1979)
4. Code of practice for design and construction of pile foundations : Part-1 concrete piles, Section 4 bored precast concrete pile(With Amendment No.-1)	2911(Part 1-Section 1984)
5. Code of practice for design and	2911 (Part 4) 1985



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construction of pile foundations:

Part-4 Load test of piles (first  
revision) (With Amendment No.1)

6. Code of practice for design and construction of pile foundations :  
Part-2 Timber piles (first revision  
(With Amendment No.-1) 2911(Part-2) 1980
7. Guide for lateral dynamic load test on piles 9716:1981
8. Guidelines for selection of ground improvement techniques for foundation in weed soils. 13094:1992
9. Glossary of terms for Geosynthetics :  
Part 1 Terms used in materials and properties 13321 (Part 1) : 1992
10. Method of test for the determination of tensile properties of extruded polymer geogrids using the wide strip. 13325:1992
11. Method of test for the evaluation of interface friction between Geosynthetics and soil Part 1 modified direct shear technique 13326(Part 1) :1992
12. Code of practice for design and construction of foundations for transmission line towers and poles (first revision) 1080:1986
13. Code of practice for design and construction of foundations in 1904:1986



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soils: general requirements

(third revision)

14. Code of practice for determination of bearing capacity of shallow foundations (first revision) (With Amendment No.1) 6403:1981



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PO/PSO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
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CO4	1	2	1	2	1	1	2	2	2	2	1	1	1	2	2
CO5	1	2	1	2	2	1	2	1	2	1	1	1	1	2	2
Average	<b>1.75</b>	<b>1.75</b>	<b>1.75</b>	<b>1.75</b>	<b>1.25</b>	<b>1.5</b>	<b>1.25</b>	<b>2</b>	<b>2</b>	<b>1.25</b>	<b>1</b>	<b>1</b>	<b>1.5</b>	<b>1.5</b>	<b>1.5</b>

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### Course Name: Maintenance of Building Structures

**Course Code: 145202**

**Semester: 2nd**

**Credits- 04**

**L T P**

**4 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

CO	Statement
CO1	Assess the health condition of structures.
CO2	Inspect and evaluate damage structures.
CO3	Test the assess the condition of properties of existing concrete structures.
CO4	Implement the techniques for repairing of concrete structures.
CO5	Dismantle and demolish structures which cannot be repaired in an environment friendly, with maximum saving of materials and in a safe way.

### Course Contents

#### UNIT-I



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Principles of Maintenance: Importance of Maintenance, Deterioration and durability, Factors affecting decision to carryout maintenance, Maintenance and GNP Agencies causing deterioration, effect of deterioration agencies on materials.

Design and economic consideration in Maintenance :

Factors to reduce maintenance at design stage, Consideration of maintenance aspects in preparing tender document and specifications, Sources of error in design which enhances maintenance, Importance of working drawings and schedules Provision of access for maintenance and its importance at design stage.

Economic consideration in Maintenance: Physical life, Functional life, Economic life of different types of buildings, discounting technique for assessment of economic life.

## UNIT II

Maintenance Management: Definition, Organization structure, work force for Maintenance, Communication needs,

Building inspections, Maintenance budget and estimates, Property inspections and reports, Specification for maintenance jobs, Health and safety in maintenance, Quality in Maintenance, maintenance Manual and their importance.

Materials for maintenance:

Compatibility of repair materials, Durability and maintenance. Types of materials, their specification and application, Criteria for selection of material, Use of Commercial available materials in maintenance.

## UNIT III

Investigation and diagnosis for Repair of structures: Basic Approach to investigations, Physical inspection, Material Tests, Non destructive testing for diagnosis, Estimation of actual, loads and environmental effects, Study of design and construction practices used in original construction, Retrospective analysis, Confirmation and repair steps.

Building Defects and Remedial Measures:

Nature, types of problems, their causes, remedial measures and special treatment for building elements. Foundation, Basements D.P.C. Walls Wall finishes Chimney, stacks and shafts Columns and beams Roof and roof terraces Floor and floor finishes Joinery work Decorative/decorative finishes Services Materials Dampness



Acoustics :

Basic problems criteria and terminology, Transmission of sources in rooms, speech privacy

Between offices, co-efficient of source absorption, noise reduction co-efficient, classification selection of acoustical materials, design and installation of acoustical Treatment for of auditorium, schools religion buildings.

Air Conditioning Heating and Ventilation: Different types of heating equipment viz radiation converters, electric radiant panel heaters,

Requirements comfort conditions, temperature control, humidity control Mechanical ventilation plenum system, exhaust system fans, air filters of different types, air conditioning plants layout of ducts for cinema auditoriums and offices etc.

## **UNIT V**

Fire Fighting: Fire regulations and requirements, cause of fire, fire resistance of materials, fire tests, fire-reissuance of elements, layout escape means for Multi storied buildings, Fire Training equipment different methods of fire fighting fire protection.

Electrical Services :

General distribution of electric power: Sub-stations for small schemes and industrial units, meter-rooms, electrical installations in buildings, Fuses and Circuit breakers, various types of conduits, earthing, switches and outlet, lamp holder electrical wiring -different materials employed specifications, electrical appliances and electrical service bye-laws pertaining to electrical installations. Different types of artificial lighting systems, lighting systems for residential buildings, public buildings, hotels, cinemas, hospitable exhibition, halls, libraries, schools, college, scientific laboratories etc.

Lifts and Escalators:

Classification types of lifts, lift codes and rules. Traffic analysis and selection of lifts, Quantity of service, Quality service, Car speed. Provision form fire safety Angle Arrangements of lifts, Details of information to be given to manufacturers, Escalators, Types and their installation.

### **Reference Books:**



1. Seeley, IVOR H. (1990). *Building Technology*. Mac Millian.
2. Shetty, M.S. (2008). *Concrete Technology – Theory and Practice*. S.Chand and Company.
3. DovKominetzky, M.S. (2001). *Design and Construction Failures*. Golgotha Publications Pvt. Ltd.
4. Ravishankar. K. & Krishnamoorthy, T.S. (2004). *Structural Health Monitoring Repair and Rehabilitation of Concrete Structures*. Allied Publishers,
5. Gambhir, M.L. CPWD and Indian Buildings Congress. (2008). *Hand book on Seismic Retrofit of Buildings*. Narosa Publishers.
6. Chudley, Building Finishes, fittings and domestic sercie longman, Scientific and Technical.

**The mapping of PO/PSO/CO attainment is as follows:**

PO/PSO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
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CO4	1	2	1	2	1	1	2	2	2	2	1	1	1	2	2
CO5	1	2	1	2	2	1	2	1	2	1	1	1	1	2	2
Average	1.75	1.75	1.75	1.75	1.25	1.5	1.25	2	2	1.25	1	1	1.5	1.5	1.5

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**Course Name: Computer Aided Design Methods**

**Course Code: 145203**

**Semester: 2<sup>nd</sup>**

**Credits- 04**

**L T P**

**4 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

CO	Statement
CO1	Create fully constrained solid models that can be quickly modified using standard



	software tools.
CO2	Use, identify and explain standard features in solid modeling including protrusions, revolutions, cutouts, and patterns
CO3	Ability to use standard software tools to create engineering drawings, or other documents, to fully describe the geometries and dimensions of parts, as well as to document assemblies according to standard practice
CO4	Ability to use standard software tools to create part assemblies and check for clearances.
CO5	Ability to create the drawings of farm implements and their analysis.

## Course Contents

### UNIT I

Introduction to CAD and its scope simple description of computer hardware. Micro, mini etc. memory, processor. Peripheral devices-disks, printer. Video terminals. Graphic floater, graphic screen digitizer. Computer Graphics: introduction, point plotting techniques, line drawing displays, two-three dimensional transformation, clipping and windowing, segmentation geometric modeling. Three dimensional graphics, curves and surfaces, hidden surface elimination, shading. Graphic input devices. Graphic input technique, input functions. Raster graphic fundamentals, interactive raster graphics, and raster graphic systems.

### UNIT II

Computer aided linkage displays and synthesis, interactive acceleration analysis. Appreciation of graphic packages. Matrix methods of structural analysis and associated computer Programme assembly of matrices. Solution of equilibrium equations. Flow charts. Typical listing as illustrations. Introduction to interactive computer Programme for the design detailing of simple structural elements: RCC slab, beams, columns, isolated footings etc. Steel typical members and connections. Data base management, storing and retrieving of data

### Reference Books:

1. Newman, William M. & Sproul, Robert F. *Principles of interactive computer graphics*.
2. Hunton & owan (2000). *Programming in Finite Element*. Golgotha Publications Pvt. Ltd.
3. Sinha, P.K. (2003). *Computer Fundamentals*. BPB Publications.
4. Rooney, Joe & Steadman, Philips. (2007). *Principles of Computer Aided design*. Golgotha Publications Pvt. Ltd.

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PO/PSO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
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CO4	1	2	1	2	1	1	2	2	2	2	1	1	1	2	2
CO5	1	2	1	2	2	1	2	1	2	1	1	1	1	2	2
Average	<b>1.75</b>	<b>1.75</b>	<b>1.75</b>	<b>1.75</b>	<b>1.25</b>	<b>1.5</b>	<b>1.25</b>	<b>2</b>	<b>2</b>	<b>1.25</b>	<b>1</b>	<b>1</b>	<b>1.5</b>	<b>1.5</b>	<b>1.5</b>

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**Course Name: Building Cost and Quality Management**

**Course Code: 145204**

**Semester: 2<sup>nd</sup>**

**Credits- 04**

**L T P**

**4 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

CO	Statement
CO1	Evaluate the principles of quality management and to explain how these principles can be applied within quality management systems.
CO2	Identify the key aspects of the quality improvement cycle and to select and use appropriate tools and techniques for controlling, improving and measuring quality.
CO3	Critically appraise the organizational, communication and teamwork requirements for effective quality management
CO4	Critically analyses the strategic issues in quality management, including current issues



	and developments, and to devise and evaluate quality implementation plans
CO5	Understand the fundamentals of quality management for a project-based industry.

## Course Contents

### UNIT I

Estimation of quantities for R.C.C. multistoried complex viz. earthwork, concrete in foundation, D.P.C., R.C.C. work, flooring and roofing, plastering and pointing etc., wood work, white washing.

Analysis of rates for multistoried building works – Brick work in foundations and Superstructure, cement concrete, R.C. C., Plastering, Flooring, Timber work etc.

### UNIT II

Checking of construction quality – various tests of bricks, cement, concrete, aggregates, and steel as per IS codes. Preparation of bills for payment, measurement book, mode of payment, running account bill. Ledger and Cash book details, Arbitration.

### UNIT III

Estimation of building services viz. water supply works, electrification, sanitary fitting etc, and their cost analysis. Completion report of the project; Checking of Plan, Details of various works, and issue of completion report of the project.

**Instructions to the Examiner:** Total eight questions are to be set out of which the students are required to attempt any five questions.

### Reference Books:

1. Rangwala, S.C. (1982). *Estimating and Costing*. Anand. Charotar Book Stall
2. Chakraborti, M. (1992). *Estimating Costing and Specification in Civil Engineering*. Calcutta Publishers.
3. Dutta, B.N. (2002). *Estimating and Costing*. Khanna Publisher.
4. Mahajan, Sanjay. (2000). *Estimating and Costing*. Satya Parkashan. Delhi
5. Singh, Gurbakshish. (1998). *Quality surveying*. Eagle Prakashan. Jalandher

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PO/PSO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3



GKU	CO1	2	1	2	2	1	2	1	2	2	1	1	1	2	1	1
	CO2	2	1	2	1	2	1	1	2	2	1	1	-	1	2	2
	CO3	2	2	2	2	1	2	1	2	2	1	-	1	2	1	1
	CO4	1	2	1	2	1	1	2	2	2	2	1	1	1	2	2
	CO5	1	2	1	2	2	1	2	1	2	1	1	1	1	2	2
	Average	<b>1.75</b>	<b>1.75</b>	<b>1.75</b>	<b>1.75</b>	<b>1.25</b>	<b>1.5</b>	<b>1.25</b>	<b>2</b>	<b>2</b>	<b>1.25</b>	<b>1</b>	<b>1</b>	<b>1.5</b>	<b>1.5</b>	<b>1.5</b>

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### Course Name: Pavement Design, Construction and Maintenance

**Course Code: 145205**

**Semester: 2<sup>nd</sup>**

**Credits- 04**

**L T P**

**4 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

CO	Statement
CO1	Study the behavior of pavements under various loads
CO2	Design the flexible and rigid pavements using different Empirical, semi-empirical and theoretical approaches
CO3	Understand the concept of Pavement Management System, pavement failures and its evaluation
CO4	Learn about various methods of flexible pavement design.
CO5	Estimate the various methods of rigid pavement design

### Course Contents

#### UNIT I

Introduction: Types of pavement structure. Functions of pavement components, Factors affecting pavement design. Design wheel load, Strength characteristics of pavement materials.



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Design of Flexible Pavements: General design considerations, Methods for design of flexible pavements; Group Index method, California Bearing Ratio (CBR) method, California Resistance Value method, Triaxial Test method, Burmister method, McLeod's method.

## UNIT II

Design of Rigid Pavements: General design considerations, Methods for design of rigid pavements; Westergard's method, F.A.A. method, IRC recommendations for design of concrete pavements, method, Types of joints and their design in cement concrete pavements. Thickness design for Airport pavement, LCN system of pavement design, design of airport pavement overlays.

Highway Construction: Types of highway construction and their selection, materials for construction, construction procedure of different highways: Earth roads, Gravel roads, WBM roads, bituminous pavements, Cement concrete pavements, Low cost roads, Introduction to various equipment used for highway construction.

Highway Maintenance: Need for highway maintenance, Pavement failures their causes and remedial measures. Typical flexible and rigid pavement failures, Types of highway maintenance: Routine, periodic and special type, materials used for maintenance of different pavements, Strengthening of existing pavements, Maintenance management system.

### **Practical Exercises:**

1. Determination of CBR value of sub grade soils.
2. Determination of Ductility of bituminous materials.
3. Determination of stripping value of road aggregate.
4. Determination of Marshall Stability value of bituminous mix.
5. Field visit for study of Batching and Mixing plant for bituminous construction of roads.

**Instructions to the Examiner:** Total eight questions are to be set, covering the complete syllabus, out of which, the students are required to attempt any five questions.

### **Reference Books:**

1. Roess, RP. McShane, WR. & Prassas, ES.(1998), *Traffic Engineering*. Prentice Hall.



2. May, A. D. (1990). *Fundamentals of Traffic Flow*. Prentice Hall.

3. Papacostas, C.S. (1987). *Fundamentals of Transportation Engineering*. Prentice Hall.

4. Kadiyali, L.R. (1987). *Traffic Engineering and Transportation Planning*. Khanna Publications.

5. *Highway Capacity Manual* (2000). Transportation Research Board, USA.

6. Khanna, S.K. & Justo, C.E. G. (1991). *Highway Engineering*. Khanna Publications.

7. Pingnataro, G. J. (1970). *Principles of Traffic Engineering*. McGraw - Hill

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CO5	1	2	1	2	2	1	2	1	2	1	1	1	1	2	2
Average	<b>1.75</b>	<b>1.75</b>	<b>1.75</b>	<b>1.75</b>	<b>1.25</b>	<b>1.5</b>	<b>1.25</b>	<b>2</b>	<b>2</b>	<b>1.25</b>	<b>1</b>	<b>1</b>	<b>1.5</b>	<b>1.5</b>	<b>1.5</b>

The correlation levels are: “1” – Low Correlation, “2” – Medium Correlation, “3” – High Correlation and “-” indicates there is no correlation





Credits- 04

L T P

4 0 0

**Course Outcomes:** On successful completion of this course, the students will be able to:

CO	Statement
CO1	Understand rural construction techniques.
CO2	Learn design principles of treatment-Low Cost water treatment technologies
CO3	Understand Low cost pavement materials-testing
CO4	Estimate the design & Construction of Tube well, Drip & Sprinkle irrigation systems
CO5	Understand Drawing and Design of rural development plans.

## Course Contents

### UNIT I

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 programmers/projects.

Rural Housing : Low cost construction materials for housing low cost housing designs-architectural considerations for individual and group housing ; composite material-Ferro cement & flay ash, Autoclaved Calcium silicate bricks and soil-stabilized unburnt brick; Plinth protection of Mud Walls; Design Consideration and Construction of: Non-erodible Mud Plaster, water-proof and fire-retardant roof treatment for thatch roofs, Precast stone Masonry Block walling scheme; rat-trap bond for walls; Prefab Brick Panels for roof, Ferro cement flooring /roofing units, Thin R.C.Ribbed slab fon 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.

Water Supply and Rural Sanitation: Epidemiology sources of water, BIS & WHO water 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 pump; 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.

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 specifies areas. Labor in tensile techniques of road construction Mechanical stabilization; lime stabilization; water bou Macadam Construction; utilization of waste in rural construction one/two coat surface dressing; bitumen premix carpet; low cost improved transport system rural areas.

### **UNIT III**

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 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.

### **Reference Books:**

1. Madhov Rao, A.G. & Ramachandra Murthy, D.S.(2000). *Apprority Technologies for low cost.* Housing oxford and IBH Publishing Co. Pvt. Ltd.
2. CBRI, Roorkee Advances in building Materials Construction.
3. Satyanarayan Murthy, C.(1998). *Design of Minor Irrigation and Canal Structures.* Wiley Eastern Ltd.
4. *Document on Rural Road Development in India.* (2009). Volume Central Road Research Institute, New Delhi.



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PO/PSO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	2	2	1	2	1	2	2	1	1	1	2	1	1
CO2	2	1	2	1	2	1	1	2	2	1	1	-	1	2	2
CO3	2	2	2	2	1	2	1	2	2	1	-	1	2	1	1
CO4	1	2	1	2	1	1	2	2	2	2	1	1	1	2	2
CO5	1	2	1	2	2	1	2	1	2	1	1	1	1	2	2
Average	<b>1.75</b>	<b>1.75</b>	<b>1.75</b>	<b>1.75</b>	<b>1.25</b>	<b>1.5</b>	<b>1.25</b>	<b>2</b>	<b>2</b>	<b>1.25</b>	<b>1</b>	<b>1</b>	<b>1.5</b>	<b>1.5</b>	<b>1.5</b>

The correlation levels are: “1” – Low Correlation, “2” – Medium Correlation, “3” – High Correlation and “-” indicates there is no correlation

**Course Name: Composite Materials**

**Course Code: 145301**

**Semester: 3<sup>rd</sup>**

**(Elective-III)**

**Credits- 04**

**L T P**

**4 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

CO	Statement
CO1	Explain the behavior of constituents in the composite materials
CO2	Enlighten the students in different types of reinforcement
CO3	Develop the student’s skills in understanding the different manufacturing methods available for composite material.
CO4	Illuminate the knowledge and analysis skills in applying basic laws in mechanics to the composite materials.
CO5	Apply constitutive equations of composite materials and understand mechanical behavior at micro and macro levels.



## Course Contents

### UNIT I

Fiber Reinforced Concrete: Properties of Constituent Materials, Mix Proportions, Mixing and Casting Procedures, Properties of Freshly mixed FRC, Mechanics and properties of Fiber reinforced concrete, Composite Material approach, Application of fibre reinforced concrete.

Fly Ash Concrete: Classification of Indian Flyashes, Properties of Fly ash, Reaction Mechanism, Proportioning of Fly ash concretes, Properties of Fly ash concrete in fresh and hardened state, Durability of flyash concrete.

### UNIT II

Polymer 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.

Ferro Cement: Constituent materials and their properties, Mechanical properties of Ferro cement, Construction techniques and application of Ferro cement.

### UNIT III

High Performance Concrete: 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.

Sulphur Concrete and Sulphur Infiltrated 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.

Light weight concrete: Properties of light weight concretes, Pumice concrete, Aerated cement mortars, No fines concrete, Design and applications of light weight concrete.

### Reference Books

1. Concrete, its Properties and Microstructure by P.K. Mehta, and P.J.M. Monterio.
2. Ferro cement by B.K. Paul, and R.P. Pama
3. Fiber Reinforced Concrete by Bentur and Mindess
4. Fly ash in Concrete by Malhotra and Ramezaniapour

### **The mapping of PO/PSO/CO attainment is as follows:**

PO/PSO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	2	2	1	2	1	2	2	1	1	1	2	1	1
CO2	2	1	2	1	2	1	1	2	2	1	1	-	1	2	2
CO3	2	2	2	2	1	2	1	2	2	1	-	1	2	1	1
CO4	1	2	1	2	1	1	2	2	2	2	1	1	1	2	2
CO5	1	2	1	2	2	1	2	1	2	1	1	1	1	2	2
Average	1.75	1.75	1.75	1.75	1.25	1.5	1.25	2	2	1.25	1	1	1.5	1.5	1.5



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The correlation levels are: “1” – Low Correlation, “2” – Medium Correlation, “3” – High Correlation and “-” indicates there is no correlation

**Course Name: Advanced Structural Design and Detailing**

**Course Code: 145302**

**Semester: 3rd**

**Credits- 04**

**L T P**

**4 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

CO	Statement
CO1	Enhance competence in design of advanced reinforced concrete structures.
CO2	Familiarize the students with the concepts of designing concrete mixes using different methods of proportioning and to understand the effects of various parameters
CO3	Show competency in design of advanced reinforced concrete structures.
CO4	Develop competence for selection of suitable structural system for tall buildings.
CO5	Analyze tall buildings under gravity, wind and earthquake loading.

## Course Contents

### UNIT I

Introduction to limit state method of design, provisions in the Indian standard codes for loading wind loads and seismic loads, design and detailing of concrete structures.

BIS Handbook for design, Examples of design using handbook.

### UNIT II

Design of Structures as per I.S. 1893 for Earthquake Resistant Design Construction.

Design and Detailing Requirements as per 4326-1993.

### UNIT III

Design and Detailing of Earthen Buildings as per 13827-1993.

Design and Detailing of Masonry Structures as per I.S. 13828-1993

### UNIT IV



## Reference Books

1. Dayaratnam, P. (2001). *Reinforced Concrete Structure*. S. Chand Publishers.
2. Jain, A.K. (1998). *Reinforced Concrete - Limit State Method of Design*. Khanna Publishers.
3. Punmia, B.C. *Reinforced Concrete Structures, Vol II*. Allied Publishers.
4. Jain & jaikrishna *Plain and Reinforced Concrete Vol II*. JP Publishers
5. B.I.S. Codes 1893, 4326, 13827, 13828, 13920, 13935

### The mapping of PO/PSO/CO attainment is as follows:

PO/PSO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
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CO2	2	1	2	1	2	1	1	2	2	1	1	-	1	2	2
CO3	2	2	2	2	1	2	1	2	2	1	-	1	2	1	1
CO4	1	2	1	2	1	1	2	2	2	2	1	1	1	2	2
CO5	1	2	1	2	2	1	2	1	2	1	1	1	1	2	2
Average	1.75	1.75	1.75	1.75	1.25	1.5	1.25	2	2	1.25	1	1	1.5	1.5	1.5

The correlation levels are: “1” – Low Correlation, “2” – Medium Correlation, “3” – High Correlation and “-” indicates there is no correlation

**Course Name: Disaster Reduction and Management**

**Course Code: 145303**

**Semester: 3rd**

**Credits- 04**

**L T P**

**4 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

CO	Statement



CO1	Provide basic conceptual understanding of disasters and its relationships with development.
CO2	Understand approaches of Disaster Risk Reduction (DRR) and the relationship between vulnerability, disasters, disaster prevention and risk reduction.
CO3	Understand Medical and Psycho-Social Response to Disasters.
CO4	Prevent and control Public Health consequences of Disasters
CO5	Enhance awareness of Disaster Risk Management institutional processes in India

## Course Contents

### UNIT I

1. Disaster Reduction :Earthquake resistant design of structures, Response spectra and design earthquake parameters, Principles and philosophies, Codal provisions, Factors affecting damage to structures, Enforcement of codal provisions, Strong motion instrumentation and data processing, Effective rescue operation, General planning and design aspects, Conventional earthquake resistant design, Seismic base isolation method, retrofitting, Training and lecturing at various levels, Preparedness to meet earthquake disaster, Programmers for public awareness, demonstrations and exhibitions, Information management (Safety, emergencies, management and planning, design, response, user experience problems and case studies), Proper land use practices, long term disaster preparedness measures. Precautions after a major earthquake, Preparedness for medical supply Emergency care (First aid, Home remedies), Disposal of dead bodies (Human and Cattle) , Care for old and orphans.

2. Indirect Damages Damage due to ground failures, Landslides, rockslides, liquefaction, fire, floods, tsunamis, release of hazardous material like poisonous gas, nuclear radiation.

### UNIT II

3. Disaster Management- Management cell, Central crisis management core group, damage reconnaissance, Management of relief and rehabilitation ( Infrastructure rehabilitation, Housing rehabilitation, Social rehabilitation ), Role of volunteers, Emergency operation centers, Information system, Danger zone restrictions, Cooperation with local authority, Coordination for international relief, Role of government, NGO's, Business and donors, Role of remote sensing in relief operations, Information management and related technologies in engineering and disaster management.



4. The design and management of Disaster Information Resource Network, Asian Disaster Preparedness Centre, Regional data base, Contacts and Sources, CD - ROM Library for Natural Disaster Management, Regional Disaster Documentation Centre, Non Governmental Organizations.

## Reference Books

1. Iyengar, (1990). *Natural Hazards in the Urban Habitat C.B.R.I.* Tata McGraw Hill Publisher
2. Ingleton, Jon. (2004). *Natural Disaster management.* Tudor Rose Published.

**The mapping of PO/PSO/CO attainment is as follows:**

PO/PSO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
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CO4	1	2	1	2	1	1	2	2	2	2	1	1	1	2	2
CO5	1	2	1	2	2	1	2	1	2	1	1	1	1	2	2
Average	<b>1.75</b>	<b>1.75</b>	<b>1.75</b>	<b>1.75</b>	<b>1.25</b>	<b>1.5</b>	<b>1.25</b>	<b>2</b>	<b>2</b>	<b>1.25</b>	<b>1</b>	<b>1</b>	<b>1.5</b>	<b>1.5</b>	<b>1.5</b>

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**Course Name: Construction Costing and Financial Management**

**Course Code: 145304**

**Semester: 3rd**

**Credits- 04**

**L T P**

**4 0 0**

**Course Outcomes: On successful completion of this course, the students will be able to:**

CO	Statement
CO1	Understand the various types of estimates that are used in the construction industry
CO2	Know how to prepare a quantity take offs and extend quantities to costs Prepare a bid recap/summary





CO3	Locate and compile information vital to the development and maintenance of schedules and budgets
CO4	Organize, calculate and present construction project budgets using common spreadsheet applications
CO5	Interpret the results of changes in the schedule or budget resulting from periodic progress or changes in the nature or scope of the project in an ethical manner

## Course Contents

### UNIT I

Construction Costing : Costing of construction Works, different methods of costing, cost elements in a project, Analysis of rates, Non-scheduled items of work, Cost estimation for a small construction job, Purpose, methods and stages of cost control, cost monitoring, cost forecasting methods, variations in individual items of work and their effect on total contract price, valuation of variations.

Cash flow: Determining the funds required for a construction job, preparing cash flow statements, Cash inflow and outflow during contract period, Project expectations and performance models.

### UNIT II

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.

Material Management : 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 store accounting.

Financial Management: Meaning and scope financial statement analysis, funds flow analysis, Capital budgeting, cost benefit analysis.

### **Practical Exercise:**

1. Filling up of prescribed treasury challan form and imprest account form with given data.
2. Preparation of cash flow statement for a small construction project with given data.
3. Filing up of Daily labor report on prescribed form with given data.
4. Recording measurement in M.B. for different work components.
5. Preparation of analysis of rates for different items of work.



# GURU KASHI UNIVERSITY

6. Preparation of cost estimates for a small project.
7. Material statement and material analysis.
8. Carry out financial statement analysis, ratio analysis and funds flow analysis for projects from given case studies.

## Reference Books:

1. Rangwala, S.C. (1982). *Estimating and Costing*. Anand. Charotar Book Stall
2. Chakraborti, M. (1992). *Estimating Costing and Specification in Civil Engineering*. Calcutta Publishers.
3. Dutta, B.N. (2002). *Estimating and Costing*. Khanna Publisher.
4. Mahajan, Sanjay. (2000). *Estimating and Costing*. Satya Parkashan. Delhi
5. Singh, Gurbakshish. (1998). *Quality surveying*. Eagle Prakashan. Jalandher

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PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	3	2	3	3	3	2	3	3	3	2	2	3	3	2	2
CO2	2	1	3	2	2	1	3	2	3	3	2	2	2	1	1
CO3	2	2	3	3	1	2	3	1	2	2	3	3	2	1	1
CO4	2	2	3	2	2	2	3	2	2	2	2	2	2	2	2
CO5	3	3	3	2	2	3	3	2	2	2	3	2	3	2	2

<b>Total Number of Courses</b>	<b>19</b>
<b>Number of Theory Courses</b>	<b>16</b>
<b>Number of Practical Courses</b>	<b>03</b>
<b>Total Number of Credits</b>	<b>64</b>

**ACADEMIC INSTRUCTIONS**

**Attendance Requirements**

A student shall have to attend 75% of the scheduled periods in each course in a semester; otherwise he / she shall not be allowed to appear in that course in the University examination and shall be detained in the course(s). The University may condone attendance shortage in special circumstances (as specified by the Guru Kashi University authorities). A student detained in the course(s) would be allowed to appear in the subsequent university examination(s) only on having completed the attendance in the program, when the program is offered in a regular semester(s) or otherwise as per the rules.

**Assessment of a course**

Each course shall be assessed out of 100 marks. The distribution of these 100 marks is given in subsequent sub sections (as applicable).

	Internal (50)					External (50)	Total	
Components	Attendance	Assignment			MST 1	MST2	ETE	
		A1	A2	A3				
Weightage	10	10	10	10	30	30	50	
Average Weightage	10	10			30		50	100

**Passing Criteria**

The students have to pass both in internal and external examinations. The minimum passing marks to clear in examination is 40% of the total marks.