Estd. 1962
NAAC 'A' Grade
MHRD-NIRF- 28th Rank

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दुरध्वनी (ईपीएबीएक्स) २६०९००० (अभ्यास मंडळे विभाग– २६०९०९४)
फॅक्स : ००९१-०२३१-२६९१५३३ व २६९२३३३.e-mail:bos@unishivaji.ac.in

SU/BOS/Sci & Tech/6498 **Date: 27/06/2019**

To,

The Principal/ Director,
All affiliated Architecture Colleges,
Shivaji University, Kolhapur..

Subject: Regarding syllabi of Part I &II M.Arch. (Construction Architecture) under the Faculty of Science & Technology

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the revised Part I &II M.Arch. (Construcion Architecture) syllabi under the Faculty of Science & Technology.

This syllabus and equivalence shall be implemented from the academic year 2019-2020 (i.e. from June 2019) onwards. A soft copy of containing syllabus is attached herewith and it is also available on university website www.unishivaji.ac.in.

The question papers on the pre-revised syllabi of above mentioned course will be set for the examinations to be held in October /November 2019 & March/April 2020. These chances are available for repeater students, if any.

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours faithfully,

Dy Registrar

1	The I/c Dean and Associal Dean, Faculty of Science & Technology	6	Appointment Section
2	The Chairman, Respective Board of Studies	7	Affiliation Section (T.1)
3	Director, Examination and Evaluation	9	Affiliation Section (T.2)
4	Eligibility Section	10	P.G.Admission Section
5	O.E. – 4	11	P.G Seminar Section

SHIVAJI UNIVERSITY, KOLHAPUR

Syllabus for

M. Arch. I & II

Architectural and Construction Project Management

(To be implemented from June, 2019 onwards)

SUMMARY OF TEACHING AND EXAMINATION SCHEME:

Category	No.	Subject	TEACHING SCHEME (50 Min. periods/week)			EXAMINATION SCHEME (marks)				Credits
			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
Semester I										
PC		Advanced Construction Technology-I	2	2	4	100	50	-	150	4
PC		Research Methodology	2	2	4	-	50	-	50	3
PC		Project Management – I	3	2	5	100	100	100	300	6
PAEC		Information Technology in Management	2	2	4	-	50		50	3
BS& AE		Services Management -I	3	-	3	100	50	50	200	4
PC		Operation Research	3	1	4	100	100	-	200	3
			15	**9**	**24**	**400**	**350**	**150**	**950**	**23**
Semester II										
PC		Advanced Construction Technology – II	3	2	5	100	50		150	4
PC		Project Management – II	3	2	5	100	50	100	250	5
PAEC		Business Development & Project Marketing	2	-	2	-	50	-	50	2
PE		Integrated Energy Conservation in Construction	2	2	4	100	50	-	150	3
BS&AE		Services Management -II	3	1	4	100	50	100	250	5
		Dissertation Stage – I		4	4	-	100	-	100	4
			13	**11**	**24**	**400**	**350**	**200**	**950**	**23**
Vacation Schedule										
		Practical training (4 week)					**50**			**3**
SEMISTER III										
PC		Project Management – III	4	2	6	100	50	100	250	6
BS& AE		Laws & Legal Aspects in Project Management	3		3	100	50		150	3
PAEC		Real Estate Management	2	-	2	-	50	50	100	2
PE		Quality & Safety Management	3	-	2	-	50	50	100	2
PC		Project Finance Management	2	2	5	100	50		150	4
SEC		Elective – I	2	1	3		50	50	100	3
SEC		Elective – II	2	1	3		50	50	100	3
			18	**6**	**24**	**300**	**350**	**300**	**950**	**23**

SEMISTER IV										
	401	Dissertation Stage – II	-	**8**	**8**	**-**	**100**	**100**	**200**	**8**
Total no of credits =80										
The Weightage in terms of Credits are as per Council of Architecture										

Semester I

Category	**No.**	**Subject**	**TEACHING SCHEME (50 Min. periods/wk)**			**EXAMINATION SCHEME (marks)**				**Credits**
			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
PC		Advanced Construction Technology-I	2	2	4	100	50	-	150	3

ADVANCED CONSTRUCTION TECHNOLOGY- I

Aim : To give a coverage on aspects of construction technologies related to building projects, the understanding of which are essential for the construction manager.

Module -1

Substructure: Geo-technical aspects, Soil / ground improvement, Planning and design considerations of Foundation systems, construction of basements including waterproofing systems, introduction to Tunnel construction

Module - 3

Construction using Concrete Technology:

Module - 4

Pile Construction:

Module –

Advanced form work

Module –

Construction chemicals

Laboratory Work:

Experimental investigations;

Non – Destructive Testing Techniques, In-situ and other field tests

Studio Program:

Soil investigation work of building project Planning design and costing of appropriate foundation system for a specific case study Foundation study of building projects. Site visits for concrete technology.

Reference Books:

1Construction Technology: Analysis,and Choice, 2ed,Bryan, Wiley India
2. Construction Planning, Equipment and methods – Peurifoy-Tata McGraw Hill Publication
3. Construction Equipment Planning and Applications – Dr. Mahesh Varma
4. Brochures Published by various agencies associated with construction.
5. Journals such as CE & CR. Construction world, International Construction.
5. Document Reports of actual major works executed.
6. Construction Technology by Roy Chudley and Roger Greeno, Prentice Hall, 2005.

Category	No.	Subject	TEACHING SCHEME (50 Min. periods/wk)			EXAMINATION SCHEME (marks)				Credits
			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
PC		Research Methodology	2	2	4	-	100	-	100	3

RESEARCH METHODOLOGY

Module1:

Introduction to Research, Meaning of research ,types of research, process of research, Sources of research problem, Criteria / Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem, formulation of research hypotheses**.** Search for causation.

Module 2:

Developing a Research Proposal Format of research proposal, Individual research proposal, Institutional research proposal,Significance,objectives,methodology,Funding for the proposal,Different funding agaencies.Framework for the planning.

Module 3:

Literature survey- Definition of literature and literature survey, need of literature survey, sources of literature, elements and objectives of literature survey, styles of literature survey, and strategies of literature survey.

Module 4:

Data collection, Measuring , Sampling and Scaling—Classification of data, benefits and drawbacks of data, evaluation of data,zestrategy,attitude measurement and scaling, types of measurements, criteria of good measurements, classification of scales.

Module 5:

Preliminary data analysis- Testing of hypothesis- concepts and testing , analysis of variance techniques, introduction to non parametrictests.Valedity and reliability, Approaches to qualitative and quantitative data analysis.

Module 6:

Advanced data analysis techniques-Correlation and regression analysis, Introduction to factor analysis, discriminate analysis, cluster analysis, multidimensional scaling, Descriptive statistics, Inferentialstatistics, Mutidimentionalmeasurementnand factor analysis.

Module 7:

Report writing—Need of effective documentation, importance of report writing, types of reports, report structure, report formulation, Plagirism.

Module 8:

Presentation of research---Research briefing, presentation styles, impact of presentation, elements of effective presentation, Writing of research paper, presenting and publishing paper, patent procedure,

studio work:

The progress of the research work is presented and discussed by the student periodically in the classroom environment and progress monitored continuously. This, develops comprehension and presentation skills of the students. The chosen topic may be further extended with additional scope of study in the third semester or taken up for thesis work in the final semester. The students are also encouraged to seek guidance from the experts in the related fields.

Reference Books:

1. Research Methodology: concepts and cases—Deepak Chawla and NeenaSondhi,Vikas Publishing House Pvt.Ltd. (ISBN 978-81-259-5205-3)
2.Research Methods for Business—Sekaran—Wiley,India
3. Research Methodology: Methods and Trends', by Dr. C. R. Kothari--- New Age International Publishers.
4.Research Methods in Education---Louis Cohen,Manion,Morrison---Routledge(Taylor &Francis Group) / -- Cambridge University Press India Pvt. Ltd.-ISBN-978-0-415-58336-7
5. Research Methodology: An Introduction' by Wayne Goddard and Stuart Melville
6. Research Methodology: A Step by Step Guide for Beginners', by Ranjit Kumar
7. Research in Education---John Best and James Kahn,Prentice Hall of India Pvt.Ltd.

e-Resource---For class room ppts---www.wileyeurope.com/college/sekaran

Category	No.	Subject	TEACHING SCHEME (50 Min. periods/wk)			EXAMINATION SCHEME (marks)				Credits
			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
PC		Project Management – I	3	3	6	100	100	100	300	5

PROJECT MANAGEMENT–I

Weightages subject wise			
Project management	**50%**	**Material management**	**15%**
Human resource management	**20%**	**Machinery management**	**15%**

Aim: To disseminate the application of Project Management in various phases of project embracing processes including Scope management, Time management, Cost management, Communication and Integration management.

Module – 1:

Basics of Management:

Definition, history, elements project, project life cycle and various management functions and styles

Module – 2:

Construction Project Management:

Construction project, importance, Indian construction industry, project management and its relevance with construction, stakeholders, role and responsibilities of project Manager, Role of Project Management Consultants

Module – 3:

Project planning: types of plans, work breakdown structure, planning techniques, bar chart, network diagram, program evaluation and review technique (PERT), critical path method (CPM), ladder network, precedence network, the line of balance (LOB) and network technique advantages.

Module – 4:

Project scheduling: resources, resource levelling and allocation, importance of scheduling, other schedule derived from project schedule, network crashing and cost time trade-off.

Module – 5:

project resource management:

module – 6:

Human resource management: Concepts of organizational and individual behavior; Perception and attitudes; Motivation concepts and processes; Group behavior and teams; Communication process and information management; Conflict management; Leadership; Nature of organizations; Organizational development; Principles of organization structure; Human resource policies & practices; Selection, training and assessment; Performance Appraisal; Training need assessment and dissemination of training; Participative management; HRM trends; Philosophies of values, morals and ethics; Societal responsibilities and good citizenry. Good practices and managerial responsibilities.

Manpower estimation for company and for projects. Methods and procedures of estimation at the tender stage and detailed work out at execution stage, risk due to lead time under of over manning.
Understanding workers and supervisors in their socio-cultural milieu.
Flex ilabour force, flex i wage and flex i work.
Methods of recruitment, selection, placement, training, financial compensation discipline, separation etc in employing and retaining engineers , managers.
Personnel office at the head office and at the project site. Role, its functions, status, and relationship with other departments. Personnel office records and procedures. Grievances handling and inquiry procedure.

Module – 7:

Material management: Study of various new and emerging building materials with regards to composition, physical and chemical properties and characteristics, durability and performance requirements, inspection and testing procedures, construction specifications and working details. Study of performance of new materials in live case studies. Exposure to various provisions of Bureau of Indian Standards and other national standards like British standards, ASTM standards etc. Good practices and managerial responsibilities. Material handling at site, inventory management, ABC analysis of materials for procurement.

Module –8:

Machinery management: Importance and role in construction, various types of machinery used in construction, earth moving, pile driving, road construction, concrete placing, materials handling, off site and on site fabrication and repairs, mechanical and electrical equipment installation, tunneling, etc. their techniques, performance characteristics in relation to the jobs in hand. Equipment hire – purchase, their depreciation, salvage value calculation and planning for the equipments for a given project.

Studio Exercises:

Project management:

Familiarization with the building projects
Conceptualize Construction Logic
Work breakdown Structure
Identification of activities, Milestones and construction sequencing
Calculation of quantities, cost and productivity data
Time calculation of AON-PERT Network.
Cost on Time Graph and Crashing.
Resource Histograms and Resource Leveling.

Human resource, material and machinery management: Exercises on all the above respective topics.

Materials Management **Reference Books**

1. Purchasing and Inventory Control- by K. S. Menon, Wheeler Publication.

2. Materials Management, P.Gopalkrishnan, Prentice Hall
3. Handbook of materials management, P.Gopalkrishnan, Sundershan, Prentice Hall.
4. Inventory Management, L.C.Jhamb, Everest Publ.

Human Resource Management Reference Books

1. Human Resource Management by BiswajeetPattanayak
2. Managing Human Resources by Bohlander& Snell
3. Personnel Management' by Monappa A. – Tata McGraw Hill,new delhi.1997
4. Harvard Business Review, "Appraising Perfoprmance Appraisal," Tata McGraw Hill.
5. Nair,MRR, "Excellence through Human Resource D evelopment", Tata McGraw Hill.
6. Rao T , "HRD in the New Economic Environment", Tata McGraw Hill.
7. Pareck , "HRD in the New Millenium", Tata McGraw Hill.
8. Singh, "Selected Reading in HRD" Tata McGraw Hill.

Category	**No.**	**Subject**	**TEACHING SCHEME (50 Min. periods/week)**			**EXAMINATION SCHEME (marks)**				**Credits**
			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
PAEC		Information Technology in management	2	2	4	-	50		50	3

Aim: computing and communication technology, commonly known as Information Technology (IT) have been radically transforming the we live, learn and play. A large number of software packages are available to all disciplines of architectural construction management teams at every stage of project process. These application can be grouped in the following modules.

Module -1:
Computer aided design and visualization.

Module -2:
Building engineering application.
Module -3:
Computer aided cost estimates.
module -4:
planning, scheduling, site management
Module -5:
Computer aided facility management.
Model -6:
Business and information management.

Studio/practical

Studio exercises are suitably planned to illustrate the concepts and applications on model case studies and problems with hands on experience on computers.

Category	No.	Subject	TEACHING SCHEME (50 Min. periods/wk)			EXAMINATION SCHEME (marks)				Credits
			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
BS& AE		Service Management -I	3	-	3	100	50	50	200	3

Service management – I

Aim: the subject provide exposure to management aspect of planning design execution and operating of sercices on building campus and township level.

Module – 1

Water supply:

- Water demand for construction and project operation for life span quantity and quality.
- Sources of water supply, quantity, quality, reliability, ownership, authority, right.
- Temporary and permanent arrangement, cost of water.
- Water facility, materials, land acquisition issues, construction materials.
- Co-ordination of water supply construction materials at site with other agencies at site.
- Hot water need, cost, energy, systems
- Pools and filtration

Module -2

Sanitary and drainage:

- Problems of drainage, problems of terrain, waterbody pollution, drainage as asset, recycling
- Rainwater drainage, storage, use
- Construction for above, materials, co-ordination at site with other agencies

Module -3

Waste disposal

- Waste generation, norms, collection system, disposal system, bye product.
- Management of collection, awareness

Module -4

Electricity

- Generation, co-generation, net metering
- Requirement of project, HT, LT, low voltage, load sanctions.
- Sub-station, installation erecting, management, maintenance, supply problem in rural area, stand by system.
- Materials, fittings fixtures facilities.
- Co-ordination of electric work with other contractors.

Module -5

Lifts escalators

- Lifts, escalators need, planning, installation and maintenance.

Reference books:

Category	No.	Subject	TEACHING SCHEME (50 Min. periods/week)			EXAMINATION SCHEME (marks)				Credits
			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
PC		Operation Research	3	1	4	100	100	-	200	3

Objectives:

- To equip the students in decision making through operational research techniques.
- To introduce various deterministic decision models

Module -1:

Introduction to Operations Research (OR)

Historical Development, Characteristic features of OR, Models in OR, Methods for solving OR models, Methodology of OR, Opportunities and short comings of OR, Introduction to software's in OR. Linear Programming (LP)-I: Mathematical Formulation, Assumptions of LP, Solution by Graphical Method, Special Cases of LP, Solution by Simplex Method-Maximization Problem with less than or equal to constraints, Primal Dual Relationship.

Module -2:

Transportation & Assignment Problem

Mathematical model of TP, Methods to find initial basic feasible solution (Least Cost Method, Vogel's Approximation Method), Finding Optimal Solution by Modified Distribution Method, Unbalanced transportation problem, Maximization Case of TP. Comparison between Assignment & Transportation Problem, Mathematical model of AP, Hungarian Assignment Method, Solving Minimization-Maximization Problem.

Module -3:

Decision Theory

Decision under certainty, Decision under risk, Expected value criterion, Decision under uncertainty, Laplace criterion, MaxiMax Criterion, MaxiMin Criterion, MiniMax criterion, MiniMax regret criterion, EPPI-EMV-EVPI, Decision making under conflict, Introduction to game theory-Terminologies, Game with pure strategies, Game with mixed strategies, Dominance properties,

Module -4:

Queuing & Simulation

General structure of a queuing system, Operating characteristics of a queuing system, Kendall's Notations for representing models, Classification of queuing models (M/M/l): (/ FCFS),
Definition, Steps in simulation process, Monte Carlo simulation, Simulation of an inventory system, simulation of a queuing system. Advantages and Disadvantages of simulation.

Module -5:

Inventory & Replacement Models

Inventory: Various terms used in Inventory, Determination of Economic Ordered Quantity - EOQ, Components, Deterministic/Stochastic Continuous & Deterministic/Stochastic Periodic Review Models, Economic Lot Size /Economic Production Quantity-EPQ Model,

Replacement Problem: Economic Life of an Asset, Selection of - Best Replacement Alternative, Replacement of assets that deteriorate with time, replacement of assets which fail suddenly.

Studio/practical work:

Objectives

- To introduce Statistics - the science of collecting, organizing and interpreting data.
- To introduce the software MS Excel to handle and analyze data.
- To enable the students to know some basic statistical tools for operations that explores & draws conclusions from data using Excel.
- To introduce Excel - the Statistical Tools of Data Analysis and

Serial Number	Details
1.	**Representation of Data** – Classification & Tabulation, Graphical Representation
2.	**Descriptive Analysis** - Measures of Central Tendency and Measures of Dispersion
3.	**Forecasting Analysis** – Correlation and Regression Analysis
4.	**Statistical Inference** – t and Z test, Chi-Square Test
5.	**Premium Solver** - Use of Excel & Premium Solver in Solving few Operation Research Models

References Books:

1. R. Panneerselvam: *Operations Research* (2002), Prentice Hall of India.
2. J.K. Sharma: *Operations Research Problems and Solutions* (2004), Macmillan India.
3. J.G. Ecker and Michael Kupferschmid: *Introduction to Operations Research* (1988), John Wiley & Sons.
4. Hamdy A. Taha: *Operations Research* (2002), Pearson Education.
5. N.D. Vohra: *Quantitative Techniques in Management* (1990), Tata MacGraw Hill.

Semester II

Category	No.	Subject	TEACHING SCHEME (50 Min. periods/wk)			EXAMINATION SCHEME (marks)				Credits
			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
PC		Advanced Construction Technology – II	3	2	5	100	50		150	3

Advanced Construction Technology – II

Aim:

The objective of the course is to introduce the structural system concepts and design processes methodology in relation to architectural and services systems of building projects. These concepts will help in the selection of the appropriate structural systems and the broader understanding of the design process and structural detailing aspects which are essential for the design management professionals and construction managers. The course coverage includes the following:

Module -1
Introduction to structures based on functional utility, durability of structures, materials of construction, structural forms and methods of construction. Classification of building structural forms; load bearing structure, framed structures, spatial structures and composite structures.

Module -2
Study of structural requirements of buildings:strength, stability, stiffness, ductility, durability and maintenance of structures.

Module -3
Various structural systems for multi-storied reinforced concrete buildings and their planning and design considerations including cost economics.

Module -4
Earthquake and wind resistant design and detailing of buildings including the relevant provisions in different codes.

Module -5
Large span structures in general.
Steel structural systems for large span roofs: steel truss system, single and double layered tubular space frames.
Large span R. C. C. systems: grid floors, virindeel girder system, shell roofs and folded plate systems.

Module -6
Basic concept of computer aided structural analysis and design process. Various computer aided structural analysis and design.

Module -7
Co-ordination aspects between structural systems and architectural and building services system.

Module -8
Spatial structural system: Tension structures and other recent developments in the innovative structural system (case study).

Module -9
Structural systems for low cost construction and non-engineering constructions.

Module -10
composite construction, composite system in steel and concrete.

Studio programs

Study of literature on innovative structural systems in buildings and making presentations and reports.
Site visits to such building projects and prepare structural system appraisal report with structural system / arrangement drawings.

Category	No.	Subject	TEACHING SCHEME (50 Min. periods/wk)			EXAMINATION SCHEME (marks)				Credits
			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
PC		Project Management – II	3	2	5	100	50	100	250	4

Project management II

The intent of the course is to disseminate about the application of project management during the pre-construction phase of a project life cycle such as initiation, feasibility, outline scheme design detailed design phases and bid and award phases of a project.

The application of management processes such as Scope management, Cost management, Risk management, Communication management and Time management during the pre construction phase will be disseminated. Some of the major techniques to be discussed are Value engineering, Quality Function Deployment, Cost benefit analysis, Brain storming, Parametric Modeling, Risk Identification, Quantification and Response Etc.

The introductory aspects of Contract Management such as types of contracts, merits and demerits of contract types, understanding of contract conditions, procurement planning etc. will be disseminated. Good practices and managerial responsibilities.

Module -1:

Construction economics: Economic decision making, time value of money, cash flow diagram, evaluating alternatives by equivalence, effect of taxation on comprehension of alternative, effect of inflation on cash-flow, evaluation of public projects: discussion on benefit-cost ratio.

Module -2:

Project feasibility & Detailed project report

What Is Project? Investment Opportunities Generation And Screening Of Project Ideas, Project Identification, Project Rating , Preliminary Analysis, Market, Technical , Financial, Economic And Ecological –Pre- Feasibility Report, Project Estimates And Techno- Economic Feasibility Report, Detailed Project Report, Different ProjectClearances.

Module -3:

Contract management:

Indian contract Act 1872, brief introduction, implementation, contract document, types of contracts, classification of contract, bidding process, bidding models, subcontract.

Module -4:

Construction Specifications

Specification its importance and purpose.

module -5:

Estimation & Valuation for building projects

Approximate method of estimation, types of estimates, valuation, types and purpose of valuation

Module -6:

Project cost and Value Management (introduction)

project cost management, cost related information, value management

module -7:

Building design process & design review

Intent: To acquaint the students with building design related aspects

Module -8:

Management of the pre – construction phase

- **Risk Management**

Risk, identification, analysis and evaluation, response to risk,

- **Site management**

Site condition, site functions, zoning.

STUDIO EXERCISES

- Specifications
- Item Nomenclature
  - Analysis of Rates and Bill of Quantities
- Project Specifics
- General Conditions of Contract
- Special Conditions of Contract
- Value Engineering

Reference books:

Category	No.	Subject	TEACHING SCHEME (50 Min. periods/wk)			EXAMINATION SCHEME (marks)				Credits
			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
PAEC		Business Development & Project Marketing	2	-	2	-	50	-	50	2

Business Development & Project Marketing:

Objective: The purpose of this course is to develop an understanding of the basic concepts of Marketing and acquire skills to develop necessary product, pricing, distribution and promotion strategies for marketing of product and services.

Module -1

INTRODUCTION: Nature and Role of Marketing, The Marketing Concept, Marketing Environment, Market Mix, Marketing Planning.

Module -2

MARKET SEGMENTATION, TARGETING AND MEASUREMENT: Market Segmentation, Market Targeting, Market Measurement and Forecasting, Marketing Research and Information System.

Module -3

BUYER BEHAVIOUR: Meaning and Importance, Determinants and Consumer Behaviour, Buying Decision Process, Industrial Buyer Behaviour.

Module -4

PRODUCT DECISIONS: Product Life Cycle, Product Mix Strategies, Branding and Packaging Decisions, New product Development, Consumer Adoption Process.

Module -5

PRICING DECISIONS: Pricing Objectives, Price Determinants, Pricing Methods, Pricing Policies and Strategies.

Module -6

MANAGING DISTRIBUTION FUNCTION: Nature and importance of Distribution Channels, Patterns of Distribution Channels, Determinants of Channel Design, Determining Intensity of Distribution, Selecting Motivating and Evaluating Channel Members, Physical Distribution Task and Approaches.

Module -7

PROMOTION DECISIONS: Marketing Communication Process, Promotion Mix and its Determinants Role of Advertising, Sales Promotion and Personal Selling; Promotion Budget.

Module -8

- GLOBAL MARKETING: Reasons underlying International Business, Distinction between Global and Domestic Marketing, Institutional and Policy Framework, Procedural Aspects, Regional Economic Groupings.

Module -9

- CONTEMPORARY ISSUES: Direct Marketing, Customer Service, Rural Marketing, Marketing of Services, Consumer Protection.

Reference books:

Category	**No.**	**Subject**	**TEACHING SCHEME (50 Min. periods/wk)**			**EXAMINATION SCHEME (marks)**				**Credits**
			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
PE		Integrated Energy Conservation in Construction	3	2	5	100	50		150	4

Integrated Energy Conservation in Construction:

Course Objective

To develop awareness of environmental issues in relation to construction, and acquire abilities to handle them.

Aim :- To develop awareness of environmental & energy issues in relation to construction and acquire abilities to handle them.

Module -1:

Energy ,Energy scenario,Tharmodynamics and energy, forms of energy , energy and buildings. Assignments on topic

Module -2:

Energy generation systems, conventional and non-conventional (renewable) energy technologies and systems, waste heat recovery, energy storage, energy and environment. Assignments on topic

Module -3:

Energy consumption in building over all scenario, solar passive architecture and it's importance, sustainability and introduction to sustainable architecture w.r.t comfort criteria in buildings viz IAQ,IEQ. Assignments on topic

Module -4:

Climate and buildings, Energy conscious buildings, building and energy Assignments on topic.

Module -5:

Thermal performance of the buildings, introduction to software for thermal performance analysis, case studies and introduction to software for analysis /performance. Assignments on topic

Module -6:

Energy efficient materials. Assignments on topic

Module -7:

Energy conservation and its importance, introduction to energy management and energy audit Assignments on topic.

Module -8:

Building envelope design guidelines w.r.t climatic zones, ECBC, case study and policies. Assignments on topic.

Module -9:

Integration of renewable energies in buildings and net zero energy concept. Assignments on topic

Module -10:

Sustainability certification, Introduction to GRAHA, IGBC, LEED, BRIM rating systems Assignments on topic.

Studio Programme :

Assignments related to the above topics.

Reference books:

Category	**No.**	**Subject**	**TEACHING SCHEME (50 Min. periods/wk)**			**EXAMINATION SCHEME (marks)**				**Credits**
			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	

BS& AE		Service Management -II	3	1	4	100	50	100	250	4

Service Management -II

Module -1

Hotel and hospital services:

- Laundry
- House keeping
- Kitchen
- Hospital waste
- Hospital gases
- CSSD

Module -2

HVAC

- HVAC equipment and sys components
- Heating and cooling load
- Effects on planning
- Co-ordination with other services

Module -3

BMS

Fire safety and fire fighting

- Fire types and extinguishing materials
- Firefighting systems and equipment
- Fire officer, evacuation and mitigation plan, fire drills, fire preparedness.
- Fire audit

Module -4

Safety and security

- Security needs, security systems, integration at construction stage, monitoring

Module -5

Roads:

- Geometry in plan and in section
- Effect of climate on terrain and strata
- Road construction section details etc.
- Materials and equipment
- Maintenance

Category	No.	Subject	TEACHING SCHEME (50 Min. periods/wk)			EXAMINATION SCHEME (marks)				Credits
			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
		Dissertation Stage – I		4	4	-	100	-	100	4

Dissertation Stage – I

The progress of the seminar work is presented and discussed by the student periodically in the classroom environment and progress monitored continuously. The seminar work develops the comprehension and presentation skills of the students. The chosen topic may be further extended with additional scope of study in the third semester or taken up for thesis work in the final semester. The students are also encouraged to seek guidance from the experts in the related fields.

Category	No.	Subject	TEACHING SCHEME (50 Min. periods/wk)			EXAMINATION SCHEME (marks)				Credits
			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
		Dissertation Stage – I		4	4	-	100	-	100	4

Dissertation Stage – I

The objective of the thesis is to provide an opportunity to the students to prepare independent and original study of special project of his own choice.

The subject for special study may be conceptual or practical but pertaining to **Building Design and Construction Management.** This should however, offer scope to adopt a fresh approach in formulating a concept of developing a methodology effective and useful. Each student will prepare the Thesis under the guidance of a principal advisor with regular reviews by the faculty of the department. The Thesis will be presented in the accepted form of a thesis report duly supported by copious References, sketches, graphs, statistical data, details of survey if any, detailed account of experimental analytical procedures adopted. Each student is required to defend his Thesis at a Viva Voce Examination by jury.

Synopsis (Copies – 12) should be submitted to university authority for scrutiny and registration. Synopsis should be completed in following respects –

1) Titles of the synopsis.
2) Abstract of research / study.
3) Aims, Objectives and scope.
4) Name, signature and consent of guide.
5) Synopsis should be submitted from 1st January to 15th February and 1st June to 15th July every year as per circular SU/PG/BVTR/ME/M.TECH/8154 dtd. 16/11/2007.
6) Literature study and collection of basic information, should be completed in Dissertation Stage – I.

Seminar on dissertation topic:

The state of art prepared on the chosen topic in the dissertation work is further studied and analysed on the specific aspects of the topic and a comprehensive seminar report is prepared with the identification of areas

for further research and development. Finally, this comprehensive seminar report is prepared in prescribed format for publication/submission. Weightage to both the work is fifty-fifty percent.

During vacation:

Category	No.	Subject	TEACHING SCHEME (50 Min. periods/wk)			EXAMINATION SCHEME (marks)				Credits
			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
		Practical training (4 week)					**50**			**2**

Practical training:

During vacation, students have to undergo four-week practical training in construction related organizations of their choice but with the approval of the institute. At the end of the training student will submit a report as per the prescribed format to the institute.

Assessment process This training is mandatory and a student has to pass the course to become eligible for the award of degree. The student shall make a presentation before a committee constituted by the institute which will assess the student based on the report submitted and the presentation made. Marks will be awarded out of 50 and appropriate credits assigned as per the regulations.

Semester III

Category	No.	Subject	TEACHING SCHEME (50 Min. periods/wk)			EXAMINATION SCHEME (marks)				Credits
			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
PC		Project Management – III	4	2	6	100	50	100	250	5

Project Management – III

The intent of the course is to disseminate about the application of Project Management during the "Bid and Award Phase" of the project life cycle. In addition, the course covers the monitoring, control and communication processes.

Module -1:

Project controlling and monitoring: The project controlling processes, updating, project control, schedule/time/progress control, Overall change control, scope change control, cost control, performance reporting and risk response control, earned value method and management information system.

Module -2:

Communication management:

Types of Communication, Communication Model, Feedback, Effective Communication, Listening Skills.

Module -3:

Project closure:

Claims and disputes, correspondence, project closure such as construction closure, financial closure, contract closure, project manager's closure and lesson learned from the project.

Module -4:

Post construction management:

Maintenance management, organization structures and contractual aspects of maintenance management, financial management of maintenance activities.

Module -5:

Broad coverage on new and emerging project management areas such as business Process re-engineering, constructability etc. professional practice & contract administration like BOT, BOOT, BOLT etc. international contracting & FEEDIC conditions, Good practices and managerial responsibilities.

Module -6:

Factors behind the success of project:

Project performance measurement criteria for project performance evaluation, attributes, effect of other elements on its performance etc.

Module -7:

Facility management:

- Planning norms for various Services & Utilities, Township facilities; Schools, Hospitals, Housing, Commercial Complexes etc. Importance of building services, type of services required to keep the facility usable, planning of services, organization structures of services management. Role and administrative functions of Supervisors.
- Fire fighting - Basic requirement for the work fire fighting system, various components of the fire fighting system, maintenance required of the system, fire lighting in high-rise buildings, commercial / industrial complexes, public buildings, checklist for fire safety, fire fighting.
- Lifts / elevators, escalators, permissions & procedures legal formalities for Elevators, various types of lifts, working mechanisms of lift and escalators. Indian standard codes for planning & installations of elevator, inspection & maintenance of lifts.
- Plumbing Services : Basics of Plumbing systems, Requirement of Plumbing works, Agency, Activity Flow chart for Plumbing work, Quality, checking of materials. Water Supply System : Water Supply distribution system in high-rise buildings & other complexes, pumps and pumping mechanism, operation & maintenance of fittings & fixtures of w/s. Do's & Don'ts for water pipe networks. Modern Sewage Treatment Plants.
- Landscaping & Horticulture
- Building maintenance management. Air - conditioning and Heating: Flowcharts of air conditioning & heating. Centralized systems, monitoring working of the equipments, checklist of Inspection, Performance testing.
- Water proofing, Damp proofing & Termite proofing. Working Procedure & stages of work of water proofing for W.C., bathrooms, Terrace, Sloping roof, Basements, tanks. Use of chemicals for water proofing treatment. Role of consultants. Damp proof course, Causes and precautions for Dampness.

Category	No.	Subject	TEACHING SCHEME (50 Min. periods/wk)			EXAMINATION SCHEME (marks)				Credits
			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	

BS& AE		Laws & Legal Aspects in Project Management	3		3	100	50		150	3

Laws & Legal Aspects in Project Management:

The objective of the course is to provide an overview of all laws and regulations related to construction projects in the various stages of the project cycle. It includes as follows,

- Building regulation and bylaws of local authorities. Laws related to land development. Land acquisition, lease & easement rights, fire regulation, completion certificate
- property acts and Guntewari acts.
- Permits and approval for construction activities ;
- statutory requirements and clearance related to environment impact,
- urban form,
- . Laws and legislation related to construction Industry labour laws
- consumer protection Act,
- MRTP act.
- The building and construction workers (regulation of employment and conditions of service) Act, 1996,
- workmen's compensation Act. Payment of wages Act,
- The employees provident fund and Miscellaneous Provisions Act 1995 etc.
- Indemnity & guarantee,
- Industrial act and labour laws,
- Environmental laws.
- National Building code,
- role of ZillaParishad& IRDP in rural housing.
- For dispute resolution Arbitration and conciliation Act 1996.

Reference books:

1) Civil Engineering Contracts and Estimates - B. S. Patil – Universities Press- 2006 Edition, reprinted in 2009.
2) The Indian Contract Act (9 of 1872), 1872- Bare Act- 2006 edition, Professional Book Publishers.
3) The Arbitration and Conciliation Act,(1996), 1996 (26 of 1996)- 2006 Edition, Professional Book Publisher.
4) Law of contract Part I and Part II, Dr. R.K. Bangia- 2005 Edition, Allahabad Law Agency.
5) Arbitration, Conciliation and Alternative Dispute Resolution Systems- Dr. S.R. Myneni- 2004 Edition, reprinted in 2005- Asia Law House Publishers.
6) The Workmen's Compensation Act, 1923 (8 of 1923) Bare Act- 2005- Professional Book Publishers.
7) Standard General Conditions for Domestic Contracts- 2001 Edition- Published by Ministry Of Statistics and Program Implementation, Government of India.
8) FIDIC Document (1999).
9) Dispute Resolution Board foundation manual-www.drbf.org.

Various acts, byelaws and law books

Category	No.	Subject	TEACHING SCHEME (50 Min. periods/wk)			EXAMINATION SCHEME (marks)				Credits
			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
PAEC		Real Estate Management	2	-	2	-	50	50	100	2

Real Estate Management

Aim: Intent of the course is to impart detailed knowledge of all aspects related to management of Real Estate projects to train the students as Real Estate Project Managers.

Module -1:
Real Estate Scope:
Classification of real estate activities and peculiarities; Factors affecting real estate market; Role of Government in real estate market; Statutory provisions, Role, scope, working characteristics and principal functions of real estate participant and stakeholders, Interests in real estate; Real Estate investment, sources and related issues;
Module -2:
Function and feasibility:
Functions of Real Estate development like project formulation, feasibility studies, developing, costing and financing, managing including planning, scheduling and monitoring of real estate projects, risk management, facilities management, marketing/advertising, post construction management etc.
Module -3:
Laws, agreements, appraisal and documentation:
laws, rules and regulations application, land use controls in property development, registration and licensing requirements; Documentation in real estate processes; Transfer of titles and title records; Real Estate appraisal and valuation; Types of agreements between the consultants and principal; Code of ethics for Real Estate participants Environmental issues related to Real Estate transactions
Module -4:
Role and responsibility:
Real estate consultants and their activities, Role and responsibilities of property managers; Good practices and managerial responsibilities.
Module -5:
Closure:
Closing the Real Estate transactions. Further knowledge base for assessment and forecasting the Real Estate market;

Category	No.	Subject	TEACHING SCHEME (50 Min. periods/wk)			EXAMINATION SCHEME (marks)				Credits
			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
PC		Quality & Safety Management	2	-	2	-	50	50	100	2

Quality & Safety Management:

Aim: The intent of the course is to give an insight into the concepts of Quality Management System and further develop applications relevant to planning, design & construction of buildings. Module on construction health, safety & environment management principles, systems & practices of safety management occupational health, hygiene in construction.

Module -1:

Quality : Traditional approaches. Its importance in technology driven, competitive market economy.

Types of Organizations, Inspection, control and enforcement, Quality Management Systems and method, Responsibilities and authorities in quality assurances and quality Control, Architects, engineers, contractors, and special consultants, Quality circle.

Module -2:

Quality policy and Total Quality Management (TQM):

Quality policy: Objectives and methods in Construction Industry, Consumers satisfaction, Economics Time of Completion, Statistical tolerance, Taguchi's concept of quality, Codes and Standards, Documents - Contract and construction programming -Inspection procedures -Processes and products -**Total Quality Management** Meaning, scope and relationship of the concept. The need of a continuum, programme and cost implication.

Module -3:

Quality Standards in construction:

Standards for various building materials and other inputs for construction process, methods and techniques for construction outputs, products and services,

Indian Standards, British, American, German & Japanese standards; study comparisons and equivalence.

Module -4:

Managing Quality in Construction:

Building quality into designs of structures, Inspection of incoming materials and machinery. In –process quality inspection and tests,Designing of quality manuals, Checklists and inspection reports, installing the quality assurance system, monitoring and control.

Module -5:

Quality Assurance and culture:

Department and quality control responsibilities of the line organization,

Examples: Quality in foundations and piling work, structural work, concreting, electrical system, building facilities, waste recycling and maintenance,

quality culture in the organization : Training of people, Mannualisation of operations, Bench-marking quality , synergy, Quality circles,

ISO 9000 , ISO 14000 & QS 9000 standards and certification procedures

Safety management:

Module -6:

Concept of safety Failure aspects:

Critical, major failure aspects and failure mode analysis, Stability methods and tools,optimum design,Reliability testing, reliability coefficient and reliability prediction,Selection of new materials - Influence of drawings detailing, specification,standardization -Bid preparation- Reliability Based Design.

Psychological, Physiological and technological factors in safety in construction,

Hazards and causes of accidents, safety measures. Safety legislation and standards for construction industry.

Module -7:

Safety management:

Safety in construction of Buildings, civil works and infrastructure development projects,
Management of Accidents, employment injuries and occupational hazards / diseases.

Module -8:

Safety roles in:

In organization, onsite and its management, Role of safety department, safety officer, safety committee. Safety training, incentives and monitoring.

Module -9:

Safety manuals and checklists:

Writing safety manuals, preparing safety checklists and inspection reports.

Reference books:

Quality management:

1. International Standards Organization – ISO 9001 and ISO 9004
2. Mantri Handbook – A to Z of Construction – Mantri Publications
3. Juran's Quality Handbook – Joseph M. Juran, A. Blanton. Godfrey – Mcgraw Hill International Edition (1998)
4. Probability and Statistics for Engineers – Miller, Freund-Hall, Prentice India Ltd.
5. Quality Control and Total Quality Management, P.L.Jain, Tata Mcgraw Hill Publ.

Safty management:

1. Construction safety manual published by National Safety Commission of India.
2. Safety Management in Construction Industry – A manual for project managers. NICMAR Mumbai.
3. Construction Safety Handbook – Davies V.S.Thomasin K, Thomas Telford, London.
4. ISI for safety in Construction – Bureau of Indian Standrads.
5. "Safety management" –Girimaldi and Simonds, AITBS, New Delhi.

Category	No.	Subject	TEACHING SCHEME (50 Min. periods/wk)			EXAMINATION SCHEME (marks)				Credits
			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
PC		Project Finance Management	2	2	4	100	50	-	150	3

Project Finance Management:

The objective of the course to familiarize the fundamentals of financial management concepts and their applications in the various phases of the project cycle of construction projects. The course also aims to provide a basic knowledge to carry out the financial feasibility of projects, selection of building systems and equipment's, evaluation of project investment decisions.

Module -1:

Accounting: Concepts, convention and principles of Accounting, Types of Business Organizations, Role of accountant in an organization, Accounting Process. Branches of accounting: Financial, Cost and

Management ccounting and their inter-relationships, Preparation and Understanding of Financial Statements of Construction Company.

Module -2:

Financial Management: Concept of Finance, scope and objectives of Project Finance Management, Profit maximization vs. Wealth maximization, Functions of Project Finance Manager in Modern Age, Financial Analysis-Concepts and objectives, Tools of Financial Analysis: Concepts of Ratio Analysis, Interpretation of Ratio Analysis, Advantages and Limitations of Ratio Analysis, Analysis and Interpretation of Financial Statement Using the techniques of Ratio Analysis, Five basic types of financial ratios, (Liquidity, Leverage Coverage, Activity, Profitability), Case studies of Financial statements of Indian companies

Module -3:

Cash Management: Concept of Gross and Net Working Capital, Use and Importance of Working Capital, Working Capital Cycle, Influencing Factors, Preparation of Schedule of Changes in Working Capital, Preparation of Funds Flow Statement and its analysis and Cash Flow Statement: Various cash and non-cash transactions, flow of cash, difference between cash flow and fund flow. Motives for Holding Cash

Module -4:

Financial Decision: Concept and techniques of Capital Budgeting Decisions, Meaning and importance, Evaluation of different proposals under capital budgeting and use in decision making. The course also aims to provide a basic knowledge to carry out the financial feasibility of projects, selection of building systems and equipment's, evaluation of project investment decisions. Leverage analysis – Financial, Operating and Combined Leverage along with its implications.

Module -5

National Economics: Features and characteristics of Indian economy, liberalization of economy, wholesale price indices, consumer price indices, construction cost indices and inflation, management economics.

Module -6:

Budget and Budgetary control: Concept of Budget, Budgeting and Budgetary Control, Organization for Budgetary control- Budget Centres, Budget Committee, Budget Manual, Budget period, Principal Budget, Cash Budget and Flexible Budget, Factors. advantages and limitations of Budgetary Control System. Concept of Zero-base Budgeting, Performance Budgeting, (Case studies on Cash Budget and Flexible Budget to be covered)

Module -7

Tax reforms and GST in India: Constitutional Background, GST Bills, Central and State Financial relations, Finance commissions, Salient features of GST, Tax compliance in the view point of construction sector.

Studio Programme:

Studio problems and exercises are designed to illustrate the practical applications of construction financial management with project case studies.

Category	No.	Subject	TEACHING SCHEME (50 Min. periods/wk)			EXAMINATION SCHEME (marks)				Credits
			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
SEC		Elective – I	2	1	3		50	50	100	3
SEC		Elective – II	2	1	3		50	50	100	3

The elective subjects are taught during the third semester. Students shall take any one of the elective courses.

1) Management of Infrastructure Projects
2) Disaster Management
3) Building Automation
4) Marketing in construction
5) Site Safety management
6) Energy management
7) Services co-ordination
8) Design Management
9) Environmental impact assessment
10) Management Information systems

			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
SEC		Management of Infrastructure Projects	2	1	3		50	50	100	3

1) Management of Infrastructure Projects:

Module—1

Construction Industry:

Nature, characteristics, size and structure. Role of infrastructure development in employment generation and improving of the National economy. Various Agencies associated with infrastructure development in India as regards various sectors.

Module—2

Status of Infrastructure in India:

Road sector,Port, Railway, communication, water supply and drainage,

Power sector, oil and gas industry, Health and educational services.

Infrastructure Development, Indian budget and its relation with Infrastructure development projects inIndia.

Various programs related with Infrastructure development in rural and urban sector.

Public Private Partnership (PPP) in Infrastructure, Draft Concession Agreement for PPP projects, EscrowAgreement.

Module—3

Issues related to infrastructure development – pre – requisites necessary to ensure success for switchingover from public sector management to private sector management, issues in developing, funding andmanaging

infrastructure projects, role, responsibility of project management consultants. FDI inInfrastructure development, Problem areas and solutions.

Module – 4

Provisions made for Infrastructure Development in the 12th and 13th five year plans of the planning commission Government of India. Formation of the Indian Infrastructure Development Corporation. SPV's for Infra projects.JNNURM - Jawaharlal Nehru National Urban Renewal Mission, PMGSY – Pradhan Mantri Gram SadakYojana, RGGVY - Rajiv Gandhi GrameenVidyutikaranYojana, Ports Connectivity Projects, IndiraGandhi International Air Port project, Indo – US Nuclear Deal, Nuclear Power Projects in India

Reference Books

1 Construction Engineering & management of Projects(For Infrastructure & Civil Works) by S. C. Sharma, Khanna Publishers, 2nd Edition, 2011
2.India Infrastructure Report – Rakesh Mohan
3.Infrastructure Today - Magazine
4.Document of five year plans, published by Govt. of India.
5.Public Private Partnership in Infrastructure by R. N. Joshi Vision Publications – 2010.
6. Infrastructure Development in India by RajarshiMajumderRawat Publications – 2010
7. Journal of the 'Indian Roads' Congress.
8. Indian Highways – Journals

			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
SEC		Disaster Management	2	1	3		50	50	100	3

2) Disaster Management

Module 1:

Disasters – Natures and extent of disasters, natural calamities such as earthquake, floods, drought volcanoes, forest, coasts hazards, landslides etc. Manmade disasters such as chemical and industrial hazards, nuclear hazards, fire hazards etc. Disaster Management – Financing relief expenditure, legal aspects, rescue operations. Casual management, risk management.

Module 2:

Emergency Management program – Administrative setup and organization. Hazard analysis, training of personnel, information management, emergency facilities and equipment necessary public awareness creation, preparation and execution of the emergency management program.

Module 3:

Various organizations registered with Government and NGO's working for disaster relief-Challenges faced by organizations. Methods of assessment of impact of disasters such as photogrammetric methods, media survey, ground data collection.

Module 4:

International adopted practices for disaster mitigation. Rules and regulations, Monitoring aspects of disaster mitigations programs.

Reference Books:

1. An Introduction to Disaster Management –Natural Disasters and Man Made Hazards, S.Vaidyanathan, Ikon Books
2. Construction Engineering and Management – Seetharaman, Umesh Publ.
3. NICMAR Publications

4. Different sites on internet on disaster management
5. Project Management – K Nagarajan – New Age International Ltd.
6. Disaster Management Handbook by Jack Pinkowski – CRC Press (Taylor and Francis group)

			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
SEC		Building Automation	2	1	3		50	50	100	3

3) Building Automation

Aim:

Security of the building and safety of personal are becoming important aspects now a day and in near future, it will be in a great demand. Complex infrastructure requires a variety of building automation and control Systems. Building Management System is computer-based control system installed in building that controls and monitors the total MEP (Mechanical – Electrical – Plumbing) and security Structure. BMS consist of both Hardware and software.

Module -1:

Introduction

Concept and application of Building Management System (BMS) and Automation, equirements and design considerations and its effect on functional efficiency of building automation system, architecture and components of BMS.

Module -2:

Fire Alarm System

Fundamentals: What is Fire? Fire modes, History, Components, and Principles of Operation.
FAS Components: Different fire sensors, smoke detectors and their types, Fire control panels, design considerations for the FA system.

Module -3:

Access Control System: Access Components, Access control system Design.
CCTV: Camera: Operation & types, Camera Selection Criteria, Camera Applications, DVR Based system, DVM, Network design, Storage design.
CCTV Applications: CCTV Applications.

Module -4:

Security Systems

Fundamentals: Introduction to Security Systems, Concepts.
Perimeter Intrusion: Concept, Components, Technology, Advanced Applications. Security Design: Security system design for verticals.
Concept of automation in access control system for safety, Physical security system with components, RFID enabled access control with components, Computer system access control.

Module -5:

HVAC system

Fundamentals: Introduction to HVAC, HVAC Fundamentals, Basic Processes (Heating,Cooling etc.)
Basic Science: Air Properties, Psychometric Chart, Heat Transfer mechanisms, Examples.
Human Comfort: Human comfort zones, Effect of Heat, Humidity, Heat loss.

Processes: Heating Process & Applications (I.e. Boiler, Heater), Cooling Process & Applications (I.e. Chiller), Ventilation Process & Applications (I.e. Central Fan System, AHU, Exhaust Fans), Unitary Systems (VAV, FCU etc).
Control Theory: Instrumentation Basics, Field components & use.
Communication: Communication Basics, Networks.

Module -6:

Energy Management System:
ASHRAE Symbols
Energy Management: Energy Savings concept & methods, Lighting control, Building Efficiency improvement, Green Building (LEED) Concept etc.

Module -7:

Building Management System:
Module -8:

EPBX System :
Design consideration of EPBX system and its components, integration of all the above systems to design BMS.

Reference Books:

- Smart Buildings by Jim Sinopoli, Butterworth-Heinemann imprint of Elsevier,2nd ed., 2010.
- Understanding Building Automation Systems (Direct Digital Control, Energy Management, Life Safety, Security, Access Control, Lighting, Building Management Programs) by Reinhold A. Carlson, Robert A. Di Giandomenico, pub. by R.S. Means Company, 1991.
- Intelligent Building Systems by Albert Ting-Pat So, WaiLok Chan, Kluwer Academic publisher,3rd ed., 2012.
- Design of Special Hazards and Fire Alarm Systems by Robert Gagnon, Thomson Delmar Learning; 2nd edition, 2007.
- HVAC Controls and Systems by Levenhagen, John I.Spethmann, Donald H., McGraw-Hill Pub.
- HVAC Control in the New Millennium by Hordeski, Michael F, Fairmont press, 2001.

			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
SEC		Marketing in construction	2	1	3		50	50	100	3

4) Marketing in construction

			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
SEC		Site Safety management	2	1	3		50	50	100	3

5) Site Safety management

Module 1:
Introduction to Construction Safety and Safety Technology--Introduction to construction safety; historical background and current perspective; Government's policy in industrial safety; safety & health legislation in India, Construction Sites (Safety) Regulations; Codes of practice;

Potential hazards/risks associated with construction sites and high risk activities such as the use of hoist, working at height and working in confined space. Safety in typical civil structures – Dams-bridges-water Tanks-Retaining Walls-Critical factors for Failure-Regular Inspection and monitoring. Safety in Erection and closing operation - Construction materials –Specifications – suitability – Limitations – Merits and demerits – Steel structures –Concrete structure.
Workplace ergonomics including display screen equipment and manual handling, personal protective equipment, first aid and emergency preparedness, fire safety, electrical hazards.

Module 2:

Construction Safety Management and Accident Prevention
Safety training; safety policy; safety committees; safety inspection; safety audit; reporting accidents and dangerous occurrences. Accident Prevention: Principles of accident prevention; job safety analysis; fault tree analysis; accident management

References

1. *Accident Prevention Manual for Industrial Operations*, NSC, Chicago, 1982.
2. Fulman, J.B., *Construction Safety, Security, and Loss Prevention,* John Wiley and Sons,1979.

			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
SEC		Energy management	2	1	3		50	50	100	3

6) Energy management

Module -1:

Energy conservation and energy efficiencies in system Energy conservation Act 2001

Module -2:

Energy management Principles, role of energy manager and energy auditor

Module -3:

Energy Audits Types and Reporting, Acceptance Recommendation, implementations.

Energy Management and comfort, IAQ, IEQ

Module -4:

Commissioning of Energy Audit in building

Practical on Energy Audit Project

			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
SEC		Services in co-ordination	2	1	3		50	50	100	3

7) Services in co-ordination

			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
SEC		Design management	2	1	3		50	50	100	3

8) Design management

			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
SEC		Environmental impact assessment	2	1	3		50	50	100	3

9) Environmental impact assessment

aim:

Introduction of EIA concepts and methodologies. Importance of data collection of EIA assessment. Preparation of EIA reports and discussion about various environmental impact Laws pertaining to India.

Module -1:

Environmental Impact Assessment: Definition, basic concepts and principles of EIA. Regulatory frame work in India. Environmental inventory, base line studies, over view of EIA studies.

Module -2:

Assessment and Methodologies: Physical, biological assessment, Socio economic and cultural environmental assessment, EIA methodologies–Adhoc, matrix, checklist approaches. Economic evaluation of impacts-cot benefits of EIA, Public participation in environmental decision making.
Procedures for reviewing EIA analysis and statement.

Module -3:

Environmental Assessment: Introduction, process, Basic steps involved, Description of environmental setting – Base line data collection, possible impacts due to water resources projects. Impact prediction and assessment – methods of impact assessment, Matrix and check list method, Selection of proposed action. Preparation of environmental impact statement.

Module -4:

Environmental Legislation and Regulations: Rationale, concerns, legislative data systems, safe drinking water act, clean water act, clean air act, noise control act, resource conservation and recovery act, comprehensive environmental response, compensation and liability act.

Module -5:

Municipal Solid Wastes: Characteristics, generation, collection and transportation of solid wastes, engineered systems for solid waste management (reuse/recycle, energy recovery, treatment and disposal).

References books:

1. Canter, L.W. (1996), 'Environmental Impact Assessment', McGraw-Hill Book Company, New York.
2. Corbitt Robert A. (1999), Standard Hand Book of Environmental Engineering' McGraw-Hill Book Company, New York.
3. Marriott, 'Environmental Impact Assessment: A Practical Guide', McGraw-Hill Book Company, New York.
4. Sabins F.F. Jr.(1978), 'Remote Sensing Principles and Interpretations' W.H. Freeman and Company, San Francisco
5. Jensen John R. (1986), 'Introductory Digital Image Processing', Prentice-Hall of India New York

			Lect.	Stud.	Total	Paper	Sess.	Viva	Total	
SEC		Management Information systems	2	1	3		50	50	100	3

10) Management Information systems

Course objectives:

To study the concepts of information systems and their applications,system development and information systems, implementation and control, and system audit. Analyze the business issues, processes, and techniques associated with managemenet information systems

Module -1:

Importance of management information systems (MIS), logical foundation of MIS, manger's view of information systems, functions of management, managerial role, activities of a construction organization.

Module -2:

Management and decision making in construction industry, classification of information systems, and impact of construction work on management information systems.

Module -3:

Strategic uses of information technology, inter organizational systems, strategic information systems related to construction industry.

Module -4

Information technology, role of information technology in construction industry, impact of information technology on the individuals, impact on the construction organization, and process of reengineering work.

Module -5

File structures and processing methods in construction organizations, data base concepts and data base management systems.

Reference books:

1. Robert Schultheis, Mary Sumner. (1999). "Management Information Systems-The Manager's View." Tata McGraw Hill Edition, New Delhi.
2. Kwakye, A.A. (1997), "Construction Project Administration", Adisson Wesley Longman, London.