

UNIVERSITY OF PUNE

SYLLABUS

FOR

Two years (four semesters) degree course

Of

MASTERS OF ARCHITECTURE

(CONSTRUCTION MANAGEMENT)

(To be implemented from 2012-13)

FACULTY OF ENGINEERING
BOARD OF STUDIES IN ARCHITECTURE

RULES OF COURSE STRUCTURE FOR MASTER OF ARCHITECTURE (M.ARCH.)

RULE NO. 1 : ELIGIBILITY CRITERIA:

The student seeking admission to M.Arch (Construction Management) course must have passed Bachelor's Examination in Architecture from recognized University securing minimum Second Class (min 50% marks and above, for grade equivalency refer to council of Architecture, India Norms). The admission will be based on the rules framed by the Council of Architecture competent authority from time to time. Common Entrance Test (CET) will be conducted as per rules & regulations of Council of Architecture, New Delhi.

RULE NO. 2 : SCHEME OF ASSESSMENT :

A candidate to be eligible for the Masters Degree in Architecture will be required to appear for and pass examinations as under:

1. First Year M.Arch. SEM I AND SEM II
2. Second Year M.Arch. SEM III AND SEM IV

RULE NO. 3 : GRANTING OF TERM:

- Academic Year will consist of TWO SEMESTERS of 90 teaching days each
- Sessional work / assignments prepared by the students shall be continuously assessed by the Internal Teacher throughout the semester.
- The candidate will be permitted to appear for the examinations at the end of each semester only if he/she keeps term at a college affiliated to the university and produces testimonials from the Principal for,
- 75% attendance in each head of passing of Theory and / or Sessional work as prescribed by the university.
- Completion of the Sessional Work prescribed for each subject and secured at least 50 % marks in the Internal Sessional & Oral Assessment.
- Good conduct.

RULE NO. 4 EXAMINATIONS

At each examination

- Theory paper
- Sessional and
- Sessional and viva-voce based on Sessional Work, as prescribed in the syllabus for the Examination at the end of the each Semester, shall constitute separate heads of passing.

RULE NO. 5 SESSIONAL WORK ASSESSMENT:

- In respect of Session~1 work in first, second, third and Fourth semesters, target date shall be fixed for the completion of each assignment. All the assignments shall be continuously assessed by the Internal Teacher during each semester.
- For First, Second and Third Semester examinations, Sessional and Viva Assessment will be done by an External Examiner.
- For Fourth Semester Examination, external assessment shall be carried out by a professional not teaching in any of the Colleges under Pune University.
- An examiner for any of the subjects of examination from First to Third semester shall have minimum of 3 years of teaching /professional experience as per norms of Council of Architecture (COA).

- To qualify as an External Examiner at Final Semester, the examiner shall have a minimum of 5 years of teaching/ professional experience.

RULE NO. 6 PRE-REQUISITES AND RULES OF A.T.K.T. FOR ADMISSION TO HIGHER CLASSES :

- A student would be allowed to keep term for the II - semester provided he does not fail in more than 4 (four) of the heads of passing in the I -semester.
- A student would be allowed to keep term for the III- semester provided he does not fail in more than 4 (four) of the heads of passing in the II -semester.
- A student would be allowed to keep term for the IV - semester provided he does not fail in more than 4 (four) of the heads of passing in the III -semester.

RULE NO. 7 : CRITERIA FOR PASSING.

- To pass in each semester Examination a candidate must obtain minimum 45% marks in each subject and shall not be less than 50 % in aggregate.

RULE NO. 8 : GRADING SYSTEM

The class shall be awarded to the student on the aggregate marks obtained by him in all heads of passing in all four semesters taken together.

The award of class shall be as follows.

- a) Aggregate 66% or more: First Class with Distinction.
- b) Aggregate 60% or more but less than 66% marks: First Class
- c) Aggregate 55% or more but less than 60% marks: Higher Second Class
- d) Aggregate 50% or more but less than 55% marks: Second Class 3

M.Arch (Construction Management)

SUMMARY OF TEACHING AND EXAMINATION SCHEME

No.	Subject	Teaching scheme (60min.periods/wk)			Examination scheme (marks)			
		Lecture	Studio	Total	Paper	Sessional	Viva-voce	Total
Semester-I								
101	Advanced Construction Technology -I	2	2	4	100	25	-	125
102	Research Methodology	2	-	2		50	-	50
103	Project Management -I	2	2	4	100	75	75	250
104	Project Resource Management	2	2	4		50	50	100
105	Information Technology In Construction	1	1	2		50	-	50
106	Advanced Building Services	1	2	3		50	50	100
107	System Analysis And Operation Research	3		3	100	25	-	125
		13	9	22	300	325	175	800
Semester-II								
201	Advanced Construction Technology -II	2	2	4	100	25	-	125
202	Project management ii	2	2	4	100	75	75	250
203	Business development & Project marketing	3	-	3	-	50	50	100
204	Project finance management	2	2	4	100	25	-	125
205	Management information system	2	-	2	-	50	50	100
206	Infrastructure services and management	2	3	5	-	50	50	100
		13	9	22	300	275	225	800
Semester-III								
301	Quality and site safety management	2	2	4	100	25		125
302	Law and legal aspect in construction project	2	2	4	100	25		125
303	Facility management and Real estate management	4	-	4		75	75	150
304	Integrated energy conservation in construction	2	2	4		75	75	150
305	Seminar		4	4		100		100
306	Dissertation stage I		2	2		50		50
		10	12	22	200	350	150	700
Semester-IV								
401	Dissertation stage I I	2	18	20		250	250	500
402	Practical Training		2	2		100	100	200
		2	20	22		350	350	700
						TOTAL		3000

Semester I

Advanced Construction Technology -I		Course no 101	
Contact hours per week		Assessment:	
Lecture	2	Theory Paper -	100
Studio	2	Internal Assessment -	25
		External Viva - -	
Total	4	Total -	125

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

Lecture:

Geo-technical aspects of foundations

Planning and design considerations of:

Foundation systems

Fabrication and erection of Steel structures

Pre-cast and pre-stressed concrete constructions

Composite constructions

Planning, design and construction of basements including waterproofing systems

Soil / ground improvement

Durability of foundations in aggressive soil conditions

Concrete Technology

Advanced form work

Construction chemicals

Selection of construction equipment

Good practices and managerial responsibilities.

Laboratory Work:

Experimental investigations;

Non – Destructive Testing Techniques,

In-situ and other field tests

Studio Program:

Tendering of 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.

Research Methodology		Course no 102	
Contact hours per week		Assessment:	
Lecture	2	Theory Paper -	
Studio	-	Internal Assessment -	50
		External Viva - -	
Total	2	Total -	50

Course outline

- Research area identification ,Hypothesis of research topic
- Literature sourcing and search, compilation and inference drawing
- Aim and objective definition
- Formulation of methodology
- Field study planning, survey data collection, analysis and result presentation
- Research study validation
- Discussion of findings of research findings
- Study conclusion and recommendation formulations.

Students are required to take any minor topic for research and carry out research using various tools.

Project Management -I		Course no 103	
Contact hours per week		Assessment:	
Lecture	2	Theory Paper -	100
Studio	2	Internal Assessment -	75
		External Viva - -	75
Total	4	Total -	250

- 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.
- Lecture:
- Principles and Practices of Construction Management
- Project organizations
- Work Break down Structure (W.B.S.)
- Time scheduling techniques
- Resource Management and scheduling techniques
- Material Management:
- Time cost Analysis
- Introduction to the management information systems (MIS)
- Computer Application in Project Management
- Studio Exercises
- Familiarization with the building projects
- Conceptualize Construction Logic
- Work breakdown Structure
- Aim: To impart process knowledge for undertaking research studies. 6
- 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.
- Introduction of the software HRM
- STUDIO in 100sqm live project

Project Resource management		Course no 104	
Contact hours per week		Assessment:	
Lecture	2	Theory Paper -	
Studio	2	Internal Assessment -	50
		External Viva - -	50
Total	4	Total -	100

Aim: the main objective of the subject is to impart and train rigorously the students for various resources involved in project viz materials, manpower, equipment and their planning and management.

HRM 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 i labour 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.

Materials 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 7 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.

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 on all the above topics

Information Technology In Construction		Course no 105	
	Contact hours per week		Assessment:
Lecture	1	Theory Paper -	
Studio	1	Internal Assessment -	50
		External Viva - -	
Total	2	Total -	50

Aim: To familiarise basic computer concepts, operating systems, application software and usage in construction

Lecture:

Computers : Concepts & Hardware

Microsoft Windows

Application Software's - Concepts & Application

Networking and Telecommunications

Project Management Applications

Project Management Software's

System approach to Project Management

Emerging Areas In Information Technology - Application In Construction

Studio Programme:

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

Advanced Building Services		Course no 106	
Contact hours per week		Assessment:	
Lecture	1	Theory Paper -	
Studio	2	Internal Assessment -	50
		External Viva - -	50
Total	3	Total -	100

Aim: To provide exposure to planning, design and execution aspects of building services for

effective co-ordination during pre-construction and construction phase of projects

Water and Waste Management Services and Systems

Water Management Water quality and quantity assessment

Water supply system components (hot & cold) Cold water supply system

Hot water supply system System Selection & Economics

Waste Management Soil and waste quantity calculation

Soil and waste system components

Soil and waste system

Rain water drainage

Solid waste disposal Heating Ventilation and Air-conditioning

Refrigeration Cycle Heating & cooling system components & installation

Air-conditioning System Types Direct Expansion units

Package units Central chilled water systems Ventilation Systems

Selection Criteria

Electrical Services

Electrical System Components

Power Requirement for Buildings

Sub-station installations

High-tension (HT) switch gear

Transformers

HT & low-tension (LT) panels

Capacitors & power factor maintenance

Types of electrical conductors

LT distribution system

Protection devices Low voltage systems

Emergency Power Supply 9

Co-ordination of Services

Operation, Maintenance and Planning for Retrofitting of Services Systems

Specialized Services

Medical Gases

Steam Supply

Laundry Services Kitchen Equipment's & Planning

Integrated Building Management System

Studio program:

Related to planning of the internal services and preparation of schematic diagrams and details.

System Analysis And Operation Research		Course no	
	Contact hours per week		Assessment:
Lecture	3	Theory Paper -	100
Studio		Internal Assessment -	25
		External Viva - -	
Total	3	Total -	125

- Decision Theories - decision analysis & decision making methods, Categorization analysis
- Concept of Operations Research :
Definitions, Concept of models, modelling steps and limitations.
- Queuing theory:
Single channel finite/infinite Queuing models, Fixation of optimum service rate and optimum number of facilities.
- Simulation:
Concepts, Discrete event simulation approach.
- 9.6 Linear programming:
Formulation, Simplex approach for solving problems, duality theory and economic interpretations, Sensitivity Analysis.
- Inventory Models :
Concepts, EOQ Models, EBS Models, Models with backorders, Cases of discounts and Anticipated price increase.
- Replacement Models :
Concepts, Replacement models with no inflation and inflation cases, Group replacement models.
- Game Theory
- Transportation & Assignment problems
- Treatment of data & information structures for computer applications
- Demand Analysis 10
- Fuzzy Sets - concepts & applications
- Goal Programming
- Geometric Programming 11

Semester II

Advanced construction technology-II		Course no 201	
	Contact hours per week		Assessment:
Lecture	2	Theory Paper -	100
Studio	2	Internal Assessment -	25
		External Viva - -	-
Total	4	Total -	125

Study of structural requirements of buildings, various structural systems for multi-story ed reinforced concrete buildings and their planning and design considerations including cost economics. Earthquake and wind resistant design and detailing of buildings including the relevant code provisions. Planning and design for durability of structures, large span structures. Basic concept of computer aided structural analysis and design process. Design and detailing of structural elements including introduction to limit state design concepts. Coordination aspects between structural systems and architectural and building services system.

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

- Structural requirement of buildings

Detailed consideration on strength, stability, stiffness, and ductility requirement of buildings. Durability of structures; planning, design and detailing, construction and maintenance aspects.

- Assessment of loads on structures; dead loads, imposed loads, and lateral loads (wind and earthquake load). B. I. S. Code provisions on loading standards and load calculation procedures.

- Structural systems for reinforced concrete multi-storied buildings.

- Earthquake resistant design of buildings.

- Structural systems for large span roofs; steel truss system, single and double layered tubular space frames, composite system with steel girders and R. C. C. slabs.

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:

Large span R. C. C. systems, grid floors, vir6endeel girder system, shell roofs and folded plate systems.

- Computer aided structural analysis and design.
- Spatial structural system: Tension structures and other recent developments in the innovative structural system (case study).
- Structural systems for low cost construction and non-engineering constructions.

Studio programs

- For the selected building project with architectural inputs (drawings) selection of appropriate structural systems with position of joints, type of floor systems, and framing systems. Preliminary sizing of structural members and preparation of floor wise structural arrangement drawings. Working out the quantities of concrete, steel, and form work and assessment of approximate cost of the structural components of the building.
- Assessment of vertical loads (dead loads and live loads) on structural members and Calculation of earthquake loads and wind loads. Understanding of a three-dimensional structural analysis and design software and structural modelling and preparation of input data for the case study project. Running of the software and obtaining outputs and interpreting of the results. Preparation of a typical detailing of structural members (slabs, beams and columns) as per local codal requirements.
- Appraisal study of structural systems of real life major building projects. Site visits to such building projects and prepare structural system appraisal report with structural system / arrangement drawings.
- Study of literature on innovative structural systems in buildings and making presentations and reports.

Project Management -II		Course no 202	
Contact hours per week		Assessment:	
Lecture	2	Theory Paper -	100
Studio	2	Internal Assessment -	75
		External Viva - -	75
Total	4	Total -	250

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 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.

Project feasibility & Detailed project report

Intent: To make student aware of the feasibility study and various project reports and formats.

Contract management

Intent: To help the student to understand the introductory aspects of contract management

Construction Specifications

Objective: To write the specifications for the various items of work. Estimation & Valuation for building projects

Intent: To acquaint the students in the area of estimation, which is an essential aspect of contract management.

Value Management

Intent: To Acquaint the students with overall idea about value management Building design process & design review

Intent: To acquaint the students with building design related aspects Management of the pre – construction phase

Risk Management

Intent: To acquaint the student with management of associated risks in construction projects

Site management

STUDIO EXERCISES

- Plinth Area Estimate
- Specifications • Detailed Estimate
- Item Nomenclature • Quantity Estimation
- Analysis of Rates and Bill of Quantities • Project Specifics
- General Conditions of Contract

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. 14

- Special Conditions of Contract

- Value Engineering

Business development & Project marketing		Course no 203	
Contact hours per week		Assessment:	
Lecture	3	Theory Paper -	
Studio		Internal Assessment -	50
		External Viva - -	50
Total	3	Total -	100

• 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.

Contents:

- INTRODUCTION: Nature and Role of Marketing, the Marketing Concept, Marketing Environment, Market Mix, Marketing Planning.
- MARKET SEGMENTATION, TARGETING AND MEASUREMENT: Market Segmentation, Market Targeting, Market Measurement and Forecasting, Marketing Research and Information System.
- BUYER BEHAVIOUR: Meaning and Importance, Determinants and Consumer Behaviour, Buying Decision Process, Industrial Buyer Behaviour.
- PRODUCT DECISIONS: Product Life Cycle, Product Mix Strategies, Branding and Packaging Decisions, New product Development, Consumer Adoption Process.
- PRICING DECISIONS: Pricing Objectives, Price Determinants, Pricing Methods, Pricing Policies and Strategies.
- 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.
- PROMOTION DECISIONS: Marketing Communication Process, Promotion Mix and its Determinants Role of Advertising, Sales Promotion and Personal Selling; Promotion Budget.
- GLOBAL MARKETING: Reasons underlying International Business, Distinction between Global and Domestic Marketing, Institutional and Policy Framework, Procedural Aspects, Regional Economic Groupings.
- CONTEMPORARY ISSUES: Direct Marketing, Customer Service, Rural Marketing, Marketing of Services, Consumer Protection.

Project finance Management		Course no 203	
Contact hours per week		Assessment:	
Lecture	2	Theory Paper -	100
Studio	2	Internal Assessment -	25
		External Viva - -	
Total	4	Total -	120

Introduction to financial 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 carryout the financial feasibility of projects, selection of building systems and equipment's, evaluation of project investment decisions.

The course coverage includes the various topics of financial management; time value of money, taxation, depreciation and inflation, capital budgeting techniques, management of working capital, cash flow forecasting and cash flow management of projects, understanding and analysis of financial statements through ratio analysis. National and construction sector economics, financial accounting and budgeting. Forms of business organization, joint ventures, consortium's and international finance, financial institutions in India and their project financing norms and procedures. Financial management aspects of international projects are other areas of coverage of the course. Realm and scope of financial management; Issues in Financial management of construction Projects and construction companies.

Financial institutions in India; Various financial institutions (IDBI, ICICI, IFCI, etc.), Frame work and functions, Polices and norms, Financial procedures, Appraisal methods and financial indicators,

Business Organisation, financial Institutions and Project Financing in India

Forms of business organisations: Sole proprietorship, partnership,

Private limited companies, public limited companies, Joint stock companies, corporations

Long term financing methods; Money markets and capital market, Equity capital, debentures, Bonds, mutual funds, Suppliers credit, Government subsidies, Unsecured loans and deposits,

National and Construction Sector economics

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

Construction sector economics: Construction economics and factors affecting construction sector. Role of construction industry in national economy, export, international contracts, concept of demand, supply and profit.

Financial accounting and budgeting.

Financial accounting: Generally accepted accounting principles (GAAP), Book keeping based on current A/C principles, Various types of accounting and accounting procedures.
Budgeting: Different types of budgets, Budgetary controls, Performance budgeting
Time value of money, valuation, risks and returns.

Valuation of long-term securities: Book value/ Market value/ intrinsic value/ Liquidation value

Risk and return: Correlation between risk and return

Taxation, depreciation and inflation

Taxation: Corporate taxation under Indian laws, Taxes on profit / capital gains/ Capital Transfer, Tax planning and payment of tax, Tax incentive and tax policies

Depreciation; Common methods of depreciation, Standard depreciation values (Buildings, Equipments), Economic life/ Salvage value/ Book value of assets

Inflation; Assessment for investment decisions

Time value of money; Simple and compound interest, Future value and present value, Effective annual interest rate, Annuity / perpetuity, Amortizing loans, Effective annual interest rates.

Financial analysis and planning

Understanding and analyzing financial statements; Statutory requirements for accounts and audit (Companies act), Construction and analysis of balance sheet, profit and loss account and fund flow statement.

Tools for financial analysis; Ratio analysis for financial conditions, Ratio analysis for financial Performance, Five basic types of financial ratios, (Liquidity, Leverage Coverage. Activity, Profitability), Case studies of Financial statements of Indian companies Working capital management

Capital budgeting procedures and techniques

Project appraisal and selection process of independent projects; Traditional methods of appraisal, discounted cash flow methods.

STUDIO PROGRAMME:

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

Management information system	Course no 205		
	Contact hours per week	Assessment:	
Lecture	2	Theory paper	
Studio	-	Internal Assessment -	50
		External Viva - -	50
Total	2	Total -	100

Course objective: To gain skills to develop Management information System at the corporate and for various functions of construction management.

Course Content / Outline: Evaluation of information system technology.

Cash flow forecasting of projects. Prerequisites for cash flow forecasting, Preparations for cash flow statement, Use of S- curve, Composite cash flow statements (Multiple Projects), Cost of borrowing, Self financing contracts,

Definition and components of W. C, Cash management, Receivable management, Payable management, Inventory management, Estimating the requirements of W. C, Working capital management of construction companies

Management information System : Definition ,Concept , Role an impact. System development , data processing and flow chart.

Computer application , file design, DBM , data communication Documentation, System design specifications ,System analysis and design. Information processing technology : Data processing technology, communication technology distributed processing and emerging information technology .

Development and implementation of MIS ; Long range plan , Management of quality, MIS factors of success and failure , impact of computer application.

Case studies of MIS at corporate and project level.

Infrastructure services and management		Course no 206	
	Contact hours per week	Assessment:	
Lecture	2	Theory paper	--
Studio	3	Internal Assessment -	50
		External Viva - -	50
Total	5	Total -	100

Fire safety would include fire detection & alarm systems; fire protection systems; study of codes and standards. The electrical infrastructure services would cover substations, substation equipments, and power distribution systems, standby and alternate power supply system. The communications would cover CCTV system, telecommunication and related information technology based facilities. Coverage on civil infrastructure services for the residential and institutional complexes include planning, design, construction and maintenance of external development works such as water supply, sewerage, solid wastes, roads and storm water drainage, including raw water harvesting methods. Emphasis is also given for the management of design and construction co-ordination of these infrastructure services through project management techniques. Good practices and managerial responsibilities.

Fire safety services.

a) Introduction to fire safety: causes of fire, fire process, fire development and growth, fire loads, concepts of fire safety.

The objective of the course is to cover fire safety services and fire safety management in buildings and in the context of large residential and institutional complexes to cover the external electrical services communication system and civil infrastructure facilities. 19

b) Means of escape: Objectives, exits, travel distance, protected escape routes , refuge Signage etc.

c) Compartmentalization: objectives, compartment size, construction requirements, openings, external fire, spread, protection of equipment.

d) Structural fire protection: Objectives, performance of materials, requirements of building components.

e) Active fire safety systems: Fire detection, fire suppression, system reliability,.

f) Smoke control: Objectives smoke control, application of buildings, HVAC systems, and pressurization.

g) Fire safety standards: fire safety codes/ standards, fire test.

h) Fire fighting equipment, rescue, external access, fire fighting shafts and elevators.

i) Fire risk and assessment: fire hazard analysis, fire safety audits.

j) Fire safety management: fire safety management, fire safety, costs,

problems in urban areas and slums.

Electrical infrastructure

a) Space requirements for substation installations; substation equipment selection criteria; power distribution system and installations; street lighting; security lighting; highway lighting; diesel generating (DG) system for standby supply; standby power integration in distribution system; devices for protection of electrical system; maintenance of electrical systems;

b) Demand load determination; capacitors and power factor; standard tariff plans; statutory obligation of consumers;

c) Low voltage systems: CCTV systems; telecom distribution system; LAN/WAN systems.

Civil infrastructure services

- Water supply; sources, treatment; storage and distribution systems
- Sewerage; sewer network and appurtenances, ground water re-charge systems.
- Roads; road networks, geometrical standards, construction specifications and locations of services.
- Solid wastes; collection, process and disposal system including recycling methods.
- Design and construction and co-ordination of infrastructure services through network planning.
- Maintenance of infrastructure services. 20

Studio program:

The studio exercise shall be carried out to illustrate the coverage of the topic preferably on

selected building and appraisal study of existing projects through site visits.

Semester III

Quality and site safety management		Course no 301	
	Contact hours per week	Assessment:	
Lecture	2	Theory paper	100
Studio	2	Internal Assessment -	25
		External Viva - -	
Total	4	Total -	125

- 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 and control processes.
- The process of project management covers topics related to selection of contract types, various international and national contract forms, Pre-qualification of contractors, Preparation of contract documents, Evaluation of contract bids, Alternate dispute resolution, issues related to contract administration, etc.
- The project controlling processes to be disseminated are Overall change control, scope change control; cost control, performance reporting and risk response control.
- The project Closing processes to be disseminated in administrative closure and contracts close out.
- Post construction management would include maintenance management, organization structures and contractual aspects of maintenance management, financial management of maintenance activities.
- The course will also disseminate 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.
- 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.
- Quality : Traditional approaches. Its importance in technology driven, competitive market economy. New approaches and recent developments,

- Quality Control, Quality Assurance, Quality Management and Total Quality Management (TQM): Meaning, scope and relationship of the concept. The need of a continuum,
- 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,
- 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, Quality Assurance Department and quality control responsibilities of the line organization,
- Quality in foundations and piling work, structural work, concreting, electrical system, building facilities , waste recycling and maintenance,
- Developing quality culture in the organization : Training of people, Manualisation of
- operations, Bench-marking quality , synergy, Quality circles,
- ISO 9000 , ISO 14000 & QS 9000 standards and certification procedures
- Concept: Psychological, Physiological and technological factors in safety in construction, Hazards and causes of accidents, safety measures. Safety legislation and standards for construction industry, Safety in construction of Buildings, civil works and infrastructure development projects, Management of Accidents, employment injuries and occupational hazards / diseases, Safety organization, site management. Role of safety department, safety officer, safety committee. Safety training, incentives and monitoring, writing safety manuals, preparing safety checklists and inspection reports.

Laws and Legal Aspects in Construction Projects		Course no 302	
Contact hours per week		Assessment:	
Lecture	2	Theory paper	100
Studio	2	Internal Assessment -	25
		External Viva - -	--
Total	4	Total -	125

- 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.
- The coverage includes Building regulation and bylaws of local authorities. Laws related to land development.
- Land acquisition, lease & easement rights, property acts and Gunthewari acts.
- Permits and approval for construction activities ; statutory requirements and clearance related to environment impact, urban form, fire regulation, completion certificate.
- 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 employee's provident fund and Miscellaneous provisions Act 1995 etc. Indemnity & guarantee, Industrial act and Labour laws, Environmental laws.
- National Building code, role of Zilla Parishad & IRDP in rural housing.
- Types of disputes in construction contracts and methods of dispute resolution processes. Alternative dispute resolution and dispute review mechanisms. Arbitration and conciliation Act1996.
- Managerial approach to dispute minimization, Conduct of Arbitration proceedings, Making of Arbitration award and Termination proceedings, powers of arbitrator, case studies of arbitration award, setting aside of awards and enforcement of awards, appeal and revision and court proceedings, introduction to civil & criminal procedure code with special reference to laws & order at project sites, project police relations.

Facility management and Real estate management		Course no 303	
	Contact hours per week		Assessment:
Lecture	4	Theory paper	--
Studio		Internal Assessment -	75
		External Viva - -	75
Total	4	Total -	150

Course Objective

- To develop students capability to manage various building services and to increase safe and healthy utilization of buildings and properties with minimal breakdown time.
- 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.

Course Content

- 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 workfire 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 pipenetworks. 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.

- Real Estate Scope : Classification of real estate activities and peculiarities ; Factors affecting real estate market; Role of Government in real estate market; Statutory provisions, laws, rules and regulations application, land use controls in property development, registration and licensing requirements;
- 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.;
- Interests in real estate; Documentation in real estate processes; Transfer of titles and title records;
- Real Estate appraisal and valuation; Role, scope, working characteristics and principal functions of real estate participant and stakeholders;
- Real estate consultants and their activities; Types of agreements between the consultants and principal; Knowledge base for assessment and forecasting the Real Estate market; Role and responsibilities of property managers;
- Real Estate investment, sources and related issues; Code of ethics for Real Estate participants; Environmental issues related to Real Estate transactions: Closing the Real Estate transactions. Good practices and managerial responsibilities.

Integrated energy conservation in construction		Course no 206	
Contact hours per week		Assessment:	
Lecture	2	Theory paper	--
Studio	2	Internal Assessment -	75
		External Viva - -	75
Total	4	Total -	150

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.

Course content out line :-

- Energy scenario, Energy & its various forms.
- Energy management & audit.
- Energy efficiency in thermal & electrical utilities
- Conventional energy systems.
- Renewable energy sources.
- General aspect, waste heat recovery, energy storage, energy conservation in Buildings.
- Building & Energy
- Selection of energy efficient materials.
- Energy, conservation & energy management (Thermal, Mechanical, Cogen, heat, Electrical, Bio energies)
- Energy codes

Studio Programme :

Assignments related to the above topics.

Seminar		Course no 305	
Contact hours per week		Assessment:	
Lecture	4	Theory paper	-
Studio		Internal Assessment -	100
		External Viva - -	-
Total	4	Total -	100

The objective of the seminar work is to train the students to prepare state of art report by assimilation of concepts / ideas on a chosen topic in the area of Building Engineering and Management through an extensive literature study and data collection from the field. 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.

Dissertation stage I		Course no 401	
Contact hours per week		Assessment:	
Lecture	10		
Studio	12	Internal Assessment -	50
		External Viva - -	
Total	22	Total -	50

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) 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
- 6) Literature study and collection of basic information, should be completed in Dissertation Stage – I.

Semester IV

Dissertation stage II		Course no 401	
Contact hours per week		Assessment:	
Lecture	2		
Studio	18	Internal Assessment -	250
		External Viva - -	250
Total	20	Total -	500

The continuous assessment of the work carried out by the student shall be done and the Sessional marks shall be based on the performance of the student.

The dissertation shall consist of literature, survey on the topic chosen in the relevant field, theoretical and or experimental work based on the literature, discussion and conclusion.

Format of Dissertation Report :-

The dissertation work report shall be typed with double space on A4 size bond paper.

The total No. of pages shall not be more than 200 and not less than 60. figures, graphs, annexure etc. by added as per requirement.

The report should be written in the following format :

- 1) Title Sheet
- 2) Certificate
- 3) Acknowledgment
- 4) List of figures, Photographs / Graphs / Tables
- 5) Abbreviations
- 6) Abstract / Final Synopsis
- 7) Contents
- 8) Text with usual scheme of chapters
- 9) Discussion of the results and conclusion
- 10) Bibliography (The source of illustrative matter be acknowledged clearly at appropriate place.)

Dissertation Report must be submitted after completion of two (2) academic years from date of

Registration for course, as follows:-

- 1) Dissertation Copy – 1 (One)
- 2) Synopsis (approved) – 10 Copies
- 3) Synopsis Registration letter
- 4) Internal term work marks (sealed envelope)

5) Xerox copy of all mark lists (attested)

6) Covering Letter of Head of Institute

Fee for dissertation (Report) with Convocation fee, Examiner and Guide as per University Rules

Practical Training		Course no 402	
Contact hours per week		Assessment:	
Lecture			
Studio	2	Internal Assessment -	100
		External Viva - -	100
Total	2	Total -	200

Practical training should be after semester III Class work. Minimum eight weeks full time with any MNC or PM Establishment

