



JAWAHARLAL NEHRU ARCHITECTURE & FINE ARTS UNIVERSITY
Mahavir Marg, Masab Tank, Hyderabad - 500 028.

ACADEMIC REGULATIONS, COURSE STRUCTURE & SYLLABUS
FOR
M. ARCH. (CONSTRUCTION MANAGEMENT)

JNAFAU School of Planning & Architecture
Mahavir Marg, Masab Tank, Hyderabad - 500 028.

ACADEMIC REGULATIONS
(Effective from the Academic year 2008-09)

M.Arch/M.Tech-2 years full time Post Graduate course

1. AWARD OF M.Arch/ M.Tech (Construction Management) Degree

- 1.1 Following postgraduate Degree of the Jawaharlal Nehru Architecture & Fine Arts University shall be conferred on the candidates who are admitted to the respective programs and fulfill all the requirements for the award of the degrees M.Arch (Construction Management) & M.Tech (Construction Management).
- 1.2 Students join with B.Tech (civil) will be awarded M.Tech (Construction Management) and with B.Arch will be awarded M.Arch (Construction Management) degrees respectively.

2. ELIGIBILITY FOR ADMISSIONS:

- 2.1 a) B. Arch or its equivalent.
b) B.Tech/B.E(Civil) or its equivalent.
- 2.2 Admissions shall be made either on the basis of merit rank obtained by the qualifying candidates at an entrance Test conducted by the University or on the basis of GATE score, subject to reservations prescribed by the University from time to time.

3. COURSE WORK:

- 3.1 A Candidate after securing admission must pursue the course of study for Four semester duration.
- 3.2 Each semester shall be of 90 instruction days.
- 3.3 A candidate admitted to a programme should complete it within a period equal to twice the prescribed duration of the programme from the date of admission.

The programmes are offered on a unit basis with each subject being considered a unit.

- 3.4 Each subject is assigned certain number of credits depending upon the number of contact hours as follows:

Theory subjects	1 Period / Week	1 Credits
Practical / Drawing	1 Period / Week	1 Credits
Design subject		

3.5 A candidate shall be deemed to have secured the credits assigned to a subject if he has put in at least 75% of attendance and secured the minimum academic requirement in the subject

3.6 In order to qualify for the award of the Post-Graduate Degree, the candidate shall earn all the prescribed credits as per the course structure.

4. EVALUATION:

The performance of the candidate in each semester shall be evaluated subject wise with a maximum of 100 marks for theory and 100 marks for practicals, on the basis of internal Evaluation and End Semester Examination

4.1 For the theory subjects 60% of the Marks will be for the end Examination 40% of the marks will be for the internal Evaluation based on the better of the marks secured in the two Mid Term examination held one in the middle of the Semester and another immediately after the completion of instruction.

4.2 For practical subjects, 60 marks shall be for the End Semester Examination, 40 marks will be for internal examination based on the performance.

4.3 For Seminar, workshops, there will be a Jury/Viva-voce for 50 marks. A candidate has to secure a minimum of 50% to be declared successful. The assessment will be made by a board consisting of two members (one internal member and another external member).

4.4 A candidate shall be deemed to have secured the minimum academic requirement in a subject if he secures a minimum of 40% of marks in the End Examination and a minimum aggregate of 50% of the total marks in the end semester Examination and Internal Evaluation taken together.

4.5 In case the candidate does not secure the minimum academic requirement in any subject (as specified in 4.4) he has to re appear for the Semester Examination in that subject or repeat the course when next offered or do any other specified subject as may be required. However one more additional chance may be provided for each subject for improving the sessionals provided the sessionals secured by a candidate are less than 50% and he failed in the end examination. In the event of taking another chance for improving the sessional marks, the marks obtained in the previous attempt are nullified.

4.6 In case the candidate secures less than 75% attendance in any subject, he shall not be permitted to appear for the End Semester Examination in that subject. He shall repeat the subject when next offered or study any other specified subject. Repetition of only two subjects in addition to the

subject in a regular semester, shall be permitted. In case of repetition, the new internal evaluation marks shall be taken into account.

4.7 The candidate shall be promoted to the next academic year if he has not more than four backlogs from all the previous semesters put together.

4.8 A candidate shall be allowed to submit the thesis / dissertation only on successful completion of all the prescribed courses and then take viva voce examination of the project. The viva- voce examination may be conducted once in a quarter for all the candidate submitted during that quarter.

5. EVALUATION OF PROJECT WORKS:

5.1 Every Candidate shall be required to submit thesis or dissertation after taking up a topic approved by the School/ College.

5.2 The Thesis/ Dissertation should be submitted within one Calendar year after completion of the penultimate Semester. Extension of time within total permissible limit for completing the programme, may be considered. The work on the project shall be initiated in the penultimate semester and continue in the final Semester.

5.3 Three copies of the thesis/ Dissertation, certified in the prescribed form by the supervisor shall be presented to the School/Collage.

5.4 The thesis / dissertation will be adjudicated by one examiner selected by the competent authority.

5.5 If the report of the examiner is favorable, viva-voce examination shall be conducted by a board consisting of the supervisor, Head of the Department and the examiner who adjudicated the thesis / dissertation. The board shall jointly report candidates work as

1. Excellent
2. Good
3. Satisfactory
4. Unsatisfactory

If the report of the viva-voce is not satisfactory, the candidate can re appear for the viva-voce examination after three months. If he fails to get a satisfactory report at the second viva-voce examination, he will not be eligible for the award of the degree, unless the candidate is asked to revise and resubmit.

5.6 If the report of the examiner is not favorable, the candidate shall revise and resubmit the thesis / dissertation after one semester. If the report of the

examiner is unfavorable again the thesis / dissertation shall be summarily rejected.

6. ATTENDANCE:

- 6.1 Candidate shall put in a minimum of 75% attendance in each subject in a semester.
- 6.2 Condonation of shortage of attendance up to 10% in any subject i.e. from 65% and above and Less than 75% may be given by the College / School Academic Committee.
- 6.3 Condonation of shortage of attendance shall be granted only on genuine and valid reasons on representation by the candidate with supporting evidence.
- 6.4 If the candidates do not satisfy the attendance requirement in any subject he will have to repeat that subject.

7. AWARD OF DEGREE AND CLASS:

A candidate shall be eligible for the award of respective degree if he satisfies the minimum academic requirements in every subject and secures 'satisfactory' report on his thesis / dissertation and viva-voce.

First class with Distinction:	70% or more
First class	below 70% but not less than 60 %
Second class	below 60% but not less than 50 %

8. WITH – HOLDING OF RESULTS:

If the candidate has not paid dues to the university or if any case of in-discipline is pending against him the result of the candidate may be withheld and he will not be allowed into next higher semester.

The issue of degree is liable to be withheld in such cases.

9. TRANSITOTY REGULATIONS:

Candidates who have discontinued or have been detained for want of attendance or who have failed after having undergone the course are eligible for admission to the same or equivalent subject as and when subject are offered, subject to 4.5 and 3.3.

The academic regulation should be read as a whole for the purpose of any interpretation.

9.1 The university reserves the right of altering the regulations as and when necessary. The regulations altered may be applicable to all the candidates on rolls.

9.2 Wherever the word he, him of his occur it will also include she, her or hers.

9.3 There shall be no place transfer within the Constituent or Affiliated Colleges of Jawaharlal Nehru Architecture & Fine Arts University.

M.Arch/M.Tech-2 years full time Post Graduate course COURSE STRUCTURE

FIRST SEMESTER

Course	Course Title	L/	Marks	Credits
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No.		Stu/wk	Int.	End	Total	
1.1	ECONOMY IN CONSTRUCTION & INFRASTRUCTURE DEVELOPMENT	4	40	60	100	4
1.2	CONSTRUCTION CONTRACTS	4	40	60	100	4
1.3	CONSTRUCTION ACCOUNTS	4	40	60	100	4
1.4	PROJECT MANAGEMENT TECHNIQUES	4	40	60	100	4
1.5	MANAGEMENT TECHNOLOGY AND ORGANIZATION	4	40	60	100	4
1.6	INFORMATION TECHNOLOGY IN CONSTRUCTION	4	40	60	100	4
1.7	CONSTRUCTION PRACTICE WORKSHOP	3	-	*50	50	3
1.8	MANAGERIAL SKILLS WORKSHOP	3	-	*50	50	3
	TOTAL		240	460	700	30

Note: * End Examination shall be a practical exam with Viva-voce.

SECOND SEMESTER

Course No.	Course Title	L/ Stu/wk	Marks			Credits
			Int.	End	Total	
2.1	CONSTRUCTION PERSONNEL MANAGEMENT	3	40	60	100	3
2.2	MATERIALS AND EQUIPMENT MANAGEMENT	3	40	60	100	3
2.3	CONSTRUCTION FINANCE MANAGEMENT	3	40	60	100	3
2.4	CONSTRUCTION SAFETY MANAGEMENT	3	40	60	100	3
2.5	CONSTRUCTION QUALITY MANAGEMENT	3	40	60	100	3
2.6	CASE STUDY	3	40	60	100	3
2.7	INFORMATION TECHNOLOGY IN CONSTRUCTION-II	3	40	60	100	3
	TOTAL		280	420	700	21

THIRD SEMESTER

Course No.	Course Title	L/ Stu/wk	Marks			Credits
			Int.	End	Total	
3.1	THESIS		120	180	300	
3.2	INTERNSHIP		80	120	200	
	TOTAL		200	300	500	

FOURTH SEMESTER

Course No.	Course Title	L/ Stu/wk	Marks			Credits
			Int.	End	Total	
4.1	LEGAL FRAMEWORK OF CONSTRUCTION	3	40	60	100	3
4.2	BUILDING SERVICES AND O&M MANAGEMENT	3	40	60	100	3
4.3	INFRASTRUCTURE DEVELOPMENT PROJECT MANAGEMENT	3	40	60	100	3
4.4	QUANTITATIVE TECHNIQUES IN MANAGEMENT	3	40	60	100	3
4.5	CONSTRUCTION AND ENVIRONMENT	3	40	60	100	3
4.6	ADVANCED CONSTRUCTION TECHNOLOGIES	3	40	60	100	3
	TOTAL		240	360	600	18

M.Arch/M.Tech-2 years full time Post Graduate course

SYLLABUS

FIRST SEMESTER

1.1 ECONOMY IN CONSTRUCTION AND INFRASTRUCTURE DEVELOPMENT

Objective of the course is to introduce students to the basic concepts of economics, broad features of Indian economy and the economic frame work of the construction industry and infrastructure development.

Scope of economics, Mechanism of supply and demand.

Macro economics – National Income, GNP, GDP, Population, Employment and work force.

Broad features of national economy: Industrial Banks and Financial Institutions.

Construction Industry – Nature, Characteristics, Size and structure.

Role of construction in economic development and employment generation. Input industries, clients, contractors, consultants and workers and their organizations.

Indices – Wholesale price index, consumer price index construction cost indices, Escalation .

Status of infrastructure in India – housing and civic services, urban infrastructure in India

Issues in developing, Funding and managing infrastructure. International and national constraints and incentives.

1.2 CONSTRUCTION CONTRACTS AND CONTRACTING

To study the legal context within which construction contracts are established, documents that make up the contract, contracting process, office engineering and contracts administration.

CONTRACT DOCUMENTATION:

Description, need, evolution. Types of contracts and rationale thereof. Merits & demerits of various types of contracts. Roles and responsibilities of various parties involved in the contract.

CONTRACT CONDITIONS:

Interpretation by parties to contract. Obligations and responsibilities of the parties. Protection and indemnification. Bonds and assurances, laws and liens. Social aspect in contract conditions, and risk evaluations.

EPC CONTRATS:

Turn key and BOT, BOOT, BOLT contracts. Study of all these forms of contracts, financial agreements, roles and responsibilities of parties, contract risks etc-.

CONTRACT LAWS:

Indian contract act, Indian Arbitration act. Case law, Claims and dispute settlement, Arbitration.

OFFICE ENGINEERING:

Estimating project costs, defining scope and procedures of procurement of design, engineering, construction and project management services, procurement of plant and equipment. Preparation of tender documents and invitation to tender. Preparation and submission of bids. Bidding process. Award of work, contract payment, contract close-outs and completion.

CONTRACT DOCUMENTATION:

CPWD contract condition document, world bank procurement procedure documents, FIDIC documents, Ministry of finance documents.

1.3 CONSTRUCTION ACCOUNTS

Students will learn accounting as the language of business, acquire a grasp of financial procedures for broad based management responsibilities and project accounts.

Basic financial accounting concepts and methods.

BASIC CONCEPTS:

Capital and revenue, financial accounting, cost accounting, management accounting and financial management.

ACCOUNTING PROCESS:

GAPP, double entry system, ten point programme in book keeping, journal, ledger, cash book, trial balance, final balance, depreciation, provisions and reserves. Profit and loss account sheets and balance sheets.

BUDGETING:

Types of budgets, procedure for master budget, cash flow forecasts. Budgetary control system. Financial ratios.

PROJECT ACCOUNTS:

Preparation of contract accounts for each project. Methods of recording and reporting site accounts to project office, from project office to head office.

1.4 PROJECT MANAGEMENT TECHNIQUES

To learn project management techniques, scheduling, monitoring and control. Method of time and cost management.

Classification of levels, Work break down structure, Assessing duration, Line of Balance technique.

Project scheduling, Job layout, Bar charts, Milestone charts, Life cycle curves, Network schedule, line and Balance schedule, time limited and resource limited schedule, schedule, hierarchy.

Management through Networks, PERT, CPM, Network elements, Time Estimates, PERT vs CPM.

Resource forecasting, manpower planning, material planning, material procurement schedule, planning and selection of equipment.

Cost planning: classification of costs, financial forecasting, budgeting.

Project cost control: Control approach, direct cost control, budgetary control systems, control responsibility.

Resource productivity control: Labor productivity control, material wasting control, control responsibility.

Project time control: Time monitoring methodology, reviewing time progress, time cost relationship.

1.5 MANAGEMENT THEORY AND ORGANISATION

Objective of the course is to introduce the students to the theory of general management and organization systems as a framework of the professional practice of construction management.

Evolution of management: Britain, Europe, America, China, Japan & India. Role of culture, technology, economics and social systems.

Introduction into Organization theory: Enterprise as an organization, organization behaviour, motivation, communication, authority & leadership. Effect of technology, markets, information technology, globalization & structure of the organization.

Management Processes & Functions: Planning, organizing, staffing, leading & Controlling. Marketing, production procurement, personnel, materials, engineering & R & D.

Management styles: Management of service enterprises, R & D & consulting organizations,

Management grid & Organization management, specific management issues.

Management and society. Global management.

1.6 INFORMATION TECHNOLOGY IN CONSTRUCTION-I

Objective of the course is to familiarize the students with the basic computer concepts, operating systems, various application software and their usage in construction.

Introduction to basic computer hard ware, peripherals and operating systems; office application software MS Office incl. MS Word; MS PowerPoint; Application software used at various stages of a construction project e. g. software used for cost estimation, contract management, billing etc;

COMPUTERS : CONCEPTS & HARDWARE

Introduction to various computer environment, single & multiple user systems and workstations, operating systems & software's, data processing systems, computer architecture, hardware components (input, output & storage devices),PC features.

MICROSOFT WINDOWS

Features, concepts and useful commands

APPLICATION SOFTWARE'S – CONCEPTS & APPLICATION

MS Office, AutoCAD, 3D studio, Adobe Photo shop.

1.7 CONSTRUCTION PRACTICE WORKSHOP

Objective of the course is to give hands on experience in the practice of building trades, operation of construction machinery and doing construction.

The students spend 4 hours per week at building sites. They may work with masons, plumbers, carpenters, handle equipment like vibrators etc. They do measurement, costing and estimating, prepare bill of quantities, tender documents and do quality inspections. And learn the application of various standards to construction practices. Students must equip themselves with safety equipments. Students are required to undergo training in first aid and gain a certificate from the competent authority.

1.8 MANAGERIAL SKILLS WORKSHOP

Objective of the course is to give hands on experience in the following skills required of a manager.

- Communication skills, audio visual and inter personal
- Listening skills, show and tell skills and skills to manage difference.
- Social skills
- Skills in dealing with clients, workers, officials, trade people etc.
- Skills in understanding the socio-political state of projects and groups.
- Group assignments, Presentations etc.

SECOND SEMESTER

2.1 CONSTRUCTION PERSONNEL MANAGEMENT

The course aims to develop competence to manage human resource and enhance its potential in the interest of individual of the organization. A student is exposed to aspects concerning human performance and its capabilities that are inherent in a professional cognizant of his/her responsibilities towards organization and the society.

Concepts of organizational and individual behaviour; Perception and attitudes; Motivation concepts and processes; Group behaviour 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 and dissemination of training; Participative management; HRM trends; Philosophies of values, morals and ethics; Societal responsibilities and good citizenry. Good practices and managerial responsibilities.

2.2 MATERIALS AND EQUIPMENT MANAGEMENT

To acquire knowledge and skills necessary for the efficient management of construction materials at site and stores, Students will learn the strategies and techniques of planning, selecting and other aspects of managing the construction inputs.

Construction Equipment Management:

Importance and role in the division in the construction industry. Various types of equipments used in construction: earthmoving, pile driving, road construction, concrete placing etc- their techniques and performance characteristics in relation to the jobs in hand.

Selection, planning and matching of construction plant and equipment with emphasis on site application, site layout, financing, hire-purchase options, owning and operation charges, economic replacement. Equipment management organization, repairs and maintenance.

Construction Materials Management:

Importance, scope, objective and functions of material management. Integrated approach to materials management.

Materials of construction: classification, codification, ABC analysis, standardization, substitution, variety reduction.

Estimating of material requirement, phasing of their procurement.

Procurement: identification of sources, vendor analysis, purchase procedure, legal aspects of purchasing, transporting of materials. Transportation modes.

Inventory/Stock control: importance, models, EOQ.

Store Management: Stores organization, stores layout, receipts and inspection, issue of materials. Care and safety in handling. Store records and store accounting.

2.3 CONSTRUCTION FINANCE MANAGEMENT

Introduction to financial management

Realm and scope of financial management; Issues in financial management of construction Projects and construction companies.

Business organization, financial Institutions and Project Financing in India

Forms of business organisations: Sole proprietorship, partnership, Private limited companies, public limited companies, joint stock companies, corporation.

Financial institutions in India; Various financial institutions (IDBI, ICICI, IFCI, etc.), Framework and functions, Policies and norms, Financial procedures, Appraisal methods and financial indicators, 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 AVC 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.

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.

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

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.

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.

Working capital management

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

Capital budgeting procedures and techniques

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

2.4 CONSTRUCTION SAFETY MANAGEMENT

To gain knowledge in the importance of safety in construction and skills to manage safety at workplaces.

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 and 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.

2.5 CONSTRUCTION QUALITY MANAGEMENT

The intent of the course is to give an insight into the concepts of Quality Management System and Further development applications relevant to planning, design & construction of buildings.

Quality concepts and stakeholders concerns for building and construction; Evolution of modern concept of Quality management process approach; Quality assurance & control; Quality management system and ISO 9000:2000 requirements; Quality system standards for construction elements; Inspections & tests; Quality management tools; Environmental Management system Standards and their application in construction; EMS-QMS relationships; Concept and philosophy of TQM; Quality circle, Quality cost; Practical aspects of quality control of building projects. Good practices and managerial responsibilities.

Introduction to concept of quality in building design, construction, Project management; standard definition of quality; Deming's principles; Special features of construction vs. manufacturing sector; Organization for quality management.

Quality of building facilities and stakeholders concerns, quality responsibilities and commitment of Architect, consultant, project managers and contractors

Product quality inspection and tests, Problems of rework, wastage and compromise in product quality approach, Problems of inspections/test oriented approach in service quality; systems approach to quality.

Evolution of modern concepts of quality management; quality systems and quality control approaches; advantages of quality system approach; quality systems concepts for building design, construction and management activities; Quality systems standards of BS 5750/QS 9000 series and their evolution.

ISO 9000 Quality system standards (family discussion); applicability of ISO 9000 series standards worldwide, India and Indian Building sector; Elements of ISO 9000 series standards

Quality systems standards elements; Aspects of quality control & assurance of major building items like RCC, brickwork, woodwork, Steelwork, flooring, finishing, internal water supply, sanitary electrical services, external services like roads, sewer etc.; quality of maintenance works, checklists.

Quality System standards elements; Proposed revision of ISO 9000-2000 Standards of quality management system; Contractual implications of quality systems

Quality cost; Quality cost; Quality system and Total Quality Management philosophy as applies to building sector; Human resource management for TQM; Business process re-engineering; Benchmarking; Partnering; Quality Circles.

Quality Function Deployment; Just in Time Technique

ISO 9000 Quality system standards and ISO 14000 series- Environmental Management System Standards; ISO 14000 standards as applied to building projects; Environmental impact assessment for environmental quality.

2.6 CASE STUDY

Familiarisation with the building projects

To identify various aspects of project and study their impact on sequence of work operations, general approach to construction, resource requirements (material, labour, equipment and infrastructure), requirements of specialized inputs etc.

Conceptualise Construction Logic

To conceptually work out alternatives of construction sequence logic. The alternatives shall take into consideration the project and site constraints, design requirements, services interaction, resource requirements etc. Identified in the above step.

Work breakdown Structure

To strategically breakdown the project into work packages. To identify an appropriate approach of work breakdown for the project based on ease of coordination, cost savings etc.

Identification of activities, Milestone and construction sequencing

To form a hierarchy of networks by identifying detailed activities, milestones and arranging them in correct construction logic based on milestone and breakdown levels.

Calculation of quantities, cost and productivity data

To determine the time duration; cost and labour/equipment resources of all activities in the project.

Time calculation on AON-PERT Network

To calculate the time duration of the project

Cost on Time Graph and Crashing

To study the deployment a pattern, sudden peaks and lows on resource histograms for crucial resources of the project

2.7 INFORMATION TECHNOLOGY IN CONSTRUCTION-II

Objective of the course is to familiarize the students with the application software and their usage in construction.

A comprehensive coverage to the project management software MS Project and its application for project planning, schedule and monitoring of projects and communication technologies which are the need of the day for creating an appropriate MIS between all the agencies in the construction projects i.e. concepts of internet facilities and their interface with other software.

PROJECT MANAGEMENT APPLICATIONS

Project Management Software's

MS Project 2000 and Primavera Project Planner-Principles of planning, scheduling and management for:-

Project modeling, work break down structure, Time management, Resource Management, Cost Management, Project Management & Up dation, Earned Value System, filtering & viewing project information & their customisation, Reports & customization, Internet support, Co-ordination & communication management, Real Time Working, Connectivity/interface with other software's/databases, Database manipulation & customization, Advanced features & applications.

System approach to Project Management

System approach to project management, application for other project management functions, project management information system (PMIS), concentric project management.

THIRD SEMESTER

3.1 RESEARCH THESIS

The objective of research methodology is to impart knowledge about process for undertaking research that students shall be expected to do through seminar.

Research area identification; hypothesis of research topic; literature sourcing and search; aim and objective definition; formulation of methodology; field study planning; survey data collection, analysis and result presentation; literature study; compilation and inference drawing; research study validation through case studies, field application and stimulation models; discussion of findings of research findings; study conclusion and recommendation formulations.

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

The subject for special study may be conceptual or practical but pertaining to Building Engineering and Management. This should however, offer scope to adopt a fresh approach in formulating a concept or 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.

1. Building Engineering
 2. Construction technology
 3. Energy efficient building materials and techniques
 4. Construction project management
 5. Time management
 6. Cost management
 7. Quality management
 8. Safety management
 9. Contract Administration
 10. Design management
 11. Construction financial management
 12. Human resource management
 13. Quantitative techniques
 14. Energy management
 15. Building services
 16. Building management systems
 17. Infrastructure services
 18. Management information systems
 19. Project planning and feasibility
- ### **3.2 INTERNSHIP**

The objective of this course is to define the job specification for a project management organization and give guidance on the project manager's role in various life cycle phases of a project.

The intent of the course is to define the scope and responsibilities of project management organization, various models for procurement of OM service, standard consultancy agreement forms, fee structure, code of professional practice and ethics. Good practices and managerial responsibilities.

FOURTH SEMESTER

4.1 LEGAL FRAME WORK OF CONSTRUCTION

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 circle.

The coverage includes Building regulation and bye laws of local authorities. Laws related to development. Land acquisition, lease & easement rights, property acts and urban land ceiling and regulation act. Permits and approvals for construction activities; statutory requirements and clearance related environment impact, urban form, fire regulation, completion certificate. Laws and legislation related to construction Industry labour laws, 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 1996 etc.

Types of disputes in construction contracts and methods of dispute resolution processes. Alternative dispute resolution and dispute review mechanisms. Arbitration and conciliation Act 1996. Managerial approach to dispute minimisation, Conduct of Arbitration proceedings, Making of Arbitration award and Termination proceedings, powers of arbitrator, case studies of arbitration awards, setting aside of awards and enforcement of awards, appeal and revision of court proceedings.

4.2 BUILDING SERVICES AND O&M MANAGEMENT

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.

Fire safety would include fire detection & fire alarms; 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 including 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 and co-ordination of these infrastructure services through project management techniques. Good practices and managerial responsibilities.

FIRE SAFETY SERVICES

- Introduction to fire safety: causes of fire, fire process, fire development and growth, fire loads, concept of fire safety.
- Means of escape: Objectives, exits, travel distance, protected escape routes, refuge signage etc.

- Compartmentalisation: objectives, compartment size, construction requirements, openings, external fire, spread, protection of equipment.
- Structural fire protection: Objectives, performance of materials, requirements of building components.
- Active fire safety systems: Fire detection, fire suppression, system reliability.
- Smoke control: Objectives smoke control, application of buildings, HVAC systems, and pressurization.
- Fire safety standards: fire safety codes/standards, fire tests.
- Fire fighting equipment, rescue, external access, fire fighting shafts and elevators.
- Fire risk and assessment: fire hazard analysis, fire safety audits.
- Fire safety management: fire safety management, fire safety, costs, problems in urban areas and slums.

ELECTRICAL INFRASTRUCTURE

- Space requirements for substation installations; substation equipment section criteria; power distribution system and installations; street 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 system;
- Demand load determination; capacitors and power factor; standard tariff plans; statutory obligation of consumers;
- Low voltage systems: CCTV systems; telecom distribution system; LAN/WAN systems.

CIVIL INFRASTRUCTURE

- 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.

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.

4.3 INFRASTRUCTURE DEVELOPMENT PROJECT MANAGEMENT

This course addresses the main concepts and methodologies of infrastructure planning management.

It also aims to advance and enhance your skills and understanding of diverse types of infrastructure assets planning and management, including the environmental, social, institutional assessments, and economic and financial aspects of infrastructure management.

What is infrastructure, the basic principles of infrastructure planning, condition assessment, monitoring of the condition of the asset, maintenance strategies, funds requirement, life cycle costing, annual budgeting for maintenance and rehabilitation, and prioritising maintenance strategies for optimum return on investment.

Site mobilization: Site reconnaissance, site layout including sizing and location of infrastructure. Organizing utilities, Mobilizing manpower, materials, equipment, funds etc.

Site management: Implementing performance accounting, monitoring systems, waste. Prevention of malpractices, networking with other parties.

Health and welfare of workers, women workers. Project and the community.

Demobilization: Testing, commissioning, trial runs, final billing, maintenance manuals and guarantees, demobilization of men, materials, equipments etc.

4.4 QUANTITATIVE TECHNIQUES IN MANAGEMENT

1. OPERATION RESEARCH

Introduction to operations research – Linear programming – Graphical and Simplex Methods, Duality and post – optimality analysis – Transportation and Assignment Problems

2. PRODUCTION MANAGEMENT

Inventory control – EQQ, - Quantity Discounts, Safety Stock – Replacement Theory – PERT and CPM – Simulation models – Quality Control

3. QUEUING THEORY

Basic concepts of queuing theory, single and multiple server markovian queuing models-customer impatience-M/G/1 Queuing system-Queuing applications.

4. DECISION THEORY

Decision Theory – Decision rules – Decision making under conditions of certainty, risk and un certainty – Decision trees – Utility Theory

5. MANAGEMENT ECONOMICS

Cost concepts – Break – even – Analysis – Pricing techniques – Game Theory applications

4.5 CONSTRUCTION AND ENVIRONMENT

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

Ecosystem: Meaning and significance in urban and rural areas: forestry, ecology, soil, chemical and biological aspects.

Environmental consequences of construction activity and the responses to it by communities, government and constructors.

Environmental policy, laws & regulations guidelines for civic environment impact assessment (EIA).

Pollution: air, water, noise and hazardous wastes, pollution control laws, regulations and guidelines.

Technological solutions, business opportunities and emerging markets in environment.

Solid and industrial waste management, air filtration, desalination of water, alternative building materials, noise reduction systems, greening and recycling businesses.

4.6 ADVANCED CONSTRUCTION TECHNOLOGIES

Modern /advanced construction technologies

Construction of Multistoried and High rise buildings

Bridges, types construction of special type of bridges such as cable stayed bridge, suspension and pre stressed bridge, construction of foundation and super structure.

Off shore structure, types, methods of construction and maintenance.

Construction, maintenance of underground railways.

Construction of diaphragm walls, Principles and construction of machine foundations.

Principles, methods of fast track construction projects.

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