M.E. (CIVIL) – CONSTRUCTION & MANAGEMENT

SYLLABUS

SHIVAJI UNIVERSITY, KOLHAPUR.

M.E.(CIVIL) – CONSTRUCTION & MANAGEMENT.

FOUR SEMESTER COURSE.

Introduced from, 2003-2004

SEMESTER – I

Sr. No.	Name of Subject	Teaching Scheme 60 Minutes periods/ week				Examination Scheme Max. Marks at Uni. Exam.			
		L	T.	Pr.	Total	TP	TW	OE	Sub. Total
01	Project Evaluation & Financing	3	1	-	4	100	25	-	125
02	Planning & Management of Projects	3	1	-	4	100	25	-	125
03	Construction Methods	3	1	-	4	100	25	-	125
04	Construction Equipments	3	1	-	4	100	25	-	125
05	Elective-I	3	1	-	4	100	25	-	125
06	Seminar - I	-	-	1	1	-	50	-	50
		15	5	2	22				

SEMESTER – II

Sr. No.	Name of Subject	Teaching Scheme 60 Minutes periods/ week				Examination Scheme Max. Marks at Uni. Exam.			
		L	T.	Pr.	Total	TP	TW	OE	Sub. Total
07	Construction Techniques	3	1	-	4	100	25	-	125
08	Legal Aspects in Construction Engineering	3	1	-	4	100	25	-	125
09	Management Information Systems for Construction Management	3	1	-	4	100	25	-	125
10	Computational Methods & Optimization Techniques	3	1	-	4	100	25	-	125
11	Elective-II	3	1	-	4	100	25	-	125
12	Seminar-II	-	-	1	1	-	50	-	50

SEMESTER – III

Sr. No.	Name of Subject	Teaching Scheme 60 Minutes periods/ week				Examination Scheme Max. Marks at Uni. Exam.			
		L	T.	Pr.	Total	TP	TW	OE	Sub. Total
13	Lab. Work.	-	-	1	1	-	50	-	50
14	Dissertation Phase-I with Seminar	-	-	3	3	-	100	-	100

Seminar based upon dissertation phase- I should be before panel or formed by guide.

SEMESTER – IV

Sr. No.	Name of Subject	Teaching Scheme 60 Minutes periods/ week				Examination Scheme Max. Marks at Uni. Exam.			
		L	T.	Pr.	Total	TP	TW	OE	Sub. Total
15	Dissertation Phase-II	-	-	5	5	-	100	200	300

Elective – I

1. Entrepreneurship in Construction
2. Human Resource Development in Construction
3. Work study and Incentive Management.

Elective –II

1. Advanced Construction
2. Appropriate Techniques
3. Environmental Impact Assessment

PROJECT EVALUATION AND FINANCING

Teaching Scheme
Lect : 3 hrs per week.
Tut : 1 hrs per week.

Examination Scheme
Paper : 100 Marks
T.W. : 25 Marks

Section - I

1. Economics of engineering projects : Economic factors discrete and continuous compounding, inflation, capitalized cost.
2. Financial appraisal criteria, MPV, Benefit- cost ration, IPR, Accounting rate of return, pay-back period.
3. Analysis of risk : Types of risk, Sensitivity analysis, Monte Carlo simulation, Decision tree analysis, Selection of projects, Fuzzy Systems.

Section - II

4. Financial management : Sources of finance, securities borrowings, debentures working capital requirement, direct and indirect financial assistance.
5. Accounting : Site Accounts, Preparation, Reporting, Accounting records, Depreciations, Standard budgeting and control.
6. Private Participation in Government Projects, Joint Ventures, BOOT, BOT, External Commercial Borrowings, International Finance.

REFERANCE BOOKS :

1. Managerial and engineering economy by Taylor G. A.
2. Principles of Construction Management by Roy Pilcher.
3. Project preparation Appraisal Implementation by Prasanna Chandra.
4. Corporate finance by Kuchal S. C.
5. Principles of Corporate Finance by Brealey R. A.
6. Fundamentals of Marketing by Stanton W. J.
7. International Construction Contracting by Vaid K. N.
8. Engineering economics by Riggs.
9. Principles of Engineering Economy by Grant Ireson/ Leavenworth.

CONSTRUCTION METHODS

Teaching Scheme
Lect : 3 hrs per week.
Tut : 1 hrs per week.

Examination Scheme
Paper : 100 Marks
T.W. : 25 Marks

Section - I

1. Underground and Underwater Construction : Tunnels- Shaft sinking, Tunnel drying in hard and soft strata, Surge chambers - Design criteria, Loads, Assumptions, Types of surge chambers. Underground power stations – Principal types. Underground railway stations Construction and Maintenance, Parking places. Bedding of conduits. Underwater Construction _ Problems encountered, Underwater drilling, blasting, concreting welding, Underwater structural concrete walls. Protection of structures against attack by ground water.

2. Grouting : Drilling pattern, procedure, Grouting pressure. Applications, Limitation, Efficiency of grouting for dams, tunnels, shafts, mines, Grouting for water control, soil stability and increase in bearing pressure of soils.

   Grouting types – Cement- Injection with high pressure screen grouting of alluvial – Clay, Types of clays used. Alluvial grouting test – Chemical grouting- Grouts for injection of fine sands. Resin grouting Polymerization, Technique of solutions of grouting Problems. Formulations, selection and application, case studies.

3. Dewatering – Dewatering of shallow and deep open excavations. Effects of ground water movement, methods of ground water control, shallow and deep well points, Horizontal drainage, vacuum dewatering by electro osmosis, analysis design and formulac well point system.

Section - II

4. Launching of steel, Prestressed, Precast bridges. Site erection methods : Side showing method for road railway bridges. End launching Using cranes and gantrics, Cantilever method, floatation method, Incremental launching for concrete girders. Case studies of steel cantilevers. Arches, simply supported beams, suspension, cable stayed bridge launching. Moving formwork staging shuttering, centering. Dismantling for maintenance, repairs inspection of bridges. testing of bridges, Coffer Dams and Caissons – Cofferdams- Types Design and Construction of single/ double wall sheet pile cofferdams, cellular sheet piles. Concrete wall movable cofferdam. Land cofferdams, soldier beam and horizontal sheeting techniques.

5. Caissons, Floating caissons – Design considerations, sinking rate, open caissons, pneumatic caissons. Machine bored caissons. Drop caissons. Details design and construction Case Studies.

PLANNING AND MANAGEMENT OF PROJECTS

Teaching Scheme
Lect : 3 hrs per week.
Tut : 1 hrs per week.

Examination Scheme
Paper : 100 Marks
T.W. : 25 Marks

Section - I

1. Site Organization : Organizational structures for construction field, Site layout, Services required on site.
2. Material Management : Functions, Inventory control, EOQ, ABC analysis, Estimating requirements, Procurement and Storage of materials.
3. Personnel Management : Functions, Special characteristics, Manpower planning, Recruitment, Placement, Training and induction, Performance appraisal, Relevant labour laws.
4. Construction Quality Management : SQC charts, Sampling techniques, Quality circles, ISO 9000, Management aspects.

Section - I

5. Safety in Construction : Safety Requirements, Safety and health codes, Occupational diseases, Economic aspects, Management of accidents, Safety department.
6. Network Analysis : Network compression, Resource allocation, Cost control, Monitoring of projects, PERT in construction projects, Construction scheduling.
7. Work study : Method study and Work measurement, Definitions, Objectives, Basic procedure, Standard time, Performance rating.
8. Computers in Construction Management, Application in office, Field Computerized construction management.

Term work : Term work is based on above topics, Case studies and information regarding the latest development from journals and magazines are expected.

REFERANCE BOOKS :

1. Critical path methods in construction, ANTILL AND WOODHEADS.
2. CPM in construction management, J. J. O. BRIEN.
3. Principles of management, KOONTZ AND O DONNEL.
4. Personal management and industries relations, DALE. (Human Res. Mg
5. Principles of management and personal management, A. S. DESHPANDE.
6. Accounting for management, S. K. BHATTARCHARYA. (Mgt. Accounting
7. Work study, R. M. CURRIE.

Const. engg management — S. Sitaraman

6. Pilling – Behavior of single pile and a group of piles during driving, under loads-Ultimate loads on driven and cast in situ piles, construction details of precast piles, Prestressed, piles steel piles, friction piles. Driven piles, Bored piles, Large diameter bored piles, negative and positive friction Multiple under reamed piles. Racker piles, sand piles. Anchor piles, Loads of piles, static, vibrating loads, cyclic loading, safe bearing loads. Method of pile driving by vibration Over water under water and through different grounds.

Reference Books :

1. Grouts and Drilling Mud in Engineering Practice- Symposium by Inst. of Engineers-1963.
   Butter Worth's.
2. Modem Foundations- N-P-Kurion, Tata McGraw, Hill pub, co. Ltd.
3. Foundation Engineering- G, A. Leonards Mcgraw Hills Co. Ltd.
4. Bridge Engineering – S.k Pounuswamy, Tata Mcgraw Hill Co. Ltd.
5. Wells and Caissons – Vijaya Singh, New Chand & Bros, Roorkee.
6. Design and Construciton of R. C. Bridges – A. W. Legal, G. Dunn W. A. Kaihursh Pub. Concrete Publications.
7. Large Boreed Piles-Institute of Civil Engineers 1966 London.
8. Modem Foundation Methods- R. Hammond Pub. Oxford & IBH Pub. Co.
9. Foundation Engineering by SJ*. Brahma, Tata mcgraw Hill Pub. Co.
10. Construction & Geotechnical Methods in Foundation Engineering R. M. Koeme : Mcgraw Hill Book Co.
11. Construction Planning Equipments and Methods Peurifey RI.
12. Hand Book of Civil Engineering- stubb.
13. Formwork Design and Construction-Wynn.
14. Foundation Engineering- Tomlinson.
15. Cofferdams- While and prentice- Columbia University Press New-York.
16. Art of Tunneling- Karl Szechy.

Reference Books :-

1. Herbert L. Nichols – Moving the Earth (D. Van Nostrand Co., Inc, New-Jersey)
2. Peurify – Construction Planning, Equipment and Methods Second edition (McGraw Hill Book Co., New York).
3. Handbook of Earth-moving Machinery (Ministry of Irrigation and Power, Central Water and Power commission, New-Delhi)
4. Kellog – Construction Methods & Machinery (Prentice-Hall Inc., New York)
5. Ackerman and Locher – Construction Planning and Plant (McGraw- Hill Book Co., New York).
6. Technical Information and Handy Reckoner on Construction Equipments (Voltas Lts., Bombay)
7. Jagamn Singh – On and with the Earth (W. Newman & Co., Calcutta)
8. Katoch – Tunneling practice, Vols. I, II and in (Water Resource Development Training Centre at University of Roorkee, India).
9. Report of Plant and Machinery Committee (Ministry of Irrigation Power C.WJPC., New Delhi)
10. Verma M.- Construction Planning and Management throt System Techniques Metropolitan Book, Co. P. Ltd., New Delhi).
11. David Day- Construction Equipment Guide .
12. Construction Machines and Equipment Manufactured India Naf. Insitutes of Construction Management and Research.
13. Earth Moving Plant – V.V. Tueker.
14. Construction equipment – Dombrovsky.

CONSTRUCTION EQUIPMENT

Teaching Scheme
Lect : 3 hrs per week.
Tut : 1 hrs per week.

Examination Scheme
Paper : 100 Marks
T.W. : 25 Marks

Section - I

1. Excavating Equipments, Excavatore, Shovels- Different bypes – back hoe Draglines- Clamshell- Cycles of operations, excavators and their use in different soil conditions. Output criteria, Rippers, Trenchers, Graders.

2. Hauling Equipments : Tractor Dumpers, Trailers, Buldozer, Scraers, Operation of cycles, matching of Excavating and hauling equipments.

3. Compacting Equipments : Properties of woil- soil stabilization, Soil compaction different types of compacting Equipments- Rollers, Sheep-foot, Rollers pneumatic rollers, Vibrating rollers, , Vibrating plates/ shoes. Vibratory compaction.

4. Conveying and Hosting Equipments : Different types of conveyors, power requirement damages during operations, Economy of transportations, Cableways and Ropeways, Different types of Hosting Equipments, such as winch, derricks and cranes. Rating of cranes and power requirement of cranes.

5. Piles and Pile driving Equipments : Pile Classifications, Types of Piles, Pile driying and extracting Equipments, Pile driving rigs, Pile driving hammers rating of pile hammers, Hammer accessories, pile extractors.

Section - II

6. Tunneling : Method of Tunneling, Equipments of Conventional tunneling, Jumbo, explosives, Temporary & permanent support and lining, Mucking Equipments, Using of moles, Use of laser beams to guide moles, Ventilations of Tunnels. advantages and disadvantages in using moles.

7. Aggregates : Types of crushers selecting crushing equipments screens, washer.

8. Concreting equipment : i) Various types of mixers ii) Various tyes of vibrators, their selection under different conditions.

9. Selection of construction equipments : Advantages and disadvantages of using machines, Planning of Construction Equipments, Cost Analysis, Economic Life and Replacement, Preventative maintenance, System approach to planning and application. Problems of Equipment Management.

Elective – I

1. ENTERPRENEURSHIP IN CONSTRUCTION

Teaching Scheme
Lect : 3 hrs per week.
Tut : 1 hrs per week.

Examination Scheme
Paper : 100 Marks
T.W. : 25 Marks

Section - I

1. General : Meaning and importance of entrepreneurship. Deflection and objectives of industrial estates, awareness and requirements of an entrepreneur, organization dealing with entrepreneurship Govt. and private.
2. Socio-economic bases : Occupation Impact on line of manufacture, the impact of education.
3. Project : Selection by identification, size appropriate technology, Cost and time scheduling.
4. Project Report : Backing market survey, demand and supply relation equipment cost space and merit analysis recommendations.

Section – II

5. Project Appraisal : Technical feasibility, commercial soundness, financial capability, economic viability, managerial aspects.
6. Financial Analysis : Resources, loans, terms and conditions, working capital, repayment, security, financial institutes.
7. Problems faced by enterprise : Marketing, finance and taxes, raw and finished materials etc.
8. Civil engineering entrepreneurship : small scale, large scale, optimum size, typical areas and preparation of specialized aspects.

Note : The subject may be taught with suitable case studies.
Term work : Term work is based on the above topics, Case studies and Information regarding the latest development from journals and magazines are expected.

Reference Books :

1. Entrepreneurship & growth of enterprise in industrial estates, Dr. N. Gangadhar Rao (deep & deep Publ.)
2. A complete guide to successful entrepreneurship, G.N. Pandey (Vikas Publ. House)
3. Project Appraisal Prasanna Chandra.
4. Entrepreneurship, Gort of India Publ.

2. HUMAN RESOURCE DEVELOPMENT IN CONSTRUCTION

Teaching Scheme	Examination Scheme
Lect : 3 hrs per week.	Paper : 100 Marks
Tut : 1 hrs per week.	T.W. : 25 Marks

Section – I

1. Introduction : Defination, history of human resource management, objectives sections, HRD in construction industry, status of construction labour.
2. Human resource planning : Formulating human resource plans, various methods, job analysis, job specifications, and job design in construction projects, forecasting personal needs and supply in construction sector.
3. Recruitment and selection : Selecting the project manager and project team, external and internal recruitment, data gathering methods, skill requirements of construction personnel.

Section – II

4. Training and development : The training process, individual and organizational development, performance appraisal, use of performance appraisal information, establishing the evaluation system.
5. Employee benefits : Employee health and safety, wage and salary, administration, incentive system, wages of construction industry, retirement and pensions.
6. Employee management relations : Collective bargaining, trade unions, connected with construction with construction industry, trade unions act, Labour Welfare Act, Payment of Wages Act, Worker's compensation Act, Contract Labour Act, management on conflict.

Term Work : Term work is based on the above topics. Case studies and information regarding the latest development from journals and magazines are expected.

Reference Books :

1. Personnel human resourece management, Terry L. Deep, Mical D Crino, MacMillan Pub. Company.
2. Personnal management, Edwin B. Flippo, McGraw Hill Book Company.
3. Personnel management, managing human resources, Paul S. Greenlaw, John P. Kohl, Harper and Row Pub.
4. Human Behavior at work Keith Davis, Tata McGraw Hill Pub. company.
5. Construction planning and management, P. S.Gahlot, B. M. Dhir, Wiley Estern Ltd.

HRM & Ind. relations → P. Subbarao.

WORK STUDY AND INCENTIVE MANAGEMENT

Teaching Scheme
Lect : 3 hrs per week.
Tut : 1 hrs per week.

Examination Scheme
Paper : 100 Marks
T.W. : 25 Marks

Section – I

1. The Evolution of work study : F. W. Taylor, Gilbreth, Definations, Objective, Basic Procedure of Work Study, Method Study and Incentive Management, Study and Work Measurement, Work content, Productivity, Work study and it's applications to Civil Engineering.
2. Method Study : Definition, Objectives, Procedure, Selection of the work, recording the facts, Process chart, Symbols, Flow process Charts, Multiple Activity Charts, Two handed Process Charts, String, diagram, Travel Charts, Other types of charts and Diagrams.
   Micro-motion study, Therbligs, Simo charts, Equipments, Cycle graph, chrono cycle graph.
3. Work measurement : Time study, Objectives, Procedure, concept of barious allowances, Performance Rating, Standard Performance, Standard Time, Time study equipments.
   Activity sampling (Work Sampling), PETS, Standard data, Analytical Estimation, Work Specifications.

Section - II

4. Application of work study : The human context of work study, Work study as a service to management, Limitation of work study, Criticism of Time study, Training of personals in work study.
5. Standard of living : What and why the driving force of incentive, Administration of incentive schemes, Incentive index and productivity allowances, Geared schemes, Piece of work activity sampling, field counts.
6. Merit Rating : Job evaluation, Installation of Incentive systems, place of Union. The work improvement and system concept, causes of failure of incentive schemes, Ergonomics.

Reference Books :

1. Introduction to Work Study, ILO.
2. Work Study, R. M. Currie.
3. Project Planning and Control, Turner and Elliot.
4. Work Study applied to building, Gearry.
5. Incentive Management, Lincon.
6. Industrial Engineering and Management, O. P. Khanna.

Semester - II

CONSTRUCTION TECHNIQUES

Teaching Scheme
Lect : 3 hrs per week.
Tut : 1 hrs per week.

Examination Scheme
Paper : 100 Marks
T.W. : 25 Marks

Section – I

1. Type of dams, their foundations constructions of dam, seepage from embankment dams, seepage from impoundants. Techniques of seepage control, preventive measures, piping phenomenon.

2. River training works, design criteria for guide bunds, design criteria of repelling spurs, special types of cut-offs, pithed Islands, bank protection techniques.

3. Off-share structures, types, techniques of construction and their maintenance.

4. Vibration controlled foundation : Free vibration, forced, Damping vibrating machine, weight of foundation, Natural frequency of Machine foundation and soil system, Design Procedure, Causes and effects of vibration transmitted through soil.

Section – II

5. Pre-fabricated Construction : Types, standardization of components, sized and economy, Fabrication techniques transport erection, jointing, fabrication, techniques, transports, erection, jointing of prefab components, light weight panels.

6. Concrete and concreting methods : Mass concrete and its temperature control, special types of concrete. Like concrete, shotcrete pumpcrete etc., guniting, techniques of prestressing, testing of concrete (Destructive and Non-Destructive)

7. Formwork : Types components, design of formwork, special types of formwork such as slipform : Removal of formwork, cost aspect of formwork.

8. (A) Retaining Walls : Types, construction techniques.

   (B) Steel Construction : Planning and field operations, varicus joints.

   (C) Preservation of structures in various climatic conditions.

Reference Books :

1. Modern Foundations – N. P. Kurion (Tata Megraw Hill Publication)
2. Foundation Engg. – G. A. Leondards (Megraw Hill Publication)
3. Cofferdams – White and Prentice (Columbia University Press, Newyork)
4. Construction Planning Equipments and Methods – Peurifoy.
5. Handbook of Civil Engg.- Stubbs.
6. Modern foundation Methods – R. Hammond (Oxford & IBH Publication)
7. Foundation Engg. by S. P. Behma (Tata Megraw Hill Publication)
8. Construction & Geotechnical Methods in foundation Engg. – R. M. Kocmc (Megraw Hill Publication)
9. Formwork Design and Construction _ Wynn.
10. Formwork Construction and Practice – John G. Richardson.
11. The Engg. of large Dams (vol I & II) by Hemy H. Thomas.
12. Foundation Engg. – Tomlinson.
13. Tearm and Design of Irrigation Structures, Varshaney, Gupta.
14. Introduction to off-shore structure – D. Fautner, M. I. Cowlines & P. A. Frieze
15. Seepage and leakage from Dams and importments by Kelly Volpe.
16. Concrete Technology by Nevilee.
17. Prefaricated Construction by Mokk.

LEGAL ASPECTS IN CONSTRUCTION ENGINEERING

Teaching Scheme
Lect : 3 hrs per week.
Tut : 1 hrs per week.

Examination Scheme
Paper : 100 Marks
T.W. : 25 Marks

Section – I

1. Professional Practice and Administration contracts : The standard from of building contracts. The right of building owner, Third parties, Indian contract Act, Sale of Goods Act, Professional Ethics.
2. Arbitration and Award : Indian Arbitration Act, Arbitration Agreement, Conduct of Arbitration, Power and Duties of Arbitration, Rules of Evidence, Preparation and publication of ward, Methods of Enforcement inpending and Awards.
3. Bailment : Nature of Transactions, Delivery of Bailee, care to be taken, Bailee's Responsibility, Termination, Bailment of pledges.
4. International Contracting : Meaning Scope, Nature, Distinctive Features of International Contracting.

Section – II

5. Injunction : Types Temporary, Perpetual, Mandatory when reffered.
6. Indemnity and Guarantee : Difference between the two, The Contract of Guarantee and Indemnity, Consideration of Gurantee, Surety's Liability, Discharge of Surety.
7. Industrial Act and Labour Laws : Industrial Dispute Act, Payment of Wages Act.
8. Safety Engineering : Sources, Classification, Cost of Accident and Injury, Workmen's Compensation Act, Safety Programme, Safety Organization. Employers Liability Act, Employers Insurance Act, Safety and Health Standards Occupations Hazards, personal Procective equipments, preventive measures Factory Act, Fatal accidents.

N.B. : The subject may taught with suitable case studies :
Term Work : Be based on case studies and information regarding the latest development from Journals and Magazines.

Reference Books :

1. Indian arbitration Act by B. S. Patil
2. Indian Contract Act.
3. Safety Engineering, Govt. of India Publicaiton.
4. Professional Practice, Roshan Namavati.
5. Legal Aspects of building and Engineering Contracts by B. S. Patil.
6. Relif Act by Kapoor.
7. Arbitration by B. S. Patil

MANAGEMENT INFORMATION SYSTEMS FOR CONSTRUCTION MANAGEMENT

Teaching Scheme
Lect : 3 hrs per week.
Tut : 1 hrs per week.

Examination Scheme
Paper : 100 Marks
T.W. : 25 Marks

Section – I

1. Introduction of MIS, Definition Role, Impact, Evolution, Structure of MIS in organization.
2. Decision making, Programmed and Non programmed decisions, Stages in decision making, Concepts of Information, Systems Theory, Decision Support System.
3. Computers in MIS, Hard ware, Software, Communication networks Ofice automation.

Section – II

4. Data Management, Collection and analysis of data, Database Management system.
5. Applications of MIS in Practical, Materials, Financial, Marketing and Service sector.
6. Implementation and maintenance of MIS, Socio-technical approach, Factors of success and failure, Quality assurance of MIS.

Term Work : Term work is based on above topics. Case studies and information regarding the latest development from Journals and Magazines are expected.

References :

1. Management Information System, Jawadekar W. S. (Tata McGraw Hill)
2. Information System For Modern Management, Robert G. Murdick. Joel E Ross, Janes R. Claggeett.
3. Management Information System, Jerome Kanter.
4. The Management Information System Gary W. Dickson Janes C. Weatherbe, McGraw Hill Book company.
5. Management Information System, S. Sadagopan.
6. Management Information System, George Scoff, McGraw Hill Book company.
7. Principles of Information System Management, Ward Jonh, Routledge.

COMPUTATIONAL METHODS & OPTIMIZATION TECHNIQUES

Teaching Scheme
Lect : 3 hrs per week.
Tut : 1 hrs per week.

Examination Scheme
Paper : 100 Marks
T.W. : 25 Marks

Section – I

Unit 1. Error and its propagation, solving Non-Linear equations, curve fitting, Linear and Non-Linear regression, latest squares regression, Gauss-Newton method, Interpolation, Statistical concepts, Linear correlation.

Unit 2. Solution of simultaneous linear and non-linear equation, direct and iterative methods.

Unit 3. Numerical differentiation and Numerical integration, Numerical solution of ordinary differentiate equations, systems of ODEs, Runge-kutta method.

Unit 4. Optimization – Types of optimization models, objective function and constraints set, Convex and Concave functions, Objectives of optimization models.

Unit 5. Linear programming – Simplex Method, Duality, Sensitivity Analysis, Transportation and assignment models.

Unit 6. Non Linear Programming- Single variable and multiple variable, Optimization, Quadratic Programming.

Unit 7. Dynamic programming – Principle of optimality.

Integer Programming - Cutting Plane Algorithm.

Simulation – Monto Carlo Method.

Term Work - Term work is based on above topics. Case studies and information regarding the latest development from Journals and Magazines are expected.

Recommended Books :

1. Optimisation – S. S. Rao.
2. Operation Researc Taha.
3. Topics in Management Service Markland.
4. Quantitave Techniques - J. K. Sharma
5. Numerical Methods – E Balaguruswamy.
6. Numerical Methods for engineers, Chapra and Canoll.

Elective - II

ADVANCED CONSTRUCTION

Teaching Scheme
Lect : 3 hrs per week.
Tut : 1 hrs per week.

Examination Scheme
Paper : 100 Marks
T.W. : 25 Marks

Section – I

1. Composite Construction : Composite v/s. Non composit action : Composite steel- concrete construction.
2. Formwork : Material for formwork, special types of formwork, design of formwork.
3. New materials for construction such as geosyntetics, Epoxy resins, Adhesives, MDF (Medium density fibre), FRC (Fibre Reinforced Concrete). FRP (Fibreglass Reinforced Concrete), Polymer based composites.
4. Land Reclaimation : Technical Progress, Drainage for land reclaimation,structural improvement.

Section – II

5. Construction of power- generation, structures, Atomic Power stations, Thermal Power Stations, Wind-Mills.

6. (A) Rehabilitation of Bridges : Necessity and methods of strengthening, preservation of bridges.

   (B) Retaining structures like diaphragm walls, advanced methods of their construction.

7. (A) Construction of concrete pavement by techniques like vaccum processing, revibrated concrete roller – compacted concrete.

   (B) Use of techniques like slip form paving in pavement construction using wet-mix macadam in road construction.

8. Advanced Techniques like roller – compacted encrete, vaccum dewatering in concrete slab construction, Reinforced earth construction, foundation strengthening.

Reference Books :

1. Handbook of composite construction Engg. – G. M. Subnis.
2. Formwork Design and Construction – Wynn.
3. formwork construction and Practice – Jonh G. Richardson.
4. Technical progress in Land Reclaimation ;by B. G. Shtepa.
5. Water Power Engg. by Dandekar, Sharma.
6. Bridge Engg. by Raina.
7. Bridge Engg. by Ponnuswamy.
8. Monthly – Civil Engineering & Construction Review (April 1995)
9. Civil Engg. & Construction Review (Dec. 1992)