

CIRCULAR :-

A reference is invited to the Ordinances, Regulations and Syllabi relating to the M.E. (Civil) (Part-Time) degree course vide Pamphlet No.190 and to this office Circular No.UG/361 of 1999 dated 8th July,1999 and the Principals of the affiliated colleges in Engineering are hereby informed that the recommendation made by the Board of Studies in Civil Engineering at its meeting held on 25th July,2005 has been accepted by the Academic Council at its meeting held on 6th August,2005 vide item 4.14 and that in accordance therewith syllabus for the M.E.(Civil Engg.) with Construction Management subjects (Part-Time degree course) is revised as per Appendix and that the same has been brought into force with effect from the academic year 2005-2006.

MUMBAI-400 032

20th September, 2005

To,

The Principals of the affiliated colleges in Engineering

AC/4.14/06.08.05

[Signature] 21/9
for REGISTRAR

No.UG/ 387 -A of 2005, MUMBAI-400 032 20th September, 2005

Copy forwarded with compliments for information to :-

- 1) The Dean, Faculty of Technology
- 2) The Chairman, Board of Studies in Civil Engineering

[Signature] 21/9
for REGISTRAR

Copy to :-

The Director, Board of College and University Development, the Deputy Registrar (Eligibility and Migration Section), the Director of Students Welfare, the Personal Assistants to the Vice-Chancellor, the Pro-Vice-Chancellor, the Registrar and the Assistant Registrar, Administrative sub-center, Ratnagiri for information .

The Officer on Special Duty-cum-Controller of Examinations (10 copies), the Finance and Accounts Officer (2 copies), Record Section (5 copies), Publications Section (5 copies), the Deputy Registrar, Enrolment, Eligibility and Migration Section (3 copies), the Deputy Registrar, Statistical Unit (2 copies), the Deputy Registrar (Accounts Section), Vidyanagari (2 copies), the Deputy Registrar, Affiliation Section (2 copies), the Director, Institute of Distance Education, (10 copies) the Director University Computer Center (IDE Building), Vidyanagari, (2 copies) the Deputy Registrar (Special Cell), the Deputy Registrar,(PRO) . the Assistant Registrar, Academic Authorities Unit (2 copies)and the Assistant Registrar, Executive Authorities Unit (2 copies) . They are requested to treat this as action taken report on the concerned resolution adopted by the Academic Council referred to in the above Circular and that no separate Action Taken Report will be sent in this connection. the Assistant Registrar Constituent Colleges Unit (2 copies), BUCT(1 copy), the Deputy Account, Unit V(1 copy), the In-charge Director, Centralize Computing Facility (1 copy), the Receptionist (1 copy), the Telephone Operator (1 copy), the Secretary MUASA (1 copy), the Superintendent, Post-Graduate Section (2 copies), the Superintendent, Thesis Section (2 copies)

AC 6.8.05

UNIVERSITY OF MUMBAI

Revised Syllabus for

M.E. Civil With Construction Management;
(Part-Time Degree Course)

(With effect from academic year 2005-2006.)

Sr No	Subject code	Subject	Teaching Scheme		Examination Scheme			
			Lectures	Tutorials	Theory		Term work	Total
					Duration	Marks		
1	CTM 1	Semester I Construction Management and Organisation	4	2	4	100	50	150
2	CTM 2	Applied statistics and Quantitative Techniques	4	2	4	100	50	150
3	CTM 3	Semester II Project Appraisal, Planning And Scheduling.	4	2	4	100	50	150
4	CTM 4	Advanced construction techniques	4	2	4	100	50	150
5	CTM 5	Semester III Legal Aspects of Construction	4	2	4	100	50	150
6	CTM 6	Management of Construction Resources	4	2	4	100	50	150
7	CTM 7	Semester IV Accounting and Finance Management	4	2	4	100	50	150
8	CTM 8	Project Monitoring and control	4	2	4	100	50	150
9	CTM 9	Semester V Elective	4	2	4	100	50	150
10	CTM 10	Seminar on Special Topics	-	-	-	-	50	50
11	CTM 11	Semester VI Dissertation Seminar Stage I	-	-	-	-	50	50
12	CTM 12	Dissertation Seminar Stage II	-	-	-	-	50	50
13	CTM 13	Semester VII Dissertation Seminar Stage III	-	-	-	-	50	50
14	CTM 14	Dissertation Viva Voce	-	-	-	-	100 100	200

M E (Civil Engineering) PTDC with Construction Management subjects
(Revised from Academic Year 2005 – 2006)



CTM 1

Construction Management and Organization

- 1.1 **Management**
Need, what is it, systems approach, emergence of management thought, contributions of Fredrick Taylor, Henry Fayol, emergence of behavioral sciences, and that of the modern management thought.
- 1.2 **Construction Management**
Need, nature of construction industry , scope and functions of construction management
- 1.3 **Planning**
Planning process , objectives , strategies and policies, making planning effective
- 1.4 **Organising**
Nature and purpose, types of organisations, organisational behavior, informal organizations, organizational climate, group decision making , making organising effective
- 1.5 **Staffing**
Nature and purpose, selection, appraisal, organizational development
- 1.6 **Leading**
Managing and human factor, motivation, leadership, team development, communication, managing conflicts, qualities of project manager
- 1.7 **Controlling**
Process of controlling, direct and indirect control.

References:

- Koontz, O'Donnel & Weihrich, Management, McGraw Hill
- Dharwadkar P P, Management in Construction Industry, Oxford & IBH
- Luthans, Organization Behavior, McGraw Hill

CTM 2

Applied statistics and Quantitative Techniques

- 2.1 Review of basic statistics and probability
- 2.2 **Probability Distributions**
Theoretical : binomial, poisson, normal, exponential, hypergeometric, uniform
- 2.3 **Sampling and Sampling Distributions**
Probability and non-probability samples, sampling and non-sampling errors, sample size, sampling distributions : t, F and χ^2 distributions
- 2.4 **Hypothesis Testing**
Type I and II error, testing of mean, proportion, tests for equality of mean and variances of two populations, confidence interval, χ^2 test for goodness of fit, ANOVA (one way classification), Non parametric tests : sign test, U test
- 2.5 **Correlation and Regression**
Karl Pearson's and Rank Correlation coefficient, simple linear regression : least squares method
- 2.6 **Management Decision Making**
System approach, decision making under uncertainty and risk: decision tables and decision tree

- 2.7 **Linear Programming**
Graphical solution, simplex method, dual, sensitivity analysis, transportation and assignment problems
- 2.8 **Waiting line**
Basic structure of opening models, M/M/I model
- 2.9 Integer, dynamic and Goal programming
- 2.10 **Simulation**
Random number generation. Monte Carlo method, applications

References:

- Shrivastava, Shenoy & Sharma, Quantitative Techniques for Managerial Decisions, Wiley
- Kothari C R, Research Methodology, Wiley Eastern
- Goode W J & Hatt P K, Methods in social research, McGraw Hill

CTM 3

Project Appraisal, Planning and scheduling

- 3.1 **Project Preparation, Analysis and Appraisal**
Project development cycle, project ideas, preliminary screening
Analysis and appraisal: market and demand, technical, financial, economic, ecological
Estimating methods: parameter, cost capacity factor, cost indices, detailed estimates, provision for escalation, inflation and contingencies
Financial appraisal criteria : NPV, BCR, IRR, Urgency, payback period, ARR, critical evaluation of various criteria, investment appraisal in practice
- 3.2 **Risk analysis:**
Types, measures, tools for assessment and analysis
- 3.3 **Value analysis:**
Job plan, function analysis, creative thinking, cost modeling, life cycle costing, value engineering and management
- 3.4 **Project planning and scheduling**
Planning process, level of detail, work breakdown structure, method statement
Planning and scheduling tools: bar chart, milestone chart, CPM and PERT methods of analysis, AOA and AON diagrams, single and over-lapping relationships, time chainage chart, line of balance method, resource allocation, leveling and smoothening, time cost tradeoff: simple & complex, Preparing project plans, schedules and budgets, master networks

At least one assignment shall be done using any project planning and scheduling software as part of term work.

References:

- Prasanna Chandra, Projects preparation, appraisal, budgeting & implementation, Tata McGraw Hill
- Zimmerman & Hart, Value engineering - a practical approach for owners, designers & contractors, CBS Publishers
- Harris R B, Precedence & arrow networking techniques for construction, Wiley
- Antill & Woodhead, Critical path methods in construction practice, John Wiley

CTM 4

Advanced Construction Techniques

- 4.1 Review of subsurface soil explorations
- 4.2 **Hazardous site and foundation conditions:**
Solution prone formations, expansive soils, landslide hazards, liquefaction of soils

- 4.3 **Soil improvement**
Mechanical, thermal, chemical
- 4.4 **Special topics of excavation**
Open excavation: trenching machines, blasting methods, dewatering
Tunneling: ventilation, lighting and drainage, cut and cover, rock tunneling, shield tunneling in free air, compressed air tunneling, linings, machine tunneling, supporting systems
- 4.5 Construction methods for drilled shafts, caissons, dikes and cribs, cofferdams, pile foundations
- 4.6 **Underpinning procedures**
Shores, needles, grillages, pit underpinning, pile underpinning, miscellaneous methods
- 4.7 **Special topics of concrete construction:**
Formwork: types, design criteria, patented systems
Fabrication of precast and prestressed components,
Pumped and sprayed concrete and mortar, ready mixed concrete, preplaced aggregate concrete, polymer modified concrete, high performance concrete, roller compacted concrete, concrete masonry, underwater concreting
Reinforcing steel: types, bending, placing, splicing and spacing, tendons
- 4.8 **Structural steel construction**
Erection equipment, mechanical fastening, welding, splicing, clearances for erection
- 4.9 New / non-conventional materials for construction, geo-textiles, construction chemicals etc.
- 4.10 **Environmental influences on structures**
Thermal effects, corrosion, oxidation, irradiation of materials and structures, methods of prevention
- References:
- Merritt F S (Ed), Standard Handbook for Civil Engineers, McGraw Hill
 - Waddell, Concrete Construction Handbook, McGraw Hill
 - Varma Mahesh, Construction Equipment, its Planning & Application, Metropoliatn Book Co

CTM 5

Legal Aspects of Construction

- 5.1 Law and common man
- 5.2 **Construction through contracts**
Types, critical comparison, bid cycle, tender and contract documents, contract conditions, study of contract documents of FIDIC, State PWD and CPWD
- 5.3 **Indian Contract Act**
Need, provisions, scope for modifications / improvement
- 5.4 **Contract administration**
Deviations and extras, claims and their management, disputes and dispute resolution methods, Arbitration and Reconciliation Act
- 5.5 **Laws applicable to construction activity**
Need and broad provisions of :
Industrial Disputes Act, Workmen's Compensation Act, Employer's Liability Act, Payment of wages Act, Contract Labour Act, Minimum Wages Act, Inter-state Migrant workmen act and other acts introduced from time to time
- References:
- Patil B S, Legal Aspects of Building & Engineering Contracts
 - Gajaria, Indian contract Act

- Fisk E R, Construction Project Administration, Wiley
- All referred bare Acts
- CPWD Manual Volume I & II, A handbook for government officials and contractors

CTM 6

Management of Construction Resources

- 6.1 **Human Resources Management**
Staffing, recruiting, orientation and training, performance evaluating, merit rating
Labour Management: Strikes and lockouts, collective bargaining, grievances and grievance settling procedure, labour welfare
- 6.2 **Equipment Management**
Mechanization on construction projects, selection of major and minor equipment, production estimating, sizing and matching of equipment
Sources of construction equipment: purchase, rent and lease, old and new equipment
Economics of equipment, useful / economic life of equipment, equipment operation and service, maintenance, depreciation, obsolescence and replacement
Equipment management systems, organizations, record keeping, training to operators
- 6.3 **Materials Management**
Importance,
Estimation of materials, Classification and codification, ABC analysis
Purchase function: legal aspects of purchase, inventory control, concept of EOQ
Stores management, , minimizing wastage
Material management systems, Organizations, record keeping
References:
Varma Mahesh, Construction Equipment, its Planning & Application, Metropolitan & Co
- Gopalkrishnan, Materials Management
 - Nunnally, Managing construction equipment, Prentice Hall

CTM 7

Accounting and Finance Management

- 7.1 **Basic accounting mechanics**
Generally accepted accounting principles, books of original entry
- 7.2 **Preparation of financial statements**
Income statement, balance sheet
- 7.3 **Techniques of financial analysis**
Statement of changes in financial position (working capital / cash flow / total resources basis)
Ratio analysis
- 7.4 **Project financing**
means, norms, and policies of financial institutions
- 7.5 **Long term investment decisions**
cash flow estimates, evaluating techniques, alternative selection, basic concepts of analysis of risk & uncertainty, cost of capital, lease financing
- 7.6 **Management of current assets**
Planning, financing and control of working capital, management of cash, receivables management, inventory management
- References:
- Bhattacharya & Dearden, Accounting for management, Vani Educational Books
 - Prasanna Chandra, Financial Management

- 8.1 **Project monitoring**
Progress reporting,, review meetings, updating plans
- 8.2 **Schedule control**
Common causes of schedule delays, measuring productivity, methods of enhancing productivity
- 8.3 **Cost control**
Cost codification, earned value concept, variance analysis, alarm reports, control measures, client and contractor point of view
- 8.4 **Quality management**
Concept of quality, aspects of quality, quality control and assurance, inspection, preparation of manuals and checklists
- 8.5 **Safety management**
Types of accidents on construction work sites and their common causes, direct and indirect costs of accidents, occupational health hazards, general precautions to be followed for avoiding accidents, safety campaign, training for safety
- 8.6 **Integrated approach to project control**
Project management information systems, computer networking

References:

- Kerzner, Project Management, CBS Publishers
- Pilcher R, Project cost control in construction, Collins
- King & Hudson, Construction Hazard & Safety Handbook, Butterworths
- Dunkan, Thorpe & Summer, Quality assurance in construction, Gower

Elective: Management of Housing Projects

- 1 **National housing policy**
Need and importance of housing, role of various state and national level agencies, local bodies etc., rural and urban housing, systems approach to housing and urban planning
- 2 **Managing technology**
New developments: materials, construction techniques, low cost housing, mass housing, industrialized housing, appropriate technology
- 3 **Planning**
Pre-execution phase, project phase and post-execution phase
- 4 **Management of building services**
Water supply, waste disposal, lifts, HVAC systems
- 5 **Maintenance of buildings**
Need and importance, organization and management
- 6 **Estate management**
Policy and organization

References:

- Published books in the relevant areas to be supplemented by latest journal articles and papers, seminar and conference proceedings, in-house publications, monographs etc.

Elective: International Construction Business

- 1 **International economy**
International political system, economic system, multinationals, features of international trade & investment, national interest in international trade
- 2 **International payments**
International monetary system, balance of international payments, transfer of international payments, foreign exchange rates and their determination
- 3 **Theories of international trade**
Developing countries in the world economy, international differences in technology, policy implications for host countries
- 4 **Cultural environment of international business**
Effect of culture, language, education, religion, value systems on business, impact on management styles in selected countries
- 5 References:
 - Published books in the relevant areas to be supplemented by latest journal articles and papers, seminar and conference proceedings, in-house publications, monographs etc.

CTM 9.3

Elective: Management of Infrastructure Services

- 1 **Infrastructure management**
Need and concept, expected performance, survey and evaluation of distresses, inspection checklists, organization for rehabilitation, policies, funding
 - 2 Concept of infrastructure upkeep
 - 3 **Buildings**
Post occupancy evaluation of buildings, deformation and common defects in buildings, restoration & rehabilitation measures
 - 4 **Pipelines (water/ sewage/ air/ gas)**
Purpose and methods of evaluation, evaluation of physical condition, methods of rehabilitation
 - 5 **Pavements (roadways / runways)**
Evaluation and performance surveys, distress evaluation, methods of resurfacing, overlays, restoring and rehabilitation, up-gradation and maintenance of permanent way
 - 6 **Bridges**
Inspection and reporting methods, rehabilitation measures
 - 7 **Ports & harbours**
Maintenance of ports, port buildings, and services
- References:
- Published books in the relevant areas to be supplemented by latest journal articles and papers, seminar and conference proceedings, in-house publications, monographs etc.

- 1 **Marketing environment:**
impact of internal and external environment, socio-economic, demographic, political, technological and legal environment, nature and impact of competition, marketing strategy
 - 2 **Basics of marketing:**
Features of marketing of consumer goods, industrial products and services, product and marketing, marketing organization structures, societal role of marketing
 - 3 **Marketing projects:**
Characteristics of construction projects, sources of information, pre-qualification documents, bid preparation – estimating, provision for overheads and profit, bidding models, bidding strategy, pre-bid meetings, negotiation, legal aspects, impact of joint ventures, collaborations and alliances, impact of globalization and privatization, strategies for project export
 - 4 **Marketing real estate:**
Characteristics of real estate, demand and supply relationship, segmentation, product mix, pricing strategies, advertising strategies, legal aspects
 - 5 **Marketing products for construction:**
Characteristics of construction materials and equipment, strategies for marketing of materials and equipment for construction, demand surveys, advertising strategies, communication, exhibitions and product demonstrations, pricing strategies, financing arrangements
- References:
- Published books in the relevant areas to be supplemented by latest journal articles and papers, seminar and conference proceedings, in-house publications, monographs etc.

Seminar on Special Topics

Each student shall be assigned a topic on which he/she will do self-study. The work may involve review of literature, laboratory experimental work, development of software, development of model, case study, field data collection and analysis etc. On completion of the work the student shall prepare a report and will give a Seminar on the report.
The student is expected to spend at least eight hours per week for this Seminar.

Dissertation

- CTM11 & CTM12 **Dissertation Seminars Stage I and Stage II**
Student shall finalize a theme, related to construction engineering and/or management area for the dissertation work. Student shall prepare a report on the theme outlining importance of the theme of the study, objective, scope of work, methodology, and a review of literature published in the relevant area. The student shall present seminars on this report.
- CTM13 **Dissertation Seminar Stage III (Pre-synopsis)**
Student shall study the problem of dissertation in the light of outcome of Stage I and Stage II seminars. On completion of data collection, analysis, and inferencing the student shall prepare an interim report and shall present a seminar on the work done, before the submission of Synopsis to the University.
- CTM14 **Dissertation and Viva Voce**
On finalization of the dissertation student shall submit the dissertation report to the University. The student shall have to appear for a Viva-voce examination for the dissertation.