

M. Tech. Construction Engineering and Management (First Level) Courses and Codes

CODE	SUBJECT	L	T	P
CM501	Construction Project Management	4	2	0
CM502	Advance Construction Techniques	4	2	0
CM503	Advanced Civil Engineering Materials	3	0	2
MA501	Probability And Statistics	3	2	0
CM504	Resources Management	4	2	0
CM505	OR In Construction Management	3	2	0
CM506	Construction Contract Management	3	2	0
CM541	Research Methodology	1	0	2
	Elective - I			
CM551	Construction Finance & Accounting	3	2	0
CM552	Sustainable Smart Buildings	3	2	0
	Elective - II			
CM553	Maintenance Management Of Construction Projects	3	2	0
CM554	Project Risk Analysis And Mitigation Techniques	3	2	0
	Open Elective	3	2	0
CM555	Strategic Management			
CM556	Disaster Management			

L: Lectures, T: Tutorial / Teacher Guided Student Activity, P: Practical, C: Credit, ESE: End Semester Examination/ Assessment, CE: Continuous Evaluation.

CM501: Construction Project Management

Teaching Scheme			Credits	Marks Distribution				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE	CE	ESE	CE	
4	2	-	6	70	30	30	20	150

Course Content:

Sr. No.	Content	Total Hrs
1	<p>Project Management Basic Concept:</p> <p>Introduction. Over view of Construction Project & Project Management. Indian Construction industry and their problems of Cost overruns & Time overruns. Phases of construction project and life cycle of project. Project Appraisal & Cost-benefit analysis. Detailed Project Report (DPR), Project Maturity, Success and Failures. Concepts of BOT, BOLT, BOOT etc.</p>	06
2	<p>Project Organizations:</p> <p>Introduction. Formal and informal organization. Forms of Project organizations. Requirements of a project organization. Types and selection of organizations.</p>	06
3	<p>Project Planning, Scheduling and Control Management:</p> <p>Introduction. WBS: Necessity, Methodology and Types. Project planning and scheduling techniques: CPM, PERT & GERT, LOB & LADDER Networks, Precedence Networks, Critical Chain Network. Time & Resource Planning. Management Software.</p>	16
4	<p>Construction Safety Management:</p> <p>Evolution of safety, Accident causation theories, Foundation of major injury, Health & Safety Act & Regulations, Cost of accidents, Roles of safety personnel, Investigations and Prevention Of Accidents, Nature, Causes And Control Measures, Principles of safety, Hazard Identifications and Control Techniques, Safety and health management system. Research results in safety management.</p>	08
5	<p>Project Quality Control:</p> <p>Introduction. Construction Quality Control: QA-QC Model, Quality Assurance: TQM, ISO Standards, CONQUAS and AUDIT. Cost of Quality. Quality policy, Objectives and methods in construction industry, Factors Influencing Construction</p>	08

Quality, Construction Productivity.

Reference Books:

1. A Management Guide to PERT/CPM by J.D. Weist & F.K. Levy – Prentice Halls of India Pvt. Ltd.
2. Engineering Project Management by Parammeshwar P. Iyer – Wheeler Publishing, New Delhi.
3. Construction Project Management by K. K. Chitkara, - Tata McGraw-Hill, New Delhi.
4. Total Project Management by P. K. Joy – Macmillan India Ltd, New Delhi.
5. Construction Project Management by Kumar Neeraj Jha - Pearson, New Delhi.
6. Total Construction Project Management by George J. Ritz – McGraw-Hill, New York.
7. Planning Techniques for Construction Network Scheduling by J.D. Stevens - McGraw
8. Construction Engineering & Management by Dr. S. Seetharaman - Umesh Publications, Delhi.
9. Construction Planning and Technology , Gupta Rajiv, CBS Publication, Delhi
10. Fundamentals Network Analysis & Synthesis, Pandey S.K., S.Chand Publication, Delhi

CM502: Advanced Construction Techniques

Teaching Scheme			Credits	Marks Distribution				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE	CE	ESE	CE		
4	2	-	6	70	30	30	20	150

Course Content:

Sr. No.	Content	Total Hrs
1	Introduction to Advanced Construction Techniques.	02
2	Construction Techniques for Excavations, Dewatering of Excavations, Pile Foundations and Piling Techniques, Caissons, Box Jacking, Pipe Jacking, Construction of Cofferdams. Trenchless Technology. Construction for High Rise Structures, Buildings, Chimneys, Cooling Towers.	12
3	Construction Techniques of Special Structures: Lattice Towers and Transmission Line Structures, On Shore and Off Shore Structures, Geodesic Structures. Tunnels,	12

Bridges, Roads

- 4 Temporary Structures for new and damaged structures, **Advance Demolition and Dismantling Techniques.** 08
Retrofitting, Strengthening of Various R.C.C Structures, Strengthening of Masonry Structures.
- 5 **Precast and Pre Stressing Techniques. Modular Coordination:** 10
Basics of Modular Co-Ordination, Advantages of Modular Coordination, applications of Modular Coordination.
Erection Technology: Erection Cycle ,Erection Methods for Various Types of Buildings And Steel Structures.

Reference Books:

1. Construction Technology by S.S. Ataev - Mir Publishers
2. Prefabrication of Reinforced Concrete by P. Dyanchenko & S. Mirotvorsky - Mir Publishers
3. Industrial Building and Modular Design by Henrick Nissen - Cement Concrete Association, London.
4. Construction Technology (Vol. I to IV) by R. Chudlay – Longman
5. Practical foundation engineering hand book, RobertwadeBrown, McGraw Hill Publications,
6. Construction Dewatering: New Methods and Applications, Patrick Powers. J., John Wiley & Sons.
7. Advanced Construction Techniques , Roy Chudley&Roger Greeno, Pearson Prentice Hall
8. Construction Planning, Equipment & Method,Peurifoy ,Tata McGraw Hall Pub.
9. Construction Technology, Sanksar S, Saraswati S, Oxford University Press
10. Concrete Technology: Theory and Practice, M.S. Shetty, S.Chand Pub. 5.

CM503: Advanced Civil Engineering Materials

Teaching Scheme			Credits	Marks Distribution				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE	CE	ESE	CE	
3	0	2	5	70	30	30	20	150

Course Content:

Sr. No.	Content	Total Hrs
1	Introduction, Durability, Mechanical Properties, Deformational Behavior, Thermo Physical Properties Etc.	3
2	Classification, Specification, Properties, Tests As Per IS For Various Civil Engineering Materials	6
3	Walling Units, Binding Materials And Additives, Aggregates, Gypsum Products, Wood Base Products, Ferrous And Non-Ferrous Metal Products, Various Types Of Concretes And Concrete Additives And Admixtures.	12
4	Repair Materials, Adhesives And Sealants.	6
5	Recent Developments And Market Awareness Regarding Applications, Varieties, Sizes And Specification For Various Materials.	9

Reference Books:

1. Materials of Construction by D.N. Ghose - Tata Mc Graw Hill
2. Civil Engineering Materials by Jackson N. Ed. - ELBS, London.
3. Material of Construction by S.Z. Haider - Oxford Unviersity Press
4. Building Materials by BRE Digest - The Construction Press, London.
5. Building Materials and Components by CBRI - Tata Mc Graw Hill

MA501: Probability and Statistics

Teaching Scheme			Credits	Marks Distribution				Total Marks
L	T	P		C	Theory Marks		Practical Marks	
			ESE		CE	ESE	CE	
3	2	-	5	70	30	30	20	150

Course Content:

Sr. No.	Topics	Teaching Hrs.
1	Preparation and standardization of data; measure of dispersion moments, skewness and kurtosis; Basic concept of probability; Independent & Dependent events. Mutually exclusive events Additions & Multiplication theorems, conditional probability and Bayes formula.	09
2	Random variables; discrete and continuous probability distribution; joint probability distribution; Laws of Expectation.	09
3	Main feature of Binominal, Poisson & Normal distributions and their properties, applications in engineering and industrial problems; Exponential, Rayleigh, Weibull, Gamma, Pearson, and log-normal distributions; transformation of random variables, moment generating functions.	09
4	Concepts of stochastic process, processes with independent; Process Furry Yale process, Polya process. Homogeneous macro chains analysis; Correlation and Regression, Multiple, partial and Rank Correlation, Analysis of Time Series data.	09
5	Element of sampling theory; large and small samples, fiducial limits for unknown mean standard error; test of significance, T & F test. Introduction to theory of estimation; simple analysis of variants of one	09

and two way classification.

Reference Books:

1. Hoel,P.G., *Introduction to Mathematical Statistics*
2. Fisz,M., *Probability and Mathematical Statistics*
3. Alder, H.L, *Introduction to Probability and Statistics*
4. Walpole,R.E., Mayers, R.H., *Probability and Statistics for Engineers and Scientist*
5. Montgomery, Runger GC. *Applied statistics and probability for Engineer*, student edition, Wiley

CM504: Resources Management

Teaching Scheme			Credits C	Marks Distribution				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE	CE	ESE	CE	
4	2	-	6	70	30	30	20	150

Course Content:

Sr. No.	Topics	Teaching Hrs.
1	<p>Material Management:</p> <p>Materials & their peculiarities, Systems of material classification, Material reconciliation. Importance and objectives of material management. Functions of material management: Material planning, materials codification and standardization, Material procurement process, Custody (receiving, warehousing and issuing) of material, material accounting, transportation, Wastage audit at site, Site waste material management plan. Inventory related costs, functions of inventory, inventory policies, Selective inventory control: ABC analysis, VED analysis etc. Inventory models: deterministic and probabilistic models and applications, Computer applications based upon available software's.</p>	16
2	<p>Equipment management :</p> <p>Classification and operational characteristics and production rates of various equipment. New trends and construction equipment of future.</p>	16

Planning and selection of equipment for earthmoving, hauling, hoisting, conveying, pneumatic, pumping, aggregate production, concrete production, pile driving, tunnelling and road construction applications. Equipment procurement, purchase, import of equipment, procedural formalities for import. Planning and maintenance of equipment, Replacement policies. Depreciation and taxation, depreciation methods. Safety aspects on construction equipment. Advanced concepts: sensitivity analysis, break even analysis.

- 3 Basics of personnel management, manpower planning, labour laws and industrial relations. Role of personnel management in construction companies. 12

Personnel management: concepts, definitions, new developments in HRD and HRM. Man power estimations for project, methods of man power estimations at various stages.

Methods of selection, training, placement, financial comparisons, discipline, in employing and retaining engineers and managers. Role, function, relationships with other departments, office record keeping and procedures.

Legal aspects: labour legislation, labour laws, grievance handling, enquiry procedure, labour administration and judiciary in relation to construction industry.

Reference Books:

1. Mahesh Varma, *Construction Planning and Management through Systems Techniques*, Metropolitan Books Co. Pvt. Ltd.
2. Kwaku A. Tenah & Jose M. Guevara, *Fundamentals of Construction Management and Organization*, Reston Publishing Co. Inc.
3. Dr. S. Seetharaman, *Construction Engineering & Management*, Umesh Publications.
4. R.L. Peurity & W.B. Ledbetter, *Construction Planning, Equipments & Methods*, Mc Graw Hill
5. K.A. Tenah & J.M. Guevara, *Fundamentals of Construction Management & Organization*, Reston Publishing Co.
6. Dr. Mahesh Verma, *Construction Equipments and its Planning & Applications*, Metropolitan Publishing Co.
7. S.C. Khanna, *Construction Equipment & Management*, Khanna Publishers.
8. A. K. Datta, *Materials Management: Procedures, Text and Cases*, PHI Learning Pvt. Ltd. 2004
9. Arnold, *Introduction To Materials Management*, Pearson Education India, 2009
10. Richard J. Tersine, *Principles Of Inventory And Materials Management*, Prentice Hall, 1994

11. Richard J. Tersine, *Modern Materials Management*, John Hardin Campbell, 1977
12. P. Gopalakrishnan, *Handbook of Materials Management*, PHI Learning Pvt. Ltd. 2004
13. Monappa A. and M.S. Saiyadaiu, *Personnel Management*, Tata Mc Graw Hill.
14. Vaid K.N, *Labour Laws for the Construction Industry in India*. NICMAR, Bombay.
15. Miuer J.B. and Miuer M.G, *Personnel and Industrial Relations - A Management Approach* Mc Millan, New York.
16. Shah Vinita, *Human Resource Development in Construction Industry* NICMAR, Bombay.
17. Carleton Counter II and Jill Justice Coulter, *The Complete Standard Hand Book of Construction Personnel Management*, Prentice Hall, Inc., New Jersey, 1989.
18. Memoria, C.B., *Personnel Management*, Himalaya Publishing Co., 1992.
19. Josy.J Familaro, *Handbook of Human Resources Administration*, McGraw Hill International Edition, 1987.
20. Justin Gooderl Longenecker and Charles D. Pringle, *Management*, C.E. Merrill, 1981.
21. R. S. Dwivedi, *"Human Relations and Organizational Behaviour "*, B.H - 1987.
22. Shamil Naoum, *"People and Organizational Management in Construction"*, Thomas Telford, 2001
23. Stephen Bach & Keith Sissons, *"A Comprehensive Guide to Theory and Practice"*, John Wiley & Sons, 2000.
24. Andrew Dainty, Martin Loosemore, *Human Resource Management in Construction Projects*, Routledge, 2012.

CM505: OR in Construction Management

Teaching Scheme			Credits C	Marks Distribution				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE	CE	ESE	CE	
3	2	-	5	70	30	30	20	150

Course Content:

Sr. No.	Topics	Teaching Hrs.
1	<p>Introduction:</p> <p>Introduction to Operations Research: Basic definitions, scope, objectives, phases, models and limitations of Operations Research. Linear Programming Problem, Formulation of LPP, Graphical solution of LPP. Simplex Method, Artificial variables, big-M method, two-phase method, degeneracy and unbound solutions.</p>	08

2	Transportation Problem:	04
	Transportation Problem. Formulation, solution, unbalanced Transportation problem. Finding basic feasible solutions," Northwest corner rule, least cost method and Vogel's approximation method. Optimality test: the stepping stone method and MODI method.	
3	Assignment and Sequencing:	03
	Assignment model. Formulation. Hungarian method for optimal solution. Solving unbalanced problem.	
4	Decision Theory:	06
	Decision strategies - decision under certainty - decision under risk - decision under uncertainty - formulation - decision criterion and decision under competitive situation. Decision tree.	
5	Dynamic Programming:	04
	Dynamic programming. Characteristics of dynamic programming. Dynamic programming approach for Priority, Management employment smoothing, capital budgeting, Stage Coach/Shortest Path, cargo loading and Reliability problem.	
6	Game Theory:	05
	Classification of games. Two - person, zero - sum games - formulation of pay off matrix - saddle points - games with pure strategies and mixed strategies - value of the game. Solution to 2 x 2 matrix, 2 x n matrix, m x 2 matrix and m x n pay-off matrix. Graphical method, algebraic method, linear programming methods. Guidelines to modeling an OR project.	
7	Waiting Line Theory:	03

Reference Books:

1. Richard Bronson, *Schaum's Outline Series Theory & Problem of Operations Research*, Mc Graw Hill Book Co., 1983
2. Hamdy A. Taha, *Operations Research : An Introduction*, IV Edition, Maxwell Macmillan International Edition, 1989
3. G. V. Shenoy, U. K. Srivastav, S. C. Sharma, *Operations Research for Management*, Wiley Eastern Limited, 1988

4. M. P. Gupta And J.K. Sharma, *Operations Research for Management*, II Edition, National Publishing House,1987
5. John O. McClain and Joseph Thomas, *Operations Management*, Prentice Hall of India Private Limited, New Delhi,1987
6. R. C. Gupta, *Quantitative Methods and Operations Research*, CBS Management Series,1986
7. Vohra N.D, *Quantitative Techniques in Management*, Tata McGraw Hill.
8. Rea's Problem Solver, *Operation Research*, Research & Education Association Publication.

CM506: Construction Contracts Management

Teaching Scheme			Credits	Marks Distribution				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE	CE	ESE	CE	
3	2	-	5	70	30	30	20	150

Course Content:

Sr. No.	Topics	Teaching Hrs.
1	Introduction to Law: Introduction to law, Laws governing structure & Working of Construction Firms.	03
2	Contracts Outline: Contracts, types of construction contracts, Evaluation of contract documents, need for documents, present stage of national and international contract documents, roles and functions of participants to the contract.	06
3	Tendering Process: Preparation of tender documents estimating, pre-qualification, bid evaluation, award of contract, project financing and contract payments, contracts close out and completion, E-tendering.	03

4	Contract Conditions:	04
	Clarification by parties to contract, obligations and responsibilities of the parties, protection and indemnification, bonds and insurance, subsurface conditions, inspection of work, change of work, rejected work and deficiencies.	
5	Arbitration:	06
	Causes and resolution of disputes, settlement for claims and extra items, arbitration. Comparison Laws-Agreements, Appointment of Arbitrators, Conditions of Arbitrations, Powers and duties of Arbitrator, Enforcement of Award-costs, Arbitration Act old & new.	
6	Specifications:	04
	Definitions, relationship with drawings, necessity/purpose, advantages/ benefits, organization of specification, drafting/writing the specifications, types of specifications.	
7	Administration Management:	04
	Proper record keeping in contract administering, establishment of standard procedures, coordination between various agencies involved, providing data for interpretation of contract clauses, Special aspects of contract management	

Reference Books:

1. Mulla and Sanjeeva Rao, B.D. Virmani, B.T.Gajaria, *Explanation of Indian Contract Act.*
2. Hudson, *Handbook of Contracts*
3. Clough Richarch, *Construction Contracting*, John Wiley & Sons, New York, 1986.
4. Prakash V.A, *Construction Contract Management*, NICMAR, Bombay
5. B. N. Dutta, *Estimating and Costing in Civil Engineering Theory and Practice*, UBS Publishers, Pistributer's Private Limited.
6. Gajaria G.T., *Laws Relating to Building and Engineering Contracts in India*, M. M. Tripathi Private Ltd., Bombay, 1982.
7. Jimmie Hinze, *Construction Contracts*, McGraw Hill, 2001.
8. Joseph T. Bockrath, *Contracts and the Legal Environment for Engineers and Architects*, McGraw Hill, 2000.

CM551: Construction Finance and Accounting

Teaching Scheme			Credits	Marks Distribution				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE	CE	ESE	CE	
3	2	0	5	70	30	30	20	150

Course Content:

Sr. No.	Content	Total Hrs
1	Basic financial concepts Capital and Revenue, financial accounting, cost accounting, management accounting, financial management.	03
2	Accounting Process GAPP, double entry system, ten point book keeping system, journal, ledger, cash book, trial balance, final account, provision and reserves, depreciation accounting, preparation of profit and loss account and balance sheet as per companies act, 1956, interpretation of financial statements.	06
3	Project Accounts Methods of recording and reporting site accounts to project office and from project office to head office.	06
4	Financial Management Financial statement analysis, ratio analysis, fund flow, cash flow analysis, source of finance. Estimating working capital needs and factors affecting it, financing working capital needs, sources, procedures and practice in construction industry, break even analysis.	06
5	Corporate taxing and tax planning, joint ventures, financial packaging of project.	06
6	Project Cost Management: Introduction. Cost Planning, Cost Budgeting and Cost Control. Estimation of project cost. Cost appraisal of project. Project cash-flow analysis and planning. Value engineering in cost validation.	06

Reference Books:

1. Accounting for Management by Bhattacharya S.K. and John Dearden – Vani Educational Books, Bombay.
2. Accounting and Finance Management for Construction Vol. I by Mott C.H. - John Wiley, New York
3. Cost Accounting for Construction Firms by EPPS B.G. and Whiteman D.E. - John Wiley, New York.
4. Construction Management: Planning & Finance by Corniman D. – Construction Press, London.

CM552: Sustainable Smart Buildings

Teaching Scheme			Credits	Marks Distribution				Total Marks
L	T	P		C	Theory Marks		Practical Marks	
			ESE		CE	ESE	CE	
3	2	0	5	70	30	30	20	150

Course Content:

Sr. No.	Content	Total Hrs
1	Basics of sustainability, Benefits of Sustainable Building, Sustainable Building Design, Site Location and Selection, Reducing Material Impacts, Increasing Energy Efficiency and Comfort, Building Systems that Reduce Material and Energy Impacts: Sustainable Foundations, Sustainable walling units, Sustainable Floor Framing Systems, Sustainable Roofing Systems, Sustainable Exterior and Interior Finish Materials, Sustainable Building Checklist.	09
2	Introduction to smart buildings and structures - Instrumented Structures Functions and Response -Sensing systems - Self-diagnosis - Signal processing consideration - Actuation systems and effectors.	06
3	Sensing Technology - Types of Sensors - Physical Measurement using Piezo Electric Strain, measurement - Inductively Read Transducers - The LVOT - Fiber Optic Techniques. Chemical and Bio-Chemical sensing in Structural Assessment - Absorptive chemical sensors -Spectroscopes - Fibre Optic Chemical Sensing Systems and Distributed measurement.	06

- 4 Measuring Techniques - Strain Measuring Techniques using Electrical strain gauges, Types -Resistance - Capacitance - Inductance - Wheatstone bridges - Pressure transducers - Load cells -Temperature Compensation - Strain Rosettes. 06
- 5 Actuator Techniques - Actuator and actuator materials - Piezoelectric and Electrostrictive Material - Magneto structure Material - Shape Memory Alloys - Electro rheological Fluids- Electromagnetic actuation - Role of actuators and Actuator Materials. 06

Reference Books:

- 1) Brain Culshaw - *Smart Structure and Materials* Artech House - Borton. London-1996.
- 2) Srinivasan, A.V and Michael McFarland. D, "*Smart Structures - Analysis and Design*, Cambridge University Press, 2001.
- 3) L. S. Srinath, *Experimental Stress Analysis*, Tata McGraw-Hill, 1998.
- 4) J. W. Dally & W. F. Riley, *Experimental Stress Analysis*, Tata McGraw-Hill, 1998.
- 5) Mukesh V. Gandhi, Brian S. Thompson, *Smart Materials and Structures*, Springer, May-1992

CM553: Maintenance Management Of Construction Projects

Teaching Scheme			Credits	Marks Distribution				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE	CE	ESE	CE		
3	2	-	5	70	30	30	20	150

Course Content:

Sr. No.	Topics	Teaching Hrs.
1	Introduction to maintenance. Typical Maintenance Engineer's Duties, Functions and Responsibilities. Deteriorations: Structural Deficiency, External Forces, Internal Forces, Problems of Substructures, Materials Deficiency, Dimensional Instability, Thermal Movements, Finishing, Coatings, Vandalism etc.	06
2	Definitions, Objectives of maintenance. Importance of maintenance, Types of maintenance: Unplanned Maintenance: Break Down Maintenance, Planned Maintenance: Preventive Maintenance, Predictive Maintenance, Reliability Centered Maintenance.	12

3	Maintenance Management, Objectives of Maintenance Management, Types of Maintenance Management. Maintenance Dimension, Maintenance Organization, Nature of Maintenance Work, Condition Assessment Procedure, Maintenance Planning and scheduling, Estimation of Maintenance, Maintenance Contracts, Execution of Maintenance.	06
4	Maintenance Management System. Computerized Management System.	05
5	Maintenance management and Maintenance Management System for Buildings and other Construction Projects based on Condition, Safety, Optimization and Life cycle cost.	04

Reference Books:

1. Dhillon, Balbir S., *Maintainability, Maintenance, and Reliability for Engineers*, CRC Press, 2006
2. Mobley, Keith R. & Higgins, Lindley R. & Wikoff, Darrin J., *Maintenance Engineering Handbook*, VII Edition, McGraw-Hill Professional, 2008.

CM554: Project Risk Analysis And Mitigation Techniques

Teaching Scheme			Credits	Marks Distribution				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE	CE	ESE	CE		
3	2	-	5	70	30	30	20	150

Course Content:

Sr. No.	Topics	Teaching Hrs.
1	<p>General:</p> <p>Importance of Risk, types of risks, quantifiable and unquantified risks</p>	03
2	<p>Risk analysis and Management for projects (RAMP):</p> <p>Identifying risk events. Probability distribution. Stages in Investment life-cycle; determination of NPV and its standard deviation for perfectly co-related, moderately co-related and un-correlated cash flows. Sensitivity analysis, scenario analysis simulation, decision tree analysis, risk profile method, certainly</p>	15

equivalent method; risk adjusted discount rate method, certainty index method, 3 point estimated method; use of risk prompts, use of Risk Assessment tables, details of RAMP process, utility of Grading of construction entities for reliable risk assessment.

3 Risk Mitigation Techniques: 15

Elimination, reducing, transferring, avoiding, absorbing or pooling. Residual risk, mitigation of unquantified risk. Coverage of risk through CIDC's MOU with the Actuarial Society of India through risk premium such as (BIP) - Bidding Indemnity Policy (DIMO) - Delay in meeting obligation by client policy, (SOC) - Settlement of claims policy (LOP)- Loss of profit policy (TI). Transit Insurance policy (LOPCE) Loss of performance of construction equipment policy.

Reference Books:

1. Dr.Surendra Kumar, *Industrial Engineering and Management of manufacturing systems*, Satya Prakashan.
2. *RAMP Handbook by institution of Civil Engineers and the faculty and Institute of Actuaries*, Thomas Telford publishing, London.
3. Seetharaman, *Construction Engineering and Management*.
4. Prasanna Chandra, *Projects Planning analysis selection implementation and Review*.

CM555: Strategic Management

Teaching Scheme			Credits	Marks Distribution				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE	CE	ESE	CE		
3	2	-	5	70	30	30	20	150

Course Content:

Sr. No.	Topics	Teaching Hrs.
1	Strategy and Process: Conceptual framework for Strategic Management, The Concept of Strategy and the Strategy Formation Process, Stakeholders in business,	

Vision, Mission and Purpose, Business definition, Objectives and Goals, Corporate Governance and Social responsibility, Case study.

2 Competitive Advantage:

External Environment, Porter's Five Forces Model, Strategic Groups Competitive Changes during Industry Evolution, Globalization and Industry Structure, National Context and Competitive advantage Resources, Capabilities and competencies, Core competencies, Low cost and differentiation Generic Building Blocks of Competitive Advantage, Distinctive Competencies, Resources and Capabilities durability of competitive Advantage, Avoiding failures and sustaining competitive advantage, Case study.

3 Strategies:

The generic strategic alternatives, Stability, Expansion, Retrenchment and Combination strategies, Business level strategy, Strategy in the Global Environment, Corporate Strategy, Vertical Integration, Diversification and Strategic Alliances, Building and Restructuring the corporation, Strategic analysis and choice, Environmental Threat and Opportunity Profile (ETOP), Organizational Capability Profile, Strategic Advantage Profile, Corporate Portfolio Analysis , SWOT Analysis, GAP Analysis, Mc Kinsey's 7s Framework, GE 9 Cell Model, Distinctive competitiveness, Selection of matrix, Balance Score Card, case study.

4 Strategy Implementation & Evaluation:

The implementation process, Resource allocation, Designing organizational structure, Designing Strategic Control Systems, Matching structure and control to strategy, Implementing Strategic change, Politics, Power and Conflict, Techniques of strategic evaluation & control, Case study.

5 Other Strategic Issues:

Managing Technology and Innovation, Strategic issues for Non Profit organizations, New Business Models and strategies for Internet Economy, case study

6 Alternate Strategic:

Alternate strategy , Joint sector, existing government policies with respect to PPP mode, case study

Reference Books:

1. William F Glueck & L. R. Jauch, *Business policy & strategy*, McGraw Hill.

2. Steiner G. & J. Miner, *Management policy & strategy*, MacMillan New York.
3. Dasgupta A. & Sen Guha, *Government and Business in INDIA*, Allied publishers, Calcutta.
4. Mles R. & C Snow, *Organization Strategy Structure & Processes*, McGraw Hill
5. Hofer C. & D. Vencil, *Strategic Planning Systems*. Englewood cliffs.
6. *Strategic Management*, Neil Ritson & Ventus publishing.
7. G. Sudarsana Reddy, K. Aswathappa Strategic Management Concepts & Cases. Himalaya publishing house
8. Srinivasan, *Strategic Management: The Indian Context*, III Edition, PHI learning Pvt. Ltd.

CM556: Disaster Management

Teaching Scheme			Credits	Marks Distribution				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE	CE	ESE	CE		
3	2	-	5	70	30	30	20	150

Course Content:

Sr. No.	Topics	Teaching Hrs.
1	<p>Objectives:</p> <p>Overview of Disaster Management - Distinguishing between an emergency and a disaster situation. Disaster Management Cycle - Phase I: Mitigation, and strategies; hazard identification and vulnerability analysis. Disaster Mitigation and Infrastructure, impact of disasters on development programmes, vulnerabilities caused by development, developing a draft country-level disaster and development policy</p>	
2	<p>Phases:</p> <p>Disaster Management Cycle - Phase II: Preparedness, Disaster Risk Reduction (DRR), Emergency Operation Plan (EOP), Mainstreaming Child Protection and Gender in Emergency Planning, Assessment, Disaster Management Cycle - Phases III and IV: Response and recovery, Response aims, Response Activities, Modern and traditional responses to disasters, Disaster Recovery, and Plan , Disasters as opportunities for</p>	

development initiatives

3 Disaster Community:

Community-based Initiatives in Disaster management, need for Community-Based Approach, categories of involved organizations: Government, Non-government organizations (NGOs), Regional And International Organizations, Panchayaths, Community Workers, National And Local Disaster Managers, Policy Makers, Grass-Roots Workers, Methods Of Dissemination Of Information, Community-Based Action Plan, Advantages/Disadvantages Of The Community-Based Approach

4 Disaster Planning:

Disaster Response Personnel and duties, Community Mitigation Goals, Pre-Disaster Mitigation Plan, Personnel Training, Volunteer Assistance, School-based Programmes, Hazardous Materials, Ways of storing and safely handling hazardous materials, Coping with Exposure to Hazardous Materials

5 Applications of science and technology for disaster management:

Geo informatics in Disaster Management.: RS, GIS, GPS Disaster safe design and construction. Structural and non structural mitigation of disasters. S&I Institutions for Disaster Management in INDIA

Reference Books:

1. Ayaz, *Disaster Management: Through the New Millennium*. Anmol Publications. 2009
2. Dave, P. K. *Emergency Medical Services and Disaster Management: A Holistic Approach*. New Delhi: Jaypee Brothers Medical Publishers (P) Ltd., 2009
3. Narayan, B. *Disaster Management*, New Delhi: A.P.H. Publishing Corporation, 2009
4. Kumar, N. *Disaster Management*. New Delhi: Alfa Publications., 2009
5. Ghosh, G. K., *Disaster Management*. New Delhi: A.P.H Publishing Corporation., 2008
6. Goel, S. L., *Disaster Management*. New Delhi: Deep & Deep Publication Pvt. Ltd., 2008
7. Singh, R. B. *Disaster Management*. New Delhi: Rawat Publications., 2008.
8. Seetharaman, *Construction Engineering and Management*, Umesh Publications
9. CE & CR's Journals
10. NICMAR Publications

CM541: Research Methodology

Teaching Scheme			Credits	Marks Distribution		Total
L	T	P		Theory Marks	Practical Marks	

				ESE	CE	ESE	CE	Marks
1	-	2	3	70	30	30	20	150

Course Content:

Sr. No.	Topics	Teaching Hrs.
1	Introduction to research methodology	
2	Importance of research in decision Making	
3	Defining research problem and formulation of research problem	
4	Research designs: Exploratory, Descriptive, Experimental	
5	Data collection and measurement : Methods and techniques of data collection: Primary data through communication, Designing Questionnaire, Qualitative Research, sampling and sampling designs Attitude measurement and scales.	
6	Data presentation and analysis: Data processing, Univariate and Bivariate analysis, Correlational analysis ANOVA, Analysis of Associations, Multivariate analysis and data, Model building and decision making	
7	Report Writing and presentation: Content of reports, formatting of content, and presentation of reports.	

Reference Books:

1. C.R. Kothari, *Research Methodology - Methods and Techniques*, 2nd Edition, New Delhi, New Age International (P) Limited, 2003
2. Eileen M. Trauth, *Qualitative Research in IS: Issues & Trends*, USA/London: IDEA Group Publishing, 2001.