



KERALA TECHNOLOGICAL UNIVERSITY

ERNAKULAM – I CLUSTER

DRAFT

SCHEME AND SYLLABI

FOR

M. Tech. DEGREE PROGRAMME

IN

CONSTRUCTION ENGINEERING AND MANAGEMENT

(2015 ADMISSION ONWARDS)

SCHEME AND SYLLABI FOR M. Tech. DEGREE PROGRAMME IN CONSTRUCTION ENGINEERING AND MANAGEMENT

SEMESTER-1

Exam Slot	Course No:	Name	L- T – P	Internal Marks	End Semester Exam		Credits
					Marks	Duration (hrs)	
A	06CM6011	Foundation Engineering	4-0-0	50	50	3	4
B	06CM6021	Construction Engineering	4-0-0	50	50	3	4
C	06CM6031	Advanced Construction Management*	4-0-0	50	50	3	4
D	06CM6041	Applied Mathematics	3-0-0	50	50	3	3
E	06CM6X51	Elective I	3-0-0	50	50	3	3
	06CM6061	Research Methodology	1-1-0	100	0	0	2
	06CM6071	Seminar I	0-0-2	100	0	0	2
	06CM6081	Construction Planning Lab	0-0-2	100	0	0	1

Credits: 23

Elective I (06CM6X51)	
06CM6151	Advanced Concrete Technology**
06CM6251	Earthquake Resistant Design of Structures
06CM6351	Construction Equipments & Management*

* Common to Structural Engineering and Construction Management

** Common to Geo Mechanics and Structures & Structural Engineering and Construction Management

SEMESTER-II

Exam Slot	Course No:	Name	L- T – P	Internal Marks	End Semester Exam		Credits
					Marks	Duration (hrs)	
A	06CM6012	Contracts and Legal Aspects in Construction	4-0-0	50	50	3	4
B	06CM6022	Modern Construction Materials	3-0-0	50	50	3	3
C	06CM6032	Maintenance and Rehabilitation of Structures	3-0-0	50	50	3	3
D	06CM6X42	Elective II	3-0-0	50	50	3	3
E	06CM6X52	Elective III	3-0-0	50	50	3	3
	06CM6062	Mini Project	0-0-4	100	0	0	2
	06CM6072	Building Technology & NDT Lab	0-0-3	100	0	0	1

Credits: 19

Elective II - (06CM6X42)		Elective III- (06CM6X52)	
06CM6142	Advanced Construction Techniques	06CM6152	Ground Improvement Techniques
06CM6242	Materials Management	06CM6252	Design of Pre stressed Concrete Structures
06CM6342	Advanced Geotechnical Engineering	06CM6352	Quantitative Techniques in Construction Management*

* Common to Structural Engineering and Construction Management

SEMESTER-III

Exam Slot	Course No:	Name	L- T – P	Internal Marks	End Semester Exam		Credits
					Marks	Duration (hrs)	
A	06CM7X11	Elective IV	3-0-0	50	50	3	3
B	06CM7X21	Elective V	3-0-0	50	50	3	3
	06CM7031	Seminar II	0-0-2	100	0	0	2
	06CM7041	Research Project(Phase 1)	0-0-8	50	0	0	6

Credits: 14

Elective IV (06CM7X11)		Elective V (06CM7X21)	
06CM7111	Building services	06CM7121	Quality Management and Safety in Construction Engineering*
06CM7211	MIS & Finance Management	06CM7221	GIS in Construction Engineering and Management
06CM7311	Energy Efficient Building Construction	06CM7321	Disaster Management*

*Common to Structural Engineering and Construction Management

SEMESTER-IV

Exam Slot	Course No:	Name	L-T-P	Internal Marks	End Semester Exam		Credits
					Marks	Duration (hrs)	
	06CM7012	Research Project (Phase II)	0-0-21	100	0	0	12

Credits: 12

Total Credits for all semesters: 68

Course No.	Course Name	L-T-P Credits	Year of Introduction
06CM6011	FOUNDATION ENGINEERING	4-0-0-4	2015
COURSE OBJECTIVES This course provides a detailed study of different soil exploration and testing methods; guidelines to the design of different types of foundations and earth retaining structures.			
SYLLABUS Soil exploration and testing methods-design of shallow foundations-pile foundations-settlement-design and construction techniques of wells, caissons and sheet piles			
EXPECTED OUTCOME Students will be able to understand and analyze different soil exploration and testing methods and analyze, design and construct different foundations and earth retaining structures			
TEXT BOOKS & REFERENCES: <ol style="list-style-type: none"> 1. Bowles JE, Foundation analysis and design, Mc Graw Hill 2. G.A.Leonards, Foundation Engineering-Mc Graw Hill Book Co. 3. Gopal Ranjan & ASR Rao, Basic applied Soil Mechanics, New Age International publishers 4. N.P.Kurian, Design of foundation systems, Narosa Publishing House, Madras 5. W.C.Teng. Foundation Design-Prentice Hall of India Pvt. Ltd, New Delhi 6. Tomlinson M.J Pile design and construction practice-Point Publications, London 7. Coduto, D., Foundation Design: Principles and Practices, Prentice Hall India, New Delhi 			
COURSE PLAN			
MODULE	CONTENTS	HOURS	SEM. EXAM MARKS
I	Soil Exploration and testing: Methods of exploration-Boring-Bore log-Standard penetration Test-Field Vane shear Test-Static Cone Penetration Test-Dynamic Cone penetration tests-Field CBR Test-Plate Load Test-Pressure meter-Geophysical Method	12	25

II	<p>Shallow Foundations-Types -criteria to be considered for satisfactory Performance-Design of strip footings, strap footings, combined footings and raft foundations</p> <p>Bearing Capacity-Ultimate bearing capacity and allowable soil pressure- Terzaghis equation- Skemptions formula-effects of water table.</p> <p>Settlement of foundations-immediate settlement – consolidation settlement-Total and differential settlement-causes –permissible settlements</p>	15	25
III	<p>Pile foundations-classifications of piles-Factors governing the choice of piles –Determination of pile capacity-Static formulae, Dynamic formulae, cone penetration tests, Pile load tests-Negative skin friction-pile spacing and group action-settlement analysis</p>	14	25
IV	<p>Wells and Caissons- types of well foundations-Depth of wells-bearing capacity-Design and construction of wells and caissons –sinking of wells</p> <p>Sheet piles-Common type of sheet piles -common types and use of sheet piling walls-Lateral pressure acting on sheet piling walls-Design of cantilever sheet piling walls – Design of anchored sheet piles-construction of sheet piling walls</p>	15	25
END SEMESTER EXAM			

Course No.	Course Name	L-T-P Credits	Year of Introduction
06CM6021	CONSTRUCTION ENGINEERING	4-0-0-4	2015
COURSE OBJECTIVES The course provides thorough knowledge of material selection, different construction procedures of major activities and inspection and submission of reports.			
SYLLABUS: Construction Inspection, Construction dewatering, Construction Materials, Equipments for inspection, Polymer materials in construction			
EXPECTED OUTCOME On completion of this course the students will gain knowledge about the materials, construction procedures and inspection for quality.			
TEXT BOOKS & REFERENCES: 1. W.J Patton, Construction Materials, Prentice Hall PTR, 1975 2. R.N.Swamy, New concrete Materials, Blackie Academic & Professional (an Imprint of Chapman & Hall); First edition 1983 3. James J.O Brien, Construction Inspection Hand book. Springer 1997 edition 4. Rangwala S C, Building Construction, Charotar Publishing House Pvt. Ltd 5. B C Punmia, building construction, Laxmi Publication, 2008 6. Shetty M., Concrete Technology: Theory and Practice, S. Chand & Company Ltd., 2005.			
COURSE PLAN			
MODULE	CONTENTS	HOURS	SEM. EXAM MARKS
I	Construction materials and their characteristics- Rock and soil-cement and concrete- New concrete materials - Sulphur Concrete - Expanded polystyrene concrete-Jet concrete or ultra-rapid hardening concrete –Use of waste materials-and industrial by products in concrete construction- Precast concrete products. Polymer materials in construction –foamed plastics- sealants and	18	25

	sealers- Adhesives and surface finishes.		
II	Erection and earth work equipments-loads created by construction equipments-concrete formwork-practical assumptions regarding pressure of concrete-Form work calculations-construction and use of formwork-form work for mass concrete, thin walls columns, slabs and tunnels. Formulae for reactions, moments and deflections for different loading conditions –Access scaffolding – Temporary bracing and guying.	18	25
III	Construction dewatering, caissons and cofferdams-temporary sheeting and bracing-underground construction supports-underpinning and shoring-demolishing operation and equipment	10	25
IV	Inspection and quality control-Role of Inspection-Anatomy of a project contract document-Modality of inspection and writing out reports. Equipments for inspection- site record- Testing of materials- Preparation of bills.	10	25
END SEMESTER EXAM			

Course No.	Course Name	L-T-P Credits	Year of Introduction
06CM6031	ADVANCED CONSTRUCTION MANAGEMENT*	4-0-0-4	2015
COURSE OBJECTIVES To impart knowledge on basic principle of management and construction organization. To enable students to apply techniques of project planning, scheduling and control. To provide knowledge on construction cost control and construction project economics. To impart knowledge on construction, resource management.			
SYLLABUS: Scientific Management and MIS-Basic principles of management with special reference to construction industry-Management information systems - Network Construction in Techniques-network diagram -scheduling- Engineering Economics-Cash flow -benefit cost analysis - Resource Management-Personnel management-resource management.			
EXPECTED OUTCOME Students will acquire knowledge on basic principles of management about various project management techniques for the completion of construction projects.			
TEXT BOOKS & REFERENCES: <ol style="list-style-type: none"> 1. Stevens JD, Techniques for construction network scheduling, Mc Graw Hill publishing Company 2. R.L. Purifoy-Construction planning Equipment and methods. 3. J.A. Havers-Hand book of heavy construction. 4. Prassanna Chandra, Projects-Planning, Analysis, Selection, Financing, Implementation and Review, Tata McGraw-Hill Education private limited. 5. R Paneerselvam., Engineering Economics, PHI Learning Private Limited, New Delhi. 6. B L Gupta & Amit Gupta., Construction management and machinery, Standard publishers Distributors, Delhi. 7. P. Gopalakrishnan & M. Sundaresan, Materials Management an integrated approach. 8. Louis A Allen, Management and organization 9. H.N. Ahuja, Construction performance control by network 			

COURSE PLAN			
MODULE	CONTENTS	HOURS	SEM. EXAM MARKS
I	<p>Scientific Management and MIS</p> <p>Concept – Elements - Contributions of pioneers in scientific Management - Basic principles of management with special reference to construction industry.</p> <p>Management information systems – definition – evolution – organizational theory – systems approach – database management – information systems for decision making - MIS effectiveness and efficiency criteria</p>	14	25
II	<p>Network Construction in Techniques</p> <p>Introduction – planning – work scheduling – work break down structure - network diagram – PERT/CPM techniques – precedence networks – least cost scheduling – resource allocation – updating – application of network techniques – related problems.</p>	14	25
III	<p>Engineering Economics</p> <p>Cash flow – interest formulas and applications – time value of money – bases of comparison – decision making amongst alternatives – rate of return – replacement analysis – break even analysis – incremental analysis – benefit cost analysis - problems and case studies.</p>	16	25
IV	<p>Resource Management</p> <p>Personnel management: Personnel principles – Organization - principles of organization - construction organization setup - plan of control-organization charts - managerial staffing-recruitment-selection-placement, training and development.</p> <p>Resource management: Basic concept – Labour requirements – Labour productivity – site productivity – Equipment Management – Material management.</p>	12	25
END SEMESTER EXAM			

Course No.	Course Name	L-T-P Credits	Year of Introduction
06CM6041	APPLIED MATHEMATICS	3-0-0-3	2015
COURSE OBJECTIVES: Students will be able to understand the statistical concepts and design of experiments and its applications in Engineering.			
SYLLABUS: Statistical Inference, Fitting regression models , Analysis of variance, Types of Design			
EXPECTED OUTCOME: To apply the knowledge of statistical inference and design of experiments in respective areas.			
TEXT BOOKS & REFERENCES: 1. Montgomery DC, Design and analysis of Experiments, John Wiley & Sons Inc. 2. Das M.N and Giri N.C (1979), Design and analysis of experiments, 2 nd edition, Wiley 3. Rao C.R(1973) Linear Statistical Inference and its Applications, Wiley 4. Montgomery DC, Peck E A and Vining G.G (2001), Introduction to Regression Analysis, 3 rd edition, Wiley.			
COURSE PLAN			
MODULE	CONTENTS	HOURS	SEM. EXAM MARKS
I	Statistical Inference: Basic statistical concepts, Binomial, Poisson and Normal distribution, Sampling distributions, Confidence Intervals, Testing of hypothesis –hypothesis concerning mean, variance , paired t test, Chi Square test of goodness of fit.	10	25
II	Fitting regression models: Curve fitting, Principle of Least Squares, Linear regressions models – estimation of parameters in linear regression models – hypothesis testing in multiple regression – confidence interval in multiple regression, Linear, Partial and Multiple Correlations (two and three variables only).	12	25

III	Analysis of variance: Introduction to design of experiments Basic Principles of experimentation, Fixed and Random effect model- model adequacy checking, Analysis of one way and two way classification- derivation and problems.	10	25
IV	Types of Design: Completely Randomised Design, Randomised Block Design, Latin Square Design, Graeco -Latin Square Design, Balanced Incomplete Block Designs (BIBD). Factorial Experiments- Two factor factorial design, general factorial design, Blocking and confounding in factorial design.	10	25
END SEMESTER EXAM			

Course No.	Course Name	L-T-P- Credits	Year of Introduction
06CM6151	ADVANCED CONCRETE TECHNOLOGY**	3-0-0-3	2015
COURSE OBJECTIVES: <ol style="list-style-type: none"> 1. To impart knowledge of cement hydration and its microstructure. 2. To impart knowledge on how to use various chemical admixtures and mineral additives to design various types of concrete. 3. To understand the properties of various special concrete and its application. 4. To understand the mix design of concrete. 			
SYLLABUS Concrete materials, Admixture in concrete, Performance of concrete, Special concretes Durability of concrete, Mix design.			
EXPECTED OUTCOME On completion of the course, the students shall attain knowledge on the fundamental concepts of cement hydration and its microstructure. The student shall acquire knowledge of various admixtures used in concrete and how to use it. The student will be able to design mix proportion of concrete.			
TEXT BOOKS & REFERENCES: <ol style="list-style-type: none"> 1. Metha, P.K. and Monteiro, P.J.M, Concrete, Microstructure, Properties and Materials, Fourth Edition, Tata McGraw- Hill Publishing company Limited, New Delhi, 2006. 2. Gambhir, M.L., Concrete Technology, Third edition, Tata McGraw-Hill Education, 2004. 3. Santhakumar, A.R., Concrete Technology, First edition, Oxford University Press India, 2006. 4. Neville, A.M. and Brooks, J.J., Concrete Technology, Pearson Education India, 2008 5. IS 10262-2009, Recommended guidelines for concrete mix design. <p>Note: Relevant IS codes are permitted.</p>			
Course Plan			
Module	Contents	Hours	Sem. Exam Marks
I	Concrete materials: Chemical Composition of OPC --	10	

	Hydration process of Portland cement - Structure of hydrated cement paste - Interfacial transition zone – Significance of interfacial transition zone –special cements – Testing of cement and aggregates- requirements and quality of water for concreting.		25
II	<p>Admixture in concrete: Supplementary cementitious materials (SCM) – Silica fume – Fly ash – Ground granulated slag – Rice husk ash – metakaolin – Chemical admixtures – Normal water reducers and high range water reducers – Air entraining admixtures – Miscellaneous admixtures.</p> <p>Performance of concrete: Properties of fresh concrete and hardened concrete - Strength –Elastic properties - Shrinkage - Creep – Rheological behavior of fresh concrete – Modified slump test.</p>	10	25
III	<p>Special concretes: Structural light weight concrete – applications - High strength concrete – significance, materials used - Self compacting concrete – significance, materials used and testing of SCC – Fiber reinforced concrete – mechanics of fiber pull out – toughening and strengthening mechanism - application of FRC – Concrete containing polymers – polymer concrete – latex modified concrete – polymer impregnated concrete – applications - Roller compacted concrete.</p> <p>Special concreting methods: General method of transporting concrete – Concrete pumping- Methods of curing and compaction -Vacuum dewatering process - Extreme weather concreting - Underwater concreting.</p>	12	25

IV	<p>Durability of concrete: Sulphate attack – Alkali aggregate reaction – Effect of fire on concrete - Corrosion of steel in concrete – Control of corrosion.</p> <p>Mix design: Factors affecting mix proportion –Variability of concrete strength – Statistical quality control – Sampling and acceptance criteria – Mix design of normal strength concrete by BIS 10262:2009 – Basic considerations in the mix proportioning of high strength concrete, fiber reinforced concrete and self compacting concrete..</p>	10	25
END SEMESTER EXAM			

Course No.	Course Name	L-T-P Credits	Year of Introduction
06CM6251	EARTHQUAKE RESISTANT DESIGN OF STRUCTURES	3-0-0-3	2015
COURSE OBJECTIVES: <ol style="list-style-type: none"> 1. To impart the fundamentals of earthquake motion and the factors influencing and controlling the response of structural members to earthquake loads. 2. To learn the effects of dynamic loading on structures. 3. To design reinforced concrete and masonry structures against earthquake loading. 			
SYLLABUS: Earthquake Ground Motion, Building Characteristics, Earthquake Resistant Design of RC structures and masonry buildings as per IS 13920.			
EXPECTED OUTCOME: Student will be able to: <ol style="list-style-type: none"> 1. Evaluate the effect of earthquake motion in structures. 2. Analyse different RCC structures subjected to seismic forces as per Indian Standards. 3. Design Reinforced Concrete and masonry structures for seismic loads. 			
TEXT BOOKS & REFERENCES: <ol style="list-style-type: none"> 1. Agrawal P and Shrikhade M, Earthquake resistant design of structures, Prentice Hall of India Pvt Ltd. 2. Duggal, Earthquake resistant Design of Structures, Oxford University Press 3. Park R and Paulay T, Reinforced concrete structures, John Wiley. 			
COURSE PLAN			
MODULE	CONTENTS	HOURS	SEM. EXAM MARKS
I	Earthquake Ground Motion: Causes of Earthquakes and Seismic Waves; Measurement of Earthquakes and Measurement parameters. Seismic zones in India-strong motion-source effect-path effect-site effect-use of strong motion data; strong motion characteristics- Concept of Response Spectrums of Earthquake, design spectrum. Earthquake and vibration effect on structures: static and	10	25

	dynamic equilibrium-structural modelling-seismic methods of analysis-seismic design methods		
II	<p>Building Characteristics-Mode shapes & fundamental period, Building frequency & ground period, Damping, Ductility, Seismic weight, Hyperstaticity, Non structural elements, foundation soil/Liquefaction, foundations-Quality of construction & materials</p> <p>Ductility considerations in earthquake design: impact of ductility-requirements for ductility – assessment of ductility-factors affecting ductility- ductile detailing as per IS 13920</p>	10	25
III	<p>ERD of RC frame as per IS 13920: preliminary data required-loading data-analysis of frame:</p> <p>Dead load-live load-earthquake load; load combinations-design of structural members-flexure Members-exterior column-interior column-detailing of reinforcements</p> <p>ERD of shear wall as per IS 13920: determination of design loads-design of shear wall-detailing of reinforcements</p>	12	25
IV	<p>ERD of masonry buildings: design lateral load-wall rigidities- torsional forces-increase in axial load due to overturning –pier loads, moments and shear-design for axial load and moment-design for shear</p>	10	25
END SEMESTER EXAM			

Course No.	Course Name	L-T-P Credits	Year of Introduction
06CM6351	CONSTRUCTION EQUIPMENTS AND MANAGEMENT*	3-0-0-3	2015
COURSE OBJECTIVES: To give an idea about the different types of equipments used for various construction activities; their applications in construction projects and the efficient utilization of the same using some scientific principles.			
SYLLABUS: Equipment cost analysis, Tractors, Bulldozers , Scrapers, Cranes, Excavating equipment, Clamshells, Trucks and wagons, Loaders, Hydraulic excavator, ripper, Engineering fundamentals of moving earth.			
EXPECTED OUTCOME: At the end of this course students will be able to understand various types of equipments used in the constructions projects. Also students will learn the strategies and techniques of planning, selecting and other aspects of managing various construction equipments.			
TEXT BOOKS & REFERENCES: <ol style="list-style-type: none"> 1. Sharma S.C. Construction Equipment and Management, Khanna Publishers, New Delhi, 1988. 2. Peurifoy RL, Ledbetter WB, Schexnayder CJ, Construction planning, equipment and methods, McGraw Hill International editions 3. J.A.Havers, Handbook of Heavy constructions 4. Deodhar, S.V., Construction Equipment and Job Planning, Khanna Publishers Delhi, 2008 5. Dr. Mahesh Varma, Construction Equipment and its planning and application, Metropolitan Book Company, New Delhi, 2003. 			
COURSE PLAN			
MODULE	CONTENTS	HOURS	SEM. EXAM MARKS
I	Equipment cost analysis: ownership cost – depreciation accounting – operation cost – economic life of construction equipment – equipment replacement calculations Engineering fundamentals of moving earth: material	8	25

	properties – payload – haul route – rolling resistance – influence factors – drawbar pull – rimpull – power output and torque – performance chart		
II	Tractors and related equipment: tractor uses – type – performance characteristics of tractors; Bulldozers – blades – bulldozer production estimating; Clearing land: land clearing operations – types of equipment used – clearing techniques – land clearing production estimating – land clearing production study. Ripping rock: rippability of rock – speed of sound waves in rock – ripper attachments – economy of ripping – estimating ripping production.	8	25
III	Scrapers: scraper types – scraper operation – scraper performance chart – cycle time of scraper – operating efficiency and production – push tractors required – increasing scraper production – scraper load growth curve – rolling resistance and scraper production – scraper performance calculation Cranes: crawler cranes – hydraulic truck cranes – all-terrain truck cranes – heavy lift crane – modified crane for heavy lift – tower cranes – crane booms – lifting capacities of crane – rated loads – rated loads for hydraulic cranes – rated loads for tower cranes – working ranges of cranes	10	25
IV	Excavating equipment: Dragline: types – size – parts and operation – output – optimum depth of cut – effect of depth of cut and swing angle on dragline output – effect of bucket size and boom length on dragline production – effect of material class on cost of excavating; Clamshells: buckets – production rates of clamshell; Hydraulic excavator: front shovels – size – parts and operation – selection – shovel production – effect of angle of swing on shovel production –	16	25

	production efficiency factor – hoes – basic parts and operation of a hoe – bucket rating for hydraulic hoes – hoe operating efficiency – hoe operating efficiency and production – gradalls. Loaders: types and sizes – bucket rating for loaders – operating specifications – production rates for wheel loaders – production rates for track loaders. Trucks and wagons: trucks – rear dump trucks – bottom dump wagons – capabilities for truck and wagons – balancing capacities of hauling units with excavator size – factors influencing the cost of hauling.		
END SEMESTER EXAM			

Course No.	Course Name	L-T-P Credits	Year of Introduction
06CM6061	RESEARCH METHODOLOGY	1-1-0-2	2015
COURSE OBJECTIVES: <ol style="list-style-type: none"> 1. To understand the various research concepts. 2. To understand how to define and formulate the research problem and the importance of literature survey in the formulation of research task. 3. To understand the basic concept of mathematical modelling. 4. To develop an awareness about the structure of a thesis report and research ethics. 			
SYLLABUS: Research concepts and motivation, formulation of research task, mathematical modelling, report writing.			
EXPECTED OUTCOME: The students will be able to <ol style="list-style-type: none"> 1. Develop an understanding about the factors involved in formulating a good research problem. 2. Develop the format of a typical thesis report. 			
TEXT BOOKS & REFERENCES: <ol style="list-style-type: none"> 1. J W Bames, Statistical Analysis for Engineers and Scientists, McGraw Hill, New York 2. Schank Fr., Theories of Engineering Experiments, Tata McGraw Hill Publication. 3. C.R. Kothari, Research Methodology, New Age Publishers. 4. WillktnsionK. L, Bhandarkar P. L, Formulation of Hypothesis, Himalaya Publication. 			
COURSE PLAN			
MODULE	CONTENTS	HOURS	SEM. EXAM MARKS
I	Research Concepts – concepts – meaning – objectives – motivation. Types of research – descriptive research – conceptual research – theoretical research – applied research – experimental research. Research process – Criteria for good research – Problems encountered by Indian researchers.	5	25
II	Formulation of Research Task – Literature Review – Importance & Methods – Sources – Quantification of	7	25

	Cause effect Relations – Discussions – Field Study – Critical Analysis of Generated Facts – Hypothetical proposals for future development and testing, selection of Research task. Case studies		
FIRST INTERNAL EXAM			
III	Mathematical modeling and simulation – Concepts of modeling – Classification of mathematical models – Modeling with – Ordinary differential equations – Difference equations – Partial differential equations – Graphs – Simulation – Process of formulation of model based on simulation.	11	25
IV	Interpretation and report writing – Techniques of interpretation – Precautions in interpretation – Significance of report writing – Differential steps in report writing – Layout of research report – Mechanics of writing research report – Layout and format – Style of writing – Typing – References – Tables – Figures – Conclusion – Appendices.	5	25
SECOND INTERNAL EXAM			

Course No.	Course Name	L-T-P Credits	Year of Introduction
06CM6071	SEMINAR I	0-0-2-2	2015
SYLLABUS <p>Students have to register for the seminar and select a topic in consultation with any faculty member offering courses for the programme. A detailed write-up on the topic of the seminar is to be prepared in the prescribed format given by the Department. The seminar shall be of 30 minutes duration and a committee with the Head of the department as the chairman and two faculty members from the department as members shall evaluate the seminar based on the coverage of the topic, presentation and ability to answer the questions put forward by the committee.</p>			

Course No.	Course Name	L-T-P Credits	Year of Introduction
06CM6081	CONSTRUCTION PLANNING LAB	0-0-2-1	2015
<p>COURSE OBJECTIVES</p> <p>This course is designed to give the students an exposure to the utilization of sophisticated softwares for the development of plan, schedule, design and modeling of any civil engineering project.</p> <p>LIST OF EXERCISES</p> <p>Students are expected to know how to plan, design, model and schedule a civil engineering project. They will be instructed of using available computer softwares. Each student will be assigned a term project and shall develop a plan using AUTOCAD, 3D model using REVIT, analyze and design using STAAD and provides project and program management through schedule using PRIMAVERA. Students are expected to learn the basics of BIM for 3D digital model visualization.</p> <p>Project work in the lab includes:</p> <ol style="list-style-type: none"> 1. Development of CAD drawing of multi-storeyed building using AUTOCAD 2. Modelling the building using REVIT 3. Analysis & Design the structure using STAAD PRO 4. Scheduling and project planning using PRIMAVERA. 5. Development using BIM for 3D digital model visualization. 			

Course No.	Course Name	L-T-P Credits	Year of Introduction
06CM6012	CONTRACTS AND LEGAL ASPECTS IN CONSTRUCTION	4-0-0-4	2015
COURSE OBJECTIVES: To provide an overview of all laws and legal procedures related to construction projects in various stages of project cycle.			
SYLLABUS: Indian Contract act: Tendering and contract information: Law of Torts-Contractor's obligation-time-payment-Contractor's claim for loss and expenses-subcontracting-Financial remedies for breach of contract: Non-adversarial dispute resolution: nature – role of contract administrator – dispute resolution; adversarial dispute resolution			
EXPECTED OUTCOME: Students will be able to apply these laws and legal procedures to deal with the issues in construction industry. Also they will acquire knowledge on formulating and managing construction contracts.			
TEXT BOOKS & REFERENCES: <ol style="list-style-type: none"> 1. Murdoch J R, Hughes W, Construction contracts: Law and Management, Spon Press Taylor and Francis series. 2. John G. Betty., Engineering Contracts, McGraw Hill, 2003 3. Avatar Singh, Law of contracts & Specific Relief, Eastern Book Co. 4. M Krishnan Nair, Law of contracts, Orient Longman 5. Patil, B.S., Building and Engineering Contracts, Mrs. S.B. Patil, Pune. 6. Gajaria G.T., Laws Relating to Building and Engineering Contracts in India , M.M.Tripathi Private Ltd., Bombay, 1982 			
COURSE PLAN			
MODULE	CONTENTS	HOURS	SEM. EXAM MARKS
I	Indian Contract act: elements of contracts –types of contracts - use – characteristics – risks – design and build contracts – management contracts – construction management contracts. Tendering and contract information: meaning of construction contracts – contracts by agreement – contracts by tender; Liability in contract and tort: Law of Torts-express terms –	15	25

	exception clauses – incorporation by reference – implied terms – liability in tort for negligence.		
II	Contractor's obligation: standard work – statutory obligations – coordination and management – transfer of materials. Employer's obligation: Implied obligation – responsibility of contract administrator – responsibility of site condition – health and safety. Time: commencement – progress – completion – contractor's obligation after completion – extension of time. Payment: employer's obligation to pay – the contract sum – variation – fluctuations – retention money.	15	25
III	Contractor's claim for loss and expenses: contract claims and damages – ground for contractual claims – claims procedure – qualification of claims. Insurance – bonds – guarantees. Sub-contracting: reasons – legal basis – domestic sub contracts – defaults – right – employer's selection of sub contractors – selection procedure.	12	25
IV	Financial remedies for breach of contract: general damages – liquidated damages – quantum merit claims – Non-adversarial dispute resolution: nature – role of contract administrator – dispute resolution; adversarial dispute resolution: adjudication – arbitration – litigation. Specifications and drawings.	14	25
END SEMESTER EXAM			

Course No.	Course Name	L-T-P Credits	Year of Introduction
06CM6022	MODERN CONSTRUCTION MATERIALS	3-0-0-3	2015
COURSE OBJECTIVES: To study and understand the properties, behavior and use of modern construction materials such as metals, timber, polymers, in construction.			
SYLLABUS: Metals, structure of metals, behaviour of metals at service, Timber: Structure, properties and use of timber, seasoning, Polymers: Molecular structure, Properties, behaviour, Polymers in civil engineering.			
EXPECTED OUTCOME: The students will have the knowledge of modern construction materials to be used in the field.			
TEXT BOOKS & REFERENCES: <ol style="list-style-type: none"> 1. Neil Jackson and Ravindra K. Dhir, Civil Engineering Materials, McMillian Press Ltd, London 2. Askeland and Phule , The science and engineering of materials – Thomson Brooks/ cole 3. Young JF, Mindess S, Gray RJ and Bentur A., The science and technology of civil engineering of materials, Prentice Hall international Inc. 4. Ashby, M.F. and Jones.D.R.H.H., Engineering Materials 1: An introduction to Properties, applications and designs”, Elsevier Publications, 2005. 5. Deucher, K.N, Korfiatis, G.P and Ezeldin, A.S, Materials for civil and Highway Engineers, Prentice Hall Inc., 1998. 6. Mamlouk, M.S. and Zaniewski, J.P., Materials for Civil and Construction Engineers, Prentice Hall Inc., 1999. 7. Shan Somayaji, Civil Engineering Materials, Prentice Hall Inc., 2001 8. Job Thomas , Learning, Concrete Technology, CENGAGE New Delhi, 1/e, 2015 			
COURSE PLAN			
MODULE	CONTENTS	HOURS	SEM. EXAM MARKS

I	Metals: Structure of Metals – atomic structure and bonding – crystalline structure of metals – interstitial sites in crystals – Deformation of Metals – elastic deformation – plastic deformation – dislocations and point of defects – polycrystalline metals – Strengthening Mechanisms - alloy and phase diagram – strain hardening and recrystallisation – solution strengthening – eutectics – dispersion strengthening – dispersion strengthening- eutectoids and Fe-C phase diagram – heat treatments in steels	10	25
II	Behaviour of metals at service – failure by yielding – tensile test – failure by fracture – effect of temperature and strain rate – fatigue of metals – creep and relaxation – corrosion – corrosion protection – role of non-destructive testing – Metals in Construction – Wrought steels – steel and iron castings – Aluminium and its alloys – copper and its alloys – non-ferrous metals – principle of metal joining- fusion welding – weld ability and avoiding defects	10	25
III	Timber: Structure of wood – classification of trees – growth of structures – cross sectional features of trunk – cell types and functions – cell structure and chemistry – structure , properties and use of timber – Production of solid timber section – conversion of timber – seasoning – stress grading – defects in timber – grade stresses – and strength classes – Durability of Timber – natural durability – insect damages – marine borers – fungal growths – preservative treatment – timber in fire – Processed timber products – sheet materials – glued – laminated sections.	10	25
IV	Polymers: Molecular structure – thermoplastic, thermosets, elastomers and gels – polymer solid state – polymerization reaction – compounding of polymer materials: polymer additives – processing method for	12	25

	thermoplastics – thermoset processes – cellular polymers – impermeable membranes – textiles – permeable membranes – polymer emulsion – Properties of polymeric materials – density – mechanical behaviour of materials – density - mechanical behaviour of polymers – thermal properties – permeability – durability – toxicity – Polymers in civil engineering – structural plastics and composites – pipe – polymer membranes – coatings – adhesives – polymer concretes		
END SEMESTER EXAM			

Course No.	Course Name	L-T-P Credits	Year of Introduction
06CM6032	MAINTENANCE AND REHABILITATION STRUCTURES	3-0-0-3	2015
COURSE OBJECTIVES: <ol style="list-style-type: none"> 1. To introduce the concepts of repair, retrofitting, rehabilitation and restoration and to identify the damages occurring during construction. 2. To provide a comprehensive knowledge on the diagnosis, assessment and material applications related to maintenance and rehabilitation of structures. 			
SYLLABUS: Damages occurring during construction, Investigation and diagnosis, concrete repair materials and methods, polymers for concrete repair, repairs to cracked concrete, sprayed concrete, large volume repairs, protective coatings.			
EXPECTED OUTCOME: Students will be able to acquire knowledge about various retrofitting and rehabilitation techniques to be adopted in the field of work.			
TEXT BOOKS & REFERENCES: <ol style="list-style-type: none"> 1. Allen RTL, Edwards SC and Shaw JDN, Repair of concrete structures, Taylor & Francis 2. Agarwal P & Shrikahande M, Earthquake resistant design of structures, Prentice Hall of India Pvt Ltd. 3. A. R Santhakumar, Concrete technology, Oxford University Press, New Delhi. 			
COURSE PLAN			
MODULE	CONTENTS	HOURS	SEM. EXAM MARKS
I	Damages occurring during construction: Cracks- surface texture defects- color variation surface blemishes- lack of cover. Investigation and diagnosis: causes of defects – investigation- assessment. Concrete repair materials and methods: Portland cement- high alumina cement- aggregate- column or beam jacketing.	10	25
II	Polymers for concrete repair: polymer modified cementation systems- resin repair mortars- properties of	10	25

	<p>polymer based repair materials- polymer bonding aids- repair of cracks/ resin injection- external bonding of steel plates – polymer impregnation.</p> <p>Repairs to cracked concrete: purpose- classification- cracks with and without further movement expected- vacuum impregnation.</p> <p>Hand applied repair of spalled concrete: preparation – choice of material – cement based – resin based- curing</p>		
III	<p>Sprayed concrete: Dry and wet process – plants and equipments – properties – specification – requirements- quality control – workman ship – practical aspects.</p> <p>Large volume repairs: preparation – form work – mix design – placing and compacting – grouted aggregate construction – curing.</p> <p>Leak sealing: site investigation- conventional methods – surface seals – liquid flow and pressure consideration – sealing from downstream side – injection techniques – equipments and materials – methods in tunnels or pipelines</p>	12	25
IV	<p>Protective coatings in concrete repair and maintenance: need – types- surface preparation – methods of paint application – selection of protective coating</p> <p>Underwater repair: preparation – patch repair – injection – large scale placement.</p> <p>Concrete floors: causes of defects – floor slabs – screeds- toppings.</p>	10	25
END SEMESTER EXAM			

Course No.	Course Name	L-T-P- Credits	Year of Introduction
06CM6142	ADVANCED CONSTRUCTION TECHNIQUES	3-0-0-3	2015
COURSE OBJECTIVES To study and understand the advanced construction techniques applied to engineering construction of substructure, superstructure, tunnelling and modular construction practices.			
SYLLABUS Substructure Construction , Super Structure Construction, Tunnelling, Bridge Construction, Domes, Modular Construction Practices			
EXPECTED OUTCOME On completion of the course, the student will get knowledge on modern construction techniques to be applied in construction of high rise buildings and special structures.			
TEXT BOOKS & REFERENCES: <ol style="list-style-type: none"> 1. Robertwade Brown, Practical foundation engineering hand book, McGraw Hill Publications 2. Patrick Powers. J., Construction Dewatering: New Methods and Applications, John Wiley & Sons 3. Jerry Irvine, Advanced Construction Techniques, CA Rocketr, 1984 4. Sankar, S.K. and Saraswati, S., Construction Technology, Oxford University Press, New Delhi, 2008 5. Allen E, Iano, J, Fundamentals of Building Construction subscription E Book, Material and Method, John Wiley and Sons, 2011. 6. Cameron K. Andres, Ronald C. Smith, Principles and Practices of Commercial Construction, 8th Ed., Prentice Hall, 2009. 7. Mehta, Madan, Scarborough, Walter, and Amrpreist, Diane. Building Construction – Principles, Materials, and Systems 8. Mindass and Young, “Concrete”, Prentice Hall.1998. 9. Aitcin – “High performance concrete”, McGraw Hill, 2009. 			
Course Plan			
Module	Contents	Hours	Sem. Exam Marks
I	Substructure Construction - Box Jacking, Pipe Jacking, Diaphragm Walls, Sheet Piles, Piling Techniques, Well and Caissons, Cofferdam, Vibroflotation, Cable	10	25

	Anchoring, Screw Anchor, Grouting, Guniting and Shotcreting. Large Reservoir Construction - Well Points - Dewatering and Stand by Plant Equipment for Underground Open Excavation, Underpinning.		
II	Super Structure Construction-Vacuum Dewatering of Concrete Flooring – Concrete Paving Technology – Techniques of Construction for Continuous Concreting Operation in Tall Buildings of Various Shapes and Varying Sections – Launching Techniques – Slip Form Techniques-Suspended Form Work – Erection Techniques of Tall Structures, Large Span Structures – Launching Techniques for Heavy Decks – Insitu Prestressing in High Rise Structures, Aerial Transporting Handling Erecting Lightweight Components on Tall Structures.	12	25
III	Tunneling: Purpose – Aspects – Shafts – Mucking – Construction Techniques – Advantages – Trenchless Technology. Tunneling methods: Drill and blast method, Tunnel boring machine, NATM. Bridge Construction: Bow String Bridges: Systems – Arrangements – Advantages. Suspension and Cable Stayed Bridges: Parallel – Radial Patterns; Domes: Types – Structural Framing – Erection Methods.	10	25
IV	Modular Construction Practices: Introduction to Modular Construction, Modular coordination, Modular Standardization, Modular System Building, Limitation and Advantages of Modular Construction	10	25
END SEMESTER EXAM			

Course No.	Course Name	L-T-P Credits	Year of Introduction
06CM6242	MATERIALS MANAGEMENT	3-0-0-3	2015
COURSE OBJECTIVES: To acquire knowledge and skills necessary for the efficient management of construction materials at construction site and stores.			
SYLLABUS: Material Management, Materials Management Techniques, Purchasing Management, Supply Management, Store Management, Inventory Management, Scrap Management.			
EXPECTED OUTCOME: Students will learn the strategies and techniques of planning, selecting and other aspects of managing the construction materials.			
TEXT BOOKS & REFERENCES: <ol style="list-style-type: none"> 1. A K. Datta, Materials Management: Procedures, Text and Cases, PHI Learning Pvt. Ltd., 2004. 2. Arnold, Introduction To Materials Management, Pearson Education India, 2009 3. Richard J. Tersine , Principles Of Inventory And Materials ,Management, Prentice Hall, 1994 4. Richard J. Tersine, Modern Materials Management, John Hardin Campbell - 1977 5. P. Gopalakrishnan, Handbook of Materials Management, PHI Learning Pvt. Ltd. 2004 			
COURSE PLAN			
MODULE	CONTENTS	HOURS	SEM. EXAM MARKS
I	Material Management– Functions And Principles Of Material Handling-Conventional And Modern Approaches -Materials Identification – Codification Of Materials – Standardization And Simplification Of Materials- Materials Management Techniques- Forecasting Material Price- Materials Management System Concept.	10	25
II	Purchasing Management – Norms Of Vendor Rating –	12	

	Purchase Budget – Purchasing Procedures And Methods – Legal Aspects – Insurance Of Materials – Supply Management – Sources Of Supply – Out Sourcing Material Management- Procurement Planning - International Buying And Import Purchasing- Governmental Purchasing Practices And Procedures- Purchasing And Quality Assurance- Incoming Material Quality Control.		25
III	Store Management-Storing Of Materials -Management Of Stores –Store Accounting- Stock Verification – Types Of Stores – Methods Of Storing –Materials Handling Equipment – Stores System And Logistics - Stores Management And Operation.	10	25
IV	Inventory Management- Inventory Control- Inventory Management And Control Systems-Materials Accounting, Flow of Costs And Inventory Valuation, Physical Verification, Security And Materials Audit - Scrap Management- Regulations And Procedures- Case Studies	10	25
END SEMESTER EXAM			

Course No.	Course Name	L-T-P Credits	Year of Introduction
06CM6342	ADVANCED GEOTECHNICAL ENGINEERING	3-0-0-3	2015
COURSE OBJECTIVES: <ol style="list-style-type: none"> 1. To understand the different types of clay minerals. 2. To learn the theory behind one dimensional and three dimensional consolidation. 3. To familiarise with various tests used to determine shear strength of soil. 4. To classify the different materials used in reinforced soil structures. 			
SYLLABUS: Origin of soils, Soil fabric, theory of one dimensional consolidation, three dimensional consolidation design of sand drains, compaction, Shear strength: shearing strength of granular soils, Shear strength of cohesive soils, Reinforced soil structures, Introduction to Geo environmental engineering.			
EXPECTED OUTCOME: Students will be able to, <ol style="list-style-type: none"> 1. Differentiate between various types clay minerals. 2. Apply theory of one dimensional and three dimensional consolidation in solving foundation settlement problems. 3. Understand the merits and demerits of various shear tests. 4. Classify the different materials used for reinforced soil structures based on their applications. 			
TEXT BOOKS &REFERENCES: <ol style="list-style-type: none"> 1. Gopal Ranjan & ASR Rao , Basic applied soil Mechanics, New Age International Publishers 2. Mitchell J.K, Fundamentals of soil behavior 3. Koerner R.M, Designing with Geosynthetics, Prentice Hall 4. Jewell R.A, Soil reinforcement and Geotextiles, CIRIA London 5. Babu S.G.L, An introduction to Soil reinforcement and geosynthetics, United Press (India) Pvt. Ltd 6. Swami Saran , Reinforced soil and its engineering applications , I.K. International Pvt. Ltd 			

COURSE PLAN			
MODULE	CONTENTS	HOURS	SEM. EXAM MARKS
I	Origin of soils: Minerology- Basic structures – Basic clay minerals – isomorphous substitution –ion exchange – inter particle forces. Bonding forces in soils: Primary bonds – Hydrogen bonds – secondary bonds – Vander Waal’s Forces. Soil fabric – definition - -factor controlling- Fabrics of soils – Method for measurement of fabric.	10	25
II	Theory of one dimensional consolidation – compressibility coefficients- Pre consolidation pressure —under consolidated, normally consolidated and over consolidated clays - secondary consolidation. Three dimensional consolidation –sand drains – radial drainage – parameters influencing drainage into sand drains – design of sand drains. Compaction: Compaction tests – Effect of compaction on soil structures and on engineering properties- field compaction control.	12	25
III	Shear strength: Introduction to theories of shear strength-principle of effective stress. Pore pressure coefficients – shearing strength of granular soils – direct shear test- tri axial shear test – critical void ratio – factors affecting shear strength. Shear strength of cohesive soils - tri axial testing in clays – CD, CU, and UU tests – vane shear test Relation of under drained shear strength and effective overburden pressure – Hvorselev’s parameters – sensitivity and thioxotropic characteristics of clay.	10	25
IV	Reinforced soil structures: mechanism of reinforced soil. Materials used in reinforced soil structures, fill materials, reinforcing materials, Geotextile, Geogrids,	10	25

	<p>Geomembranes, Geocomposites and Geojutes, Geofoam, Natural fibers - facing elements.</p> <p>Introduction to Geo environmental engineering – environmental cycle – sources, production and classification of waste</p> <p>Causes of soil pollution – factors governing soil-pollutant interaction.</p>		
END SEMESTER EXAM			

Course No.	Course Name	L-T-P Credits	Year of Introduction
06CM6152	GROUND IMPROVEMENT TECHNIQUES	3-0-0-3	2015
COURSE OBJECTIVES: To introduce different types and application of engineering methods to ground improvement projects.			
SYLLABUS: Role of ground improvement - Drainage and Dewatering- densification methods-Cement and lime stabilization- reinforced earth-geosynthetics-applications of grouting			
EXPECTED OUTCOME: Students will be able to judge, analyze and provide suitable ground improvement technique for different site conditions			
TEXT BOOKS & REFERENCES: <ol style="list-style-type: none"> 1. Robert M Koerner, Construction and Geotechnical Methods in Foundation Engineering, Mc Graw Hill 2. C.J.F.P Jones, Earth Reinforcement and soil structures, Buuterworths 3. Purushothama Raj. P, Ground Improvement Techniques, Laxmi Publications(P) Ltd., New Delhi 4. Shashi K. Gulhati & Manoj Datta, Geotechnical Engineering, Tata McGraw Hill 5. Shroff A. V. and Shah. D. L, Grouting technology in tunneling and Dam construction, Oxford and IBH 6. R. A Jewell, Soil reinforcement with geotextiles 7. Bell, F.G, Foundation Engineering in Difficult Ground. 			
COURSE PLAN			
MODULE	CONTENTS	HOURS	SEM. EXAM MARKS
I	Introduction to Ground Improvement Techniques: Role of Ground Improvement in foundation engineering Drainage and Dewatering: Methods of dewatering and pressure relief- deep well drainage vacuum dewatering	10	25

	systems –drainage by electro osmosis – analysis and design of dewatering systems – installation and operation of dewatering systems- well point system, shallow & deep well system, vacuum dewatering, electro osmosis.		
II	<p>In-situ densification methods in granular soils: Introduction- mechanical stabilization- deep dynamic compaction- vibro compaction – blasting</p> <p>In-situ densification methods in cohesive soils: Preloading- Concept of three dimensional consolidation – sand drain design and methods of their installation – fabric drains- stone columns & lime piles (installation techniques only)</p> <p>Cement and lime stabilization: Cement stabilization- types of soil cement- factors affecting soil cement mixing, Lime stabilization- effect of lime on soil properties</p>	10	25
III	<p>Earth Reinforcement- Concept of reinforced earth- load transfer mechanism and strength development- Stability analysis of reinforced earth retaining walls- external stability analysis, internal stability analysis (brief mention about the methods only) – application areas.</p> <p>Geosynthetics: Classification- Functions of geotextiles as separators, reinforcement, filters and in drainage - damage and durability of geotextiles.</p>	10	25
IV	<p>Introduction to grouts and grouting-basic functions- permeation grouting, compaction grouting, hydrofracturing- Groutability Ratio – travel distance of grouts- Classification of grouts</p> <p>Suspension grouts- cement grouts- admixtures used & their role -bentonite grouts- cement and bentonite grouts- lime grouts – asphaltic emulsion grouts-</p>	12	25

	<p>Solution grouts – aqueous solution – non-aqueous solutions- colloidal solutions- advantages and disadvantages of solution grouts over suspension grouts.</p> <p>Properties of grouts: viscosity, fluidity, stability, rigidity, thixotropy</p> <p>Applications of grouting.</p>		
END SEMESTER EXAM			

Course No.	Course Name	L-T-P Credits	Year of Introduction
06CM6252	DESIGN OF PRESTRESSED CONCRETE STRUCTURES	3-0-0-3	2015
COURSE OBJECTIVES: <ol style="list-style-type: none"> 1. To enable the students to acquire knowledge in basic concepts of prestressing. 2. To provide comprehensive understanding on the analysis and design of prestressed concrete structures. 			
SYLLABUS: Basic concepts of prestressing, materials, losses. Analysis of members: under axial load and flexure. Analysis of Partially Prestressed Section - Analysis of Un bonded Post-tensioned Beam. Design for flexure: Design of Sections for Axial Tension, Type 1 Type 2, Analysis and design for Shear and Torsion			
EXPECTED OUTCOME: Students will be able to explain the concept of prestressing and to analyse and design prestressed concrete members .			
TEXT BOOKS & REFERENCES: <ol style="list-style-type: none"> 1. Lin T Y, Design of prestressed concrete structures, John Wiley & sons 2. Hurst M K, Prestressed Concrete Design, E&FN Spon 3. Krishna Raju N, Prestressed concrete, Tata McGraw Hill 4. Guyon Y, Prestressed concrete vol I & II, Concrete contractors record Ltd, London 			
COURSE PLAN			
MODULE	CONTENTS	HOURS	SEM. EXAM MARKS
I	Basic concepts of prestressing, materials for prestressing and their characteristics, prestressing system, Losses in prestressing. Analysis of members under Axial load: Analysis at Transfer – Analysis at Service – Analysis of Ultimate Strength – Analysis of Behaviour; Analysis of Member under Flexure: Analysis at Transfer and at Service – Cracking Moment – Kern Point – Pressure Line – Analysis for Ultimate Strength – Variation of Stress in	12	25

	Steel – Condition at Ultimate Limit State – Analysis of a Rectangular Section – Analysis of a Flanged Section – Analysis of Partially Prestressed Section - Analysis of Un bonded Post-tensioned Beam		
II	Design for flexure: Calculation of Demand – Design of Sections for Axial Tension – Preliminary Design – Final Design for Type 1 Members – Final Design of Type 2 Members – Choice of sections – Determination of Limiting Zone – Post-Tensioning in Stages – Magnel’s Graphical Method – Detailing Requirements for Flexure: Tendon Profile – Minimum Amount of Reinforcement – Miscellaneous Requirements	12	25
III	Analysis for Shear: Stress in an Un cracked Beam – Types of Cracks – Components of Shear Resistance – Modes of Failure – Effect of Prestressing Force; Design for Shear: Limit State of Collapse for Shear – Design of Transverse Reinforcement – Detailing Requirements Analysis for Torsion: Stresses in an Un cracked Beam – Crack Pattern under Pure Torsion – Components of Resistance for pure Torsion – Modes of Failure – Effect of Prestressing Force Design for Torsion: Limit state of Collapse for Torsion – Design of Longitudinal Reinforcement – Design of Transverse Reinforcement – Detailing Requirements.	10	25
IV	Calculation of Deflection: Deflection due to Gravity Loads – Deflection due to Prestressing Force – Total Deflection – Limits of Deflection – Determination Moment of Inertia – Limits of Span-to-effective Depth Ratio Calculation of Crack Width: Method of calculation – Limits of Crack Width.	8	25
END SEMESTER EXAM			

Course No.	Course Name	L-T-P Credits	Year of Introduction
06CM6352	QUANTITATIVE TECHNIQUES IN CONSTRUCTION MANAGEMENT	3-0-0-3	2015
COURSE OBJECTIVES: To study the various quantitative techniques applied to construction industry.			
SYLLABUS: Linear programming-Graphical and Simplex Methods, Duality and Post- Optimality Analysis- Transportation and Assignment Problems. Inventory control-Quality control -Inventory control-working capital management-Decision Making & Risk Analysis.			
EXPECTED OUTCOME: On completion of this course students will be able to solve different problems related to construction projects which involve operation research, production management and financial management.			
TEXT BOOKS & REFERENCES: <ol style="list-style-type: none"> 1. Vohra, N.D., Quantitative Techniques in Management, Tata McGraw Hill Co., Ltd , New Delhi, 1990. 2. Seehroeder, R.G., Operations Management , McGraw Hill, USA, 1982. 3. Levin, R.I, Rubin, D.S., and Stinsonm J., Quantitative Approaches to Management, McGraw Hill Book Co., 1988. 4. Frank Harrison, E., The Managerial Decision Making Process, Houghton Mifflin, 1995. 5. RL Varshney and KL Maheshwari , Managerial economics, Sultan Chand, 1990 			
COURSE PLAN			
MODULE	CONTENTS	HOURS	SEM. EXAM MARKS
I	Operations Research- Introduction to Operations research-Linear programming-Graphical and Simplex Methods, Duality and Post- Optimality Analysis- Transportation and Assignment Problems.	10	25

II	Production Management-Inventory control: EOQ, Quantity Discounts, Safety Stock-Replacement Theory- PERT and CPM -Simulation Models-Quality Control.	12	25
III	Financial Management: Working Capital Management- Compound Interest and Present Value methods- Discounted Cash Flow Techniques-Capital Budgeting	10	25
IV	Decision Making & Risk Analysis - Decision Theory- Decision Rules-Decision making under conditions of certainty, risk and uncertainty-Decision trees-Utility Theory Cost concept -Pricing techniques Game Theory application.	10	25
END SEMESTER EXAM			

Course No.	Course Name	L-T-P Credits	Year of Introduction
06CM6062	MINI PROJECT	0-0-4-2	2015
<p>SYLLABUS:</p> <p>During the course of the second semester each student need to undertake mini project related to any area of construction engineering and management. Each student must keep a project notebook, which shall be checked periodically throughout the semester, as part of evaluation. At the end of the project student shall submit a report in the prescribed format to the department.</p> <p>The student shall make a presentation before a committee constituted by the department which will assess the mini project based on the report submitted and the presentation made. Marks will be awarded out of 100 assigned as per the regulations.</p>			

Course No.	Course Name	L-T-P Credits	Year of Introduction
06CM6072	BUILDING TECHNOLOGY AND NDT LAB	0-0-2-1	2015
<p>LIST OF EXERCISES:</p> <p>BUILDING TECHNOLOGY LABORATORY</p> <ol style="list-style-type: none"> 1. Wind flow using anemometer 2. Sound intensity contours inside a room 3. Light intensity contours inside a room 4. Temperature contours inside a room 5. Humidity measurement inside a room 6. Shadow in a building model <p>NON-DESTRUCTIVE TESTING LABORATORY</p> <ol style="list-style-type: none"> 1. Ultrasonic Pulse velocity test 2. Rebound hammer test 3. Penetration resistance 4. Rebar locator 5. Core sampling 6. Corrosion identification 			

SEMESTER III

Course No.	Course Name	L-T-P Credits	Year of Introduction
06CM7111	BUILDING SERVICES	3-0-0-3	2015
COURSE OBJECTIVES: The course provides an idea of various building services and civil infrastructural facilities.			
SYLLABUS: Built environment, Heat loss calculation, Ventilation and air conditioning, Hot and cold water supply, Soil and waste system, Surface water drainage, Condensation in buildings, Gas piping Lighting, Room acoustics.			
EXPECTED OUTCOME: The students will get awareness and will understand various building services to be employed in buildings. Students will be able to address environmental issues related to these services.			
TEXT BOOKS & REFERENCES: <ol style="list-style-type: none"> 1. Chadderton DV, Building services engineering, Taylors & Francis Group 2. G.M. Fair, J.C. Geyer and D. Okun, "Water and waste Engineering, Vol.II, John Wiley & sons, Inc., New York. 2008. 3. Hand book for Building Engineers in Metric systems, NBC, New Delhi, 1968. 4. William H. Severns and Julian R. Fellows, Air conditioning and refrigeration" John Wiley and sons, London, 2008. 			
COURSE PLAN			
MODULE	CONTENTS	HOURS	SEM. EXAM MARKS
I	Built environment: comfort equation – comfort measurement – external environment – environmental measurements – temperature – dry temperature – comfort criteria. Energy economics: energy audits – unitary brackets – calorific value of fuel- energy cost- fuel cost – economic thickness and thermal insulation – accounting energy economic system – low energy building. Heat loss calculation: thermal resistance of materials – thermal transmittance – heat loss from building –	10	25

	thermal transmittance measurements.		
II	<p>Ventilation and air conditioning: requirements – natural and mechanical system – removal of heat gains- psychometric cycle – air conditioning systems- vapor compression refrigeration – absorption refrigeration cycle- ventilation rate measurements- ventilation duct works- chlorofluorocarbons- sick building syndrome – air temperature profile.</p> <p>Hot and cold water supply: water treatment – service lines – pipe sizing – allocation of sanitary appliances – materials – solar heating.</p> <p>Soil and waste system: fluid flow in waste pipes – pipe work design – discharge unit per pipe sizing – materials- testing – maintenance.</p>	12	25
III	<p>Surface water drainage: flow load – roof drainage – disposal of surface water.</p> <p>Below ground drainage: design principle – access provisions – external load on buried pipe lines – materials – sewage lifting pump.</p> <p>Condensation in buildings: sources – condensation and mould growth – vapour diffusion – temperature gradient – dew point temperature – installation.</p> <p>Gas piping: sizing – flue system – ignition and safety controls.</p>	10	25
IV	<p>Lighting: natural and artificial illumination – maintenance – utilization factor – glare and reflection – lumen design method – air handling luminaries – colour temperature – lamp types – control.</p> <p>Room acoustics: acoustic principles – sound power and pressure level – absorption of sound – reverberation time – plant sound power level – transmission of sound – outdoor sound pressure level – sound pressure level in the intermediate space and target room – noise rating</p>	10	25
END SEMESTER EXAM			

Course No.	Course Name	L-T-P Credits	Year of Introduction
06CM7211	MIS & FINANCE MANAGEMENT	3-0-0-3	2015
COURSE OBJECTIVES: This course provides an introduction to the Information System in the areas of Computer Hardware, Networking and Database management System The course also examines the role of information system for decision making and the system life cycle. It provides knowledge on recording of business transactions, preparation of financial accounts of business enterprise and a broad framework of investment criteria decision-making in business units.			
SYLLABUS: IT infrastructure and Information System Applications- Capital Budgeting Techniques - Final account of sole Trading Organisations			
EXPECTED OUTCOME: Students will be able to understand the concept of IT Infrastructure and application systems which will enhance their knowledge while applying and they have the ability to prepare final accounts of sole trading organizations and a decision making capacity in capital investment projects.			
TEXT BOOKS & REFERENCES: 1. Murdick & Rose : Information systems of Modern Management, Prentice Hall 2. Sumit Gulati and Y.P Singh: Financial Management, Mc Graw Hill 3. S.N Maheshwari and S.K Maheshwari: An Introduction to Accountancy 4. V. Rajaraman: Analysis and design of information systems 5. Management Information System by Kenneth C Laudon & Jane P LaudonRajiv 6. Srivastava and Anil Misra: Financial Management			
COURSE PLAN			
MODULE	CONTENTS	HOURS	SEM. EXAM MARKS
I	Introduction to MIS- Classification of computers- hardware & software details – introduction to networking- concepts of networking – Configuration –	25	25

	types and inter connection of various networks (LAN/MAN/WAN) Data base: definition – n analysis of DBMS – classification of data items – coding considerations – types of coded structures.		
II	Concept of data and information Role of MIS for managing information system for decision making – phases in the information system life cycle. File storage: composition of data file classification – selection consideration for file media and file organization methods- file design considerations.	10	25
III	Financial Management: Capital Budgeting Decision, Techniques of evaluation of Capital Budgeting Decisions- Pay back, Accounting Rate of Return- Net Present Value- Internal Rate of Return-Profitability Index- Discounted Pay Back	12	25
IV	Management of Accounting: Fundamentals of book keeping, journalizing ledger accounts, subdivision of journal cash book, banking transactions. Trail balance, preparation of trading profit and loss account and bank balance sheet, adjustments.	10	25
END SEMESTER EXAM			

Course No.	Course Name	L-T-P- Credits	Year of Introduction
06CM7311	ENERGY EFFICIENT BUILDING CONSTRUCTION	3-0-0-3	2015
COURSE OBJECTIVES <ol style="list-style-type: none"> 1. To give an awareness among the students, the importance of energy conservation. 2. To study about energy efficiency and the method of energy audit in buildings. 3. To understand the concepts underlying energy management by adopting appropriate design methodology in providing energy related service. 4. To get familiarized with eco-friendly materials. 			
SYLLABUS Energy Conservation, Energy Efficiency , Energy Management, Eco-friendly Materials			
EXPECTED OUTCOME <ol style="list-style-type: none"> 1. The student will be able to understand the importance of energy conservation, energy efficiency and the method of energy audit. 2. The student will be able to apply the concepts underlying energy management by adopting appropriate design methodology in their field of construction. 3. Students will be familiarized with eco-friendly materials. 			
TEXT BOOKS & REFERENCES: <ol style="list-style-type: none"> 1. Moore F., Environmental control systems, McGraw Hill, Inc., 1994. 2. Brown, G.Z, Sun, Wind and Light: Architectural design Strategies, John Wiley & Sons., 1985. 3. Cook, J, Award - Winning Passive Solar Design, McGraw Hill, 1984. 4. Charles J. Kibert, Sustainable Construction: Green Building Design and Delivery, John Wiley & Sons, 2005 5. Lynne Elizabeth, Cassandra Adams, Alternative Construction : Contemporary Natural Building Methods , Softcover, Wiley & Sons Australia, Limited, John, 2005 6. Eugene Eccli, Low Cost, Energy efficient shelter for owner & builder, Rodale Press, 1976 7. Advances in Building Materials & Construction – CRBI Roorke 			
COURSE PLAN			
Module	Contents	Hours	Sem. Exam Marks
I	Energy Conservation: Energy required for building construction -Energy and resource conservation- Principles, Design of green buildings-rating systems- LEED Standards-Evaluation Tools for Building Energy-	10	25

	Embodied and Operating Energy-Peak demand, Comfort and Indoor Air Quality-Visual and Acoustical Quality-Energy Efficient Design Strategies-Contextual factors-Longevity and Process Assessment		
II	Energy Efficiency: Energy in Building Design-Energy Efficient and Environmental Friendly Building-Energy Audit-Types of Energy audit-Certification -Analysis of results-Energy flow diagram-Energy consumption/Unit production Identification of wastage- Energy efficient buildings for various zones	10	25
III	Energy Management: Energy Management of Electrical Equipment-Improvement of Power Factor-Management of Maximum Demand- Energy Savings in Pumps-Fans-Compressed Air Systems-Energy Savings in Lighting Systems-Air Conditioning Systems-Applications-Facility Operation And Maintenance-Facility Modifications-Energy Recovery Dehumidifier- Water Heat Recovery-Rooftop rainwater harvesting systems	12	25
IV	Eco-friendly Materials: Locally available building materials- Soil, Fly ash, Ferrocement, Lime, Fibres, Stone Dust, Red mud, Gypsum, Alternate Wood, Polymer-ADOBE, Cob Rammed Earth, Light Clay, Straw-Bale, Bamboo, Agro-Industrial Waste, Innovative Materials Developed by CBRI, SERC, Structural Properties Of Alternate Building Materials, Earthen Finishes , Earth Plasters, Earth Floors.	10	25
END SEMESTER EXAM			

Course No.	Course Name	L-T-P- Credits	Year of Introduction
06CM7121	QUALITY MANAGEMENT & SAFETY IN CONSTRUCTION ENGINEERING	3-0-0-3	2015
COURSE OBJECTIVES <ol style="list-style-type: none"> 1. To understand the elements of quality planning and its implication. 2. To create awareness about the advantages of quality assurance and means of quality control. 3. To study the quality management system in construction. 4. To study and understand the various safety concepts and its requirement in construction projects. 			
SYLLABUS <p>Quality Assurance and Control, Safety aspects in construction industry, Safety in material handling and equipments, Effect of temperature on properties of building materials, Classification of buildings.</p>			
EXPECTED OUTCOME <p>The students will be able to gain knowledge about the importance of quality and safety in construction and will be skilled to manage both at work place.</p>			
TEXT BOOKS & REFERENCES: <ol style="list-style-type: none"> 1. John L. Ashford, The Management of Quality in Construction, E & F.N, Spon. New York, 2009. 2. K.N.Vaid, Construction Safety Management, National Institute of Construction Management and Research, 1988 3. J.B.Fullman, Construction Safety Security & Loss Prevention , John Wiley & Sons Inc 4. Linger.L, Modern Methods of Material Handling 5. V.A.K. Jain, New Age International, Fire Safety in Building 6. Willi Hammer and Dennis Price, Occupational Safety Management & Engineering, Prentice-Hall 7. James, J.O Brien, Construction Inspection Handbook - Quality Assurance and Quality Control , Van Nostrand, New York, 1989. 11 8. Juran Frank, J.M. and Gryna, F.M., Quality planning and Analysis, Tata McGraw Hill, 1982. 			

9. Steven McCabe, “Quality Improvement Techniques in Construction ”, Addison Wesley Longman Ltd., England, 1998.

COURSE PLAN

Module	Contents	Hours	Sem. Exam Marks
I	<p>Inspection, Control and enforcement, Quality Management Systems and Method, Responsibilities and authorities in Quality assurance and Quality control- Architects, Engineers, Contractors and Consultants</p> <p>Quality circle, Quality Management- Quality policy, Objectives and methods in construction industry - Taguchi's concept of quality Codes and standards- Documents- procedures -Total QA / QC Programme</p>	10	25
II	<p>Quality Assurance and Control -Objectives-Regularity agent-Owner, Design, Contract And Construction Oriented Objectives, Methods -Techniques,</p> <p>Quality control by Statistical methods – Sampling by attributes and variables, Needs Of QA/QC - Different Aspects of Quality-Appraisals,</p> <p>Factors Influencing Construction Quality-Critical, Standardization</p>	10	25
III	<p>Safety aspects in construction industry – human factors – role of different groups in safety –steps in accident recovery. Safety in various construction operations – Excavation – under-water works– Ladders and Scaffolds – Design of scaffolding - Tunneling – Blasting – Demolition – confined Space – National Building Code Provisions on construction safety, Construction safety manuals.</p> <p>Safety in material handling and equipments –storage and stacking of construction materials. Safety in Vehicles, Cranes, Tower Cranes, Wire Ropes, Pulley blocks,</p>	12	25

	Mixers. Temporary power supply. Theories and principles of accident –frequency – rate – serviceability rate – incident rate – activity rate, first aid		
IV	<p>Effect of temperature on properties of building materials – test of combustibility – test of fire resistance of building elements – fire protection.</p> <p>Classification of buildings based on occupancy and fire resistance as per NBC. Fire Zones - Principles of Fire extinguishment – fire bucket, sand bucket, fire blanket, fire pails and water barrels, horse reels;</p> <p>Description, working principle, method of operation of different types of portable fire extinguishers – water type, foam type, dry powder type, CO2 type, vaporizing liquid type; Care, inspection, and maintenance of portable extinguishers.</p>	10	25
END SEMESTER EXAM			

Course No.	Course Name	L-T-P- Credits	Year of Introduction
06CM7221	GIS IN CONSTRUCTION ENGINEERING AND MANAGEMENT	3-0-0-3	2015
COURSE OBJECTIVES <ol style="list-style-type: none"> 1. To introduce GIS as an application in construction engineering and management. 2. To study the means of getting suitable data output and to use the data output for construction management using GIS tools. 3. To study the various types of data, data analysis methods and data quality requirements. 			
SYLLABUS Introduction To GIS ,Types Of Data ,Data Structure, Data Quality, Case Study , GIS Software , Fields Of Application			
EXPECTED OUTCOME To introduce the elements of GIS in construction management and achieve awareness on application techniques.			
TEXT BOOKS &REFERENCES: <ol style="list-style-type: none"> 1. Burrough P.A., Principles of GIS for Land Resources Assessment, Oxford Publication, 2008. 2. Robert Laurini and Derek Thompson, Fundamentals of Spatial Information Systems, Academic Press, 2006. 3. Anji Reddy, Remote Sensing and Geographical Information Systems, BS Publications 2001 4. Srinivas M.G. (Edited by), Remote Sensing Applications, Narosa Publishing House, 2001. 5. Rhind, D., Understanding of GIS, the ARC / INFO Method, ESRI Press. 2000. 			
COURSE PLAN			
Module	Contents	Hours	Sem. Exam Marks
I	Introduction To GIS ,GIS – Definition – Components Of GIS -Maps – Definition – Types Of Maps –	10	25

	Characteristics Of Maps – Map Projections — Hardware, Software And Organizational Context – GIS Software		
II	Types Of Data ,Data Types – Spatial And Non-Spatial – Spatial Data – Points, Lines And Areas– Non-Spatial Data – Nominal, Ordinal, Interval And Ratio – Digitizer – Scanner – Editing And Cleaning – Geo Reference Data	10	25
III	Data Structure, Raster And Vector Data Structure – Raster Data Storage – Run Length, Chain And Block Coding – Vector Data Storage – Topology – Topological Models – Arc Node Structure – Surface Data – DEM – Grid DEM And TIN Structure Applications Of DEM	10	25
IV	Data Quality, Reclassification– Measurement – Buffering – Overlaying – SQL For Queries – Neighbourhood And Zonal Operations – Data Quality – Components Of Data Quality - Sources Of Errors In GIS – Meta Data -Output – Maps, Graphs, Charts, Plots , Reports – Printers – Plotters – Fields Of Application – Natural Resource Management, Construction Management Parcel Based, AM/FM Applications Examples – Case Study	12	25
END SEMESTER EXAM			

Course No.	Course Name	L-T-P- Credits	Year of Introduction
06CM7321	DISASTER MANAGEMENT*	3-0-0-3	2015
COURSE OBJECTIVES The intent of the course is to give an insight into the impact of disasters, Disaster Management, Disaster Mitigation and Disaster Planning. It also aims at further development and involvement of different organizations in disaster mitigation process.			
SYLLABUS Disaster Management Cycles Phase II, Phases III and IV and about the Disaster Community and planning ,Disaster Planning			
EXPECTED OUTCOME To enable the students to plan effectively the disaster management system and will be exposed to the mitigation techniques.			
TEXT BOOKS & REFERENCES: <ol style="list-style-type: none"> 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 			
Course Plan			
Module	Contents	Hours	Sem. Exam Marks
I	Objectives-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	10	25

	disasters on development programmes, vulnerabilities caused by development, developing a draft country-level disaster and development policy		
II	<p>Phases-Disaster Management Cycle – Phase II: Preparedness, Disaster Risk Reduction(DRR),Emergency Operation Plan (EOP), Mainstreaming Child Protection and Gender in Emergency Planning, Assessment</p> <p>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 development initiatives</p>	12	25
III	<p>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,</p> <p>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</p>	10	25
IV	<p>Disaster Planning-Disaster Response Personnel and duties, Community Mitigation Goals, Pre-Disaster Mitigation Plan, Personnel Training</p> <p>Volunteer Assistance, School-based Programmes, Hazardous Materials, Ways of storing and safely handling hazardous materials, Coping with Exposure to Hazardous Materials</p>	10	25
END SEMESTER EXAM			

Course No.	Course Name	L-T-P Credits	Year of Introduction
06CM7031	SEMINAR II	0-0-2-2	2015
<p>SYLLABUS: Students have to register for the seminar and select a topic in consultation with any faculty member offering courses for the programme. A detailed write-up on the topic of the seminar is to be prepared in the prescribed format given by the Department. The seminar shall be of 30 minutes duration and a committee with the Head of the department as the chairman and two faculty members from the department as members shall evaluate the seminar based on the coverage of the topic, presentation and ability to answer the questions put forward by the committee.</p>			

Course No.	Course Name	L-T-P Credits	Year of Introduction
06CM7041	RESEARCH PROJECT (PHASE 1)	0-0-8-6	2015

SYLLABUS:

The project work is carried out in two phases – Phase I in third semester and Phase II in fourth semester. Project work is to be evaluated both in the third and the fourth semesters. Based on these evaluations the grade is finalized in the fourth semester. Each student is expected to do an individual project.

Normally students are expected to do the project within the college. However they are permitted to do the project in an industry or in a government research institute under a qualified supervisor from that organization. At the end of the semester the student has to give a presentation and submit an interim report. Progress of the project work is to be evaluated at the end of the third semester. For this a committee headed by the head of the department with two other faculty members in the area of the project, of which one shall be the project supervisor. If the project is done outside the college (provision is available for them to do it outside the college either in an industry or in an institute of repute and is possible only in the fourth semester), the external supervisor associated with the student will also be a member of the committee. Final project grading shall take into account the progress evaluation done in the third semester and the project evaluation in the fourth semester. If the quantum of work done by the candidate is found to be unsatisfactory, the committee may extend the duration of the project up to one more semester, giving reasons for this in writing to the student. Normally further extension will not be granted and there shall be no provision to register again for the project.

Project evaluation weights shall be as follows:-

For convenience the marks are allotted as follows.

Total marks for the Project: 150

In the 3rd Semester:- Marks:50

Project Progress evaluation:

Progress evaluation by the Project Supervisor : 20 Marks

Presentation and evaluation by the committee : 30 Marks

SEMESTER IV

Course No.	Course Name	L-T-P Credits	Year of Introduction
06CM7012	RESEARCH PROJECT (PHASE 2)	0-0-21-12	2015
<p>SYLLABUS:</p> <p>Phase II of the project work shall be in continuation of Phase I only. The final evaluation of the project will be taken up only on completion of the project in the fourth semester and on completion of the project the student has to submit a project report. The evaluation shall be done by a committee constituted for the purpose by the principal of the college. The concerned head of the department shall be the chairman of this committee. It shall have two senior faculty members from the same department, project supervisor and the external supervisor, if any, of the student and an external expert either from an academic/R&D organization or from Industry as members. This evaluation will be based on the project report and a viva voce examination on the project.</p> <p>The method of assessment for Phase II is as given:</p> <p>In the 4th Semester: - Marks: 100</p> <p>Project evaluation by the supervisor/s: 30 Marks</p> <p>Evaluation by the External expert: 30 Marks</p> <p>Presentation & evaluation by the Committee: 40 Marks</p>			