

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
**Course Structure and syllabi for**  
**M.Tech-CIVIL-CONSTRUCTION PLANNING AND MANAGEMENT**  
**for affiliated Engineering Colleges 2017-18**

**I YEAR I Semester**

S. No	Course Code	Subject	L	T	P	C
1.	17FBS101	Probability and Statistics	4	---	---	4
2.	17D21101	Construction Planning and Project Management	4	---	---	4
3.	17D21102	Construction Practices	4	---	---	4
4.	17D20106	Advanced Concrete Technology	4	---	---	4
5.		Elective – I	4	---	---	4
	17D21103	1. Human Resource Development for Construction				
	17D21104	2. Value Engineering				
	17D20105	3. Experimental Stress Analysis				
6.		Elective – II	4	---	---	4
	17D21105	1. Construction Economics and Finance				
	17D21106	2. Construction Technology for Tunnels				
	17D21107	3. Building Services				
7.	17D21108	CAD Laboratory	--	---	4	2
<b>Total</b>			<b>24</b>		<b>4</b>	<b>26</b>

**I YEAR II Semester**

S. No	Course Code	Subject	L	T	P	C
1.	17D21201	Quantitative Methods in Construction Management.	4	---	---	4
2.	17D21202	Construction Techniques, Methods & Equipment	4	---	---	4
3.	17D21203	Quality & Safety Management	4	---	---	4
4.	17D21204	High Rise Building Technologies	4	---	---	4
5.		Elective – III	4	---	---	4
	17D21205	1. Strategic Management in Construction.				
	17D21206	2. Form Work Design.				
	17D20109	3. Maintenance And Rehabilitation Of Structures.				
6.		Elective – IV	4	---	---	4
	17D20207	1. Earth Quake Resistant Structures				
	17D20108	2. Prestressed Concrete				
	17D20107	3. Low Cost Housing Techniques				
7.	17D21207	Project Management Software Lab	--	---	4	2
<b>Total</b>			<b>24</b>		<b>4</b>	<b>26</b>

**M.Tech. II YEAR (III Semester)**

S. No	Course Code	Subject	L	T	P	C
1.	17D20301 17D20302 17D20303	Elective – V ( Open Elective) 1. Research Methodology 2. Human Values & Professional Ethics 3. Intellectual Property Rights	4	---	---	4
2.	17D21301	ELECTIVE – VI ( MOOCs)	--	---	---	--
3.	17D21302	Comprehensive Viva Voce	--	---	---	2
4.	17D21303	Seminar	--	---	---	2
5.	17D21304	Teaching Assignment	--	---	---	2
6.	17D21305	Project Work Phase I	--	---	---	4
		<b>Total</b>	<b>4</b>			<b>14</b>

**M.Tech. II YEAR (IV Semester)**

S. No	Course Code	Subject	L	T	P	C
1.	17D21401	Project Work Phase II	--	---	---	12
		<b>Total</b>				<b>12</b>

**Project Viva Voce Grades:****A: Satisfactory****B: Not Satisfactory**

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**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
**M.Tech I semester (CPM)**

**L T P C**  
**4 0 0 4**

**(17FBS101) PROBABILITY AND STATISTICS**

**UNIT – I**

Basic Concepts Of Probability – Random Variables – Expectation – Discrete And Continuous Distributions – Distribution Functions. Binomial And Poisson Distributions Normal Distribution – Related Properties.

**UNIT – II**

Test Of Hypothesis: Population And Sample - Confidence Interval Of Mean From Normal Distribution - Statistical Hypothesis - Null And Alternative Hypothesis - Level Of Significance. Test Of Significance - Test Based On Normal Distribution - Z Test For Means And Proportions.

**UNIT – III**

Small Samples - T- Test For One Sample And Two Sample Problem And Paired T-Test, F-Test And Chi-Square Test (Testing Of Goodness Of Fit And Independence).

**UNIT – IV**

Statistical Quality Control: Concept Of Quality Of A Manufactured Product -Defects And Defectives - Causes Of Variations - Random And Assignable - The Principle Of Shewhart Control Chart-Charts For Attribute And Variable Quality Characteristics- Constructions And Operation Of - Chart, R-Chart, p - Chart and C-Chart.

**UNIT – V**

Queuing Theory: Pure Birth And Death Process, M/M/1 & M/M/S & Their Related Simple Problems.

**TEXT BOOKS:**

- Probability & Statistics by E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher.
- Probability & Statistics for engineers by Dr. J. Ravichandran WILEY-INDIA publishers.

## REFERENCES:

1. Probability & Statistics by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, S.Chand publications.
2. Statistical methods by S.P. Gupta, S.Chand publications.
3. Probability & Statistics for Science and Engineering by G.Shanker Rao, Universities Press.
4. Probability and Statistics for Engineering and Sciences by Jay L.Devore, CENGAGE.
5. Probability and Statistics by R.A. Jhonson and Gupta C.B.

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**(17D21101) CONSTRUCTION PLANNING AND PROJECT MANAGEMENT**

**UNIT – I:**

**BASICS OF PROJECT MANAGEMENT:** Modern Scientific Management, Management Functions, Management Styles. Basic Forms Of Organization With Emphasis On Project And Matrix Structures; Project Life Cycle, Planning For Achieving Time, Cost, Quality, Project Feasibility Reports Based On Socio-Techno-Economic-Environmental Impact Analysis, Project Clearance Procedures And Necessary Documentation For Major Works.

**UNIT – II:**

**CONSTRUCTION PLANNING AND MANAGEMENT:** Basic Concepts In The Development Of Construction Plans – Choice Of Technology And Construction Method – Defining Work Tasks – Defining Precedence Relationships Among Activities – Estimating Activity Durations – Estimating Resource Requirements For Work Activities – Coding Systems; Site Mobilization – Demobilization Aspects, Various Resources Management Based On Funds Availability. Co-ordinating, Communicating & Reporting Techniques. Application Of MIS To Construction. Training Of Construction Managers. Qualities, Role And Responsibilities Of Project Manager, Role Of Project Management Consultants.

**UNIT – III:**

**SCHEDULING PROCEDURES AND TECHNIQUES:** Construction Schedules – Critical Path Method – Scheduling Calculations – Float – Presenting Project Schedules – Scheduling For Activity-On-Node And With Leads, Lags, And Windows – Scheduling With Resource Constraints And Precedence's – Use Of Advanced Scheduling Techniques – Scheduling With Uncertain Durations – Calculations For Monte Carlo Schedule Simulation – Crashing And Time/Cost Tradeoffs – Improving The Scheduling Process.

**UNIT – IV:**

**QUALITY CONTROL AND SAFETY DURING CONSTRUCTION:** Quality And Safety Concerns In Construction – Organizing For Quality And Safety – Work And

Material Specifications – Total Quality Control – Quality Control By Statistical Methods – Statistical Quality Control With Sampling By Attributes – Statistical Quality Control With Sampling By Variables – Safety.

#### **UNIT – V:**

**ORGANIZATION AND USE OF PROJECT INFORMATION:** Types of Project Information – Accuracy and Use of Information – Computerized Organization and Use of Information – Organizing Information in Databases – Relational Model of Databases – Other Conceptual Models of Databases – Centralized Database Management Systems – Databases and Applications Programs – Information Transfer and Flow.

**WORK STUDY METHODS AND MEASUREMENT TECHNIQUES :** Definition, Objectives, Basic Procedure, Method Study And Work Measurement, Work Study Applications In Civil Engineering. Method Study – Definition, Objective, Procedure For Selecting The Work, Recording Facts, Symbols, Flow Process Charts, Multiple Activity Charts, String Diagrams. Work Measurement – Time And Motion Studies, Concept Of Standard Time And Various Allowances, Time Study, Equipment Performance Rating. Activity Sampling, Time-Lapse Photography Technique, Analytical Production Studies.

#### **TEXT/ REFERENCE BOOKS:**

1. Construction Project Management: Planning, Scheduling And Control BY Chitkara, K.K. , Tata Mcgraw-Hill Publishing Company, New Delhi.
2. Construction Planning & Management By P S Gahlot & B M Dhir , New Age International Limited Publishers
3. Construction Project Administration By Fisk, D.R, Prentice Hall International, London.
4. Construction Project Management Theory & Practice - Kumar Neeraj Jha, Pearson,2012
5. Project Management – K Nagrajan – New Age International Ltd.
6. Construction Management Fundamentals By Knutson, Schexnayder, Fiori, Mayo, Tata Mcgraw Hill, 2nd Edition, 2010
7. Construction Management And Planning By Sengupta And Guha-Tata Mcgraw Hill Publication.
8. Construction Project Scheduling By Callahan, M.T., Quackenbush,D.G.,And Rowing,J.E, Mcgraw-Hill ,New York,1992

**(17D21102) CONSTRUCTION PRACTICES**

**UNIT – I:**

**INTRODUCTION:** Introduction To Construction Techniques- Applications – Advantages – Disadvantages – Measures.

**MECHANIZED METHODS OF EARTHWORK:** Tractors And Attachments, Dozers, Tippers, Scrapers, Shovels And Trenching Machines, Dumpers, Rollers And Compactors, Estimation Of Quantities Of Earthwork In Grading, Grading Of Sites With Bulldozers And Scrapers, Drilling, Blasting Methods, Labour Protection In Drilling And Blasting.

**UNIT – II:**

**FORMWORK:** Requirements Of Formwork, Loads Carried By Formwork, Types Of Formwork: Timber, Steel, Modular Shuttering, Slip Forms, Scaffolding.

**REINFORCED CONCRETE CONSTRUCTION:** Introduction, Fabrication Of Reinforcement And Transportation Of Erected Reinforcement, Concreting, Special Methods For Concreting Construction.

**UNIT – III:**

**PRESTRESSED CONCRETE CONSTRUCTION:** Introduction To Prestressed Concrete, Advantages Of Prestressed Concrete, Types Of Pre-Stressing, Methods Of Pre-Stressing, Equipment For Pre-Stressing Operation.

**PREFABRICATED STRUCTURES:** Introduction To Prefabricated Structures, Planning For Pre-Casting, Selection Of Equipment For Fabrication, Transport And Erection Of Prefabricated Components, Quality Measures, Design Considerations Of Precast Elements, Safety Measure During Erection.

**UNIT – IV:**

**READY MIX CONCRETE:** Production Of Ready Mixed Concrete, Site Mixed Vs. Ready Mixed Concrete, Equipment For RMC Plant, IS Code Provision For RMC, Quality Measures Of Ready Mixed Concrete, RMC Productivity Analysis, Productivity Analysis-Case Study.

## **UNIT V:**

**MODULAR CONSTRUCTION PRACTICES:** Introduction To Modular Construction, Modular Coordination, Modular Standardization, Modular System Building, Limitation And Advantages Of Modular Construction

### **TEXT/REFERENCE BOOKS :**

1. Fundamentals Of Building Construction Material And Method By Allen E, Iano.J. John Wiley And Sons,2013.
2. Principals And Practices Of Commercial Construction, By Cameron K.Andres.Ronald C.Smith 8<sup>th</sup> Edition, Prentice Hall,2009.
3. Fundamentals Of Residential Constructions By Edward Allen, John Wiley And Sons,2011.
4. Design Of Concrete Mixes By N.Krishna Raju, CBS Publishers.
5. Formwork For Concrete Structures By Kumar Neeraja Jha, TMH Publishers.
6. Concrete For Construction Facts And Practice, 2<sup>nd</sup> Edition By Dr.V.K.Raina,Shroff Publishers
7. Professional Practices By K.G.Krishna Murthy And Ravindra S.V., PHI Publishers

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**M.Tech I semester (CPM)**

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**(17D20106) ADVANCED CONCRETE TECHNOLOGY**

- Cements And Admixtures:** Portland Cement – Chemical Composition – Hydration, Setting And Finenesses Of Cement – Structures Of Hydrated Cement – Mechanical Strength Of Cement Gel - Water Held In Hydrate Cement Paste – Heat Of Hydration Of Cement – Influence Of Compound Composition On Properties Of Cement – Tests On Physical Properties Of Cement – I.S. Specifications – Different Types Of Cements – Admixtures.
- Aggregates:** Classification Of Aggregate – Particle Shape And Texture – Bond Strength And Other Mechanical Properties Of Aggregate Specific Gravity, Bulk Density, Porosity, Absorption And Moisture In Aggregate – Soundness Of Aggregate – Alkali – Aggregate Reaction, Thermal Properties – Sieve Analysis – Fineness Modulus – Grading Curves – Grading Requirements – Practical Grading – Road Note No.4 Grading Of Fine And Coarse Aggregates Gap Graded Aggregate – Maximum Aggregate Size.
- Fresh Concrete:** Workability – Factors Affecting Workability – Measurement Of Workability By Different Tests – Effect Of Time And Temperature On Workability – Segregation And Bleeding – Mixing And Vibration Of Concrete – Quality Of Mixing Water.  
**Hardened Concrete:** Water/Cement Ratio-Abram's Law – Gel Space Ratio – Effective Water In Mix – Nature Of Strength Of Concrete – Strength In Tension And Compression- Griffith's Hypothesis – Factors Affecting Strength – Autogeneous Healing –Relation Between Compression And Tensile Strength – Curing And Maturity Of Concrete Influence Of Temperature On Strength – Steam Curing – Testing Of Hardened Concrete – Compression Tests – Tension Tests – Factors Affecting Strength – Flexure Tests – Splitting Tests – Non Destructive Testing Methods.

4. **Elasticity, Shrinkage And Creep:** Modulus Of Elasticity – Dynamic Modulus Of Elasticity – Poisson’s Ratio – Early Volume Changes – Swelling – Drying Shrinkage - Mechanism Of Shrinkage – Factors Affecting Shrinkage – Differential Shrinkage – Moisture Movement Carbonation Shrinkage-Creep Of Concrete – Factors Influencing Creep – Relation Between Creep And Time – Nature Of Creep – Effect Of Creep.
5. **Mix Design:** Proportioning Of Concrete Mixes By Various Methods – Fineness Modulus, Trial And Error, Mix Density, Road Note. No. 4, ACI And ISI Code Methods – Factors In The Choice Of Mix Proportions – Durability Of Concrete – Quality Control Of Concrete – Statistical Methods – High Strength Concrete Mix Design. **Special Concrete’s:** Light Weight Concretes –Light Weight Aggregate Concrete- Cellular Concrete - No Fines Concrete – High Density Concrete – Fiber Reinforced Concrete – Different Types Of Fibers - Factors Affecting Properties Of FRC – Applications Polymer Concrete – Types Of Polymer Concrete Properties Of Polymer Concrete and Applications

**TEXT/ REFERENCE BOOKS:**

1. Properties Of Concrete By A.M.Neville – Pearson Publication – 4th Edition
2. Concrete Technology By M.S.Shetty. – S.Chand & Co. ; 2004
3. Design Of Concrete Mix By Krishna Raju, CBS Pablishers.
4. Concrete: Micro Structure, Properties And Materials – P.K.Mehta And J.M.Monteiro, Mc-Graw Hill Publishers
5. Concrete Technology By A.R. Santha Kumar, Oxford University Press, New Delhi
6. Concrete Technology By A.M.Neville – Pearson Publication
7. Concrete Technology By M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi
8. Non-Destructive Test And Evaluation Of Materials By J.Prasad & C.G.K. Nair , Tata Mcgraw Hill Publishers, New Delhi

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**(17D21103) HUMAN RESOURCE DEVELOPMENT FOR CONSTRUCTION**  
**ELECTIVE-I**

**UNIT – I:**

**Organization And Management Theory:** Challenges Of Managing People In Construction, Contemporary Management Theory, Production Efficiency: The Classical Approach, Human Behavior Theory, Manager's Attitude Towards People In Construction, Expectations Of The Employment Relationship.

**UNIT – II:**

**HUMAN BEHAVIOUR:** Introduction To The Field Of Management-Basic Individual Psychology-Motivation-Job Design And Performance Management-Managing Groups At Work-Self Managing Work Teams-Inter Group Behavior And Conflict In Organizations-Leadership-Behavioral Aspects Of Decision-Making;And Communication For People Management.

**UNIT – III:**

**STRATEGIC HRM APPROACHES AND OPERATIONAL HRM APPROACHES:** Models Of HRM, Employee Resourcing, Recruitment & Selection, Case Study Discussion, Training & Development, Appraisal Systems, Reward Management, Case Study Discussion, Mentoring, Career In Construction Management.

**UNIT – IV:**

**MANPOWER PLANNING:** Manpower Planning Process ,Organising, Staffing, Directing, And Controlling – Estimation, Manpower Requirement – Factors Influencing Supply And Demand Of Human Resources – Role Of HR Manager – Personnel Principle  
**TRAINING:** Training Of Multi-Skilled Workforce, Quality, Productivity And Employee Relations In Construction, Training Of Engineers Related To Issues Such As Management Capabilities, Formation Of Joint Ventures, Privatization And BOT Type Of Systems. CIDC – IGNOU Training Programs.

## **UNIT – V:**

**EMPLOYEE RELATIONS AND EMPOWERMENT:** Employees Relations, The Changing Role Of Trade Unions, The Effect Of Unions, Collective Bargaining, Case Study Discussion, The Evolution Of Empowerment Within HRM.

**DIVERSITY AND WORK/LIFE BALANCE:** Workforce Diversity, Equal Opportunities In Construction, Work-Life Balance.

**EMPLOYEE WELFARE AND EMPLOYMENT LEGISLATIONS:** Workplace Health And Safety Hazards, Employment Legislations.

### **TEXT/ REFERENCE BOOKS:**

1. Human Resource Management In Construction By Langford D.A., Longman PUBLISHERS.
2. Human Resource Management In Construction Projects: Strategic And Operational Approaches, Taylor And Francis, 2010.
3. Human Resource Management – Aswathappa – TMH, 2010.
4. Human Resource Management, Garry Dessler, And Biju Varkkey, PEA, 2011.
5. Human Resource Management By S.S.Khanka,S.Chand PUBLISHERS,2003.
6. Personnel Management By Monappa A. – Tata Mcgraw Hill,New Delhi.
7. Managing Human Resources By Mutsuddi, New Age PUBLISHERS.
8. Harvard Business Review, “Appraising Performance Appraisal,” Tata Mcgraw Hill.
9. Human Resources Management – Principles And Practices By P G Aquinas, Vikas PUBLISHERS.
10. Excellence Through Human Resource Development By, Nair,MRR, Tata Mcgraw Hill.

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**(17D21104) VALUE ENGINEERING**  
**ELECTIVE-I**

**UNIT – I:**

**CONCEPTS:** Introduction, History Of Value Engineering, Value, Function, Cost, Worth, Case Study Discussions.

**VALUE ENGINEERING:** Definition And Concepts Of The Creative And Structured Phases Of Value Engineering. The Workshop Approach To Achieve Value- Procedures-Merits And Demerits-Detailed Analysis. Teambuilding Theory; Target Setting; Time Management.

**UNIT – II:**

**GENERAL TECHNIQUES IN INFRASTRUCTURE VALUATION:** General Techniques -Brainstorming Technique, The Gordon Technique, Feasibility Ranking, The Morphological Analysis Technique, ABC Analysis, Probabilistic Approach, Make or Buy Technique, Case Study Discussions.

**UNIT – III:**

**Special Techniques In Infrastructure Valuation I:** Special Techniques - Function – Cost – Worth Analysis, Function Analysis System Technique - Technically Oriented Fast And Customer-Oriented Fast, Weighted Evaluation Method - Equal Importance Method, Descending Order Of Importance Method,

**Special Techniques In Infrastructure Valuation Ii:** Numeric Analysis - Forced Distribution Technique, Quantitative Method, Predetermined Minimum Method. Evaluation Matrix. Break-Even Analysis. Life Cycle Cost (Lcc), Case Study Discussions.

**UNIT – IV:**

**APPLICATIONS OF INFRASTRUCTURE VALUATION:** Team Dynamics - Team Structure And Team Building, Definition Of The Creative And Structured Phases Of Value Engineering, The Workshop Approach To Achieving Value, Target Setting, Time Management, Case Study Discussions.

**UNIT – V:**

**LIFE CYCLE COSTING:** Life Cycle Costing – Forecasting Of Capital As Well As Operating & Maintenance Costs, Time Value, Present Worth Analysis, DCF Methods,

ROR Analysis, Sensitivity Analysis. Different Methods Of Performing Value Engineering.

**PREPARATION OF VALUATION REPORT:** Valuation Report, Contents, Standard Formats, Case Study Of Any One Report.

**TEXT/ REFERENCE BOOKS:**

1. Value Engineering Concepts, Techniques And Applications By Anil Kumar Mukhopadhyaya,, Response Books, 2013.
2. Value Engineering By Iyer, S.S, New Age Pibilishers, 3<sup>rd</sup> Edition 2012Techniques Of
3. Value Analysis And Engineering By Lawrence D. Miles, Tata Mcgraw-Hill Book Company, 2009.
4. Cost Analysis For Management Decisions By M.R.S. Murthy, Tata Mcgraw-Hill Publishing Company Ltd., 1988.
5. Industrial Engg. & Mgt.By O.P.Khanna, Dhanpat Rai Publishers.
6. Industrial Organization & Engg. Economics, T.R.Banga, S.C.Sharma, Khanna Publishers.
7. Estimating And Costing In Civil Engineering: Theory And Practice B.N Dutta Published S. Dutta & Company, Lucknow.
8. Estimating And Costing By Rangwala , Charotar Publishing House,
9. Practical Information For Quantity Surveyors, Property Valuers, Architects Engineers And Builders, P.T.Joglekar, Pune Vidyarthi Griha Prakashan, 2008 Reprint.

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**(17D20105) EXPERIMENTAL STRESS ANALYSIS**  
**(ELECTIVE I)**

**1. PRINCIPLES OF EXPERIMENTAL APPROACH :-**

Merits Of Experimental Analysis Introduction, Uses Of Experimental Stress Analysis Advantages Of Experimental Stress Analysis, Different Methods –Simplification Of Problems.

**2. STRAIN MEASUREMENT USING STRAIN GAUGES :-**

Definition Of Strain And Its Relation Of Experimental Determinations Properties Of Strain-Gauge Systems-Types Of Strain Gauges –Mechanical, Acoustic And Optical Strain Gauges. Introduction To Electrical Strain Gauges - Inductance Strain Gauges – LVDT – Resistance Strain Gauges – Various Types –Gauge Factor – Materials Of Adhesion Base..

**3. STRAIN ROSSETTES AND NON – DESTRUCTIVE TESTING OF CONCRETE:-**Introduction – The Three Elements Rectangular Rosette – The Delta Rosette Corrections For Transverse Strain Gauge. Ultrasonic Pulse Velocity Method – Application To Concrete. Hammer Test – Application To Concrete.

**4. THEORY OF PHOTOELASTICITY :-**

Introduction –Temporary Double Refraction – The Stress Optic Law –Effects Of Stressed Model In A Polariscopes For Various Arrangements – Fringe Sharpening. Brewster’s Stress Optic Law.

**5. TWO DIMENSIONAL PHOTOELASTICITY :-**

Introduction – Isochromatic Fringe Patterns- Isoclinic Fringe Patterns Passage Of Light Through Plane Polariscopes And Circular Polariscopes Isoclinic Fringe Patterns – Compensation Techniques – Calibration Methods – Separation Methods – Scaling Model To Prototype Stresses – Materials For Photoelasticity- Properties Of Photoelastic Materials.

**Reference Books :-**

- 1.Experimental Stress Analysis By J.W.Dally And W.F.Riley, College House Enterprises
2. Experimental Stress Analysis By Dr.Sadhu Singh.Khanna Publishers
- 3.Experimental Stress Analysis By U.C.Jindal, Pearson Publications.
4. Experimental Stress Analysis By L.S.Srinath, MC.Graw Hill Company Publishers

**(17D21105) CONSTRUCTION ECONOMICS AND FINANCE**  
**(ELECTIVE – II)**

**UNIT – I:**

**ECONOMICS:** Role Of Civil Engineering In Industrial Development-Advances In Civil Engineering And Engineering Economics- Support Matters Of Economy As Related Top Engineering-Market Demand And Supply-Choice Of Technology- Quality Control And Quality Production-Audit In Economic Law Of Returns Governing Production

**CONSTRUCTION ECONOMICS:** Construction Development In Housing, Transport And Other Infrastructures-Economics Of Ecology, Environment, Energy Resources-Local Material Selection- Form And Functional Designs-Construction Workers-Urban Problems-Poverty-Migration- Unemployment-Pollution.

**UNIT – II:**

**PROJECT FORMULATION:** Project – Concepts – Capital Investments - Generation And Screening Of Project Ideas - Project Identification – Preliminary Analysis, Market, Technical, Financial, Economic And Ecological - Pre-Feasibility Report And Its Clearance, Project Estimates And Techno-Economic Feasibility Report, Detailed Project Report – Different Project Clearances Required.

**PROJECT APPRAISAL :** NPV – BCR – IRR – ARR – Urgency – Pay Back Period – Assessment Of Various Methods – Indian Practice Of Investment Appraisal – International Practice Of Appraisal – Analysis Of Risk – Different Methods – Selection Of A Project And Risk Analysis In Practice

**UNIT – III:**

**FINANCING:** The Need For Financial Management-Types Of Financing-Short Term Borrowing-Long Term Borrowing-Leasing - Equity Financing-Internal Generation Of Funds-External Commercial Borrowings-Assistance From Government Budgeting Support And International Finance Corporations-Analysis Of Financial Statements-Balance Sheet-Profit And Loss Account-Cash Flow And Fund Flow Analysis-Ratio Analysis-Investment And Financing Decision-Financial Control-Job Control And Centralized Management

#### **UNIT –IV:**

**ACCOUNTING METHOD:** General Overview-Cash Basis Of An Accounting-Accrual Basis Of Accounting- Percentage Completion Method- Completed Contract Method-Accounting For Tax Reporting Purposes And Financial Reporting Purposes.

**LENDING TO CONTRACTORS:** Loans To Contractors-Interim Construction Financing-Security And Risk Aspects - Work Pricing, Cost Elements Of Contract, Bidding And Award, Revision Due To On Forcing Causes, Escalation.

#### **UNIT – V:**

**COMPARING ALTERNATIVES PROPOSALS:** Comparing Alternatives- Present Worth Analysis, Annual Worth Analysis, Future Worth Analysis, Rate Of Return Analysis (ROR) And Incremental Rate Of Return (IROR)Analysis, Benefit/Cost Analysis, Break Even Analysis.Evaluating Alternative Investments: Real Estate - Investment Property, Equipment Replace Analysis, Depreciation – Tax Before And After Depreciation – Value Added Tax (VAT) – Inflation.

#### **TEXT/ REFERENCE BOOKS:**

1. Projects - Planning Analysis Selection Implementation & Review By Prasanna Chandra, Fourth Edition, Tata Mcgraw Hill Publishing Co., Ltd, New Delhi.
2. Financial And Cost Concepts For Construction Management By Halpin, D.W.John Wiley And Sons, New York.
3. Project Management By Nagarajan.K., New Age Pubilishers.
4. A Text Book For Accounting For Management By S N Maheshwari, Vikas Pubilishers
5. Fundamentals Of Accounting And Financial Analysis By Anil Chowdhury , Pearson Education
6. Accounting For Management By Srinivasan , S.Chand Pubilishers.
7. Fundamental Of Construction Management And Organization By Kwaku A., Tenah And Jose M. Guevera, Prentice Hall Of India, 1995 .
8. Project Management- Strategic Financial Planning, Evaluation And Control By Patel, B M , Vikas Publishing House Pvt. Ltd. New Delhi.
9. Construction Planning And Management By Shrivastava,U.K.,2nd Edn. Galgotia Publications Pvt. Ltd. New Delhi.
10. Project Management By Bhavesh Patel, Vikas Pubilishers.

(17D21106) CONSTRUCTION TECHNOLOGY FOR TUNNELS  
ELECTIVE - II

**UNIT – I:**

**TUNNELS IN SOILS AND ROCKS:** Benefits Of Tunnelling, Tunnels For Different Purposes, Site Investigation And Geophysical Methods Adopted For Tunnelling Purposes, Rock Rating And Classification, Instrumentation On Tunnels.

**TUNNELLING METHODS:** Drill And Blast Method, Tunnel Boring Machine, NATM, Shield Tunnelling, Earth Pressure Method, Application Of Compressed Air.

**UNIT – II:**

**TUNNEL LINING AND SUPPORTS:** Different Types Of Support Measures Adopted In Tunnelling, Analysis Of Stresses On The Tunnel Lining, Design Of Tunnel Lining And Support Measures.

**TUNNELLING MECHANICS:** Behaviour Of Soils And Rocks, Stress And Deformation Fields Around Tunnels, Analytical Equations Used And Derivations, Stability Problems In Tunnels.

**UNIT – III:**

**NUMERICAL ANALYSIS OF TUNNELLING:** Finite element analysis of tunnelling process, Constitutive models used, Development of longitudinal displacement curves and ground reaction curves, Ground surface settlement due to tunnelling in soft grounds.

**UNIT – IV:**

**UNDERGROUND TUNNEL CONSTRUCTION :** Underground And Underwater Construction – Tunnel-Shaft Sinking, Micro Tunneling, Tunnel Driving In Hard And Soft Strata, Bedding Of Conduits.

**UNDER WATER TUNNEL CONSTRUCTION:** Problems Encountered. Underwater Drilling, Blasting, Grouting Methods In Soft And Hard Soil Including Jet Grouting And Chemical Grouting, Dewatering In Shallow And Deep Excavations Using Different Methods, Vacuum Dewatering And Well Point System.

**UNIT – V:**

**ON SITE WORKS FOR TUNNELING:** Site Preparation, Temporary Roads, Side Drainage, Site Preparation Building Areas. Deep – Trench, Deep-Basement Excavations, Bulk Excavation, Stability Of Slopes To Open Excavations. Support Of Excavation By Timbering And Sheet Piling Retaining Walls And Sheet Pile Designing. Shoring And Underpinning – Requirements For Shoring And Underpinning, Methods Of Shoring And Underpinning

**TEXT/ REFERENCE BOOKS:**

1. Construction Of Marine And Offshore Structures, Ben C. Gerwick Jr., 3rd Edition, CRC Press, 2007.
2. Construction Dewatering: New Methods And Applications, Patrick Powers. J, John Wiley & Sons, 1992.
3. Tunneling And Tunnel Mechanics, A Rational Approach To Tunnelling, Kolymbas D., Springer, 2005.
4. Tunelling Through Weak Rocks, Singh B. And Goel R. K., Elsevier, 2006.
5. Construction Technology By Roy Chudley And Roger Greeno, Prentice Hall, 2005.
6. Construction Technology: Analysis And Choice, Bryan, Wiley India
7. Construction Planning Equipment And Methods By RL Peurifoy Tata Mcgraw Hill
8. Modern Construction Equipment And Methods By Frank Harris John Wiley And Sons.
9. Construction Technology By Sankar, S.K. And Saraswati, S., Oxford University Press, New Delhi, 2008.

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**(17D21107) BUILDING SERVICES**  
**(Elective - II)**

**UNIT – I:**

**GENERAL BUILDING ORIENTATION AND PLANNING REQUIREMENTS:**

Selection Of Site, Orientation Of Building, Design Of Residential Buildings With Particular Reference To Grouping And Circulation. Open Spaces In And Around Buildings For Lighting And Ventilation, Minimum Sizes And Height Of Roofs, Rat And Termite Proofing Of Buildings, Lightning Protection Of Buildings. Factors Affecting Selection Of Services/Systems, Provision Of Space In The Building To Accommodate Building Services, Structural Integrity Of Building Services Equipment. Sound And Vibration Attenuation Features, Provisions For Safe Operation And Maintenance,

**UNIT – II:**

**WATER SUPPLY & SEWAGE SYSTEM:** Water Quality, Purification And Treatment- Water Supply Systems- Distribution Systems In Small Towns -Types Of Pipes Used- Laying Jointing, Testing-Testing For Water Tightness Plumbing System For Building- Internal Supply In Buildings- Municipal Bye Laws And Regulations - Rain Water Harvesting - Sanitation In Buildings- -Pipe Systems- Storm Water Drainage From Buildings -Septic And Sewage Treatment Plant - Collection, Conveyance And Disposal Of Town Refuse Systems.

**VENTILATION:** Ventilation And Its Importance-Natural And Artificial Systems- Window Type And Packaged Air-Conditioners-Chilled Water Plant -Fan Coil Systems- Water Piping -Cooling Load –Air Conditioning Systems For Different Types Of Buildings -Protection Against Fire To Be Caused By A.C. Systems.

**UNIT – III:**

**ELECTRICAL SYSTEM:** Types Of Wires , Wiring Systems And Their Choice - Planning Electrical Wiring For Building -Main And Distribution Boards -Transformers And Switch Gears -Modern Theory Of Light And Colour -Synthesis Of Light -Luminous Flux -Candela- Lighting Design-Design For Modern Lighting. Electrical Appliances And Electrical Service Bye-Laws Pertaining To Electrical Installations. Different Types Of Artificial Lighting Systems, Lighting Systems For Residential Buildings, Public

Buildings, Hotels, Cinemas, Hospital Exhibition, Halls, Libraries, Schools, College, Scientific Laboratories Etc.

**UNIT – IV:**

**SAFETY AGAINST FIRE IN BUILDINGS:** Safety-Ability Of Systems To Protect Fire-Preventive Systems-Fire Escape System Design-Planning For Pollution Free Construction Environmental-Hazard Free Construction Execution Safety Regulations-NBC-Planning Considerations In Buildings Like Noncombustible Materials, Construction, Staircases And A.C. Systems-Heat And Smoke Detectors-Dry And Wet Risers-Automatic Sprinklers - Capacity Determination Of OHT And UGT For Firefighting Needs. Fire Training Equipment Different Methods Of Fire Fighting Fire Protection.

**UNIT – V:**

**ACOUSTICS :** Basic Problems Criteria And Terminology, Transmission Of Sources In Rooms, Speech Privacy Between Offices, Co-Efficient Of Source Absorption, Noise Reduction Co-Efficient, Classification Selection Of Accoustical Materials, Design And Installation Of Accoustical Treatment For Of Auditorium, Schools Religion Buildings.

**LIFTS AND ESCALATORS:** Classification Types Of Lifts, Lift Codes And Rules. Traffic Analysis And Selection Of Lifts, Quantity Of Service, Quality Service, Car Speed. Provision Form Fire Safety Angle Arrangements Of Lifts, Details Of Information To Be Given To Manufacturers, Escalators, Types And Their Installation.

**TEXT/ REFERENCE BOOKS:**

1. Building Services & Equipment , Fred Hall, Longman Scientific and Technical.
2. Building Services, Technology and Design, Roger Greeno, Longman Scientific and Technical.
3. Maintenance of Buildings by A.C. Panchadari, New Age International (P) limited Publishers
4. Building Maintenance Management, Chanter, Wiley India
5. Handbook for Building Engineers in Metric systems, NBC, New Delhi, 1968.
6. Fire safety in Buildings by Jain, New age Pubilishers.
7. Building Construction, Arora and Bindra, Dhanpat Rai, 2012.
8. National Building Code of India, Bureau of Indian Standards, 2005.
9. Electrical & Mechanical Services In High Rise Buildings Design & Estimation Manual by Ak Mittal, CBS Pubilishers.

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**(17D21108) CAD LABORATORY**

1. Analysis Of Cantilever, Simply Supported Beam, Fixed Beams, Continuous Beams For Different Loading Conditions.
2. Design Of R.C.C. Beams, Slabs, Foundations.
3. Design Of Steel Tension Members
4. Reinforcement Detailing In Beam Using Graphics.
5. Reinforcement Detailing In Slabs Using Graphics.
6. Reinforcement Detailing In Foundation Using Graphics.

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**(17D21201) QUANTITATIVE METHODS IN CONSTRUCTION MANAGEMENT**

**UNIT – I:**

**INTRODUCTION AND CONCEPTS OF PROBABILITY AND STATISTICS:** Probability: Conditional Probability, Probability Distributions (Normal, Bayesian, Poisson And Exponential), Probability Density Functions.

**PRELIMINARY DATA ANALYSIS:** Testing Of Hypothesis- Concepts And Testing , Analysis Of Variance Techniques, Introduction To Non Parametric Tests, Validity And Reliability, Approaches To Qualitative And Quantitative Data Analysis.

**UNIT – II:**

**LINEAR PROGRAMMING:** Formulation Of LP Problems: Basic Variables, Constrains, Corner Points, Augmented Form, Maximization And Minimization Problems. Solution Methods: Graphical Method, Algebraic Method, Simplex Method (Tabular And Matrix Form). Integer Linear Programming. Transportation And Assignment Problems: Transportation Problem: Basic Feasible Solutions Using N-W Corner Rule, Minimum Cost Method, Vogel's Approximation Method. Optimal Solutions Using Stepping Stone Method, Modified Distribution Method.

**UNIT – III:**

**DYNAMIC PROGRAMMING:** Stage Coach Problem, Reliability Problem, Continuous Variables, Oil Exploration Problem, Manpower Planning Problem. Queuing Theory: Single Server Infinite Queue Length Model, Single Server Finite Queue Length Model, Multiple Server Infinite Queue Length Model, Multiple Server Infinite Queue Length Model. Queuing Theory - Decision Theory-Optimal Decision Strategy.

**UNIT – IV:**

**FORECASTING:** Quantitative Methods-Time Series (Average Method, Moving Average Method, Exponential Smoothing, Mean Square Error), Regression Analysis. Qualitative Methods.

**GAMES THEORY SIMULATIONS APPLIED TO CONSTRUCTION:** N X M Person Zero Sum Games With Finite Strategies, Maximin & Minimax Strategies, Saddle Points, Rule Of Dominance.

**SOLUTION METHODOLOGIES:** Algebraic Method, Graphical Method, Method Of Matrices, LP Method, Iterative Method Of Approximate Solution.

**UNIT – V:**

**MODIFICATIONS AND IMPROVEMENT ON CPM/PERT TECHNIQUES:** Beyond CPM/PERT: Overview Of The Pitfalls Of Making Traditional CPM/PERT Assumptions. PERT Technique Extended To Monte-Carlo Simulation Analyses. CPM: Advantages Of Circle Notation Diagram For The Presentation Of CPM Project Plans. Concept Of Dependent Operations Overlapping In Time.

**TEXT/ REFERENCE BOOKS:**

1. Probability And Statistics For Engineers By Freund,J.E.And Miller,I.R., Prentice Hall Of INDIA, New Delhi,1994.
2. Fundamentals Of Mathematical Statistics, Gupta,S.C.And Kapur,V.K., Sultan Chand And Sons New Delhi,1999.
3. Engineering And Managerial Economics By Agrawal, New Age Publications
4. Mathematical Statistics By Saxena, S.Chand Publications
5. Operations Research: An Introduction, Taha,H.A., Prentice Hall INDIA,New Delhi,2010.
6. Quantitative Methods In Construction Management, James, A., Adrain, American Elsevier Publishing Co., Inc., 1973.
7. Managing The Construction Process-Estimating, Scheduling & Project Control”, Frederick E Gould, Dorling Kindersely India Pvt. Ltd.,2012
8. Quantitative Techniques In Management , Vohra, N.D. Tata Mcgraw Hill Co., Ltd , New Delhi, 1990.
9. Managerial Economics By H.L.Ahuja, S.Chand Publications
10. Managerial Economics And Financial Analysis By Shailaja Gajjala, Universities Press.

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**(17D21202) CONSTRUCTION TECHNIQUES, METHODS AND EQUIPMENT**

**UNIT – I:**

**INTRODUCTION TO CONSTRUCTION EQUIPMENT :**Construction Equipments – Understanding Basics And Functions Of Equipment Earthmoving Machinery, Concreting Equipment, Material Handling Equipment And Transportation Of Equipments.

**CONSTRUCTION EQUIPMENTS AND MANAGEMENT :** Identification – Planning Of Equipment – Selection Of Equipment - Equipment Management In Projects - Maintenance Management – Equipment Cost – Operating Cost – Cost Control Of Equipment - Depreciation Analysis – Replacement Of Equipment- Replacement Analysis - Safety Management

**UNIT – III:**

**EQUIPMENT FOR EARTHWORK:** Fundamentals Of Earth Work Operations - Planning For Earthwork Construction - Graphical Presentation Of Earthwork, Earthwork Quantities, Mass Diagram, Pricing Earthwork Operations. Earth Moving Operations - Types Of Earth Work Equipment - Tractors, Motor Graders, Scrapers, Front End Loaders, Earth Movers-Compaction And Stabilization Equipment : Compaction Of Soil And Rock, Types Of Compacting Equipment, Dynamic Compaction, Stabilizing Soils With Lime, Cement Soil Stabilization

**UNIT – III:**

**DOZERS, SCRAPERS, EXCAVATORS:** Introduction, Performance Characteristics Of Dozers, Pushing Material, Land Clearing, Scraper Types, Operation, Performance Charts, Production Cycle, Hydraulic Excavators, Shovels, Hoes.

**MATERIAL HANDLING EQUIPMENT:-** Trucks And Hauling Equipment, Finishing Equipment - Productivity, Performance Calculations, Graders, Trimmers.

**UNIT – IV:**

**EQUIPMENT FOR PRODUCTION OF AGGREGATE AND CONCRETING :** Crushers – Feeders - Screening Equipment - Handling Equipment - Batching And Mixing Equipment - Hauling, Pouring And Pumping Equipment – Transporters.

**EQUIPMET FOR PILE DRIVING AND DEWATERING** : Pile Hammers, Selecting A Pile Hammer, Loss Of Energy Due To Impact, Energy Losses Due To Causes Other Than Impact. Vacuum Dewatering Of Concrete Flooring - For Underground Open Excavation.

**UNIT – V:**

**OTHER CONSTRUCTION EQUIPMENTS** : Equipment For Dredging, Trenching, Tunneling, Drilling, Blasting - Equipment For Compaction - Erection Equipment - Types Of Pumps Used In Construction - Equipment For Demolition.

**TEXT/ REFERENCE BOOKS:**

1. Construction Planning And Equipment Methods, Peurifoy,R.L., Ledbetter.W.B And Schexnayder,C, Mcgraw Hill, Singapore,1995.
2. Construction Equipment And Management, Sharma S.C..Khanna Publishers,New Delhi.
3. Construction Equipment And Job Planning, Deodhar, S.V. Khanna Publishers, New Delhi, 1988.
4. Construction Management & Equipment By Saurabh Kumar Soni, SK Kataria Sons.
5. Heavy Construction Planning Equipment And Methods By Jagman Singh, Oxford And IBH.
6. Rock Engineering By John A Franklin And Maurice B Dusseault, Tata Mcgraw Hill
7. Modern Construction Equipment And Methods By Frank Harris, John Wiley And Sons.
8. Equipment Management By Krishna Chandra , Sarup Book Pubilishers.
9. Construction Technology By Roy Chudley And Roger Greeno, Prentice Hall, 2005.
10. Introduction To Material Handling By Ray Siddartha, New Age Pubilishers.

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**M.Tech II semester (CPM)**

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**(17D21203) QUALITY AND SAFETY MANAGEMENT**

**UNIT – I:**

**QUALITY MANAGEMENT:** Quality Policy In Construction Industry-Consumer Satisfaction-Ergonomics ,Time Of Completion-Statistical Tolerance-Taguchi's Concept Of Quality- Contract And Construction Programming-Inspection Procedures.

**QUALITY ASSURANCE AND CONTROL:** Total QA/QC Program And Cost Implication. Different Aspects Of Quality-Appraisals, Failure Mode Analysis, Stability Methods And Tools, Influence Of Drawings, Detailing, Specification.Standardization-Bid Preparation-Construction Activity.

**UNIT – II:**

**SAFETY PROGRAMMES AND ORGANIZATION:** Environmental Safety, Social And Environmental Factors. Problem Areas In Construction Safety-Elements Of An Effective An Safety Program-Job Site-Safety Assessment-Safety Meetings-Safety Incentives

**CONSTRUCTION ACCIDENTS:** Accidents And Their Causes – Human Factors In Construction Safety – Costs Of Construction Injuries – Occupational And Safety Hazard Assessment – Legal Implications.

**UNIT – III:**

**SAFETY PROGRAMMES:** Problem Areas In Construction Safety – Elements Of An Effective Safety Programme – Job-Site Safety Assessment – Safety Meetings – Safety Incentives.

**DESIGNING FOR SAFETY:** Safety Culture – Safe Workers – Safety And First Line Supervisors – Safety And Middle Managers – Top Management Practices, Company Activities And Safety – Safety Personnel – Sub Contractual Obligation – Project Coordination And Safety Procedures – Workers Compensation.

**UNIT – IV:**

**OWNERS' AND DESIGNERS' OUTLOOK:** Owner's Responsibility For Safety – Owner Preparedness – Role Of Designer In Ensuring Safety – Safety Clause In Design Document.

**UNIT – V:**

**QUALITY CONTROL AND SAFETY DURING CONSTRUCTION:** Quality And Safety Concerns In Construction-Organizing For Quality And Safety-Work And Material Specifications-Total Quality Control-Quality Control By Statistical Methods -Statistical Quality Control With Sampling By Attributes-Statistical Quality Control By Sampling And Variables-Safety.

**TEXT/ REFERENCE BOOKS:**

1. Productivity Improvement In Construction By Clarkson H.Oglesby, Mcgraw Hill.
2. Construction Inspection Handbook Quality Assurance And Quality Control, James,J.O Brain, Van Nostrand.
3. Quality Planning And Analysis, Juran Frank, J.M. And Gryana, F.M., Tata Mcgraw Hill.
4. Fundamental Of Construction Management And Organization By Kwaku A., Tenah And Jose M.Guevera, PHI PUBLISHERS.
5. Construction Safety Manual Published By National Safety Commission Of India.
6. Safety Management In Construction Industry – A Manual For Project Managers. NICMAR Mumbai.
7. Construction Safety Handbook – Davies V.S.Thomasin K, Thomas Telford, London.
8. ISI For Safety In Construction – Bureau Of Indian Standards.
9. “Safety Management” –Girimaldi And Simonds, AITBS, New Delhi.

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**(17D21204) HIGH RISE BUILDING TECHNOLOGIES**

**UNIT – I:**

**EVOLUTION OF TALL BUILDINGS:** Introduction, Design Criteria For Structural Design Of Tall Building, Concept Of Premium For Height, Development Of High Rise Architecture.

**ASSEMBLY OF BUILDING:** Building Performance –Cost, Quality And Time, Environmental Requirements, Industrialization & Robotics In Construction, Introduction To Safety And Health Management System.

**UNIT – II:**

**SITE INVESTIGATION:** Stages Of Site Investigation, Site Reconnaissance & Ground Investigation-Field Tests & Laboratory Tests.

**FOUNDATION SYSTEMS:** Foundation Systems. Material Handling And Mechanization: Material Handling Considerations, Earthmoving Equipment's, Horizontal And Vertical Movements, Selection & Utility Of Cranes (Tower Cranes & Climbing Cranes).

**UNIT – III:**

**WIND EFFECTS ON BEHAVIOUR OF TALL STRUCTURES:** Outlook Of Design Considerations And Characteristics Of Wind, Codal Wind Loads And Cladding Pressures On Behavior Of Tall Buildings.

**UNIT – IV:**

**SEISMIC EFFECTS ON BEHAVIOUR OF TALL STRUCTURES:** Introduction To Tall Building Behavior During Earthquakes And Seismic Design Philosophy – Building Behaviour – Seismic Design Concept – Dynamic Response Concept – Dynamic Analysis Theory – Design Techniques.

**UNIT – V:**

**STRUCTURAL FORMS & FLOORING SYSTEMS:** Introduction Of Various Structural Forms And Their Importance To High Rise Architecture, Introduction To Various Flooring Systems In Concrete & Steel.

**MODELING FOR ANALYSIS:** Approaches For Analysis, Assumptions Involved In Modelling, Reduction Techniques, Application Using Structural Engineering Software.

**TEXT/ REFERENCE BOOKS:**

1. Concrete And Composite Design Of Tall Buildings. By Taranath, B, Steel, 2nd Edition, Mcgraw Hill, 1998.
2. Building Structural Design Handbook .By White And Salmon, John Wiley & Sons.
3. The Design Of Building Structures. By Wolfgang Schueller, , Prentice Hall India,
4. Tall Buildings Structures Analysis And Design By Bryan S,Smith And Alex Coull, Wiley India Pvt Ltd.
5. Reinforced Concrete Design Of Tall Buildings By S.Taranath.B, CRC Press.

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(17D21205) STRATEGIC MANAGEMENT IN CONSTRUCTION  
(ELECTIVE III)

**UNIT – I:**

**INTRODUCTION TO STRATEGIC MANAGEMENT CONCEPTS:** Introduction To Strategy, Purpose, Objectives, Goals, Policies And Programs, 7-S Frame Work, Board Of Directors-Roles, Responsibilities, Structure And Composition Role Of Top Management.  
**EXTERNAL AND INTERNAL ENVIRONMENT ANALYSIS:** Strategic Management Process, SWOT Analysis Macro And Micro Environmental Factors. Importance Of Value Chain.

**UNIT – II:**

**DECISION AND ANALYTICAL TOOLS:** Competitive Environment-Five Forces Model, Factors Driving Industry Change. Key Factors For Success In Organization, Overall Cost Leadership, Focus And Differentiation Strategies.  
**FINANCIAL STRATEGIES:** Growth Strategy, Stabilization Strategy And Retrenchment Strategy. Portfolio Strategies G.E, B.C.G & Arthur D.Little's Model.

**UNIT – III:**

**CORPORATE STRATEGIC:** Events: Corporate Parenting Strategy, Ansoffs Product Market Grid-Product Development, Market Development And Market Penetration And Diversification Strategies.  
**STRATEGIC MANAGEMENT EVALUATION AND CONTROL:** Strategy Implementation And Evaluation Control Of Strategic Performance-Performance Gap, ROI, Budget And Financial Ratios, Strategy Audit.

**UNIT – IV:**

**STRATEGIC BEHAVIOUR OF CONSTRUCTION FIRMS :** Introduction - Core Business And Core Competencies In Construction-Levels Of Strategy - Managing The Diversified Construction Firm Strategies At The Operating Core In Contracting Firms - Project Portfolios And Potential Capacity - Sub-Contracting As A Production Strategy Within Project – Portfolios- The Management Resourcc In Construction Firrms As A Source Of Competitive Advantage - Resolving A Strategic Paradox.

## **UNIT – V:**

**TECHNIQUES FOR THE STRATEGIC PLANNER:** Portfolio Management, Delphi Techniques And Scenarios - Marketing And Promotional Strategies In Construction - Marketing Orientation And Relationship Marketing Service Quaiity And Customer Satisfaction Internal Marketing Internal Customer Satisfaction - Synthesis Of Strategic Management In Construction

### **TEXT/ REFERENCE BOOKS:**

1. Strategic Management In Construction By David Langford, Steven Male, John-Wiley And Sons, 2008.
2. Construction Management In Practice. By Richard Fellows, Blackwell Science.
3. Strategic Cost Analysis For Project Managers And Engineers By Creese, Robert's., New Age Pubilishers.
4. Strategic Management By Michael A.Hitt, Cengage Publishers.
5. Strategic Management By Hriyappa.B., New Age Publishers.
6. Strategic Management By Garth Saloner, John Wiley Publications.

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**(17D21206) FORM WORK DESIGN**  
**(ELECTIVE III)**

**UNIT – I:**

**INTRODUCTION:** Formwork And False Work, Temporary Work Systems, Construction Planning And Site Constraints, Materials And Construction Of The Common Formwork And False Work Systems, Special And Proprietary Forms.

**FORM MATERIALS:** Lumber – Types – Finish – Sheathing Boards Working Stresses – Repetitive Member Stress – Plywood – Types And Grades – Textured Surfaces And Strength – Reconstituted Wood – Steel – Aluminum Form Lining Materials – Hardware And Fasteners – Nails In Plywood Concrete Density – Height Of Discharge – Temperature – Rates Of Placing – Consistency Of Concrete – Live Loads And Wind Pressure – Vibration Hydrostatic Pressure And Pressure Distribution – Examples – Vertical Loads - Uplift On Shores – Adjustment For Non Standard Conditions.

**UNIT – II:**

**PLANNING AND SITE EQUIPMENT & PLANT FOR FORM WORK:** At Tender Stage – Development Of Basic System – Planning For Maximum Reuse – Economical Form Construction – Planning Examples – Crane Size, Effective Scheduling Estimate– Recheck Plan Details – Detailing The Forms. Overall Planning – Detail Planning – Standard Units–Corner Units – Schedule For Column Formwork – Formwork Elements– Planning Crane Arrangements–Site Layout Plan–Transporting Plant – Formwork Beams – Formwork Ties – Wales And Ties – Scaffold Frames From Accessories – Vertical Transport Table Form Work.

**UNIT – III:**

**FORMWORK – DESIGN AND PLANNING:** Concrete Pressure On Forms, Design Of Timber And Steel Forms, Loading And Moment Of Formwork. Overall Planning - Detailed Planning - Standard Units - Corner Units - Schedule -Planning At Tender Stage - Development Of Basic System - Planning For Maximum Reuse – Planning Examples - Site Layout Plan-Crane Arrangements -Recheck Plan Details - Planning For Safety-Transporting Plant -Wales And Ties - Vertical Transportable Form Work.

#### **UNIT IV:**

**BUILDING AND ERECTING THE FRAMEWORK:** Location Of Job Mill -Storage - Equipment-Form For Wall Footings -Column Footings -Slab On Grade And Paving Work -Highway And Airport Paving - External Vibration -Prefabricated Panel Systems - Giant Forms -Curved Wall Forms –Erections Practices -Column Heads-Beam Or Girder Forms - Suspended Forms- Concrete Joint Construction- Flying System Forms.

#### **UNIT – V:**

**CAUSES OF FAILURES:** Case Studies- Finish Of Exposed Concrete –Design Deficiencies -Safety Factors -Stripping Sequence - Reshore Installation -Advantages Of Reshoring.

**DESIGN OF DECKS AND FALSE WORKS:** Types Of Beam, Decking And Column Formwork, Design Of Decking, False Work Design, Effects Of Wind Load, Foundation And Soil On False Work Design.

**CONSTRUCTION SEQUENCE AND SAFETY IN USE OF FORMWORK:** Sequence Of Construction, Safety Use Of Formwork And False Work.

#### **TEXT/ REFERENCE BOOKS:**

1. Formwork For Concrete. By Austin, C.K., , Cleaver - Hume Press Ltd.
2. Formwork For Concrete Structures. By Robert L. Peurifoy, Mcgraw-Hill.
3. Slip Form Techniques. By Tudor Dinescu And Constantin Radulescu, Abacus Press.
4. Insulating Concrete Forms Construction By Pieter A Vanderwe, TMH Publications.
5. Concrete And Formwork By T.W.Love, Craftsman Book Company
6. Form Work For Concrete Structures By Kumar Neeraj Jha, TMH Publications.
7. Concrete And Concrete Materials For Practicing Engineers By Vinod K Mehrotra, Standards Publishers.

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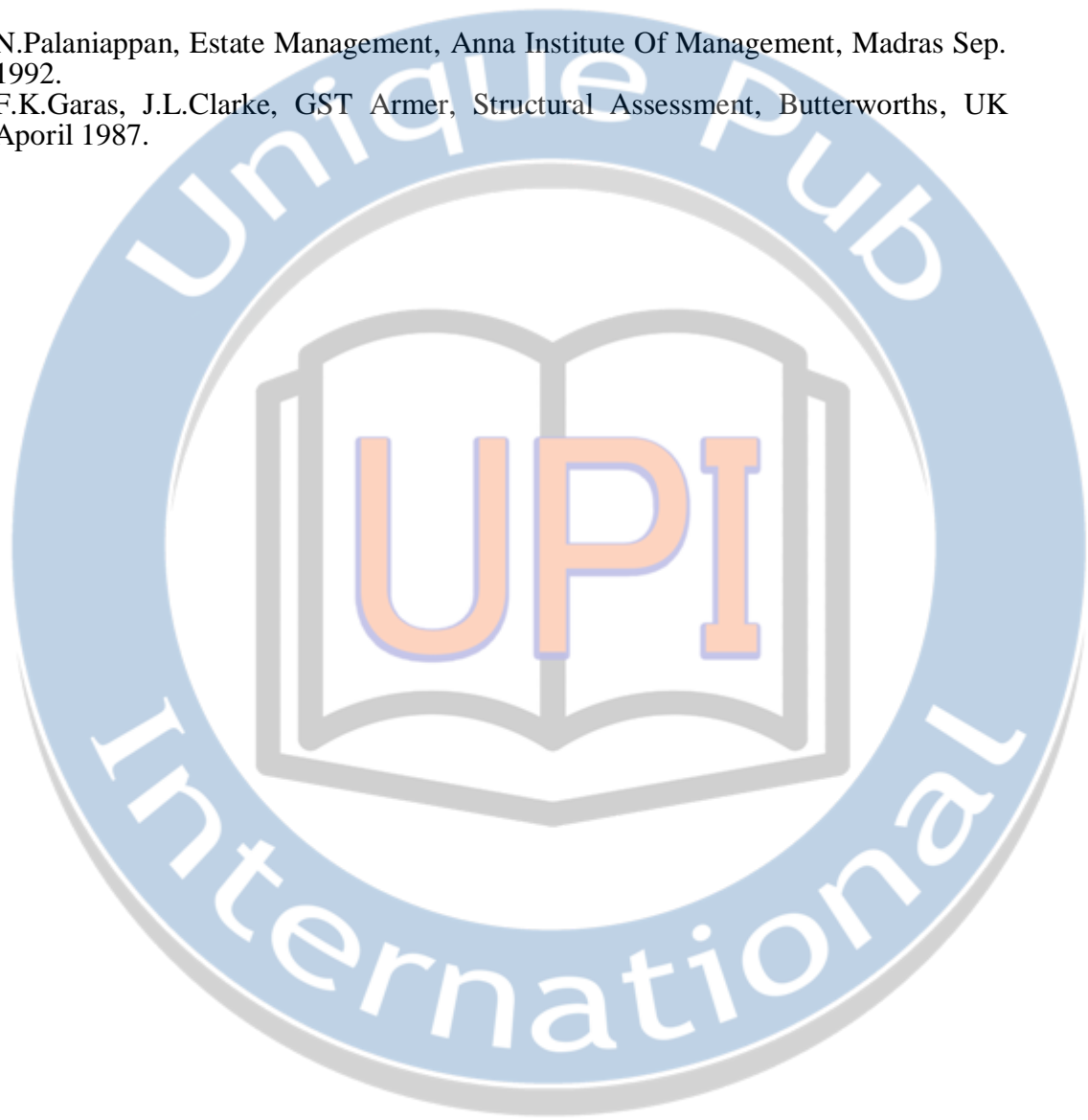
**(17D20109) MAINTENANCE AND REHABILITATION OF STRUCTURES**  
**(ELECTIVE III)**

- 1. Influence On Serviceability And Durability:-** General : Quality Assurance For Concrete Construction, As Built Concrete Properties, Strength, Permeability, Volume Changes, Thermal Properties, Cracking. Effects Due To Climate, Temperature, Chemicals, Wear And Erosion, Design And Construction Errors, Corrosion Mechanism, Effects Of Cover Thickness And Cracking Methods Of Corrosion Protection, Inhibitors, Resistant Steels, Coatings Cathodic Protection.
- 2. Maintenance And Repair Strategies :-** Inspection, Structural Appraisal, Economic Appraisal, Components Of Equality Assurance, Conceptual Bases For Quality Assurance Schemes.
- 3. Materials For Repair :-** Special Concretes And Mortar, Concrete Chemicals, Special Elements For Accelerated Strength Gain, Expansive Cement, Polymer Concrete, Sulphur Infiltrated Concrete, Ferro Cement, Fibre Reinforced Concrete.
- 4. Techniques For Repair :-** Rust Eliminators And Polymers Coating For Rebars During Repair, Foamed Concrete, Mortar And Dry Pack, Vacuum Concrete, Guniting And Shotcrete Epoxy Injection, Mortar Repair For Cracks, Shoring And Underpinning.
- 5. Case Studies :-** Repairs To Overcome Low Member Strength, Deflection, Cracking, Chemical Disruption, Weathering, Wear, Fire, Leakage, Marine Exposure.

**TEXT/REFERENCE BOOKS:**

1. Denson Campbell, Allen And Harold Roper, Concrete Structures, Materials, Maintenance And Repair, Longman Scientific And Technical, U.K. 1991.
2. RT.Allen And S.C. Edwards, Repair Of Concrete Structures, Blakie And Sons, UK, 1987.
3. MS. Shetty, Concrete Technology – Theory And Practice, S.Chand And Company, New Delhi, 1992.
4. Santhakumar, A.R.Training Course Notes On Damage Assessment And Repair In Low Cost Housing RHDC-NBO Anna University, Madras, July, 1992.
5. Raikar, R.N.Learning From Failures – Deficiencies In Design, Construction And Service – R&D Centre (SDCPL), Raikar Bhavan, Bombay, 1987.

6. N.Palaniappan, Estate Management, Anna Institute Of Management, Madras Sep. 1992.
7. F.K.Garas, J.L.Clarke, GST Armer, Structural Assessment, Butterworths, UK April 1987.



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(17D20207) EARTH QUAKE RESISTANT STRUCTURES  
(ELECTIVE IV)

- 1. Engineering Seismology :**  
Earthquake – Causes Of Earthquake – Earthquakes And Seismic Waves – Scale And Intensity Of Earthquakes – Seismic Activity – Measurements Of Earth Quakes – Seismometer- Strong Motion Accelerograph / Field Observation Of Ground Motion – Analysis Of Earthquakes Waves – Earth Quake Motion – Amplification Of Characteristics Of Surface Layers – Earthquake Motion On The Ground Surface;
- 2. Vibration Of Structures Under Ground Motion:**  
Elastic Vibration Of Simple Structures – Modelling Of Structures And Equations Of Motion – Free vibrations Of Simple Structures – Steady State Forced Vibrations – Non Steady State Forced Vibrations – Response Spectrum Representations; Relation Between The Nature Of The Ground Motion And Structural Damage.
- 3. Design Approaches:** Methods Of Analysis – Selection Of Analysis – Equivalent Lateral Force Procedure Seismic Base Shear – Seismic Design Co-Efficient - Vertical Distribution Of Seismic Forces And Horizontal Shear – Twisting Moment - Over Turning Moment – Vertical Seismic Load And Orthogonal Effects Lateral Deflection – P-  $\Delta$  Characteristics Effect – Soil Structure Interaction. Seismic – Graphs Study, Earthquake Records For Design – Factors Affecting Accelerogram Characteristics - Artificial Accelerogram – Zoning Map. Dynamic – Analysis Procedure: Model Analysis – Inelastic – Time History Analysis Evaluation Of The Results.
- 4.. Earthquake – Resistant Design Of Structural Components And Systems:**  
Introduction – Monolithic Reinforced – Concrete Structures – Precast Concrete Structures – Prestressed Concrete Structures – Steel Structures – Composite – Structures, Masonry Structures – Timber Structures.
- 5. Fundamentals Of Seismic Planning:** Selection Of Materials And Types Of Construction Form Of Superstructure – Framing Systems And Seismic Units – Devices For Reducing. Earthquake Loads,

**TEXT / REFERENCE BOOKS:**

1. Design Of Earthquake Resistant Structures By Minoru Wakabayashi.
2. A.K.Chopra, Strucutural Dynamics For Earthquake Engineering”, Pearson Publications.

3. R.W.Clough And 'Dynamics Of Structures'. Mc Graw – Hill, 2<sup>nd</sup> Edition, 1992.
4. N.M Newmark And E.Rosenblueth, 'Fundamentals Of Earthquake Engineering' Prentice Hall,1971.
5. David Key, 'Earthquake Design Practice For Buildings.' Thomas Telford,London,1988
6. R.L. Wegel, 'Earthquake Engg; Prentice Hall 12nd Edition 1989.
7. J.A. Blume, N.M. Newmark, L.H. Corning., 'Design Of Multi –Storied Buildings For Earthquake Ground Motions', Portland Cement Association, Chicago,1961
8. I.S.Codes No. 1893,4326,13920.
9. 'Earthquake Resistant Design By Pankaj Agarwal.

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(17D20108) PRESTRESSED CONCRETE  
(ELECTIVE IV)

- 1. INTRODUCTION:** Development Of Prestressed Concrete –Advantages And Disadvantages Of PSC Over RCC –General Principles Of Pre-Stressing-Pre Tensioning And Post Tensioning –Materials Used In PSC-High Strength Concrete –High Tension Steel-Different Types /Methods/Systems Of Prestressing.
- 2. Losses Of Prestress:** Estimation Of The Loss Of Prestress Due To Various Causes Like Elastic Shortening Of Concrete ,Creep Of Concrete, Shrinkage Of Concrete, Relaxation Of Steel, Slip In Anchorage, Friction Etc.
- 3. Flexure & Deflections:** Analysis Of Sections For Flexure In Accordance With Elastic Theory-Allowable Stresses-Design Criteria As Per I.S Code Of Practice – Elastic Design Of Beams (Rectangular, I And T Sections) For Flexure – Introduction To Partial Prestressing. Introduction-Factors Influencing Deflections-Short Term And Long Term Deflections Of Un-cracked And Cracked Members.
- 4. Shear, Bond, Bearing And Anchorage:** Shear In PSC Beams –Principal Stresses –Conventional Elastic Design For Shear-Transfer Of Prestress In Pre-tensioned Members-Transmission Length –Bond Stresses-Bearing At Anchorage – Anchorage Zone Stresses In Post-Tensioned Members-Analysis And Design Of End Blocks By Guyon, Magnel And Approximate Methods –Anchorage Zone Reinforcements.
- 5. Statistically Indeterminate Structures:** Introduction –Advantages And Disadvantages Of Continuity –Layouts For Continuous Beams-Primary And Secondary Moments –Elastic Analysis Of Continuous Beams-Linear Transformation-Concordant Cable Profile-Design Of Continuous Beams.

**REFERENCE BOOKS:**

1. Prestressed Concrete By S. Krishna Raju, TMH Publishers.
2. Prestressed Concrete By S. Ramamrutham, Dhanpati Rai Publicartions.
3. Prestressed Concrete Design By Praveen Nagarajan, Pearson Publications.
4. T.Y.Lin, Design Of Prestressed Concrete Structures, Asian Publishing House, Bombay, 1953.
5. Y.Guyon, Prestressed Concrete, Vol.I&II, Wiley And Sons, 1960.
6. F.Leohhardt, Prestressed Concrete Design And Construction, Wilhelm Ernst And Shon, Berlin, 1964.
7. C.E.Reynolds and J.C. Steedman, Reinforced concrete designers hand bood, A view point publication, 1989.
8. Edward P.Nawy, Prentice Hall – Prestressed Concrete.
9. Prestressed Concrete – by Raj Gopal, Narsoa Publications.

(17D20107) LOW COST HOUSING TECHNIQUES  
(ELECTIVE IV)

1. **A) Housing Scenario**  
Introduction - Status Of Urban Housing - Status Of Rural Housing  
**B) Housing Finance:**  
Introducing - Existing Finance System In India - Government Role As Facilitator  
- Status At Rural Housing Finance - Impedimently In Housing Finance And Related Issues  
**A) Land Use And Physical Planning For Housing**  
Introduction - Planning Of Urban Land - Urban Land Ceiling And Regulation Act  
- Efficiency Of Building Bye Lass - Residential Densities  
**B) Housing The Urban Poor**  
Introduction - Living Conditions In Slums - Approaches And Strategies For Housing Urban Poor
2. **Development And Adoption Of Low Cost Housing Technology**  
Introduction - Adoption Of Innovative Cost Effective Construction Techniques - Adoption Of Precast Elements In Partial Prefatroids - Adopting Of Total Prefactcation Of Mass Housing In India- General Remarks On Pre Cast Roofing/Flooring Systems -Economical Wall System - Single Brick Thick Loading Bearing Wall - 19cm Thick Load Bearing Masonry Walls - Half Brick Thick Load Bearing Wall - Flyash Grypsym Thick For Masonry - Stone Block Masonry - Adoption Of Precast R.C. Plank And Join System For Roof/Floor In The Building
3. **Alternative Building Materials For Low Cost Housing**  
Introduction - Substitute For Scarce Materials – Ferrocement - Gypsum Boards - Timber Substitutions - Industrial Wastes - Agricultural Wastes - Fitire Starateru; For ,P,Topm Of Alternative Building Maintenance  
**Low Cost Infrastructure Services:**  
Introduce - Present Status - Technological Options - Low Cost Sanitation - Domestic Wall - Water Supply, Energy

- 4. Rural Housing:**  
Introduction Traditional Practice Of Rural Housing Continuous - Mud Housing Technology  
Mud Roofs - Characteristics Of Mud - Fire Treatment For Thatch Roof - Soil Stabilization - Rural Housing Programs
- 5. Housing In Disaster Prone Areas:**  
Introduction – Earthquake - Damages To Houses - Traditional Prone Areas - Type Of Damages And Railways Of Non-Engineered Buildings - Repair And Restore Action Of Earthquake Damaged Non-Engineered Buildings Recommendations For Future Constructions. Requirement's Of Structural Safety Of Thin Precast Roofing Units Against Earthquake Forces status Of R& D In Earthquake Strengthening Measures - Floods, Cyclone, Future Safety

#### **TEXT BOOKS**

1. Building Materials For Low –Income Houses – International Council For Building Research Studies And Documentation.
2. Hand Book Of Low Cost Housing By A.K.Lal – Newage International Publishers.
3. Properties Of Concrete – Neville A.M. Pitman Publishing Limited, London.
4. Light Weight Concrete, Academic Kiado, Rudhai.G – Publishing Home Of Hungarian Academy Of Sciences 1963.
5. Low Cost Housing – G.C. Mathur.
6. Modern Trends In Housing In Developing Countries – A.G. Madhava Rao, D.S. Ramachandra Murthy & G.Annamalai.

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**LIST OF EXPERIMENTS .**

1. Quantity Takeoff, Preparation And Delivery Of The Bid Or Proposal Of An Engineering Construction Project.
2. Design Of A Simple Equipment Information System For A Construction Project.
3. Scheduling Of A Small Construction Project Using Primavera Scheduling Systems Including Reports And Tracking.
4. Scheduling Of A Small Construction Project Using Tools Like MS Project Scheduling Systems Including Reports And Tracking.
5. Simulation Models For Project Risk Analysis.
6. Break Up Of Activities For Construction Of Residential Building
7. Time Estimate For Activities And Expected Time Calculation
8. Estimation For Apartment With Framed Structure

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**M.Tech III semester (CPM)**

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**(17D20301) RESEARCH METHODOLOGY**  
**(Elective V-OPEN ELECTIVE )**

**UNIT I**

Meaning of Research – Objectives of Research – Types of Research – Research Approaches – Guidelines for Selecting and Defining a Research Problem – research Design – Concepts related to Research Design – Basic Principles of Experimental Design.

**UNIT II**

Sampling Design – steps in Sampling Design – Characteristics of a Good Sample Design – Random Sampling Design.  
Measurement and Scaling Techniques-Errors in Measurement – Tests of Sound Measurement – Scaling and Scale Construction Techniques – Time Series Analysis – Interpolation and Extrapolation.  
Data Collection Methods – Primary Data – Secondary data – Questionnaire Survey and Interviews.

**UNIT III**

Correlation and Regression Analysis – Method of Least Squares – Regression vs Correlation – Correlation vs Determination – Types of Correlations and Their Applications

**UNIT IV**

Statistical Inference: Tests of Hypothesis – Parametric vs Non-parametric Tests – Hypothesis Testing Procedure – Sampling Theory – Sampling Distribution – Chi-square Test – Analysis of variance and Co-variance – Multi-variate Analysis.

**UNIT V**

Report Writing and Professional Ethics: Interpretation of Data – Report Writing – Layout of a Research Paper – Techniques of Interpretation- Making Scientific Presentations in Conferences and Seminars – Professional Ethics in Research.

**Text Books:**

1. Research Methodology:Methods And Techniques – C.R.Kothari, 2<sup>nd</sup> Edition,New Age International Publishers.
2. Research Methodology: A Step By Step Guide For Beginners- Ranjit Kumar, Sage Publications (Available As Pdf On Internet)
3. Research Methodology And Statistical Tools – P.Narayana Reddy And G.V.R.K.Acharyulu, 1<sup>st</sup> Edition,Excel Books,New Delhi.

**REFERENCES:**

1. Scientists Must Write - Robert Barrass (Available As Pdf On Internet)
2. Crafting Your Research Future –Charles X. Ling And Quiang Yang (Available As Pdf On Internet)

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**(17D20302) HUMAN VALUES AND PROFESSIONAL ETHICS**  
**(Elective V-OPEN ELECTIVE )**

**Unit I:**

**HUMAN VALUES:** Morals, Values and Ethics-Integrity-Work Ethic-Service learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty – Courage- Co Operation – Commitment – Empathy –Self Confidence Character – Spirituality.

**Unit II:**

**ENGINEERING ETHICS:** Senses of Engineering Ethics- Variety of moral issues – Types of inquiry – Moral dilemmas – Moral autonomy –Kohlberg’s theory- Gilligan’s theory- Consensus and controversy – Models of professional roles- Theories about right action- Self interest - Customs and religion –Uses of Ethical theories – Valuing time –Co operation – Commitment.

**Unit III :**

**ENGINEERING AS SOCIAL EXPERIMENTATION:** Engineering As Social Experimentation – Framing the problem – Determining the facts – Codes of Ethics – Clarifying Concepts – Application issues – Common Ground - General Principles – Utilitarian thinking respect for persons.

**UNIT IV:**

**ENGINEERS RESPONSIBILITY FOR SAFETY AND RISK:** Safety and risk – Assessment of safety and risk – Risk benefit analysis and reducing riskSafety and the Engineer- Designing for the safety- Intellectual Property rights(IPR).

**UNIT V:**

**GLOBAL ISSUES:** Globalization – Cross culture issues- Environmental Ethics – Computer Ethics – Computers as the instrument of Unethical behavior – Computers as the object of Unethical acts – Autonomous Computers- Computer codes of Ethics – Weapons Development - Ethics .

**Text Books :**

1. “Engineering Ethics includes Human Values” by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009.
2. “Engineering Ethics” by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.
3. “Ethics in Engineering” by Mike W. Martin and Roland Schinzinger – Tata McGrawHill– 2003.
4. “Professional Ethics and Morals” by Prof.A.R.Aryasri, Dharanikota Suyodhana-Maruthi Publications.
5. “Professional Ethics and Human Values” by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran , Laxmi Publications.

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**(17D20303) INTELLECTUAL PROPERTY RIGHTS**  
**(Elective V-OPEN ELECTIVE )**

**UNIT – I**

Introduction To Intellectual Property: Introduction, Types Of Intellectual Property, International Organizations, Agencies And Treaties, Importance Of Intellectual Property Rights.

**UNIT – II**

Trade Marks : Purpose And Function Of Trade Marks, Acquisition Of Trade Mark Rights, Protectable Matter, Selecting And Evaluating Trade Mark, Trade Mark Registration Processes.

**UNIT – III**

Law Of Copy Rights : Fundamental Of Copy Right Law, Originality Of Material, Rights Of Reproduction, Rights To Perform The Work Publicly, Copy Right Ownership Issues, Copy Right Registration, Notice Of Copy Right, International Copy Right Law.  
Law Of Patents : Foundation Of Patent Law, Patent Searching Process, Ownership Rights And Transfer

**UNIT – IV**

Trade Secrets : Trade Secrete Law, Determination Of Trade Secrete Status, Liability For Misappropriations Of Trade Secrets, Protection For Submission, Trade Secrete Litigation.  
Unfair Competition : Misappropriation Right Of Publicity, False Advertising.

**UNIT – V**

New Development Of Intellectual Property: New Developments In Trade Mark Law ; Copy Right Law, Patent Law, Intellectual Property Audits.  
International Overview On Intellectual Property, International – Trade Mark Law, Copy Right Law, International Patent Law, International Development In Trade Secrets Law.

**TEXT BOOKS & REFERENCES:**

1. Intellectual Property Right, Deborah. E. Bouchoux, Cengage Learning.
2. Intellectual Property Right – Nileshmy The Knowledge Economy, Prabuddha Ganguli, Tate Mc Graw Hill Publishing Company Ltd.,