JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
Course Structure and syllabi for
M.Tech- Structural Engineering and Construction Management
for affiliated Engineering Colleges 2017-18

I YEAR I Semester

S. No	Course Code	Subject	L	T	P	C
1.	17D20101	Advanced Mathematical Methods	4	---	---	4
2.	17D20102	Advanced Structural Analysis	4	---	---	4
3.	17D20103	Theory of Elasticity and Plasticity	4	---	---	4
4.	17D91101	Construction Management	4	---	---	4
5.	17D20107 17D91102 17D20109	Elective – I 1. Low Cost Housing Techniques 2. Contract Laws and Regulations 3. Maintenance and Rehabilitation of Structures	4	---	---	4
6.	17D91103 17D91104 17D91105	Elective – II 1. Advanced Construction Techniques 2. Construction Methods and Equipment 3. Quality Control and Safety Management	4	---	---	4
7.	17D91106	Advanced Structural Engineering Laboratory	--	---	4	2
	Total		**24**		**4**	**26**

I YEAR II Semester

S. No	Course Code	Subject	L	T	P	C
1.	17D20201	Structural Dynamics	4	---	---	4
2.	17D20202	Finite Element Methods	4	---	---	4
3.	17D20203	Stability of Structures	4	---	---	4
4.	17D91201	Project Planning and Implementation	4	---	---	4
5.	17D20108 17D91202 17D91203	Elective – III 1. Prestressed Concrete 2. Construction Personnel Management 3. Construction Economics and Finance Management	4	---	---	4
6.	17D91204 17D91205 17D91206	Elective – IV 1. Construction Planning, Scheduling and Control 2. Civil Engineering Material Science 3. Environment and Pollution	4	---	---	4
7.	17D91207	CAD Laboratory	--	---	4	2
	Total		**24**		**4**	**26**

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.	17D91301	ELECTIVE – VI (MOOCs)	--	---	---	--
3.	17D91302	Comprehensive Viva Voce	--	---	---	2
4.	17D91303	Seminar	--	---	---	2
5.	17D91304	Teaching Assignment	--	---	---	2
6.	17D91305	Project Work Phase I	--	---	---	4
	Total		**4**			**14**

M.Tech. II YEAR (IV Semester)

S. No	Course Code	Subject	L	T	P	C
1.	17D91401	Project Work Phase II	--	---	---	12
	Total					**12**

Project Viva Voce Grades:

A: Satisfactory
B: Not Satisfactory

M.Tech I semester (SECM)

L	T	P	C
4	0	0	4

(17D20101) ADVANCED MATHEMATICAL METHODS

UNIT-I

Calculus Of Variation – Functionals – Euler's Equation - Solution Of Euler's Equation – Isoperimetric Problems – Several Dependent Variables – Functionals Invoving Higher Order Derivatives – Hamilton's Principle – Lagrange's Equations.

UNIT-II

Numerical Methods: Eigen Values And Eigen Vectors – General Method – Power Method, Spectral Method. Numerical Solution Of Ordinary Differential Equations - Taylor Series Method, Picard's Method, Euler's Method Modified Euler's Method & R.K.Method.

UNIT-III

Numerical Solution Of Partial Differential Equations –Elliptical Equations Standard Five Points Formula, Diagonal Five Point Formula –Solution Of Laplace Equation By Leibmann's Iteration Method, Poisson's Equation And Its Applications.

UNIT-IV

Numerical Solution Of Partial Differential Equations – Parabolic Equations Bender – Schmidt Method-Bender - Schmidt Recurrence Equation, Crank-Nicholson Difference Method.

UNIT-V

Finite Element Method – Weighted Residual Methods, Least Square Method Gelarkin's Method – Finite Elements – Interpolating Over The Whole Domain – One Dimensional Case, Two Dimensional Case – Application To Boundary Value Problems.

TEXT BOOKS:

1. Higher Engineering Mathematics By B.S. Grewal Khanna Publishers.
2. Numerical Methods For Engineers By Steven C.Chapra And Raymond P.Canale – Mc Graw Hill Book Company.

REFERENCE BOOKS:

1. Applied Numerical Analysis By Curtis. F.Gerald- Addeson Wesely Publishing Company.
2. C-Language And Numerical Methods By C-Xavier. New Age International Publishers.
3. Computational Methods For Partial Differential Equations By M.K.Jain, SKR Lyengar, R.K.Jain.

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L	T	P	C
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(17D20102) ADVANCED STRUCTURAL ANALYSIS

1. **INTRODUCTION:-**Indeterminacy-Determination Of Static And Kinematic Indeterminacies Of Two-Dimensional And Three-Dimensional Portal Frames, Pin Jointed Trusses And Hybrid Frames-Coordinate Systems –Structural Idealization. Introduction To Matrix Methods Of Analysis-Flexibility And Stiffness Matrices-Force Displacement Relationships For Axial Force, Couple, Torsional Moments – Stiffness Method Of Analysis And Flexibility Method Of Analysis.

2. **ANALYSIS OF CONTINUOUS BEAMS**- Stiffness Method And Flexibility Method Of Analysis –Continuous Beams Of Two And Three Spans With Different End Conditions-Internal Hinges.

3. **ANALYSIS OF TWO DIMENSIONAL PORTAL FRAMES & PIN JOINTED TRUSSES** – Stiffness And Flexibility Method Of Analysis Of 2D Portal Frames With Different End Conditions-Plotting Of Bending Moment Diagrams. Computation Of Joint Displacement And Member Forces For Pin jointed Trusses.

4. **TRANSFORMATION OF CO-ORDINATES** - Local And Global Co-Ordinate Systems-Transformation Of Matrices From Local To Global Coordinates Of Element Stiffness Matrix-Direct Stiffness Method Of Analysis-Assembly Of Global Stiffness Matrix From Element Stiffness Matrices –Static Condensation-Sub-Structuring.

5. **EQUATION SOLVERS**-Solution Of System Of Linear Algebraic Equations-Direct Inversion Method-Gauss Elimination Method-Cholesky Method-Banded Equation Solvers-Frontal Solution Technique.

TEXT/REFERENCE BOOKS :

1. Structural Analysis By Pundit & Gupta, Tata MC Graw Hill Book Company.
2. Structural Analysis By C.S.Reddy, Tata MC Graw Hill Book Company
3. Cotes, R.C., Couties, M.G., And Kong, F.K., Structural Analysis, ELBS.
4. MC.Guire, W.,And Gallagher, R.H., Matrix Structural Analysis, John Wiley And Sons.
5. John L.Meek., Matrix Strucstural Analysis, MC Graw Hill Book Company.
6. Structural Analysis – R.C.Hibbeler, Pearson Education

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(17D20103) THEORY OF ELASTICITY AND PLASTICITY

1. **INTRODUCTION TO PLANE STRESS AND PLANE STRAIN ANALYSIS:** Elasticity –Notation For Forces And Stresses-Components Of Stresses – Components Of Strain –Hooke's Law. Plane Stress-Plane Strain-Differential Equations Of Equilibrium- Boundary Conditions- Compatibility Equations-Stress Function-Boundary Conditions.

2. **TWO DIMENSIONAL PROBLEMS IN RECTANGULAR COORDINATES:** Solution By Polynomials-Saint Venant's Principle-Determination Of Displacements-Bending Of Simple Beams-Application Of Fourier Series For Two Dimensional Problems - Gravity Loading.

3. **TWO DIMENSIONAL PROBLEMS IN POLAR COORDINATES :** General Equation In Polar Co-Ordinates - Stress Distribution Symmetrical About An Axis –Pure Bending Of Curved Bars- Strain Components In Polar Coordinates-Displacements For Symmetrical Stress Distributions-Simple Symmetric And Asymmetric Problems-General Solution Of Two Dimensional Problem In Polar Coordinates-Application Of The General Solution Of Two Dimensional Problem In Polar Coordinates-Application Of The General Solution In Polar Coordinates.

4. **ANALYSIS OF STRESS AND STRAIN IN THREE DIMENSIONS:** Principle Stress - Ellipsoid And Stress-Director Surface-Determination Of Principle Stresses- Maximum Shear Stresses-Homogeneous Deformation-Principle Axis Of Strain Rotation. **General Theorems:** Balance Laws - Differential Equations Of Equilibrium- Conditions Of Compatibility - Determination Of Displacement-Equations Of Equilibrium In Terms Of Displacements-Principle Of Superposition-Uniqueness Of Solution –The Reciprocal Theorem.

5. **TORSION OF PRISMATICAL BARS:** **T**orsion Of Prismatic Bars- Elliptical Cross Section-Other Elementary Solutions-Membrane Analogy-Torsion Of Rectangular Bars-Solution Of Torsional Problems By Energy Method-Use Of Soap Films In Solving Torsional Problems-Hydra Dynamical Analogies-Torsion Of Shafts, Tubes, Bars Etc.

TEXT/REFERENCE BOOKS :

1. Theory of Elasticity and Plasticity by Timoshenko, S., MC Graw Hill Book company.
2. Advanced Strength of materials by Papoov, MC Graw Hill Book company.
3. Theory of Elasticity and Plasticity by Sadhu Singh. Khanna Publishers.
4. Chen, W.F. and Han, D.J.Plasticity for structural Engineers, Springer – Verlag, New York.
5. Lubliner, J., Plasticity theory, Mac Millan Publishing Co., New York.
6. Foundations of Solid Mechanics by Y.C.Fung, PHI Publications.
7. Advanced Mechanics of Solids by L.S. Srinath, Tata MC Graw Hill Book company.

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(17D91101) CONSTRUCTION MANAGEMENT

1. Introduction – Types Constructions Public And Private Contract Management – Scrutinizing Tenders And Acceptance Of Tenders, Contracted, Changes And Terminating Of Contract – Subcontracts Construction Organizations – Organizational Chart-Decentralization Payrolls And Records – Organization Chart Of A Construction Company.

2. Construction Practices – Times Management – Bar Chart, CPM, PERT – Progress Report

3. Resources Management And Inventor- Basic Concepts Equipment Management, Material Management Inventory Control.

4. Accounts Management – Basic Concepts, Accounting System And Book Keeping, Depreciation, Balance Sheet, Profit And Loss Account, Internal Auditing. Quality Control By Statistical Methods, Sampling Plan And Control Charts, Safety Requirements.

5. Cost And Financial Management – Cost Volume Relationship, Cost Control System, Budget Concept Of Valuation, Cost Of Equity Capital Management Cash. Labor And Industrial; Laws – Payment Of Wages Act. Contract Labor, Workmen's Compensation, Insurance, Industrial Disputes Act.

REFERENCE:

1. Construction Project Management By Jha ,Pearson Pubilications,New Delhi.
2. Construction Technology By Subir K.Sarkar And Subhajit Saraswati – Oxford Higher Education- Univ.Press, Delhi.
3. Project Planning And Control With PERT And CPM By Dr.B.C.Punmia, K.K.Khandelwal, Lakshmi Publications New Delhi.
4. Optimal Design Of Water Distribution Networks P.R.Bhave, Narosa Publishing House 2003.
5. Total Project Management, The Indian Context- By : P.K.JOY- Mac Millan Publishers India Limited.

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(17D20107) LOW COST HOUSING TECHNIQUES
ELECTIVE-I

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 Prefatroices - Adopting Of Total Prefactcation Of Mass Housing In India- General Remarks On Pre Cast Rooting/Flooring Systems -Economical Wall System - Single Brick Thick Loading Bearing Wall - 19cm Thick Load Bearing Masonery Walls - Half Brick Thick Load Bearing Wall - Flyash Grypsym Thick For Masonry - Stone Block Masonery - 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 Precost Roofing Units Against Earthquake Forcesstatus 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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(17D91102) CONTRACT LAWS AND REGULATIONS
ELECTIVE-I

UNIT-I

Construction Contracts: Indian Contracts Act-Elements Of Contracts-Types Of Contracts- Features-Suitability.

Design Of Contract Documents-International Contract Document-Standard Contract Document-Law Of Torts

UNIT-II

Tenders: Prequalification-Bidding-Acceptance-Evaluation Of Tender From Technical, Contractual And Commercial Points Of View-Contract Formation And Interpretation.

Potential Contractual Problems-World Bank Procedures And Guidelines.

UNIT-III

Arbitration- Comparison Of Actions And Laws-Agreements-Subject Matter-Violations-Appointment Of Arbitrators-Conditions Of Arbitrations-Powers And Duties Of Arbitrator-Rules Of Evidence-Enforcement Of Award-Costs

UNIT-IV

Legal Requirements-Insurance And Bonding-Laws Governing Sale, Purchase And Use Of Urban And Rural Land-Land Revenue Codes

Tax Laws-Income Tax, Sales Tax, Excise And Customs Duties And Their Influence On Construction Costs-Local Government Laws For Approval.

UNIT:V

Labour Regulations-Social Security-Welfare Legislation-Laws Relating To Wages And Bonus, Labour Administration- Insurance And Safety Regulations-Workmen's Compensation Act.

REFERENCE BOOKS:

1. Gajaria G.T., "*Laws Relating To Building And Engineering Contracts In India* ", M.M.Tripathi Private Ltd.,Bombay, 1982.
2. Jimmie Hinze, "*Construction Contracts* ", 2nd Edition, Mcgraw Hill, 2001.
3. Joseph T. Bockrath, " *Contracts And The Legal Environment For Engineers And Architects* ", 6th Edition, Mcgraw Hill, 2000.
4. Richard Hudson Clough, Glenn A. Sears, "*Construction Contracting*", J. Wiley, 21-Mar-2005.

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(17D20109) MAINTENANCE AND REHABILITATION OF STRUCTURES
(ELECTIVE I)

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, Gunite 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. Dension 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 Aporil 1987.

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(17D91103) ADVANCED CONSTRUCTION TECHNIQUES (ELECTIVE – II)

UNIT I

Construction Techniques: Box Jacking -Pipe Jacking - Under Water Construction Of Diaphragm Walls And Basement. Tunneling Techniques. Piling Techniques - Driving Well And Caisson -Sinking Cofferdam - Cable Anchoring And Grouting.

Driving Diaphragm Walls Sheet Piles - Laying Operations For Built Up Offshore System - Shoring For Deep - Well Points - Dewatering And Stand By Plant Equipment For Underground Open Excavation - Trenchless Technology.

UNIT II

Techniques For Concreting: Techniques Of Construction For Continuous Concreting Operation In Tall Buildings Of Various Shapes And Varying Sections Launching Techniques -Slipform Techniques- Suspended Form Work-.

Erection Techniques Of Tall Structures - Launching Techniques For Heavy Decks -In Situ Prestressing In High Rise Structures, Aerial Transporting Handling Erecting Lightweight Components On Tall Structures - Erection Of Lattice Towers And Rigging Of Transmission Line Structures.

UNIT III

Construction Sequence And Methods: Bow String Bridges, Cable Stayed Bridges. Launching And Pushing Of Box Decks. Construction Sequence And Methods In Domes And Prestressed Domes. Vacuum Dewatering Of Concrete Flooring - Concrete Paving Technology- Erection Of Articulated Structures.

UNIT IV

Construction Techniques For Foundation: Mud Jacking Grout Through Slab Foundation - Micro Piling For Strengthening Floor And Shallow Profile Pipeline Laying - Protecting Sheet Plies, Screw Anchors - Sub Grade Water Proofing Under Pinning Advanced Techniques And Sequence In Demolition And Dismantling.

UNIT V

Fundamentals Of Energy: Energy Production Systems -Heating. Ventilating And Air. Conditioning -Solar Energy And Conservation -Energy Economic Analysis -Energy Conservation And Audits

Domestic Energy Consumption -Savings- Challenges -Primary Energy Use In Buildings - Residential. Commercial -Institutional And Public Buildings.

REFERENCE BOOKS:

1. Jerry Irvine, Advanced Construction Techniques, Ca Rocketr, 1984
2. Sarkar, S.K. And Saraswati, S., Construction Technology, Oxford University Press, New Delhi,
3. 2008.Peter.H.Emmons, "Concrete Repair And Maintenance Illustrated", Galgotia Publications Pvt.Ltd., 2001.Press, 2008
4. Robertwade Brown, "Practical Foundation Engineering Hand Book", Mcgraw Hill Publications, 1995
5. Patrick Powers .J, "Construction Dewatering: New Methods And Applications", John Wiley & Sons, 1992

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4	0	0	4

(17D91104) CONSTRUCTION METHODS AND EQUIPMENT
ELECTIVE - II

UNIT-I

Modern Construction Methods:

a) Open Excavation, Shafts And Tunnels-Construction Methods For Pile, Pier And Caisson Foundations.

b) Basement Construction – Construction Methods For Supporting The Excavations – Control Of Ground Water - Shoring And Underpinning – Basement Waterproofing.

UNIT-II

Construction Methods-I: Construction Method In Brief For: Bridges, Roads, Railways, Dams, Harbors, River Works And Pipelines.

Construction Methods-II: Construction Of Power Generating Structures – Atomic Power Stations, Thermal Power Stations. Windmills, Transmission Towers

UNIT-III

Construction Equipment And Techniques:

Construction Equipment And Techniques For: Earth Moving, Excavating, Drilling, Blasting, Tunneling And Hoisting And Erection.

UNIT-IV

Factors Affecting Selection Of Equipment - Technical And Economic, Construction Engineering Fundamentals-Analysis Of Production Outputs And Costs.

UNIT-V

Equipment For Production Of Aggregate And Concrete: Crushers – Feeders – Screening Equipment – Batching And Mixing Equipment – Hauling, Pouring And Pumping Equipment – Transporters.

REFERENCE BOOKS:

1. Antil J.M., (1982) "Civil Engineering Construction", Mcgraw Hill Book Co.
2. Peurifoy, R.L., Ledbette. W.B. (2000), "Construction Planning, Equipment And Methods", Mcgraw Hill Co.
3. Ratay, R.T. (1984), "Hand Book Of Temporary Structures In Construction", Mcgraw Hill.
4. Koerner, R.M. (1984), "Construction & Geotechnical Methods In

Foundation Engineering", Mcgraw Hill.
5. Varma,M. (1979), "Construction Equipment And Its Planning & Applications", Metropolitain Book Co.
6. Smith, R.C, Andres, C.K. (1986), "Principles And Practive Of Heavy Construction", Prentice Hall

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(17D91105) QUALITY CONTROL AND SAFETY MANAGEMENT (Elective - II)

UNIT-I

Types Of Organizations: Inspection. Control And Enforcement -Quality Management Systems And Method - Responsibilities And Authorities In Quality Assurances And Quality Control- Architects, Engineers, Contractors, And Special Consultants, Quality Circle.

Quality Systems : Introduction - Quality System Standard – ISO 9000 Family Of Standards – Requirements – Preparing Quality System Documents – Quality Related Training – Implementing A Quality System – Third Party Certification.

UNIT-II

Quality Policy: Objectives And Methods In Construction Industry -Consumers Satisfaction, Economics- Time Of Completion -Statistical Tolerance -Taguchi's Concept Of Quality. Codes And Standards -Documents -Contract And Construction Programming -Inspection Procedures - Processes And Products -Total QA I QC Programme And Cost Implication.

UNIT-III

Regularity Agent, Owner, Design, Contract And Construction Oriented Objectives, Methods -Techniques And Needs Of QA/QC -Different Aspects Of Quality - Appraisals, Factors Influencing Construction Quality.

UNIT-IV

Critical, Major Failure Aspects And Failure Mode Analysis -Stability Methods And Tools, Optimum Design -Reliability Testing- Reliability Coefficient And Reliability Prediction –Selection Of New Materials -Influence Of Drawings Detailing, Specification, Standardization-Bid Preparation- Reliability Based Design.

UNIT-V

Construction Activity And Environmental Safety: Social And Environmental Factors-Natural Causes And Speed Of Construction -Life Cycle Costing- Reliability And Probabilistic Methods-Value Engineering And Value Analysis

REFERENCE BOOKS:

1. Total Quality Management, Besterfield, Pearson Publications 2010 3rd Edition
2. Kwaku A., Tenah And Jose M.Guevera, Fundamental Of Construction Management And Organization,Prentice Hall Of India 1995
3. John L.Ashford, " *The Management Of Quality In Construction* ", E & F.N Spon, New York, 1989
4. Steven Mccabe, Quality Improvement Techniques In Construction, Addison Wesley Longman Ltd, 1998.

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(17D91106) ADVANCED STRUCTURAL ENGINEERING LABORATORY

List Of Experiments:

1. Mix Design Of Concrete And Casting Of Specimen.
2. Young's Modulus Of Concrete
3. Accelerated Curing Test On Concrete Cubes.
4. Non Destructive Tests On Concrete.
5. Mix Design Of High Strength Concrete Including Casting And Testing Of Specimens.
6. Mix Design Of Fly Ash Concrete Including Casting And Testing Of Specimens.
7. Bending Test On A RCC Beam Under.

    a) Single Point Load
    b) Three Point Load

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(17D20201) STRUCTURAL DYNAMICS

1. **Theory Of Vibrations:** Introduction –Elements Of A Vibratory System – Degrees Of Freedom-Continuous Systems –Lumped Mass Idealization –Oscillatory Motion –Simple Harmonic Motion –Pictorial Representation Of S.H.M - Free Vibrations Of Single Degree Of Freedom (SDOF) Systems –Undamped And Damped – Critical Damping –Logarithmic Decrement –Forced Vibrations Of SDOF Systems-Harmonic Excitation –Dynamic Magnification Factor-Bandwidth.Fundamental Objective Of Dynamic Analysis-Types Of Prescribed Loading- Methods Of Discretization- Formulation Of The Equations Of Motion.

2. **Single Degree Of Freedom System**: Formulation And Solutions Of The Equation Of Motion - Free Vibration Response –Response To Harmonic, Periodic, Impulsive And General Dynamic Loading –Duhamel Integral

3. **Multi Degree Of Freedom System:** Selection Of The Degree Of Freedom – Evaluation Of Structural Property Matrices-Formulation Of The MDOF Equations Of Motion –Undamped Free Vibrations-Solution Of Eigen Value Problem For Natural Frequencies And Mode Shapes- Analysis Of Dynamic Response –Normal Coordinates –Uncoupled Equations Of Motion –Orthogonal Properties Of Normal Modes-Mode Superposition Procedure

4. **Practical Vibration Analysis:** Stodola Method- Fundamental Mode Analysis – Analysis Of Second And Higher Modes –Holzer's Method –Basic Procedure – Transfer Matrix Procedure

5. **Introduction To Earthquake Analysis:** Introduction –Excitation By Rigid Base Translation –Lumped Mass Approach -SDOF And MDOF System- I.S Code Methods Of Analysis.**Continuous System:** Introduction –Flexural Vibrations Of Beams- Elementary Case-Equation Of Motion –Analysis Of Undamped Free Shapes Of Simple Beams With Different End Conditions-Principles Of Application To Continuous Beams.

REFERENCE BOOKS:

- A.K.Chopra, "Structural Dynamics For Earthquake Engineering",Pearson Pubilications
- Dynamics Of Structures By Clough & Penziem
- Structural Dynamics By Mario Paz
- I.S:1893(Latest)" Code Of Practice For Earthquakes Resistant Design Of Stuctures"
- Anderson R.A Fundamentals Of Vibration, Amerind Pulblishing Co.,1972.

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(17D20202) FINITE ELEMENT METHODS

1. **Introduction-**Concepts Of FEM –Steps Involved –Merits &Demerits –Energy Principles –Discretization –Rayleigh –Ritz Method Of Functional Approximation. **Elastic Formulations:** Stress Equations-Strain Displacement Relationships In Matrix Form-Plane Stress, Plane Strain And Axi-Symmetric Bodies Of Revolution With Axi Symmetric Loading

2. **One Dimensional FEM-**Stiffness Matrix For Beam And Bar Elements Shape Functions For ID Elements –Static Condensation Of Global Stiffness Matrix-Solution –Initial Strain And Temperature Effects.

3. **Two Dimensional FEM-**Different Types Of Elements For Plane Stress And Plane Strain Analysis –Displacement Models –Generalized Coordinates-Shape Functions-Convergent And Compatibility Requirements –Geometric Invariance –Natural Coordinate System-Area And Volume Coordinates-Generation Of Element Stiffness And Nodal Load Matrices –Static Condensation.

4. **Isoparametric Formulation**-Concept, Different Isoparametric Elements For 2D Analysis-Formulation Of 4-Noded And 8-Noded Isoparametric Quadrilateral Elements –Lagrangian Elements-Serendipity Elements. **Axi Symmetric Analysis** –Bodies Of Revolution-Axi Symmetric Modelling –Strain Displacement Relationship-Formulation Of Axi Symmetric Elements.

5. **Three Dimensional FEM-**Different 3-D Elements, 3D Strain –Displacement Relationship- Formulation Of Hexahedral And Isoparametric Solid Element.

REFERENCE BOOKS:

1. Finite Elements Methods In Engineering By Tirupati. R. Chandrnpatla And Ashok D. Belegundu – Pearson Education Publications.
2. Finite Element Analysis – Theory & Programming By C.S.Krishna Murthy- Tata Mc.Graw Hill Publishers Finite Elements Methods In Engineering By Tirupati. R. Chandrnpatla, Universities Press India Ltd. Hyderabad.
3. Finite Element Method And Its Application By Desai ,2012, Pearson Pubilications.
4. Finite Element Methods By Darrel W.Pepper, Vikas Pubilishers

5. Finite Element Analysis And Procedures In Engineering By H.V.Lakshminaryana, 3rd Edition, Universities Press, Hyderabad.
6. Finite Element Analysis In Engineering Design By S.Rajasekharan, S.Chand Publications, New Delhi.
7. Finite Element Analysis By S.S. Bhavakatti-New Age International Publishers

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(17D20203) STABILITY OF STRUCTURES

1. **Formulations Related To Beam Columns :** Concept Of Stability, Differential Equation For Beam Columns –Beam Column With Concentrated Loads – Continuous Lateral Load –Couples -Beam Column With Built In Ends – Continuous Beams With Axial Load –Application Of Trignometric Series – Determination Of Allowable Stresses.

2. **Elastic Buckling Of Bars:** Elastic Buckling Of Straight Columns –Effect Of Shear Stress On Buckling-Eccentrically And Laterally Loaded Columns –Energy Methods –Buckling Of A Bar On Elastic Foundation, Buckling Of A Bar With Intermediate Compressive Forces And Distributed Axial Loads –Buckling Of Bars With Change In Cross Section –Effect Of Shear Force On Critical Load –Built Up Columns

3. **Inelastic Buckling And Torsional Buckling :** Buckling Of Straight Bars-Double Modulus Theory –Tangent Modulus Theory. Pure Torsion Of Thin Walled Bar Of Open Cross Section-Non –Uniform Torsion Of Thin Walled Bars Of Open Cross Section-Torsional Buckling –Buckling Under Torsion And Flexure.

4. **Mathematical Treatment Of Stability Problems:** Buckling Problem Orthogonality Relation –Ritz Method-Timoshenko Method, Galerkin Method

5. **Lateral Buckling Of Simply Supported Beams And Rectangular Plates :** Beams Of Rectangular Cross Section Subjected For Pure Bending. Derivation Of Equation Of Rectangular Plate Subjected To Constant Compression In Two Directions And One Direction.

REFERNCE BOOKS:

1. Stability Of Metalic Structure By Bleich –Mc Graw Hill
2. Theory Of Beam Columns Vol I By Chen & Atsuta Mc.Graw Hill
3. Smitses,Elastic Stability Of Structures, Prentice Hall,1973.
4. Timoshenko, S., And Gere., Theory Of Elastic Stability, Mc Graw Hill Book Company, 1973.
5. Brush And Almorth., Buckling Of Bars Plates And Shells, Mc Graw Hill Book Company ,1975.
6. Chajes, A., Principles Of Structural Stability Theory, Prentice Hall,1974

7. Ashwini Kumar, Stability Theory Of Structures, TATA Mc Graw Hill Publishing Company Ltd, New Delhi,1985.

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(17D91201) PROJECT PLANNING AND IMPLEMENTATION

UNIT-I

Project Planning:

Project Reports – Sanctions – Tendering – Contracts; Execution Of Works – Measurements –Payment – Disputes – Compensation – Arbitration.

UNIT-II

Construction Scheduling – Work Break Down Structure, Activity Cost And Time Estimation In CPM,PERT, RPM (Repetitive Project Modelling) Techniques.

UNIT-III

Work And Productivity Analysis

a) Work Study – Factors Influencing Productivity – Tools To Assess Productivity – Productivity Improvement Techniques

b) Behavioral Science Aspects – Motivation Of Individuals –Management Of Groups – Leadership – Communication.

UNIT-IV

Quality In Construction

a) Planning And Control Of Quality During Design Of Structures – Quality Standards And Codes In Design And Construction

b) Concept And Philosophy Of Total Quality Management..

UNIT-V

Concept Of Safety In Construction

Factors Affecting Safety – Site Management With Regard Top Safety Recommendations –Safety Legislation, Standards And Codes With Regard To Safety Recommendations.

REFERENCE BOOKS:

1. Chitkara. K.K(1998) "Construction Project Management: Planning Scheduling And Control", Tata Mcgraw Hill Publishing Company, New Delhi
2. *Construction Project Management, Dr. Neeraj Kumar Jha Pearson Publications*
3. Halpin,D.W., " *Financial And Cost Concepts For Construction Management ",* John Wiley And Sons, New York 1985.

4. Chris Hendrickson And Tung Au(2000), “Project Management For Construction - Fundamental Concepts For Owners, Engineers, Architects And Builders”, Prenticehall Pittsburgh.

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(17D20108) PRESTRESSED CONCRETE
(ELECTIVE III)

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 Pubilishers.
2. Prestressed Concrete By S. Ramamrutham, Dhanpati Rai Pubilicartions.
3. Prestressed Concrete Design By Praveen Nagarajan, Pearson Pubilications.
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 Pubilications.

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(17D91202) CONSTRUCTION PERSONNEL MANAGEMENT
(ELECTIVE III)

UNIT- I

Manpower Planning: Manpower Planning, Organizing, Staffing, Directing And Controlling-Personnel Principles-Case Studies.

UNIT-II

Organization:

a) Organization-Span Of Control-Organization Charts-Staffing Plan-Development And Operation Of Human Resources.

b) Managerial Staffing-Recruitment-Selection-Placement, Training And Development.

UNIT- III

Human Behaviour:

a) Introduction To The Field Of Management-Basic Individual Psychology Motivation-Job Design And Performance Management.

b) 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- IV

Management And Development Methods :

a) Compensation-Wages And Salary, Employee Benefits, Employee Appraisal And Assessment-Employee Services- Safety And Health Discipline And Discharge.

b) Special Human Resource Problems, Performance Appraisal Employee Hand Book And Personnel Manual-Job Descriptions And Organization Structure And Human Relations-Productivity Of Human Resources.

UNIT V

WELFARE MEASURES: Compensation – Safety And Health – GPF – EPF – Group Insurance – Housing - Pension – Laws Related To Welfare Measures.

REFERENCE BOOKS:

1. Carleton Counter II And Jill Justice Coulter, "*The Complete Standard Hand Book Of Construction Personnel Management "*, Prentice Hall, Inc., New Jersey, 1989.
2. Memoria, C.B., *" Personnel Management* ", Himalaya Publishing Co., 1992.

3. Josy.J Familaro, " *Handbook Of Human Resources Administration* ", Mcgraw Hill International Edition, 1987.
4. Justin Gooderl Longenecker, Charles D. Pringle, " *Management "* C.E. Merrill, 1981.
5. R.S.Dwivedi, *" Human Relations And Organizational Behaviour* ", B.H - 1987.
6. Shamil Naoum, "*People And Organizational Management In Construction*",Thomas Telford,2001
7. Stephen Bach & Keith Sissons,"*A Comprehensive Guide To Theory And Practice"*, John Wiley & Sons,2000.
8. Andrew Dainty, Martin Loosemore, "Human Resource Management In Construction Projects", Routledge,2012.

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(17D91203) CONSTRUCTION ECONOMICS AND FINANCE MANAGEMENT
(ELECTIVE III)

UNIT- I

Economics:

a) Role Of Civil Engineering In Industrial Development-Advances In Civil Engineering And Engineering Economics- Support Matters Of Economy As Related Top Engineering.

b) Market Demand And Supply-Choice Of Technology- Quality Control And Quality Production-Audit In Economic Law Of Returns Governing Production

UNIT- II

Construction Economics:

a) Construction Development In Housing, Transport And Other Infrastructures-Economics Of Ecology, Environment, Energy Resources-Local Material Selection.

b) Form And Functional Designs-Construction Workers-Urban Problems-Poverty-Migration-Unemployment-Pollution.

UNIT-III

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.

UNIT-IV

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- V

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.

REFERENCE BOOKS:

1. Prasanna Chandra, “Projects - Planning Analysis Selection Implementation & Review ", Fourth Edition, Tata Mcgraw Hill Publishing Co., Ltd, New Delhi, 1995.
2. Kwaku A., Tenah And Jose M. Guevera, “Fundamental Of Construction Management And Organization ", Prentice Hall Of India, 1995 .
3. Halpin, D.W., " Financial And Cost Concepts For Construction Management ", John Wiley And Sons, New York, 1985.
4. Madura J. And Veit, E.T., “Introduction To Financial Management ", Westpublishing Co., 1988

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(17D91204) CONSTRUCTION PLANNING, SCHEDULING AND CONTROL
(ELECTIVE IV)

UNIT-I

CONSTRUCTION PLANNING: 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.

UNIT-II

SCHEDULING PROCEDURES AND TECHNIQUES:

a) Construction Schedules – Critical Path Method – Scheduling Calculations – Float – Presenting Project Schedules – Scheduling For Activity-On-Node And With Leads, Lags, And Windows.

b) 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-III

COST CONTROL, MONITORING AND ACCOUNTING:

a) The Cost Control Problem – The Project Budget – Forecasting For Activity Cost Control – Financial Accounting Systems And Cost Accounts.

b) Control Of Project Cash Flows –Schedule Control – Schedule And Budget Updates – Relating Cost And Schedule Information.

UNIT-IV

QUALITY CONTROL AND SAFETY DURING CONSTRUCTION :

a) Quality And Safety Concerns In Construction – Organizing For Quality And Safety – Work And Material Specifications – Total Quality Control

b) 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.

REFERENCE BOOKS:

1. Chitkara. K.K(1998) "Construction Project Management: Planning Scheduling And Control", Tata Mcgraw Hill Publishing Company, New Delhi
2. *Construction Project Management, Dr. Neeraj Kumar Jha Pearson Publications*
3. Halpin,D.W., " *Financial And Cost Concepts For Construction Management ",* John Wiley And Sons, New York 1985
4. Chris Hendrickson And Tung Au(2000), "Project Management For Construction - Fundamental Concepts For Owners, Engineers, Architects And Builders", Prenticehall Pittsburgh
5. Moder, J., C. Phillips And E. Davis (1983) "Project Management With CPM, PERT And Precedence Diagramming", Van Nostrand Reinhold Company, Third Edition, Willis, E. M., Scheduling Construction Projects

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(17D91205) CIVIL ENGINEERING MATERIAL SCIENCE
(ELECTIVE IV)

UNIT-I

Introduction: Classification Of Engineering Materials, Atomic Structure And Bonding, The Architecture Of Solids, Crystal Structure, Mechanical Properties.

Phase Transformation, Alloys And Their Phase Diagrams, Equilibrium Microstructure Of Steel Alloys, Heat Treatment Of Steel Alloys, Stainless Steel, Cast Iron.

UNIT-II

Introduction To Concrete:

a) Hydraulic Cements, Aggregates For Concrete, Proportioning Of Concrete Mixes, Properties Of Fresh Cement.
b) Microstructure Of Cement Paste, Strength Of Concrete .
c) Elastic Behavior-Shrinkage And Creep.

UNIT-III

Durability Of Concrete: Physical And Chemical Causes, Temperature Effects In Concrete, Environmental Impact Of Concrete, Corrosion Of Steel Reinforcement.

UNIT-IV

Supplementary Cementing Materials: Silica Fume, Fly Ash, Metakaolin, Ground Granulated Blast Furnace Slag, Rice-Husk Ash Etc. Polymers, Plastics, Rubber And Composite Materials.

UNIT-V

Nanomaterials, Self Healing Concrete, Bacterial Concrete.

REFERENCE BOOKS:

1. Young. J. F; Mindess, S; Bentuer, "The Science And Technology Of Civil Engineering Materials", Presntice Hall, New York.

2. Ashby, M.F And Jones, D.R.H (2005), "Engineering Materials – An Introduction To Properties, Applications And Design".

3. Mehta, P.K And Monteiro. P.J.M, "Concrete: Microstructure, Properties And Materials".

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(17D91206) ENVIRONMENT AND POLLUTION
(ELECTIVE IV)

UNIT-I:

Introduction To Environment: Components Of Environment – Man And Environment Natural Resources – Water, Land, Forest, Mineral, Energy, Food

Introduction To Environmental Pollution:

General Pollutants; Types Of Pollutants. Pollution – Air, Water, Land, Noise, Thermal, Marine, Pesticide, Radioactive, Plastic Pollution Case Studies.

Population And The Environment. Environmental Ethics, Disaster Management.

UNIT-II:

Industrial scenario in India:

Industrial Activity And Environment - Uses Of Water By Industry - Sources And Types Of Industrial Wastewater - Industrial Wastewater And Environmental Impacts - Regulatory Requirements For Treatment Of Industrial Wastewater .

UNIT-III:

Industrial Waste Survey - Industrial Wastewater Generation Rates, Characterization And Variables - Population Equivalent - Toxicity Of Industrial Effluents And Bioassay Tests.

UNIT-IV:

Prevention of Industrial Pollution:

Benefits And Barriers - Source Reduction Techniques - Waste Audit - Evaluation Of Pollution Prevention Options .

Environmental Statement As A Tool For Pollution Prevention - Waste Minimization Circles.

UNIT-V:

Pollution Control And Role Of Human Beings.

REFERENCE BOOKS:

1. P. Aarne Vesilind (1997), "Introduction To Environmental Engineering", Pws Publishers.
2. Dr. Arumugam & Prof. Kumaresan, " Environmental Studies", Saras Publication
3. Surinder Deswal & Dr. Anupama Deswal, " A Basic Course In Environmental

Studies", Dhanpat Rai And Co (P) Ltd
4. Eckenfelder, W.W. (1999), "Industrial Water Pollution Control", Mcgraw-Hill.
5. Arceivala, S.J. (1998), "Wastewater Treatment For Pollution Control", Tata Mcgraw-Hill.
6. Butterworth Heinemann (2001), "Frank Woodard Industrial Waste Treatment Handbook" , New Delhi.
7. World Bank Group "Pollution Prevention And Abatement Handbook - Towards Cleaner Production', World Bank And Unep, Washington D.C.1998
8. Paul L. Bishop (2000) "Pollution Prevention: - Fundamentals And Practice", Mcgraw-Hill International.

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(17D91207) 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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M.Tech III semester (SECM)

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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, 2nd 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, 1st 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).

UINIT 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 Learing.
2. Intellectual Property Right – Nleashmy The Knowledge Economy, Prabuddha Ganguli, Tate Mc Graw Hill Publishing Company Ltd.,