JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

M.TECH. IN STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT
COURSE STRUCTURE & SYLLABI

SEMESTER – I

S. No.	Course codes	Course Name	Category	Hours per			Credits
				L	T	P	
1.	21D91101	Construction Management	PC	3	0	0	3
2.	21D35102	Matrix Methods of Structural Analysis	PC	3	0	0	3
3.	21DBS105 21D91102a 21D91102b	**Program Elective Course – I** Advanced Mathematical Methods Cost Effective housing Techniques Contract Laws and Regulations	PE	3	0	0	3
4.	21D35101 21D91103a 21D91103b	**Program Elective Course - II** Theory of Elasticity Advanced Construction Techniques Quality Control and Safety Management	PE	3	0	0	3
5.	21D35106	Advanced Structural Engineering Laboratory	PC	0	0	4	2
6.	21D35105	CAD Lab	PC	0	0	4	2
7.	21DRM101	Research Methodology and IPR	MC	2	0	0	2
8.	21DAC101a 21DAC101b 21DAC101c	**Audit Course – I** English for Research paper writing Disaster Management Sanskrit for Technical Knowledge	AC	2	0	0	0
Total							**18**

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SEMESTER – II

S.No.	Course codes	Course Name	Category	Hours per			Credits
				L	T	P	
1.	21D91201	Project Planning and Implementation	PC	3	0	0	3
2.	21D91202	Finite Element Analysis of Structures	PC	3	0	0	3
3.	21D91203a 21D35104b 21D91203b	**Program Elective Course – III** Stability of Structures Design of Prestressed Concrete Construction Personnel Management	PE	3	0	0	3
4.	21D35201 21D91204a 21D91204b	**Program Elective Course – IV** Structural Dynamics Construction Economics and Finance Management Civil Engineering Materials Science	PE	3	0	0	3
5.	21D91205	Construction Project Studio	PC	0	0	4	2
6.	21D91206	Building Information Modelling Laboratory	PC	0	0	4	2
7.	21D91207	Technical seminar	PR	0	0	4	2
8.	21DAC201a 21DAC201b 21DAC201c	**Audit Course – II** Pedagogy Studies Stress Management for Yoga Personality Development through Life Enlightenment Skills	AC	2	0	0	0
Total							**18**

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SEMSTER - III

S.No.	Course codes	Course Name	Category	Hours per			Credits
					T	P	
1.	21D91301a 21D91301b 21D91301c	**Program Elective Course – V** Maintenance and Rehabilitation of Structures Construction Planning, Scheduling and Control Construction Methods and Equipment	PE	3	0	0	3
2.	21DOE301a 21DOE301b 21DOE301c	**Open Elective** Cost Management of Engineering Projects Industrial safety Business Analytics	OE	3	0	0	3
3.	21D91302	Dissertation Phase – I	PR	0	0	20	10
4.	21D91303	Co-curricular Activities					2
		Total					**18**

SEMESTER - IV

S.No.	Course codes	Course Name	Category	Hours per			Credits
				L	T	P	
1.	21D91401	Dissertation Phase – II	PR	0	0	32	16
Total							**16**

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Course Code	CONSTRUCTION MANAGEMENT	L	T	P	C
21D91101		3	0	0	3
	Semester	**I**			

Course Objectives: This Course will enable students:

- Understand the broad principles and concepts of construction management
- To create awareness of management techniques in construction industry
- Represent various works measurement standards

Course Outcomes (CO): Student will be able to

- Ability to take responsibilities as construction manager
- Awareness of principles of construction Management and decision making in construction Industry
- Applications of mobilization, cost time schedules and MIS technique in the real time construction operation
- Application of work study measurements
- Knowledge of work measurement application in construction industry

UNIT - I	Lecture Hrs:

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.

UNIT - II	Lecture Hrs:

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

UNIT - III	Lecture Hrs:

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

UNIT - IV	Lecture Hrs:

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.

UNIT - V	Lecture Hrs:

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.

Textbooks:

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.

Reference Books:

1. Optimal Design Of Water Distribution Networks P.R.Bhave, Narosa Publishing House 2003.
2. Total Project Management, The Indian Context- By : P.K.JOY- Mac Millan Publishers India Limited.
3. Project Management – K Nagrajan – New age International Ltd

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Course Code	MATRIX METHODS OF STRUCTURAL ANALYSIS	L	T	P	C
21D35102		3	0	0	3
	Semester	I			

Course Objectives: This Course will enable students:

- To understand the static and kinematic indeterminacy of the structures
- To understand the concepts of matrix methods of analysis of structures
- To understand the analysis of continuous beams.
- To understand the analysis of rigid and pin jointed frames

Course Outcomes (CO): Student will be able to

- Distinguish determinate and indeterminate structures.
- Identify the method of analysis for indeterminate structures.
- Apply matrix methods of analysis for continuous beams.
- Apply matrix methods of analysis for rigid and pin jointed frames.

UNIT - I Lecture Hrs:

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.

UNIT - II Lecture Hrs:

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

UNIT - III Lecture Hrs:

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.

UNIT - IV Lecture Hrs:

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.

UNIT - V Lecture Hrs:

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

Textbooks:

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. Structural Analysis, Cotes, R.C., Couties, M.G., And Kong, F.K., ELBS.

Reference Books:

1. Matrix Structural Analysis, MC.Guire, W.,And Gallagher, R.H., John Wiley And Sons.
2. Matrix Strucstural Analysis, John L.Meek., MC Graw Hill Book Company.
3. Structural Analysis – R.C.Hibbeler, Pearson Education

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Course Code	ADVANCED MATHEMATICAL METHODS	L	T	P	C
21DBS105	(Common to SE and CM and SE (PEC-I))	3	0	0	3
	Semester	I			

Course Objectives: This Course Will Enable Students:

- With calculus of variation, numerical methods of solving ordinary and partial differential equations.
- To impart knowledge in basic concepts of finite element methods and applications.

Course Outcomes (CO): Student will be able to

- Solve functionals using Hamilton's principle .
- Numerically solve ordinary and partial differential equations that are initial value or boundary value problems.
- Apply the concepts of finite element method for 1-D and 2-D problems.

UNIT - I	Calculus of Variation	Lecture Hrs: 8

Calculus of Variation – Functionals – Euler's Equation - Solution of Euler's Equation – Isoperimetric problems – several dependent variables – Functionals involving higher Order derivatives – Hamilton's principle – Lagrange's Equations.

UNIT - II	Numerical Solution of ordinary Differential Equations & Eigen values and Eigen vectors	Lecture Hrs: 8

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	Lecture Hrs: 10

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	Lecture Hrs: 8

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

UNIT - V	Finite Element Method	Lecture Hrs: 8

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.

Textbooks:

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.

Online Learning Resources:

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After completion of this course the student should be able to :

- Understand the concept and steps of calculus of variation.
- Solve ordinary and partial differential equations numerically.
- Solve the initial and boundary value problems numerically.
- Solve the 1-D and 2-D problems using finite element method.
- Identify, formulate and solve structural engineering problems.

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COURSE STRUCTURE & SYLLABI

Course Code	COST EFFECTIVE HOUSING TECHNIQUES	L	T	P	C
21D91102a	(PE-I)	3	0	0	3
	Semester	I			

Course Objectives: This Course will enable students:

- To possess comprehensive knowledge of planning, design, evaluation, construction and financing of housing projects.
- To focuses on cost effective construction materials and methods.
- To understand on the principles of sustainable housing policies and programmes.
- to adopt the suitable techniques in rural and disaster prone areas by using locally available materials.

Course Outcomes (CO): Student will be able to

- Development of construction technology and innovative techniques as tools to address demand mass construction
- Knowledge of eco friendly material with their application
- Learn the use of locally available material according to their availability and maintenance

UNIT - I Lecture Hrs:

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

UNIT - II Lecture Hrs:

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

UNIT - III Lecture Hrs:

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

UNIT - IV Lecture Hrs:

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

UNIT - V Lecture Hrs:

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
Textbooks:
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.
Reference Books:
1. Light Weight Concrete, Academic Kiado, Rudhai.G – Publishing Home Of Hungarian Academy Of Sciences 1963. 2. Low Cost Housing – G.C. Mathur. 3. Modern Trends In Housing In Developing Countries – A.G. Madhava Rao, D.S. Ramachandra Murthy & G.Annamalai.

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COURSE STRUCTURE & SYLLABI

Course Code	CONTRACT LAWS AND REGULATIONS (PE-I)	L	T	P	C
21D91102b		3	0	0	3
	Semester	I			

Course Objectives: This Course will enable students:

- To study the various types of construction contracts and their legal aspects and provisions.
- To study the of tenders, arbitration, legal requirement, and labour regulations

Course Outcomes (CO): Student will be able to

- To describe fundamentals of common law and understand bid cycle
- To explain Indian contract act and demonstrate the concept contract administration
- To summarize students with Laws applicable to construction activity
- To interpret various acts in connection with construction activities

UNIT - I	Lecture Hrs:

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	Lecture Hrs:

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	Lecture Hrs:

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	Lecture Hrs:

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	Lecture Hrs:

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

Textbooks:

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.

Reference Books:

1. Joseph T. Bockrath, " *Contracts And The Legal Environment For Engineers And Architects* ", 6th Edition, Mcgraw Hill, 2000.
2. Richard Hudson Clough, Glenn A. Sears, "*Construction Contracting*", J. Wiley

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COURSE STRUCTURE & SYLLABI

Course Code	THEORY OF ELASTICITY	L	T	P	C
21D35101	(PE-I)	3	0	0	3
	Semester	I			

Course Objectives: This Course will enable students:

- To make students understand the principles of elasticity.
- To familiarize students with basic equations of elasticity.
- To expose students to two dimensional problems in Cartesian and polar coordinates.
- To make students understand the principle of torsion of prismatic bars.

Course Outcomes (CO): Student will be able to

- To apply elastic analysis to study the fracture mechanics.
- To apply linear elasticity in the design and analysis of structures such as beams, plates, shells and sandwich composites.
- To apply hyper elasticity to determine the response of elastomer-based objects.
- To analyze the structural sections subjected to torsion.

UNIT - I Lecture Hrs:

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.

UNIT - II Lecture Hrs:

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.

UNIT - III Lecture Hrs:

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.

UNIT - IV Lecture Hrs:

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.

UNIT - V Lecture Hrs:

TORSION OF PRISMATIC BARS:
Torsion 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 and Bars.

Textbooks:

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.

Reference Books:

1. Plasticity for structural Engineers- Chen, W.F. and Han, D.J., Springer – Verlag, New York.
2. Plasticity theory, Lubliner, J., Mac Millan Publishing Co., New York.

3. Foundations of Solid Mechanics by Y.C.Fung, PHI Publications.
4. Advanced Mechanics of Solids by L.S. Srinath, Tata MC Graw Hill Book company.

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Course Code	ADVANCED CONSTRUCTION TECHNIQUES	L	T	P	C
21D91103a	(PE-II)	3	0	0	3
	Semester	I			

Course Objectives: This Course will enable students:

- To give an experience in the implementation of new technology concepts which are applied in field of Advanced construction.
- To study different methods of construction to successfully achieve the structural design with recommended specifications.
- To involve the application of scientific and technological principles of planning, analysis, design and management to construction technology.
- To provide a coherent development to the students for the courses in sector of Advanced construction technology.

Course Outcomes (CO): Student will be able to

- Gain an experience in the implementation of new construction technology on engineering concepts which are applied in field Advanced construction technology.
- Get a diverse knowledge of Advanced technology practices applied to real life problems.
- Understand the theoretical and practical aspects of new technology in civil engineering along with the design and management applications.
- Study of construction equipments, and temporary works required to facilitate the construction process

UNIT - I Lecture Hrs:

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 Lecture Hrs:

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 Lecture Hrs:

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 Lecture Hrs:

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 Lecture Hrs:

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

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COURSE STRUCTURE & SYLLABI

Course Code	QUALITY CONTROL AND SAFETY MANAGEMENT (PE-II)	L	T	P	C
21D91103b		3	0	0	3
	Semester	II			

Course Objectives: This Course will enable students:

- To prepare work breakdown plan and estimate resources requirements
- Study the elements of cost of project
- Understand the principles of project management, resource management

Course Outcomes (CO): Student will be able to

- Plan and develop project organization for executing construction projects.
- Prepare work break down plan and estimate resources requirements
- Solve problems of resource allocation and levelling using network diagrams
- Implement project monitoring and control in construction projects.

UNIT - I Lecture Hrs:

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 Lecture Hrs:

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 Lecture Hrs:

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 Lecture Hrs:

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 Lecture Hrs:

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

Textbooks:

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.

Reference Books:

1. Construction Project Management Theory & Practice - Kumar Neeraj Jha, Pearson,2012
2. Project Management – K Nagrajan – New Age International Ltd.
3. Construction Management Fundamentals By Knutson, Schexnayder, Fiori, Mayo, Tata Mcgraw Hill, 2nd Edition, 2010

4. Construction Management And Planning By Sengupta And Guha-Tata Mcgraw Hill Publication.
5. Construction Project Scheduling By Callahan, M.T., Quackenbush,D.G.,And Rowing,J.E, Mcgraw-Hill ,New York,1992

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M.TECH. IN STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT
COURSE STRUCTURE & SYLLABI

Course Code	ADVANCED STRUCTURAL ENGINEERING LABORATORY	L	T	P	C
21D35106		0	0	4	2
	Semester	**I**			

Course Objectives: The students will acquire knowledge about

- To learn the principles of workability in cement concrete.
- To learn the preliminary tests on aggregates like flakiness test, elongation test, specific gravity, bulk density fineness modulus.
- To know the compression test, Young's modulus test procedures
- To learn the mix design procedure

Course Outcomes (CO): At the end of the course, students will be able to:

- Assess the workability of cement concrete and its suitability, quality of concrete
- Assess the quality of fine and coarse aggregates after testing the aggregates according to IS specifications.
- Test the quality of cement concrete by conducting compressive strength on concrete cubes.
- Design different grades of mix design and also asses the fineness of cement, flash, silica

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

References:

1. Properties of Concrete, Neville A. M., 5th Edition, Prentice Hall, 2012.
2. Concrete Technology, Shetty M. S., S. Chand and Co., 2006.
3. Concrete Technology by A.R. Santha kumar, Oxford University Press.

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M.TECH. IN STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT
COURSE STRUCTURE & SYLLABI

Course Code	CAD LABORATORY	L	T	P	C
21D35105		0	0	4	2
	Semester	I			

Course Objectives: The students will acquire knowledge about

- Demonstrate the design of reinforced concrete structural elements.
- Demonstrate the method of analysis of truss.
- Explain the procedure of reinforcement detailing of structural elements
- Explain about design of steel tension members

Course Outcomes (CO): At the end of the course, students will be able to:

- Analyze and design the structural components like beams, slabs, columns and foundations
- Analyze for building frames
- Analyze and design steel members.
- Draft the reinforcement detailing of various structural members

List of Experiments:

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. IN STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT
COURSE STRUCTURE & SYLLABI

Course Code	RESEARCH METHODOLOGY AND IPR	L	T	P	C
21DRM101		2	0	0	2
	Semester	I			

Course Objectives:

- Identify an appropriate research problem in their interesting domain.
- Understand ethical issues understand the Preparation of a research project thesis report.
- Understand the Preparation of a research project thesis report
- Understand the law of patent and copyrights.
- Understand the Adequate knowledge on IPR

Course Outcomes (CO): Student will be able to

- Analyze research related information
- Follow research ethics
- Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
- Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
- Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

UNIT - I Lecture Hrs:

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, scope, and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT - II Lecture Hrs:

Effective literature studies approaches, analysis Plagiarism, Research ethics, Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

UNIT - III Lecture Hrs:

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT - IV Lecture Hrs:

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

UNIT - V

New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

Textbooks:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'"
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"

Reference Books:

1. Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners"
2. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
3. Mayall, "Industrial Design", McGraw Hill, 1992.
4. Niebel, "Product Design", McGraw Hill, 1974.
5. Asimov, "Introduction to Design", Prentice Hall, 1962.
6. Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age", 2016.

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COURSE STRUCTURE & SYLLABI

Course Code	PROJECT PLANNING AND IMPLEMENTATION	L	T	P	C
21D91201		3	0	0	3
	Semester	II			

Course Objectives: This Course will enable students:

- To prepare work breakdown plan and estimate resources requirements
- Study the elements of cost of project
- Understand the principles of project management, resource management

Course Outcomes (CO): Student will be able to

- Plan and develop project organization for executing construction projects.
- Prepare work break down plan and estimate resources requirements
- Solve problems of resource allocation and levelling using network diagrams
- Implement project monitoring and control in construction projects.

UNIT - I Lecture Hrs:

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

UNIT - II Lecture Hrs:

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

UNIT - III Lecture Hrs:

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 Lecture Hrs:

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 Lecture Hrs:

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.

Textbooks:

1. Construction Project Management: Planning Scheduling AndControl", Chitkara. K.K(1998) Tata Mcgraw Hill Publishing Company, New Delhi
2. Construction Project Management, Dr. Neeraj Kumar Jha Pearson Publications
3. Construction Planning & Management By P S Gahlot & B M Dhir , New Age International Limited Publisher

Reference Books:

1. Financial And Cost Concepts For Construction Management, Halpin,D.W., John Wiley And Sons, New York 1985.
2. Project Management For Construction -Fundamental Concepts For Owners, Engineers, Architects And Builders, Chris Hendrickson And Tung Au(2000), Prenticehall Pittsburgh.
3. Construction Project Scheduling By Callahan, M.T., Quackenbush,D.G.,And Rowing,J.E, Mcgraw-Hill ,New York,1992

Course Code	FINITE ELEMENT ANALYSIS OF STRUCTURES	L	T	P	C
21D91202		3	0	0	3

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M.TECH. IN STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT
COURSE STRUCTURE & SYLLABI

	Semester	**II**
Course Objectives: This Course will enable students:		
• To provide an overview and basic fundamentals of Finite Element Analysis. • To introduce basic aspects of finite element theory, including domain discretization, interpolation, application of boundary conditions, assembly of global arrays, and solution of the resulting algebraic systems. • To explain the underlying concepts behind variational methods and weighted residual methods in FEM. • Formulate simple structural problems in to finite elements		
Course Outcomes (CO): Student will be able to		
• Analyse and build FEA models for various Engineering problems. • Able to identify information requirements and sources for analysis , design and evaluation • Use professional-level finite element software to solve engineering problems. • Interpret results obtained from FEA software solutions, not only in terms of conclusions but also awareness of limitations.		
UNIT - I		Lecture Hrs:
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		
UNIT - II		Lecture Hrs:
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.		
UNIT - III		Lecture Hrs:
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.		
UNIT - IV		Lecture Hrs:
Iso-parametric 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.		
UNIT - V		Lecture Hrs:
Three Dimensional FEM-Different 3-D Elements, 3D Strain –Displacement Relationship-Formulation Of Hexahedral And Isoparametric Solid Element.		
Textbooks:		
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 3. Finite Elements Methods In Engineering By Tirupati. R. Chandrnpatla, Universities Press India Ltd. Hyderabad.		
Reference Books:		
1. Finite Element Method And Its Application By Desai ,2012, Pearson Pubilications. 2. finite Element Methods By Darrel W.Pepper, Vikas Pubilishers 3. Finite Element Analysis And Procedures In Engineering By H.V.Lakshminaryana, 3rd Edition, Universities Press, Hyderabad. 4. Finite Element Analysis In Engineering Design By S.Rajasekharan, S.Chand Publications, New Delhi.		

5. Finite Element Analysis By S.S. Bhavakatti-New Age International Publishers
6. Finite Element Analysis By P Seshu-PHI Learning Publications.

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M.TECH. IN STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT
COURSE STRUCTURE & SYLLABI

Course Code	STABILITY OF STRUCTURES	L	T	P	C
21D91203a	(PE-III)	3	0	0	3
	Semester	II			

Course Objectives: This Course will enable students:

- Determine stability of columns and frames
- Determine stability of beams and plates
- Use stability criteria and concepts for analyzing discrete and continuous systems,
- To form differential equations for plate buckling

Course Outcomes (CO): Student will be able to

- Apply the torisonal buckling and platesfor buckling concept
- Apply the inelastic behaviour of materials and analyse the inelastic charecter of column
- Analyse the frame structures
- Analyse the plate structures

UNIT - I Lecture Hrs:

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.

UNIT - II Lecture Hrs:

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

UNIT - III Lecture Hrs:

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.

UNIT - IV Lecture Hrs:

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

UNIT - V Lecture Hrs:

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.

Textbooks:

1. Stability Of Metalic Structure By Bleich –Mc Graw Hill
2. Theory Of Beam Columns Vol I By Chen & Atsuta Mc.Graw Hill
3. Theory Of Elastic Stability, Timoshenko, S., And Gere., Mc Graw Hill Book Company, 1973.

Reference Books:

1. Elastic Stability Of Structures, Smitses, Prentice Hall,1973.
2. Buckling Of Bars Plates And Shells, Brush And Almorth., Mc Graw Hill Book Company ,1975.
3. Principles Of Structural Stability Theory, Chajes, A., Prentice Hall,1974
4. Stability Theory Of Structures, Ashwini Kumar, TATA Mc Graw Hill Publishing Company Ltd, New Delhi,1985.

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M.TECH. IN STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT
COURSE STRUCTURE & SYLLABI

Course Code	DESIGN OF PRESTRESSED CONCRETE	L	T	P	C
21D35104b	(PE-II)	3	0	0	3
	Semester	II			

Course Objectives: This Course will enable students:

- Familiarize students with concept of prestressing and analysis of prestress
- Design and analysis of pretension and post tensioned concrete memebers
- Determination of deflections of prestressed members
- To calculate the losses of prestress,creep and shrinkage.

Course Outcomes (CO): Student will be able to

- To understand the basic concepts about prestressed concrete and analysis of prestress
- Estimate the effective losses in prestress
- Analyze the effect of prestressing force in the behavior of beams in flexure
- To design shear, torsion and transmission length in prestressed concrete members
- Design of compression and tension members as per codes of practice

UNIT - I Lecture Hrs:

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.

UNIT - II Lecture Hrs:

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 and Friction.

UNIT - III Lecture Hrs:

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.

UNIT - IV Lecture Hrs:

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.

UNIT - V Lecture Hrs:

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.

Textbooks:

1. Prestressed Concrete By N. Krishna Raju, TMH Pubilishers.
2. Prestressed Concrete by K.U.Muthu, I.K. International Publishing House.
3. Prestressed Concrete Design By Praveen Nagarajan, Pearson Pubilications.

Reference Books:

1. Design Of Prestressed Concrete Structures, T.Y.Lin, Asian Publishing House, Bombay, 1953.
2. Prestressed Concrete, Vol.I&II, Y.Guyon, Wiley And Sons, 1960.
3. Prestressed Concrete Design And Construction, F.Leohhardt, Wilhelm Ernst And Shon, Berlin, 1964.
4. Reinforced concrete designers hand bood, A view point publication, C.E.Reynolds and J.C. Steedman, 1989.
5. Prestressed Concrete, Edward P.Nawy, Prentice Hall –.
6. Prestressed Concrete – by Raj Gopal, Narsoa Pubilications.

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M.TECH. IN STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT
COURSE STRUCTURE & SYLLABI

Course Code	CONSTRUCTION PERSONNEL MANAGEMENT (PE-III)	L	T	P	C
21D91203b		3	0	0	3
	Semester	II			

Course Objectives: This Course will enable students:

- Discuss principles of management and its functions in construction organization.
- Knowledge of organization's working procedures and organizational developments and group decision making.
- Identify quality of team leader and qualities of project leader.
- Carry out organization and execute work in group in an organization

Course Outcomes (CO): Student will be able to

- Plan and manage key human resource functions within organizations.
- Analyze current issues, trends, practices, and implement processes in HRM
- Contribute to employee performance management and organizational effectiveness.
- Develop employability skills.

UNIT - I — Lecture Hrs:

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

UNIT - II — Lecture Hrs:

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 — Lecture Hrs:

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 — Lecture Hrs:

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 — Lecture Hrs:

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

Textbooks:

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

Reference Books:

1. Handbook Of Human Resources Administration ,Josy.J Familaro, Mcgraw Hill International Edition, 1987.
2. Human Resources Management Justin Gooderl Longenecker, Charles D. Pringle, C.E.

Merrill, 1981.
3. Human Relations And Organizational Behaviour R.S.Dwivedi, , B.H - 1987.
4. People And Organizational Management In Construction,Shamil Naoum, Thomas Telford,2001
5. A Comprehensive Guide To Theory And Practice Stephen Bach & Keith Sissons, , John Wiley & Sons,2000.
6. Human Resource Management In Construction Projects Andrew Dainty, Martin Loosemore, , Routledge,2012.

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M.TECH. IN STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT
COURSE STRUCTURE & SYLLABI

Course Code	STRUCTURAL DYNAMICS	L	T	P	C
21D35201	(PE-IV)	3	0	0	3
	Semester	II			

Course Objectives: This Course will enable students:

- Determine vibration characteristics of structures like frequency,amplitude,impedence and time period
- Differentiate the response of single and multi degree of freedom systems
- Determine the response of structures for pulse excitation like blast load
- Differentiate the response of Multi Degree of Freedom systems

Course Outcomes (CO): Student will be able to

- Write equation of motion for single and multi degree of freedom systems
- Understand the impact of damping on charecterstics of vibrating system
- Gain Knowledge about arbitary and pulse excitation
- Understand applications of Numerical methods in dynamics
- Analyse in various theories of failure and plasticity

UNIT - I Lecture Hrs:

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.

UNIT - II Lecture Hrs:

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

UNIT - III Lecture Hrs:

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

UNIT - IV Lecture Hrs:

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

UNIT - V Lecture Hrs:

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.

Textbooks:

1. Structural Dynamics For Earthquake Engineering,A.K.Chopra,Pearson Pubilications
2. Dynamics Of Structures By Clough & Penziem
3. Structural Dynamics by Roy. R. Craig John willy & fours.

Reference Books:

1. Structural Dynamics By Mario Paz
2. I.S:1893(Latest) Code Of Practice For Earthquakes Resistant Design Of Stuctures
3. Fundamentals Of Vibration, Anderson R.A, Amerind Pulblishing Co.,1972.

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M.TECH. IN STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT
COURSE STRUCTURE & SYLLABI

Course Code	CONSTRUCTION ECONOMICS AND FINANCE MANAGEMENT (PE– IV)	L	T	P	C
21D91204a		3	0	0	3
	Semester	II			

Course Objectives: This Course will enable students:

- To cover the principles of engineering economy by following the basic methods for carrying out Economic studies.
- Learn about cost analysis and economics accounting
- To know about contract bidding and awards
- To understand different budgeting procedures

Course Outcomes (CO): Student will be able to

- Prepare income, profit and loss statements and implement construction accounting.
- Evaluate construction project economics, cost-benefit analysis and breakeven analysis.
- Analyze and evaluate construction risks and uncertainties.
- Manage working capital and employ budgeting and control.

UNIT - I — Lecture Hrs:

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 — Lecture Hrs:

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 — Lecture Hrs:

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

UNIT - IV — Lecture Hrs:

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 — Lecture Hrs:

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.

Textbooks:

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.

Reference Books:

1. A Text Book For Accounting For Management By S N Maheshwari, Vikas Pubilishers
2. Fundamentals Of Accounting And Financial Analysis By Anil Chowdhury , Pearson Education
3. Accounting For Management By Srinivasan , S.Chand Pubilishers.
4. Fundamental Of Construction Management And Organization By Kwaku A., Tenah And Jose M. Guevera, Prentice Hall Of India, 1995 .
5. Project Management- Strategic Financial Planning, Evaluation And Control By Patel, B M , Vikas Publishing House Pvt. Ltd. New Delhi.
6. Construction Planning And Management By Shrivastava,U.K.,2nd Edn. Galgotia Publications Pvt. Ltd. New Delhi.
7. Project Management By Bhavesh Patel, Vikas Pubilishers.

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M.TECH. IN STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT
COURSE STRUCTURE & SYLLABI

Course Code	CIVIL ENGINEERING MATERIALS SCIENCE	L	T	P	C
21D91204b	(PE– IV)	3	0	0	3
	Semester	I			

Course Objectives: This Course will enable students:

- To cover the principles of engineering economy by following the basic methods for carrying out Economic studies.
- Learn about cost analysis and economics accounting
- To know about contract bidding and awards
- To understand different budgeting procedures

Course Outcomes (CO): Student will be able to

- Prepare income, profit and loss statements and implement construction accounting.
- Evaluate construction project economics, cost-benefit analysis and breakeven analysis.
- Analyze and evaluate construction risks and uncertainties.
- Manage working capital and employ budgeting and control.

UNIT - I — Lecture Hrs:

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 — Lecture Hrs:

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 — Lecture Hrs:

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

UNIT - IV — Lecture Hrs:

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 — Lecture Hrs:

Nanomaterials, Self Healing Concrete, Bacterial Concrete, Self Compacting Concrete and Geopolymer Concrete.

Textbooks:

1. The Science And Technology Of Civil Engineering Materials, S; Bentuer,Young. J. F; Mindess, Presntice Hall, New York.
2. Engineering Materials – An Introduction To Properties, Applications And Design. Ashby, M.F And Jones, D.R.H (2005),
3. Civil engineering Materials by Tech. Teachers Training Institute, Tata Mc Graw Hill (1992).

Reference Books:

1. Mehta, P.K And Monteiro. P.J.M, Concrete: Microstructure, Properties And Materials
2. Concrete Technology – Theory And Practice, MS. Shetty, S.Chand And Company, New Delhi, 1992
3. Properties Of Concrete – Neville A.M. Pitman Publishing Limited, London.

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COURSE STRUCTURE & SYLLABI

Course Code	CONSTRUCTION PROJECT STUDIO	L	T	P	C
21D91205		0	0	4	2
	Semester	II			

Course Objectives:

- Prepare work break down plan and estimate resources required in a construction project.
- Prepare precedence diagram and network diagrams.
- Implement resource allocation and levelling using MSP.
- Build architectural plan and material take-off

Course Outcomes (CO):

- Prepare contract drawings and estimates for civil engineering works.
- Develop detailed item wise specification of the project.
- Identify and estimate resources for the items of the project and prepare detailed project schedule.
- Conduct a case study on overall project management of constructions using construction management tools.

List of Experiments:

1. Selection of real time project development of 2D and 3D model of Project using Auto CAD and AutodeskRevit Tool.
2. Development of Work breakdown structure, planning, scheduling and resource allocation using MSP andPrimavera P6 tool.
3. Estimation and Quantity Take off from Autodesk Revit tool.
4. Integrate of 3D model and project planning, scheduling of project in Navisworks tool.
5. Simulation of project model for 4D (time) and 5D (cost) in Navisworks tool.
6. Application of BIM approach to adopt 6D to 10D in the real time project through case studies.
7. Demonstration on IT tools used in construction projects

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COURSE STRUCTURE & SYLLABI

Course Code	BUILDING INFORMATION MODELING LABORATORY	L	T	P	C
21D91206		0	0	4	2
	Semester	II			

Course Objectives:

- Provide familiarity with current BIM technologies.
- Understand the shift from 2D representation to 3D simulation.
- Synthesize, link and maintain continuity of existing and designed BIM information and other vital information into the model.
- Explore new project delivery systems and technologies for _integrated practice

Course Outcomes (CO):

- Understand and apply the fundamental concepts of building information modeling (BIM)
- integrate construction processes through Building Information Modelling (BIM)
- Understand and manage information delivery cycle using BIM and related digital technologies
- Model a structure with building information modeling(BIM) software.

List of Experiments:

1. Level of Detail (LOD) BIM Concepts
2. Detailed Architectural BIM Modeling
3. Basic Introduction to Structural / MEP BIM Concepts
4. 3D Spatial Interference Analysis
5. Generating Good for Construction (GFC) Documentation
6. Material Take-Off(MTO)
7. Bill of Quantity (BOQ) Generation
8. Project Scheduling with BIM
9. 4D Simulation

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M.TECH. IN STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT
COURSE STRUCTURE & SYLLABI

Course Code	MAINTENANCE AND REHABILITATION OF ENGINEERING STRUCTURES (PE-V)	L	T	P	C
21D91301a		3	0	0	3
	Semester	**III**			

Course Objectives: This Course will enable students:

- To judge the rate of corrosion in various exposure conditions
- To conduct non destructive testing of structural elements
- To select a suitable bonding technique
- To judge the effect of fire and earthquake loads on discontinuities

Course Outcomes (CO): Student will be able to

- Estimate the causes for distress and deterioration of structures
- Apply the NDT for condition assessment of structures, identify damages in RC structures
- Select repair material and retrofitting strategy suitable for distress
- Formulate guidelines for repair management of deteriorated structures
- Strengthening of earthquake and fire damaged elements using various techniques.

UNIT - I	Lecture Hrs:

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.

UNIT - II	Lecture Hrs:

Maintenance And Repair Strategies :- Inspection, Structural Appraisal, Economic Appraisal, Components Of Equality Assurance, Conceptual Bases For Quality Assurance Schemes.

UNIT - III	Lecture Hrs:

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.

UNIT - IV	Lecture Hrs:

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.

UNIT - V	Lecture Hrs:

Case Studies :- Repairs To Overcome Low Member Strength, Deflection, Cracking, Chemical Disruption, Weathering, Wear, Fire, Leakage, Marine Exposure.

Textbooks:

1. Concrete Structures, Materials, Maintenance And Repair, Dension Campbell, Allen And Harold Roper, Longman Scientific And Technical, U.K. 1991.
2. Repair Of Concrete Structures, RT.Allen And S.C. Edwards, Blakie And Sons, UK, 1987.
3. Maintenance, Repair & Rehabilitation and Minor Works of Buildings, P. C. Varghese, PHI, 2014.

Reference Books:

1. Concrete Technology – Theory And Practice, MS. Shetty, S.Chand And Company, New Delhi, 1992.
2. Training Course Notes On Damage Assessment And Repair In Low Cost Housing RHDC-NBO, Santhakumar, A.R. Anna University, Madras, July, 1992.
3. Learning From Failures – Deficiencies In Design, Construction And Service – R&D Centre (SDCPL), Raikar, R.N, Raikar Bhavan, Bombay, 1987.
4. Estate Management, N.Palaniappan, anna Institute Of Management, Madras Sep. 1992.
5. Structural Assessment, F.K.Garas, J.L.Clarke, GST Armer, Butterworths, UK Aporil 1987.

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COURSE STRUCTURE & SYLLABI

Course Code	CONSTRUCTION PLANNING, SCHEDULING AND CONTROL (PE-V)	L	T	P	C
21D91301b		3	0	0	3
	Semester	III			

Course Objectives: This Course will enable students:

- To judge the rate of corrosion in various exposure conditions
- To conduct non destructive testing of structural elements
- To select a suitable bonding technique
- To judge the effect of fire and earthquake loads on discontinuities

Course Outcomes (CO): Student will be able to

- Estimate the causes for distress and deterioration of structures
- Apply the NDT for condition assessment of structures, identify damages in RC structures
- Select repair material and retrofitting strategy suitable for distress
- Formulate guidelines for repair management of deteriorated structures
- Strengthening of earthquake and fire damaged elements using various techniques.

UNIT - I — Lecture Hrs:

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 — Lecture Hrs:

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 — Lecture Hrs:

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 — Lecture Hrs:

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 — Lecture Hrs:

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.

Textbooks:

1. Construction Project Management: Planning Scheduling AndControl, Chitkara. K.K(1998) Tata Mcgraw Hill Publishing Company, New Delhi
2. *Construction Project Management, Dr. Neeraj Kumar Jha Pearson PublicationS*

3. PERT and CPM – BC Punmia and KK Khandelwal

Reference Books:

1. Halpin,D.W., Financial And Cost Concepts For Construction Management , John Wiley And Sons, New York 1985
2. Chris Hendrickson And Tung Au(2000), Project Management For Construction - Fundamental Concepts For Owners, Engineers, Architects And Builders, Prenticehall Pittsburgh
3. 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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COURSE STRUCTURE & SYLLABI

Course Code	CONSTRUCTION METHODS AND EQUIPMENT (PE-V)	L	T	P	C
21D91301c		3	0	0	3
	Semester	III			

Course Objectives: This Course will enable students:

- Understanding the various construction practices and properties
- Ability to evaluate damaged structure and understands the maintenance & strengthening techniques for concrete repair.
- Knowledge on Piling techniques - well and caisson, sheet piles

Course Outcomes (CO): Student will be able to

- Identify various construction techniques and their limitations.
- Analyze productivity and economics in construction techniques.
- Implement modular construction practices.
- Apply reliable proportioning concepts in construction techniques.

UNIT - I Lecture Hrs:

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 Lecture Hrs:

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 Lecture Hrs:

Construction Equipment And Techniques:

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

UNIT - IV Lecture Hrs:

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

UNIT - V Lecture Hrs:

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

Textbooks:

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

Reference Books:

1. Construction & Geotechnical Methods In Foundation Engineering, Koerner, R.M. (1984), Mcgraw Hill.
2. Construction Equipment And Its Planning & Applications, Varma,M. (1979), Metropolitain Book Co.
3. Principles And Practive Of Heavy Construction, Smith, R.C, Andres, C.K. (1986), Prentice Hall

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COURSE STRUCTURE & SYLLABI

AUDIT COURSE-I

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COURSE STRUCTURE & SYLLABI

Course Code	ENGLISH FOR RESEARCH PAPER WRITING	L	T	P	C
21DAC101a		2	0	0	0
	Semester	I			

Course Objectives: This course will enable students:

- Understand the essentials of writing skills and their level of readability
- Learn about what to write in each section
- Ensure qualitative presentation with linguistic accuracy

Course Outcomes (CO): Student will be able to

- Understand the significance of writing skills and the level of readability
- Analyze and write title, abstract, different sections in research paper
- Develop the skills needed while writing a research paper

UNIT - I	Lecture Hrs:10

1Overview of a Research Paper- Planning and Preparation- Word Order- Useful Phrases - Breaking up Long Sentences-Structuring Paragraphs and Sentences-Being Concise and Removing Redundancy -Avoiding Ambiguity

UNIT - II	Lecture Hrs:10

Essential Components of a Research Paper- Abstracts- Building Hypothesis-Research Problem - Highlight Findings- Hedging and Criticizing, Paraphrasing and Plagiarism, Cauterization

UNIT - III	Lecture Hrs:10

Introducing Review of the Literature – Methodology - Analysis of the Data-Findings - Discussion-Conclusions-Recommendations.

UNIT - IV	Lecture Hrs:9

Key skills needed for writing a Title, Abstract, and Introduction

UNIT - V	Lecture Hrs:9

Appropriate language to formulate Methodology, incorporate Results, put forth Arguments and draw Conclusions

Suggested Reading

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books) Model Curriculum of Engineering & Technology PG Courses [Volume-I]
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook
4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

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M.TECH. IN STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT
COURSE STRUCTURE & SYLLABI

Course Code	DISASTER MANAGEMENT	L	T	P	C
21DAC101b		2	0	0	0
	Semester	I			

Course Objectives: This course will enable students:

- Learn to demonstrate critical understanding of key concepts in disaster risk reduction and humanitarian response.
- Critically evaluate disaster risk reduction and humanitarian response policy and practice from Multiple perspectives.
- Developanunderstandingofstandardsofhumanitarianresponseandpracticalrelevanceinspecific types of disasters and conflict situations
- Criticallyunderstandthestrengthsandweaknessesofdisastermanagementapproaches,planningand programming in different countries, particularly their home country or the countries they work in

UNIT - I

Introduction:
Disaster:Definition,FactorsandSignificance;DifferenceBetweenHazardandDisaster;Naturaland Manmade Disasters: Difference, Nature, Types and Magnitude.

Disaster Prone Areas in India:
Study of Seismic Zones; Areas Prone to Floods and Droughts, Landslides and Avalanches; Areas Prone to Cyclonic and Coastal Hazards with Special Reference to Tsunami; Post- Disaster Diseases and Epidemics

UNIT - II

Repercussions of Disasters and Hazards:
Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes,Volcanisms,Cyclones,Tsunamis,Floods,DroughtsandFamines,Landslides and Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks of Disease and Epidemics, War and Conflicts.

UNIT - III

Disaster Preparedness and Management:
Preparedness: Monitoring of Phenomena Triggering ADisasteror Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological and Other Agencies, Media Reports: Governmental and Community Preparedness.

UNIT - IV

Risk Assessment Disaster Risk:
Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. TechniquesofRiskAssessment,GlobalCo-OperationinRiskAssessmentand Warning, People's Participation in Risk Assessment. Strategies for Survival.

UNIT - V

Disaster Mitigation:
Meaning,ConceptandStrategiesofDisasterMitigation,EmergingTrendsInMitigation.Structural Mitigationand Non-Structural Mitigation, Programs of Disaster Mitigation in India.

Suggested Reading

1. R.Nishith,SinghAK,"DisasterManagementinIndia:Perspectives,issuesandstrategies
2. "'New Royal book Company..Sahni,PardeepEt.Al.(Eds.),"DisasterMitigationExperiencesAndReflections",PrenticeHa

ll OfIndia, New Delhi.
3. GoelS.L.,DisasterAdministrationAndManagementTextAndCaseStudies",Deep&Deep Publication Pvt. Ltd., New Delhi

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COURSE STRUCTURE & SYLLABI

Course Code	SANSKRITFOR TECHNICAL KNOWLEDGE	L	T	P	C
21DAC101c		2	0	0	0
	Semester	**I**			

Course Objectives: This course will enable students:

- To get a working knowledge in illustrious Sanskrit, the scientific language in the world
- Learning of Sanskrit to improve brain functioning
- LearningofSanskrittodevelopthelogicinmathematics,science&othersubjects enhancing the memory power
- The engineering scholars equipped with Sanskrit will be able to explore the huge
- Knowledge from ancientliterature

Course Outcomes (CO): Student will be able to

- Understanding basic Sanskrit language
- Ancient Sanskrit literature about science &technology can be understood
- Being a logical language will help to develop logic in students

UNIT - I

Alphabets in Sanskrit,

UNIT - II

Past/Present/Future Tense, Simple Sentences

UNIT - III

Order, Introduction of roots

UNIT - IV

Technical information about Sanskrit Literature

UNIT - V

Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

Suggested Reading

1.“Abhyaspustakam” –Dr.Vishwas, Sanskrit-Bharti Publication, New Delhi
2.“Teach Yourself Sanskrit” Prathama Deeksha- VempatiKutumbshastri, RashtriyaSanskrit Sansthanam, New Delhi Publication
3.“India’s Glorious ScientificTradition” Suresh Soni, Ocean books (P) Ltd.,New Delhi

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AUDIT COURSE-II

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M.TECH. IN STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT
COURSE STRUCTURE & SYLLABI

Course Code	PEDAGOGY STUDIES	L	T	P	C
21DAC201a		2	0	0	0
	Semester	**II**			

Course Objectives: This course will enable students:

- Reviewexistingevidenceonthereviewtopictoinformprogrammedesignandpolicy making undertaken by the DfID, other agencies and researchers.
- Identify critical evidence gaps to guide the development.

Course Outcomes (CO): Student will be able to

Students will be able to understand:

- Whatpedagogicalpracticesarebeingusedbyteachersinformalandinformalclassrooms in developing countries?
- What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
- Howcanteachereducation(curriculumandpracticum)andtheschoolcurriculumand guidance materials best support effective pedagogy?

UNIT - I

Introduction and Methodology: Aims and rationale, Policy back ground, Conceptual frame work and terminology Theories oflearning,Curriculum,Teachereducation.Conceptualframework,Research questions**.** Overview of methodology and Searching.

UNIT - II

Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.

UNIT - III

Evidence on theeffectivenessofpedagogicalpractices,Methodologyfortheindepthstage:quality assessmen t of included studies. How can teacher education (curriculumandpracticum) andthescho curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of th body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.

UNIT - IV

Professional development: alignment with classroom practices and follow-up support, Peer support, Support from the head teacherandthecommunity.Curriculumandassessment,Barrierstolearning:limitedresourcesand large class sizes

UNIT - V

Researchgapsandfuturedirections: Researchdesign**,**Contexts**,**Pedagogy**,**Teachereducation**,** Curriculum and assessment**,** Dissemination and research impact.

Suggested Reading

1. AckersJ,HardmanF(2001)ClassroominteractioninKenyanprimaryschools,Compare, 31 (2): 245-261.
2. AgrawalM(2004)Curricularreforminschools:Theimportanceofevaluation,Journalof
3. Curriculum Studies, 36 (3): 361-379.
4. AkyeampongK(2003) Teacher training in Ghana - does it count? Multi-site teachereducation

research project (MUSTER) country report 1. London: DFID.

5. Akyeampong K, LussierK, PryorJ, Westbrook J (2013)Improving teaching and learning of basic maths and reading in Africa: Does teacherpreparation count?International Journal Educational Development, 33 (3): 272–282.
6. Alexander RJ(2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
   Chavan M (2003)ReadIndia: A mass scale, rapid, 'learning to read'campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf.

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COURSE STRUCTURE & SYLLABI

Course Code	STRESSMANAGEMENT BY YOGA	L	T	P	C
21DAC201b		2	0	0	0
	Semester	**II**			

Course Objectives: This course will enable students:

- To achieve overall health of body and mind
- To overcome stres

Course Outcomes (CO): Student will be able to

- Develop healthy mind in a healthy body thus improving social health also
- Improve efficiency

UNIT - I		
Definitions of Eight parts of yog.(Ashtanga)		
UNIT - II		
Yam and Niyam.		
UNIT - III		
Do`sand Don't'sin life. i) Ahinsa,satya,astheya,bramhacharyaand aparigrahaii) Shaucha,santosh,tapa,swadhyay,ishwarpranidhan		
UNIT - IV		
Asan and Pranayam		
UNIT - V		
i)Variousyogposesand theirbenefitsformind &body ii)Regularizationofbreathingtechniques and its effects-Types ofpranayam		

Suggested Reading

1.'Yogic Asanas forGroupTarining-Part-I": Janardan SwamiYogabhyasiMandal, Nagpur
2."Rajayogaor conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata

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COURSE STRUCTURE & SYLLABI

Course Code	PERSONALITY DEVELOPMENT THROUGHLIFE ENLIGHTENMENTSKILLS	L	T	P	C
21DAC201c		2	0	0	0
	Semester	II			

Course Objectives: This course will enable students:

- To learn to achieve the highest goal happily
- To become a person with stable mind, pleasing personality and determination
- To awaken wisdom in students

Course Outcomes (CO): Student will be able to

- StudyofShrimad-Bhagwad-Geetawillhelpthestudentindevelopinghispersonalityand achieve the highest goal in life
- The person who has studied Geetawilllead the nation and mankind to peace and prosperity
- Study of Neetishatakam will help in developing versatile personality of students

UNIT - I

Neetisatakam- Holistic development of personality
Verses-19,20,21,22(wisdom)
Verses-29,31,32(pride &heroism)
Verses-26,28,63,65(virtue)

UNIT - II

Neetisatakam- Holistic development of personality
Verses-52,53,59(dont's)
Verses-71,73,75,78(do's)

UNIT - III

Approach to day to day work and duties.
ShrimadBhagwadGeeta:Chapter2-Verses41,47,48,
Chapter3-Verses13,21,27,35,Chapter6-Verses5,13,17,23,35,
Chapter18-Verses45,46,48.

UNIT - IV

Statements of basic knowledge.
ShrimadBhagwadGeeta:Chapter2-Verses 56,62,68
Chapter12 -Verses13,14,15,16,17,18
Personality of Rolemodel. Shrimad Bhagwad Geeta:

UNIT - V

Chapter2-Verses 17,Chapter3-Verses36,37,42,
Chapter4-Verses18,38,39
Chapter18– Verses37,38,63

Suggested Reading

1."SrimadBhagavadGita"bySwamiSwarupanandaAdvaitaAshram(PublicationDepartment), Kolkata
2.Bhartrihari'sThree Satakam (Niti-sringar-vairagya) by P.Gopinath, RashtriyaSanskrit Sansthanam, New Delhi.

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M.TECH. IN STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT
COURSE STRUCTURE & SYLLABI

OPEN ELECTIVE

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M.TECH. IN STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT
COURSE STRUCTURE & SYLLABI

Course Code	COST MANAGEMENT OF ENGINEERING PROJECTS	L	T	P	C
21DOE301a		3	0	0	3
	Semester	I			

Course Objectives:

- To explain cost concepts and objectives of costing system and cost management process
- To provide knowledge and explain Cost behaviour in relation to Volume and Profit and pricing decisions.
- To know the concepts of target costing, life cycle costing and activity based cost management in a project or business.
- To discuss on budget and budgetary control , type of budgets in a business to control costs
- To provide knowledge on project, types of projects, stages of project execution, types of project contracts and project cost control.

Course Outcomes (CO): Student will be able to

- Know the cost management process and types of costs
- Learn and apply different costing methods under different project contracts
- To understand relationship of Cost-Volume and Profit and pricing decisions.
- Prepare budgets and measurement of divisional performance.
- Acquires knowledge on various types of project contracts, stages to execute projects and controlling project cost..

UNIT - I	Lecture Hrs:10

Introduction and Overview of the Strategic Cost Management Process - Cost concepts in decision-making; Relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.

UNIT - II	Lecture Hrs:12

Cost Behavior and Profit Planning: Marginal Costing- Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems; Pareto Analysis Just-in-time approach, Theory of constraints.; Divisional performance management: - Measurement of Divisional profitability - pricing decisions - transfer pricing.

UNIT - III	Lecture Hrs:10

Target costing- Life Cycle Costing - Activity-Based Cost management:- Activity based costing- Value-Chain Analysis- Bench Marking; Balanced Score Card.

UNIT - IV	Lecture Hrs:10

Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing.

UNIT - V	Lecture Hrs:12

Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and non-technical activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process.

Textbooks:

1. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting
2. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher

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Reference Books:
1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi 2. Charles T. Horngren and George Foster, Advanced Management Accounting 3. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd
Online Learning Resources:
https://nptel.ac.in/courses/105/104/105104161/ https://nptel.ac.in/courses/112/102/112102106/

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COURSE STRUCTURE & SYLLABI

Course Code	INDUSTRIAL SAFETY	L	T	P	C
21DOE301b		3	0	0	3
	Semester	III			

Course Objectives:

- To know about Industrial safety programs and toxicology, Industrial laws , regulations and source models
- To understand about fire and explosion, preventive methods, relief and its sizing methods
- To analyse industrial hazards and its risk assessment.

Course Outcomes (CO): Student will be able to

- To list out important legislations related to health, Safety and Environment.
- To list out requirements mentioned in factories act for the prevention of accidents.
- To understand the health and welfare provisions given in factories act.

UNIT - I Lecture Hrs:

Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

UNIT - II Lecture Hrs:

Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

UNIT - III Lecture Hrs:

Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working andapplications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

UNIT - IV Lecture Hrs:

Fault tracing: Fault tracing-concept and importance, decision treeconcept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

UNIT - V Lecture Hrs:

Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

Textbooks:

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.

Reference Books:

1.Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.
2. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.

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M.TECH. IN STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT
COURSE STRUCTURE & SYLLABI

Course Code	**BUSINESS ANALYTICS**	**L**	**T**	**P**	**C**
21DOE301c		**3**	**0**	**0**	**3**
	Semester	**III**			

Course Objectives:

- The main objective of this course is to give the student a comprehensive understanding of business analytics methods.

Course Outcomes (CO): Student will be able to

- Students will demonstrate knowledge of data analytics.
- Students will demonstrate the ability of think critically in making decisions based on data and deep analytics.
- Students will demonstrate the ability to use technical skills in predicative and prescriptive modeling to support business decision-making.
- Students will demonstrate the ability to translate data into clear, actionable insights.

UNIT - I	Lecture Hrs:
Business Analysis: Overview of Business Analysis, Overview of Requirements, Role of the Business Analyst. Stakeholders: the project team, management, and the front line, Handling Stakeholder Conflicts.	
UNIT - II	Lecture Hrs:
Life Cycles: Systems Development Life Cycles, Project Life Cycles, Product Life Cycles, Requirement Life Cycles.	
UNIT - III	Lecture Hrs:
Forming Requirements: Overview of Requirements, Attributes of Good Requirements, Types of Requirements, Requirement Sources, Gathering Requirements from Stakeholders, Common Requirements Documents. Transforming Requirements: Stakeholder Needs Analysis, Decomposition Analysis, Additive/Subtractive Analysis, Gap Analysis, Notations (UML & BPMN), Flowcharts, Swim Lane Flowcharts, Entity-Relationship Diagrams, State-Transition Diagrams, Data Flow Diagrams, Use Case Modeling, Business Process Modeling	
UNIT - IV	Lecture Hrs:
Finalizing Requirements: Presenting Requirements, Socializing Requirements and Gaining Acceptance, Prioritizing Requirements. Managing Requirements Assets: Change Control, Requirements Tools	
UNIT - V	Lecture Hrs:
Recent Trands in: Embedded and colleborative business intelligence, Visual data recovery, Data Storytelling and Data Journalism.	

Textbooks:

1. Business Analysis by James Cadle et al.
2. Project Management: The Managerial Process by Erik Larson and, Clifford Gray

Reference Books:

1. Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, Pearson FT Press.
2. Business Analytics by James Evans, persons Education.