JAI SHRIRAM ENGINEERING COLLEGE, TIRUPPUR – 638 660
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REGULATIONS 2024

M. E. STRUCTURAL ENGINEERING

CHOICE BASED CREDIT SYSTEM

CURRICULUM FOR SEMESTERS I TO IV

REGULATIONS 2024
M. E. STRUCTURAL ENGINEERING
CHOICE BASED CREDIT SYSTEM
CURRICULUM FOR SEMESTERS I TO IV

SEMESTER - I

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
THEORY							
1.	24PMA101	Advanced Mathematical Methods	FC	4	0	0	4
2.	24PSE101	Theory of Elasticity and Plasticity	PC	3	1	0	4
3.	24PSE102	Structural Dynamics and Earthquake Engineering	PC	3	1	0	4
4.	24PRM101	Research Methodology and IPR	RM	2	0	0	2
5.		Professional Elective I	PE	3	0	0	3
6.		Audit Course*	AC	2	0	0	0
PRACTICAL							
7.	24PSE111	Advanced Construction Engineering and Experimental Techniques Laboratory	PC	0	0	4	2
8.	24PSE112	Technical Seminar	EE	0	0	2	1
			Total Credits	**17**	**2**	**6**	**20**

SEMESTER - II

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
THEORY							
1.	24PSE201	Advanced Steel Structures	PC	3	1	0	4
2.	24PSE202	Advanced Concrete Structures	PC	3	1	0	4
3.	24PSE203	Finite Element Analysis in Structural Engineering	PC	3	0	0	3
4.		Professional Elective II	PE	3	0	0	3
5.		Professional Elective III	PE	3	0	0	3
PRACTICAL							
6.	24PSE211	Structural Design Studio	PC	0	0	4	2
7.	24PSE212	Finite Element Analysis Laboratory	PC	0	0	4	2
			Total Credits	**15**	**2**	**8**	**21**

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SEMESTER - III

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
THEORY							
1.		Professional Elective IV	PE	3	0	0	3
2.		Professional Elective V	PE	3	0	0	3
3.		Open Elective	OE	3	0	0	3
PRACTICAL							
4.	24PSE311	Internship (4 Weeks)	EE	0	0	0	2
5.	24PSE312	Project Work I	EE	0	0	12	6
			Total Credits	**9**	**0**	**12**	**17**

SEMESTER - IV

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
PRACTICAL							
1.	24PSE411	Project Work II	EE	0	0	24	12
			Total Credits	**0**	**0**	**24**	**12**

Total Credits: 70

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LIST OF ELECTIVES

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
Elective – I							
1.	24PSEP101	Non-linear Analysis of Structures	PE	3	0	0	3
2.	24PSEP102	Structural Stability	PE	3	0	0	3
3.	24PSEP103	Wind and Cyclone Effects on Structures	PE	3	0	0	3
4.	24PSEP104	Prefabricated Structures	PE	3	0	0	3
Elective – II							
1.	24PSEP201	Advanced Concrete Technology	PE	3	0	0	3
2.	24PSEP202	Advanced Prestressed Concrete	PE	3	0	0	3
3.	24PSEP203	Reliability Analysis of Structures	PE	3	0	0	3
4.	24PSEP204	Design of Formwork	PE	3	0	0	3
Elective – III							
1.	24PSEP205	Maintenance, Repair and Rehabilitation of Structures	PE	3	0	0	3
2.	24PSEP206	Mechanics of Fiber Reinforced Polymer Composite Materials	PE	3	0	0	3
3.	24PSEP207	Design of Steel-Concrete Composite Structures	PE	3	0	0	3
4.	24PSEP208	Design of Masonry Structures	PE	3	0	0	3
Elective – IV							
1.	24PSEP301	Design of Industrial Structures	PE	3	0	0	3
2.	24PSEP302	Experimental Techniques	PE	3	0	0	3
3.	24PSEP303	Optimization of Structures	PE	3	0	0	3
4.	24PSEP304	Structural Health Monitoring	PE	3	0	0	3
Elective – V							
1.	24PSEP305	Design of Offshore Structures	PE	3	0	0	3
2.	24PSEP306	Performance of Structures with Soil-Structure Interaction	PE	3	0	0	3
3.	24PSEP307	Design of Bridge Structures	PE	3	0	0	3
4.	24PSEP308	Design of Shell and Spatial Structures	PE	3	0	0	3

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CREDITS SUMMARY

M.E. STRUCTURAL ENGINEERING						
S. No	Subject Area	Credits per Semester				Total Credits
		I	II	III	IV	
1	FC	4				4
2	PC	10	15			25
3	PE	3	6	6		15
4	RM	2				2
5	OE.			3		3
6	EE	1		8	12	21
7	Non-Credit /(Audit Course)	√				
Total		20	21	17	12	70

Total Credits for the entire Programme: 70

COMPARISON OF CREDIT SUMMARY

S. No	Course Components	AICTE Recommendation		Anna University Curriculum R2021		JSREC Autonomous Curriculum R2024	
		Credits	% Credits	Credits	% Credits	Credits	% Credits
1	Foundation Course (FC)	-	-	4	6%	4	6%
2	Professional Core (PC)	22	32%	25	36%	25	36%
3	Professional Electives (PE)	15	22%	15	21%	15	21%
4	Research Methodology and IPR Course (RM)	2	4%	2	3%	2	3%
5	Open Electives (OE)	3	4%	3	4%	3	4%
6	Employment Enhancement Course (EE)	26	38%	21	30%	21	30%
7	Non-Credit /Audit Course(AC)	-	-	√	√	√	√
TOTAL CREDITS		68	100%	70	100%	70	100%

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OPEN ELECTIVE

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
24PCEO01	Environmental Sustainability	OE	3	0	0	3
24PCEO02	Vibration and Noise Control Strategies	OE	3	0	0	3
24PCEO03	Integrated water resources and Management	OE	3	0	0	3
24PCEO04	Environmental Impact Assessment	OE	3	0	0	3
24PECO01	IOT for Smart Systems	OE	3	0	0	3
24PCSO02	Internet of Things and Cloud	OE	3	0	0	3
24PCSO03	Machine Learning and Deep Learning	OE	3	0	0	3
24UPEEO01	Electric Vehicle Technology	OE	3	0	0	3
24UPEEO02	Renewable Energy Technologies	OE	3	0	0	3
24PECO02	Biomedical Signal Processing	OE	3	0	0	3
24PECO03	Robotics	OE	3	0	0	3
24PMBO01	Sustainable Management	OE	3	0	0	3
24PMBO02	Micro and Small Business Management	OE	3	0	0	3
24PMEO01	Nanocomposite Materials	OE	3	0	0	3
24PMEO02	Additive Manufacturing	OE	3	0	0	3

AUDIT COURSES

COURSE CODE	COURSE TITLE	CATEGORY	L	T	P	C
24PAC001	English for Research Paper	AC	2	0	0	0
24PAC002	Disaster Management	AC	2	0	0	0
24PAC003	Constitution of India	AC	2	0	0	0

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M. E. STRUCTURAL ENGINEERING

CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR SEMESTER I

24PMA101	ADVANCED MATHEMATICAL METHODS (Common to M. E. Structural Engineering, CSE & Applied Electronics)	L	T	P	C
		4	0	0	4

Prerequisites:
Nil

COURSE OBJECTIVES:
• To provide the student with a repertoire of mathematical methods that are essential to the solution of advanced problems encountered in the fields of applied physics and engineering. This course covers a broad spectrum of mathematical techniques such as Laplace Transform, Fourier Transform, Calculus of Variations, Conformal Mapping and Tensor Analysis. The application of these topics to the solution of problems in physics and engineering is stressed.

UNIT-I	LAPLACE TRANSFORM TECHNIQUES FOR PARTIAL DIFFERENTIAL EQUATIONS	12
Laplace transform - Definitions – Properties – Transform error function – Bessel's function - Dirac delta function – Unit step functions – Convolution theorem – Inverse Laplace transform - Complex inversion formula – Solutions to partial differential equations - Heat equation – Wave equation.		

UNIT-II	FOURIER TRANSFORM TECHNIQUES FOR PARTIAL DIFFERENTIAL EQUATIONS	12
Fourier transform - Definitions – Properties – Transform of elementary functions – Dirac delta function – Convolution theorem – Parseval's identity – Solutions to partial differential equations - Heat equation – Wave equation – Laplace and Poisson's equations.		

UNIT-III	CALCULUS OF VARIATIONS	12
Concept of variation and its properties – Euler's equation – Functional dependent on first and higher order derivatives – Functionals dependent on functions of several independent variables – Variational problems with moving boundaries – Isoperimetric problems – Direct methods – Ritz and Kantorovich methods.		

UNIT-IV	CONFORMAL MAPPING AND APPLICATIONS	12
Introductiontoconformalmappingsandbilineartransformations– SchwarzChristoffeltransformation – Transformation of boundaries in parametric form – Physical applications - Fluid flow and heat flow problems.		

UNIT-V	TENSOR ANALYSIS	12
Summation convention – Contravariant and covariant vectors – Contraction of tensors – Inner product – Quotient law – Metric tensor – Christoffel symbols – Covariant differentiation – Gradient - Divergence and curl.		

L:60	T: 00	P: 00	Total : 60 Periods

REFERENCES
1. Andrews L.C. and Shivamoggi, B., "Integral Transforms for Engineers", Prentice Hall of India Pvt. Ltd., New Delhi, 2003.
2. Elsgolc, L.D., "Calculus of Variations", Dover Publications Inc., New York, 2007.

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3. Mathews, J. H., and Howell, R.W., "Complex Analysis for Mathematics and Engineering", 6th Edition, Jones and Bartlett Publishers, 2011.
4. Kay, D. C., "Tensor Calculus", Schaum's Outline Series, Tata McGraw Hill Edition, 2014.
5. Naveen Kumar, "An Elementary Course on Variational Problems in Calculus ", Narosa Publishing House, 2005.
6. Saff, E.B and Snider, A.D, "Fundamentals of Complex Analysis with Applications in Engineering, Science and Mathematics", 3rd Edition, Pearson Education, New Delhi, 2014.
7. Sankara Rao, K., "Introduction to Partial Differential Equations", 3rd Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2010.
8. Spiegel, M.R., "Theory and Problems of Complex Variables and its Applications", Schaum's Outline Series, McGraw Hill Book Co., 1981.
9. Ramaniah. G. "Tensor Analysis", S. Viswanathan Pvt. Ltd., 1990.

WEB RESOURCES

- https://web.uvic.ca/~tbazett/diffyqs/laplacepde_section.html
- https://math.libretexts.org/Bookshelves/Differential_Equations/Introduction_to_Partial_Differential_Equations_(Herman)/09%3A_Transform_Techniques_in_Physics/9.11%3A_Transforms_and_Partial_Differential_Equations
- https://www.open.edu/openlearn/science-maths-technology/introduction-the-calculus-variations/content-section-

COURSE OUTCOMES

At the end of the course students should be able to

CO1: Application of Laplace and Fourier transforms to the initial value, initial–boundary value and boundary value problems in Partial Differential Equations.
CO2: Maximizing and minimizing the functions that occur in various branches of Engineering Disciplines.
CO3: Construct conformal mappings between various domains and use conformal mapping in studying problems in physics and engineering, particularly fluid flow and heat flow problems.
CO4: Understand tensor algebra and its applications in applied sciences and engineering and develops the ability to solve mathematical problems involving tensors.
CO5: Competently use tensor analysis as a tool in the field of applied sciences and related fields.

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24PSE101	THEORY OF ELASTICITY AND PLASTICITY	L	T	P	C
		3	1	0	4

Prerequisites:

- Nil

COURSE OBJECTIVES:

- To develop the ability to use the principles of theory of elasticity in engineering problems and to introduce theoretical fundamentals of theory of plasticity.

UNIT-I	ELASTICITY	9 + 3

Analysis of stress and strain, Equilibrium Equations - Compatibility Equations - Stress Strain Relationship. Generalized Hooke's law-Constitutive Equations

UNIT-II	2D STRESS STRAIN PROBLEMS	9 + 3

Plane stress and plane strain - Simple two-dimensional problems in Cartesian and Polar Coordinates

UNIT-III	TORSION OF NON-CIRCULAR SECTION	9 + 3

St. Venant's approach - Prandtl`s approach – Membrane analogy - Torsion of Thin Walled- Open and Closed sections-Design approach to open web section subjected to torsion - Finite Difference Method

UNIT-IV	BEAMS ON ELASTIC FOUNDATIONS	9 + 3

Beams on Elastic foundation – Methods of analysis – Elastic line method – Idealization of soil medium – Winkler model – Infinite beams – Semi-infinite and finite beams – Rigid and flexible – Uniform Cross Section – Point load and UDL – Solution by Finite Differences.

UNIT-V	PLASTICITY	9 + 3

Physical Assumptions – Yield Criteria – Failure Theories –Thick Cylinder – Plastic Stress Strain Relationship - Bending and Torsion in Elasto-Plastic Materials -Strain hardening Materials

L:45	T:15	P:00	Total : 60 Periods

REFERENCES

1. Jane Helena H, "Theory of Elasticity and Plasticity", PHI, New Delhi 2017
2. Slater R.A.C, "Engineering Plasticity", John Wiley and Son, New York, 1977.
3. Timoshenko, S. and GoodierJ.N " Theory of Elasticity", Third Edition, McGraw Hill Book Co., New York, 2017
4. Ansel.C.Ugural and Saul.K.Fenster, "Advanced Strength and Applied Elasticity," Fourth Edition, Prentice Hall Professional Technical Reference, New Jersey, 2003
5. Chakrabarty. J, "Theory of Plasticity", Third Edition, Elsevier Butterworth – Heinmann – UK, 2007.

WEB RESOURCES

- https://onlinecourses.nptel.ac.in/ Dynamics of Classical and Quantum Fields
- http://www.digimat.in/nptel/courses/video/105105177

COURSE OUTCOMES

At the end of the course students should be able to

CO1: Derive and write the fundamental equations of elasticity describing the lineof elements and develop constitutive models based on material behaviour.

CO2: Demonstrate the application of plane stress and plane strain in a given situation in both

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cartesian and polar coordinate systems.
CO3: Solve torsion problems in circular and non-circular cross-sections.
CO4: Analyse beams resting on elastic foundations.
CO5: Solve analytically the simple boundary value problems with elasto-plastic and strain hardening properties.

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24PSE102	STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING	L	T	P	C
		3	1	0	4

Prerequisites:

- Nil

COURSE OBJECTIVES:

- To make the students understand the basics of structural dynamics and earthquake engineering and to develop the ability to design an earthquake resistant structure.

UNIT-I	PRINCIPLES OF VIBRATION ANALYSIS	9 + 3

Mathematical models of single degree of freedom systems - Free and forced vibration of SDOF systems, Response of SDOF to special forms of excitation, Effect of damping, Evaluation of damping, Transmissibility, vibration control, Tuned mass damper

UNIT-II	DYNAMIC RESPONSE OF MULTI-DEGREE OF FREEDOM SYSTEMS	9 + 3

Mathematical models of two-degree of freedom systems and multi-degree of freedom systems, free and forced vibrations of two-degree and multi-degree of freedom systems, normal modes of vibration, applications. orthogonality of normal modes, free and forced vibrations of multi-degree of freedom systems, Mode superposition technique, Applications.

UNIT-III	DYNAMIC RESPONSE OF CONTINUOUS SYSTEMS	9 + 3

Mathematical models of continuous systems, Free and forced vibration of continuous systems, Rayleigh-Ritz method – Formulation using Conservation of Energy – Formulation using Virtual Work, Applications. Damping in MDOF systems, Nonlinear MDOF systems, and step-by-step numerical integration algorithms.

UNIT-IV	EARTHQUAKE GROUND MOTION AND ITS EFFECTS ON STRUCTURES	9 + 3

Engineering Seismology Seismotectonics and Seismic Zoning of India, Earthquake Monitoring and Seismic Instrumentation, Characteristics of Strong Earthquake Motion, Estimation of Earthquake Parameters, Microzonation. Effect of Earthquake on Different Types of Structures - Lessons Learnt from Past Earthquakes -Evaluation of Earthquake Forces as per codal provisions - Response Spectra, Design Spectra.

UNIT-V	EARTHQUAKE RESISTANT DESIGN OF MASONRY AND RC STRUCTURES	9 + 3

Structural Systems - Types of Buildings - Causes of damage - Planning Considerations – effect of material of construction on the performance of structures - Philosophy and Principle of Earthquake Resistant Design - Guidelines for Earthquake Resistant Design - Earthquake Resistant Design of Masonry Buildings and R.C.C. Buildings. Design consideration - Rigid Frames – Shear walls - Lateral load analysis of structures- Capacity based Design and detailing

L:45	T:15	P:00	Total : 60 Periods

REFERENCES

1. Mario Paz, Structural Dynamics -Theory and Computation, Kluwer Academic Publishers, Fifth Edition, 2006 (Unit I, II).
2. Roy R.Craig, Jr, Andrew J. Kurdila, Fundamentals of Structural Dynamics, John Wiley & Sons, 2011 (Unit II, III, IV, V).

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3. Brebbia C. A.," Earthquake Resistant Engineering Structures VIII", WIT Press, 2015 (Unit III, IV).
4. Mohiuddin Ali Khan "Earthquake-Resistant Structures: Design, Build and Retrofit", Elsevier Science& Technology, 2013 (Unit I, II, III, IV, V).
5. Pankaj Agarwal and Manish Shrikhande, "Earthquake Resistant Design of Structures", Prentice Hall of India, 2014 (Unit V).
6. Paulay.T and Priestley M.J.N., "Seismic Design of Reinforced Concrete and MasonryBuildings", John Wiley and Sons, 2013

WEB RESOURCES

- http://nptel.ac.in/courses/ structural dynamics and earthquake

COURSE OUTCOMES

At the end of the course students should be able to

CO1: Do vibration analysis of system/structures with a single degree of freedom and can explain the method of damping the systems.

CO2: Do the dynamic analysis of system/structures with Multi degrees of freedom under free and forced vibration.

CO3: Derive a mathematical model of a continuous system and do a dynamic analysis under free and forced vibration.

CO4: Explain the causes and effects of an earthquake.

CO5: Design masonry and RC structures for the earthquake forces as per their commendations of IS codes of practice.

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24PRM101	RESEARCH METHODOLOGY AND IPR (Common to M. E. Structural Engineering, CSE & Applied Electronics)	L	T	P	C
		2	0	0	2

Prerequisites:

- Nil

COURSE OBJECTIVES:

- To design and implement various research methodologies
- To Apply appropriate data collection methods and design effective measurement tools.
- To Analyze complex data using multivariate techniques, test hypotheses, and present research findings clearly through written reports and oral presentations.
- To Understand and apply key concepts, processes, and international frameworks related to Intellectual Property Rights.
- To Understand the patent process, including the stages of application, examination, and grant, and demonstrate knowledge of fundamental patenting principles.

UNIT-I	RESEARCH DESIGN	6

Overview of the research process and design, Use of Secondary and exploratory data to answer the research question, Qualitative research, Observation studies, Experiments and Surveys

UNIT-II	DATA COLLECTION AND SOURCES	6

Measurements, Measurement Scales, Questionnaires and Instruments, Sampling and methods. Data - Preparing, Exploring, examining and displaying

UNIT-III	DATA ANALYSIS AND REPORTING	6

Overview of Multivariate analysis, Hypotheses testing and Measures of Association. Presenting Insights and findings using written reports and oral presentations

UNIT-IV	INTELLECTUAL PROPERTY RIGHTS	6

Intellectual Property – The concept of IPR, Evolution and development of the concept of IPR, IPR development process, Trade secrets, utility Models, IPR & Bio diversity, Role of WIPO and WTO in IPR establishments, Right of Property, Common rules of IPR practices, Types and Features of IPR Agreement, Trademark, Functions of UNESCO in IPR maintenance

UNIT-V	PATENTS	6

Patents – objectives and benefits of patent, Concept, features of patent, Inventive step, Specification, Types of patent application, process E-filling, Examination of patent, Grant of patent, Revocation, Equitable Assignments, Licences, Licensing of related patents, patent agents, Registration of patent agents

L:30	T:00	P:00	Total : 30 Periods

REFERENCES

1. Cooper Donald R, Schindler Pamela S and Sharma JK, "Business Research Methods", Tata McGraw Hill Education, 12e (2018) (Unit I, II, III,IV& V)
2. Catherine J. Holland, "Intellectual property: Patents, Trademarks, Copyrights, Trade Secrets", Entrepreneur Press, 2007 (Unit III, IV, V).
3. David Hunt, Long Nguyen, Matthew Rodgers, "Patent searching: tools & techniques", Wiley, 2012 (Unit I, II).

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4. The Institute of Company Secretaries of India, Statutory body under an Act of parliament, "Professional Programme Intellectual Property Rights, Law and practice", December 2018. (Unit II, III, IV, V).

WEB RESOURCES

- https://archive.nptel.ac.in/courses/117/106/117106033/
- https://www.tutorialsduniya.com/notes/semiconductor-devices-notes/
- https://www.researchgate.net/publication/267261216_Semiconductor_Device_Modeling

COURSE OUTCOMES

At the end of the course students should be able to

CO1: Explore the properties of MOS capacitors.

CO2: Analyze the various characteristics of MOSFET devices.

CO3: Describe the various CMOS design parameters and their impact on performance of the device

CO4: Discuss the device level characteristics of BJT transistors.

CO5: Identify the suitable mathematical technique for simulation.

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24PSE111	ADVANCED CONSTRUCTION ENGINEERING AND EXPERIMENTAL TECHNIQUES LABORATORY	L	T	P	C
		0	0	4	2

Prerequisites:

- Nil

COURSE OBJECTIVES:

- To provide a thorough knowledge of material selection through the material testing based on specification.

A	ADVANCED CONSTRUCTION ENGINEERING LABORATORY	30

LIST OF EXPERIMENTS

1. Mix design of concrete as per IS, ACI & BS methods for high performance concrete.
2. Flow Characteristics of Self Compacting concrete.
3. Effect of minerals and chemical admixtures in concrete at fresh and hardened state with relevance to workability, strength and durability.
4. NDT on hardened concrete - UPV, Rebound hammer and core test.
5. Permeability test on hardened concrete (RCPT) – Demonstration

COURSE OUTCOMES

At the end of the course students should be able to

CO1: Do the mix proportion using IS and ACI codal provisions.
CO2: Test the concrete in a non-destructive manner using rebound hammer.
CO3: Know the permeability characteristics of concrete.
CO4: Observe the effect of mineral and chemical admixture in concrete.
CO5: Study the flow characteristics of self-compacting concrete.

COURSE OBJECTIVES:

- To provide a detailed account of modern experimental techniques in construction Engineering research.
- To introduce the basic working principles, the operational know-how, and the strength and limitations of the techniques.

B	EXPERIMENTAL TECHNIQUES LABORATORY	30

LIST OF EXPERIMENTS

1. Determination of elastic constants – Hyperbolic fringes
2. Determination of elastic constants – Elliptical fringes
3. Strain gauge meter – Determination of Young's modulus of a metallic wire
4. Ultrasonic interferometer – ultrasonic velocity in liquids
5. Electrical conductivity of metals and alloys with temperature-four probe method
6. Resistivity measurements
7. NDT – Ultrasonic flaw detector
8. Calibration of Proving Ring and LVDT

L:00	T:00	P:60	Total : 60 Periods

COURSE OUTCOMES

At the end of the course students should be able to

CO1: Gain practical knowledge by applying the experimental methods to correlate with the theory.

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CO2: Learn the usage of electrical and optical systems for various measurements.
CO3: Apply the analytical techniques and graphical analysis to interpret the experimental data.
CO4: Gain practical knowledge of non-destructive testing.
CO5: Learn to calibrate and use proving rings and LVDTs

24PSE112	TECHNICAL SEMINAR	L	T	P	C
		0	0	2	1

Prerequisites:
• Nil

COURSE OBJECTIVES:
• To work on a specific technical topic in Structural Engineering in order to acquire the skills of oral presentation and to acquire technical writing abilities for seminars and conferences.

SYLLABUS	30
The students will work for two hours per week guided by a group of staff members. They will be asked to talk on any topic of their choice related to Structural Engineering and to engage in dialogue with the audience. A brief copy of their talk also should be submitted. Similarly, the students will have to present a seminar of not less than fifteen minutes and not more than thirty minutes on the technical topic. They will also answer the queries on the topic. The students as the audience also should interact. Evaluation will be based on the technical presentation and the report and also on the interaction during the seminar	

L:00	T:00	P:30	Total : 30 Periods

COURSE OUTCOMES

At the end of the course students should be able to

CO1: Identify the latest developments in the field of Structural Engineering.

CO2: Acquire technical writing abilities for seminars, conferences and journal publications.

CO3: Use modern tools to present the technical details.

CO4: Conduct brainstorming sessions on technical concepts.

CO5: Gain insight on upcoming trends in Structural Engineering

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M. E. STRUCTURAL ENGINEERING

CHOICE BASED CREDIT SYSTEM

SYLLABUS FOR SEMESTER II

24PSE201	ADVANCED STEEL STRUCTURES	L	T	P	C
		3	1	0	4

Prerequisites:

- Nil

COURSE OBJECTIVES:

- To study the behaviour of members, connections and industrial buildings.

UNIT-I	GENERAL	9 + 3

Design Philosophies and Design Codes (IS, EC, AISC) – Stability Criteria –Beam- Columns and Frames (Sway and Non-Sway) – Design of members subjected to combined forces – Design of Purlins, Louver rails, Gable column and Gable wind girder.

UNIT-II	DESIGN OF CONNECTIONS	9 + 3

Types of connections – Welded and Bolted – Design of simple base, Gusseted base and Moment Resisting Base – Flexible Connections - Seated Connections – Unstiffened and Stiffened Seated Connections – Moment Resistant Connections– Clip angle Connections – Split beam Connections.

UNIT-III	ANALYSIS AND DESIGN OF INDUSTRIAL BUILDINGS	9 + 3

Structural Configurations - Functional and Serviceability Requirements- Analysis and design of different types of trusses – Analysis and design of industrial buildings – Sway and non-sway frames –Gantry Girders –Earthquake resistant design of steel buildings

UNIT-IV	PLASTIC ANALYSIS OF STRUCTURES	9 + 3

Introduction, Shape factor - Moment redistribution - Beam, Sway, Joint and Gable mechanisms - Combined mechanisms– Analysis of portal frames, Effect of axial force and shear force on plastic moment capacity, Connection Requirements– Moment resisting connections - Design of Straight Corner Connections –Design of continuous beams.

UNIT-V	DESIGN OF LIGHT GAUGE STEEL STRUCTURES	9 + 3

Introduction to Direct Strength Method - Behaviour of Compression Elements - Effective width for load and deflection determination – Behaviour of Unstiffened and Stiffened Elements – Design of webs of beams – Flexural members – Lateral buckling of beams – Shear Lag – Flange Curling – Design of Compression Members – Wall Studs

L:45	T:15	P:00	Total : 60 Periods

REFERENCES

1. Lynn S. Beedle, Plastic Design of Steel Frames, John Wiley and Sons, 1997 (Unit I, II, III,IV& V)
2. Narayanan.R.et.al., Teaching Resource on Structural steel Design, INSDAG, Ministry of Steel Publishing, 2000 (Unit III, IV, V).
3. Subramanian. N, Design of Steel Structures, Oxford University Press, 2016 (Unit I, II).
4. Wie Wen Yu, Design of Cold-Formed Steel Structures, McGraw Hill Book Company, 2019 (Unit II, III, IV, V).
5. S.K. Duggal, Limit State Design of Steel Structures, McGraw Hill Book Company, 2017 (Unit I, II, III, IV, V).

WEB RESOURCES

- http://nptel.ac.in/course/advanced steel structures
- https://onlinecourses.nptel.ac.in/noc22_oe02/preview

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COURSE OUTCOMES

At the end of the course students should be able to

CO1: Design the steel members such as purlins, gable wind girders subjected to combined forces.

CO2: Explain and design different types of steel connections such as welded and bolted flexible as well as moment resisting connections.

CO3: Analyze and design industrial structures such as trusses and portal frames subjected to wind and seismic forces.

CO4: Explain the effect of axial force and shear force on steel structures and analyse continuous beams and frames using plastic theory.

CO5: Evaluate the behaviour and design of compression and flexural Cold-formed Steel members.

24/10/24

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24PSE203	FINITE ELEMENT ANALYSIS IN STRUCTURAL ENGINEERING	L	T	P	C
		3	0	0	3

Prerequisites:

- Nil

COURSE OBJECTIVES:

- To make the students understand the basics of the Finite Element Technique, and to cover the analysis methodologies for 1-D, 2-D and 3-D Structural Engineering problems.

UNIT-I	INTRODUCTION	9

Introduction - Basic Concepts of Finite Element Analysis - Introduction to Elasticity- Steps in Finite Element Analysis - Finite Element Formulation Techniques - Virtual Work and Variational Principle -Galerkin Method - Finite Element Method: Displacement Approach - Stiffness Matrix and Boundary Conditions

UNIT-II	ELEMENT PROPERTIES	9

Natural Coordinates - Triangular Elements-Rectangular Elements - Lagrange and SerendipityElements - Solid Elements - Isoparametric Formulation - Stiffness Matrix of Isoparametric Elements Numerical Integration: One, Two and Three Dimensional - Problems

UNIT-III	ANALYSIS OF FRAME STRUCTURES	9

Stiffness of Truss Members-Analysis of Truss-Stiffness of Beam Members-Finite Element Analysis of Continuous Beam-Plane Frame Analysis-Analysis of Grid and Space Frame

UNIT-IV	TWO AND THREE DIMENSIONAL SOLIDS	9

Constant Strain Triangle - Linear Strain Triangle - Rectangular Elements- Numerical Evaluation of Element Stiffness - Computation of Stresses, Geometric Nonlinearity and Static Condensation -Axisymmetric Element - Finite Element Formulation of Axisymmetric Element - Finite Element Formulation for 3 Dimensional Elements- Problems

UNIT-V	APPLICATIONS OF FEM	9

Introduction to Plate Bending Problems - Finite Element Analysis of Thin Plate - Finite Element Analysis of Thick Plate - Finite Element Analysis of Skew Plate -Introduction to Finite Strip Method -Finite Element Analysis of Shell -Finite Elements for Elastic Stability - Dynamic Analysis

L:45	T:00	P:00	Total : 40 Periods

REFERENCES

1. David Hutton, "Fundamentals of Finite Element Analysis", Tata McGraw Hill PublishingCompany Limited, New Delhi, 2017.
2. Logan D. L,A First Course in the Finite Element Method, Thomson- Engineering, 3rd edition,2010.
3. Zienkiewicz, O.C. and Taylor, R.L., "The Finite Element Method", Seventh Edition, McGraw– Hill, 2013.
4. Chandrupatla, R.T. and Belegundu, A.D., "Introduction to Finite Elements in Engineering",Fourth Edition, Prentice Hall of India, 2015.
5. Moaveni, S., "Finite Element Analysis Theory and Application with ANSYS", Prentice HallInc., 2020.

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24PSE202	ADVANCED CONCRETE STRUCTURES	L	T	P	C
		3	1	0	4

Prerequisites:

- Nil

COURSE OBJECTIVES:

- To make the students familiar with the behaviour of RCC beams and columns and to design special structural members with proper detailing.

UNIT-I	BEHAVIOUR AND DESIGN OF R.C. BEAMS	10 + 3

Properties and behaviour of concrete and steel – Behaviour and design of R.C. beams in flexure, shear and torsion - modes of failure - calculations of deflections and crack width as per IS 456.

UNIT-II	BEHAVIOUR AND DESIGN OF R.C. COLUMNS	8 + 3

Behaviour of short and long columns - behaviour of short column under axial load with uniaxial and bi-axial moments - construction of Pu - Mu interaction curves - Design of slender columns

UNIT-III	DESIGN OF SPECIAL R.C. ELEMENTS	9 + 3

Design of RC walls - design of corbels - strut and tie method - design of simply supported and continuous deep beams - analysis and design of grid floors.

UNIT-IV	FLAT SLABS AND YIELD LINE BASED DESIGN	9 + 3

Design of flat slabs according to IS method – Check for shear - Design of spandrel beams – Yield line theory and design of slabs - virtual work method - equilibrium method.

UNIT-V	INELASTIC BEHAVIOUR OF CONCRETE STRUCTURES	9 + 3

Inelastic behaviour of concrete beams - Moment-curvature curves - moment redistribution – Concept of Ductility – Detailing for ductility – Design of beams, columns for ductility - Design of cast-in-situ joints in frames.

L:45	T:15	P:00	Total : 60 Periods

REFERENCES

1. Gambhir.M. L., "Design of Reinforced Concrete Structures", Prentice Hall of India, 2012.
2. Purushothaman, P, "Reinforced Concrete Structural Elements: Behaviour Analysis and Design", Tata McGraw Hill, 1986
3. Unnikrishna Pillai and Devdas Menon "Reinforced Concrete Design', Third Edition, Tata McGraw Hill Publishers Company Ltd., New Delhi, 2017.
4. Varghese, P.C, "Advanced Reinforced Concrete Design", Prentice Hall of India, 2020.
5. Sinha.S.N., Reinforced Concrete Design", Tata McGraw Hill publishing company Ltd.2017

WEB RESOURCES

- https://nptel.ac.in/courses/105106224
- https://nptel.ac.in/courses/105103224

COURSE OUTCOMES

At the end of the course students should be able to

CO1: Explain the structural behaviour of flexural members and columns.
CO2: Design the compression members and construct interaction diagrams.
CO3: Design the special elements like corbels, deep beams and grid floors.
CO4: Design flat slab and spandrel beams
CO5: Predict the moment curvature behavior and design and detail concrete elements based on ductility.

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WEB RESOURCES
• https://nptel.ac.in/courses/105105041 • https://nptel.ac.in/courses/105106051
COURSE OUTCOMES
On completion of the course, the student is expected to be able to CO1: Formulate a finite element problem using basic mathematical principles. CO2: Explain the various types of elements and select the appropriate element for modelling. CO3: Analyse a frame using truss element. CO4: Formulate and analyse the two- and three-dimensional solid finite element problems. CO5: Analyse shells, thick and thin plates and explain the dynamic analysis using FEM.

24/6/24

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24PSE211	STRUCTURAL DESIGN STUDIO	L	T	P	C
		0	0	4	2

Prerequisites:
• Nil

COURSE OBJECTIVES:
• To design a structure using modern software tools available like ETABS, STAAD, STRAP, etc. and present it in the form of a complete detailed drawing. Students have to work individually with standard codes, computational tools and software packages for analyzing, designing and detailing a structure. A detailed report on the work done shall be submitted by individual students in the form of a report and presentation.

L:00	T:00	P:60	Total : 60 Periods

COURSE OUTCOMES

On completion of the course, the student is expected to be able to

CO1: Understand the requirements of a structure and model it accordingly using computer software.

CO2: Analyze the structure for various loads and load combinations according to the relevant IS codes.

CO3: Design and detail structures using computer software/tools and check the correctness using manual approximate methods.

CO4: Prepare the complete structural drawings using computer software.

CO5: Observe the flow of forces in a structure and its response to it.

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24PSE212	FINITE ELEMENT ANALYSIS LABORATORY	L	T	P	C
		0	0	4	2

Prerequisites:

- Nil

COURSE OBJECTIVES:

- To solve the mathematical equations and finite element analysis with computational methods like MATLAB and Finite element software using software like ANSYS, ABAQUS etc.

EXPERIMENTS/ EXERCISES

1. Dynamic analysis of frame using mathematical computational software
2. Finite Element Analysis of 2D truss and 3D space trusses
3. Modelling and Finite Element Analysis of RC beams and slabs
4. Finite Element Analysis of thin and thick plates
5. Stability analysis using FEM

L:00	T:00	P:60	Total : 60 Periods

COURSE OUTCOMES

On completion of the course, the student is expected to be able to

CO1: Thorough knowledge to handle FE software.
CO2: Dynamic analysis of frames.
CO3: Analysis of thin and thick plates.
CO4: Stability Analysis.
CO5: Learn to use MATLAB and import MATLAB codes for FE modelling.

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SYLLABUS FOR SEMESTER III

24PSE311	INTENSHIP (4 Weeks)	L	T	P	C
		0	0	0	2

COURSE OBJECTIVES:
• To train the students in the field work so as to have firsthand knowledge of practical problems related to Structural Engineering in carrying out engineering tasks.

The students individually undertake training in reputed engineering companies doing Structural Engineering during the summer vacation for a specified duration of four weeks. At the end of the training, a detailed report on the work done should be submitted within ten days from the commencement of the semester. The students will be evaluated through a viva-voce examination by a team of internal staff

L:00	T: 00	P: 4 Weeks	Total: 4 Weeks

COURSE OUTCOMES On completion of the course, the student is expected to be able to
CO1: Describe the Structural Engineering organization
CO2: Realize the various functions of construction activities
CO3: Gain an understanding of groups and group dynamics
CO4: Participate in real-life construction projects
CO5: Put to use the theoretical knowledge gained so far

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24PSE312	PROJECT WORK I	L	T	P	C
		0	0	12	6

COURSE OBJECTIVES:

- To identify a specific problem for the current need of the society and collect information related to the same through a detailed review of literature.
- To develop the methodology to solve the identified problem.
- To train the students in preparing project reports and to face reviews and viva-voce examinations.

The student individually works on a specific topic approved by the faculty member who is familiar with this area of interest. The student can select any topic which is relevant to his/her specialization of the programme. The topic may be experimental or analytical or case studies. At the end of the semester, a detailed report on the work done should be submitted which contains a clear definition of the identified problem, detailed literature review related to the area of work and a methodology for carrying out the work. The students will be evaluated through a viva-voce examination by a panel of examiners including one external examiner.

L:00	T: 00	P: 180	Total: 180 Periods

COURSE OUTCOMES

On completion of the course, the student will be able to

CO1: Apply the knowledge gained from theoretical and practical courses in solving problems

CO2: Recognize the importance of literature review

CO3: Develop a clear outline and methodology for the project

CO4: Identify the potential research gap and list parameters to work with

CO5: Report and present the findings of the work conducted.

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SYLLABUS FOR SEMESTER IV

24PSE411	PROJECT WORK II	L	T	P	C
		0	0	24	12

COURSE OBJECTIVES:
• To solve the identified problem based on the formulated methodology. • To develop skills to analyze and discuss the test results, and make conclusions..

The student should continue the phase I work on the selected topic as per the formulated methodology / Undergo internship. At the end of the semester, after completing the work to the satisfaction of the supervisor and review committee, a detailed report should be prepared and submitted to the head of the department. The students will be evaluated based on the report and the viva-voce examination by a panel of examiners including one external examiner.

L:00	T: 00	P: 360	Total: 360 Periods

COURSE OUTCOMES On completion of the course, the student will be able to
CO1: Discover potential research areas in the field of Structural Engineering. CO2: Apply the knowledge gained from theoretical and practical courses to be creative, well-planned, organized and coordinated CO3: Represent data acquired in graphical and reader-friendly formats CO4: Derive detailed conclusions from work carried out CO5: Report and present the findings of the work conducted

2/4/25

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SYLLABUS FOR

PROFESSIONAL ELECTIVE -I

24PSEP101	NON-LINEAR ANALYSIS OF STRUCTURES	L	T	P	C
		3	0	0	3

Prerequisites:

- Nil

COURSE OBJECTIVES:

- To study the concept of non-linear behaviour and analysis of elements and simple structures.

UNIT-I	INTRODUCTION TO NON-LINEAR ANALYSIS	9

Material non-linearity, geometric non-linearity; statically determinate and statically indeterminate bar systems of uniform and variable thickness

UNIT-II	INELASTIC ANALYSIS OF FLEXURAL MEMBERS	9

Inelastic analysis of uniform and variable thickness members subjected to geometric and material non-linearity; inelastic analysis of bars of uniform and variable stiffness members with and without axial Restraints

UNIT-III	VIBRATION THEORY AND ANALYSIS OF FLEXURAL MEMBERS	9

Vibration theory and analysis of flexural members; hysteretic models and analysis of uniform and variable stiffness members under cyclic loading

UNIT-IV	ELASTIC AND INELASTIC ANALYSIS OF PLATES	9

Elastic and inelastic analysis of uniform and variable thickness plates.

UNIT-V	NON-LINEAR VIBRATION AND INSTABILITY	9

Nonlinear vibration and Instabilities of elastically supported beams

L:45	T:00	P:00	Total : 45 Periods

REFERENCES

1. Fertis, D.G, Non-linear Mechanics, CRC Press, 1999.
2. Reddy.J.N, Non-linear Finite Element Analysis, Oxford University Press, 2014.
3. Sathyamoorthy.M, Nonlinear Analysis of Structures, CRC Press, 2017.

WEB RESOURCES

- https://nptel.ac.in/courses/105106222
- https://archive.nptel.ac.in/courses/112/103/112103300/

COURSE OUTCOMES

On completion of the course, the student is expected to be able to

CO1: Analyze the bar system considering the material and geometric nonlinearity.
CO2: Perform inelastic analysis of flexural members.
CO3: Perform vibration analysis of flexural members.
CO4: Perform elastic and inelastic analysis of Plates.
CO5: Perform nonlinear and instability analysis of elastically supported beams.

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24PSEP102	STRUCTURAL STABILITY	L	T	P	C
		3	0	0	3

Prerequisites:

- Nil

COURSE OBJECTIVES:

- To study the concept of buckling and analysis of structural elements.

UNIT-I	BUCKLING OF COLUMNS	9

States of equilibrium - concept of equilibrium, energy, imperfection and vibration approaches to stability analysis. Governing equation for column buckling - critical load using Equilibrium, Energy methods - Approximate methods - Rayleigh Ritz, Galerkins approach - Numerical Techniques – Finite difference method.

UNIT-II	BUCKLING OF BEAM-COLUMNS AND FRAMES	9

Theory of beam column - Stability analysis of beam column with single and several concentrated loads, distributed load and end couples - Analysis of rigid jointed frames with and without sway –Use of stability function to determine the critical load.

UNIT-III	TORSIONAL AND LATERAL BUCKLING	9

Torsional buckling – Combined Torsional and flexural buckling - Local buckling - Buckling of Open Sections - Lateral buckling of beams - simply supported and cantilever beams

UNIT-IV	BUCKLING OF PLATES	9

Governing differential equation - Buckling of thin plates with various edge conditions - Analysis by equilibrium and energy approach – Finite difference method.

UNIT-V	INELASTIC BUCKLING	9

Double modulus theory - Tangent modulus theory - Shanley's model - Eccentrically loaded inelastic column. Inelastic buckling of plates - Post buckling behaviour of plates.

L:45	T:00	P:00	Total : 45 Periods

REFERENCES

1. Ashwini Kumar, "Stability Theory of Structures", Allied publishers Ltd., New Delhi, 2003.
2. Chajes, A. "Principles of Structures Stability Theory", Prentice Hall, 1974.
3. Gambhir.M.L, "Stability Analysis and Design of Structures", springer, New York, 2013.
4. Simitser.G.J and Hodges D.H, "Fundamentals of Structural Stability", Elsevier Ltd., 2006.
5. Timoshenko.S.P, and Gere.J.M, "Theory of Elastic Stability", Dover Publication, 2012.

WEB RESOURCES

- https://nptel.ac.in/courses/105105217
- https://archive.nptel.ac.in/courses/114/106/114106047/

COURSE OUTCOMES

On completion of the course, the student is expected to be able to

CO1: Explain the phenomenon of buckling of columns and calculate the buckling load on column by various approaches.

CO2: Estimate the buckling load of beam – columns and frames.

CO3: Explore the concepts of torsional and lateral buckling of thin walled members.

CO4: Explain the phenomenon of buckling of plates.

CO5:Analyze the inelastic buckling of columns and plates.

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24PSEP103	WIND AND CYCLONE EFFECTS ON STRUCTURES	L	T	P	C
		3	0	0	3

Prerequisites:

- Nil

COURSE OBJECTIVES:

- To study the concept of wind and cyclone effects for the analysis and design of structures.

UNIT-I	INTRODUCTION	9

Introduction, Types of wind – Characteristics of wind – Method of Measurement of wind velocity, variation of wind speed with height, shape factor, aspect ratio, drag and lift effects - Dynamic nature of wind –Pressure and suctions - Spectral studies, Gust factor.

UNIT-II	EFFECT OF WIND ON STRUCTURES	9

Classification of structures – Rigid and Flexible – Effect of wind on structures –Vortex shedding, translational vibration of structures - Static and dynamic effects on Tall buildings – Chimneys

UNIT-III	DESIGN OF SPECIAL STRUCTURES	9

Design of Structures for wind loading – as per IS, ASCE and NBC code provisions – Design of Industrial Structures– Tall Buildings – Chimneys – Transmission towers and steel monopoles

UNIT-IV	CYCLONE EFFECTS	9

Cyclone effect on – low rise structures – sloped roof structures - Tall buildings. Effect of cyclone on claddings – design of cladding – use of code provisions in cladding design – Analytical procedure and modeling of cladding

UNIT-V	WIND TUNNEL STUDIES	9

Wind Tunnel Studies, Types of wind tunnels, Types of wind tunnel models - Modelling requirements- Aero dynamic and Aero-elastic models, Prediction of acceleration – Load combination factors –Wind tunnel data analysis – Calculation of Period and damping value for wind design

L:45	T:0	P:0	Total : 45 Periods

REFERENCES

1. Cook.N.J., "The Designer's Guide to Wind Loading of Building Structures", Butterworths, 1990.
2. Kolousek.V, Pirner.M, Fischer.O and Naprstek.J, "Wind Effects on Civil Engineering Structures", Elsevier Publications, 1984
3. Lawson T.V., "Wind Effects on Building Vol. I and II", Applied Science Publishers, London,1980.
4. Peter Sachs, "Wind Forces in Engineering", Pergamon Press, New York, 2014

WEB RESOURCES

- https://www.iitk.ac.in/nicee/IITK-GSDMA/W02.pdf

COURSE OUTCOMES

On completion of the course, the student is expected to be able to

CO1: Explain the phenomenon of buckling of columns and calculate the buckling load on column by various approaches.

CO2: Estimate the buckling load of beam – columns and frames.

CO3: Explore the concepts of torsional and lateral buckling of thin walled members.

CO4: Explain the phenomenon of buckling of plates.

CO5: Analyze the inelastic buckling of columns and plates.

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24PSEP104	PREFABRICATED STRUCTURES	L	T	P	C
		3	0	0	3

Prerequisites:

- Nil

COURSE OBJECTIVES:

- To study the design principles, analysis and design of Prefabricated structures.

UNIT-I	DESIGN PRINCIPLES	9

General Civil Engineering requirements, specific requirements for planning and layout of prefabrication plant. IS Code specifications. Modular co-ordination, standardization, Disuniting of Prefabricates, production, transportation, erection, stages of loading and code provisions, safety factors, material properties, Deflection control.

UNIT-II	REINFORCED CONCRETE	9

Prefabricated structures - Long wall and cross-wall large panel buildings, one way and two way prefabricated slabs, Framed buildings with partial and curtain walls, -Connections – Beam to column and column to column.

UNIT-III	FLOORS, STAIRS AND ROOFS	9

Types of floor slabs, analysis and design example of cored and panel types and two-way systems, Design analysis for product manufacture, handling and erection, staircase slab, types of roof slabs and insulation requirements, Description of joints, their behaviour and reinforcement requirements, Deflection control for short term and long term loads, Ultimate strength calculations in shear and flexure.

UNIT-IV	WALLS	9

Types of wall panels, Blocks and large panels, Curtain, Partition and load bearing walls, Hoisting and placing, load transfer from floor to wall panels, vertical loads, Eccentricity and stability of wall panels, Design Curves, types of wall joints, their behaviour and design, Leak prevention, joint sealants, sandwich wall panels, Lateral load resistance, Location and types of shear walls, approximate design of shear walls.

UNIT-V	INDUSTRIAL BUILDINGS AND SHELL ROOFS	9

Components of single-storey industrial sheds with crane gantry systems, R.C. Roof Trusses, Roof Panels, corbels and columns, wind bracing. Cylindrical, Folded plate and paraboloid shells, Erection and jointing of components in industrial buildings

L:45	T:00	P:00	Total : 45 Periods

REFERENCES

1. Hubert Bachmann and Alfred Steinle , Precast Concrete Structures, 2012.
2. Koncz.T. Manual of Precast Concrete Construction, Vol.I II and III & IV Bauverlag, GMBH,1971.
3. Laszlo Mokk, Prefabricated Concrete for Industrial and Public Structures, AkademiaiKiado,Budapest, 2007.
4. Lewicki.B, Building with Large Prefabricates, Elsevier Publishing Company, 1988.
5. Structural Design manual, Precast concrete connection details, Society for studies in the useof Precast concrete, Netherland BetorVerlag, 2009.

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WEB RESOURCES
• https://archive.nptel.ac.in/courses/124/105/124105013/

COURSE OUTCOMES

On completion of the course, the student is expected to be able to

CO1: Explain the design principles involved in prefabrication.

CO2: Detail the different types of connection.

CO3: Design for stripping forc es during manufacture.

CO4: Determine the forces in shear walls.

CO5: Identify the different roof trusses used in industrial buildings.

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24PSEP201	ADVANCED CONCRETE TECHNOLOGY	L	T	P	C
		3	0	0	3

Prerequisites:

- Nil

COURSE OBJECTIVES:

- To study the properties of concrete making materials, tests, mix design, special concretes, and various methods for making concrete.

UNIT-I	CONCRETE MAKING MATERIALS	9

Aggregates classification IS Specifications, Properties, Grading, Methods of combining aggregates,. specified gradings, Testing of aggregates - Cement, Grade of cement, Chemical composition, Testing of concrete, Hydration of cement, Structure of hydrated cement, special cements - Water - Chemical admixtures, Mineral admixture.

UNIT-II	MIX DESIGN	9

Principles of concrete mix design, Methods of concrete mix design, IS Method, ACI Method, DOE Method – Mix design for special concretes- changes in Mix design for special materials.

UNIT-III	CONCRETING MATERIALS	9

Process of manufacturing of concrete, methods of transportation, placing and curing, cracking, plastic shrinkage, Extreme weather concreting, special concreting methods. Vacuum dewatering – Underwater Concrete

UNIT-IV	SPECIAL CONCRETES	9

Light weight concrete Fly ash concrete, Fiber reinforced concrete, Sulphur impregnated concrete, Polymer Concrete – High performance concrete. High performance fiber reinforced concrete, Self-Compacting Concrete, Geo Polymer Concrete, Waste material-based concrete – Ready mixed concrete

UNIT-V	TEST ON CONCRETES	9

Properties of fresh concrete, Hardened concrete, Strength, Elastic properties, Creep and shrinkage – Durability of concrete. Non-destructive Testing Techniques - microstructure of concrete

L:45	T:00	P:00	Total : 45 Periods

REFERENCES

1. Gupta.B.L., Amit Gupta, "Concrete Technology, Jain Book Agency, 2017.
2. Shetty M.S., Concrete Technology, S.Chand and Company Ltd. Delhi, 2019.
3. Gambhir.M.L., Concrete Technology, McGraw Hill Education, 2006.
4. Neville, A.M., Properties of Concrete, Prentice Hall, 1995, London.
5. Job Thomas., Concrete Technology, Cencage learning India Private Ltd, New Delhi, 2015

WEB RESOURCES

- https://archive.nptel.ac.in/courses/105/106/105106176/
- https://onlinecourses.nptel.ac.in/noc22_ce58/preview/
- https://archive.nptel.ac.in/noc/courses/noc19/SEM2/noc19-ce44/

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COURSE OUTCOMES

On completion of the course, the student is expected to be able to

CO1: Develop knowledge on various materials needed for concrete manufacture.

CO2: Apply the rules to do mix designs for concrete by various methods

CO3: Develop the methods of manufacturing of concrete.

CO4: Explain about various special concrete.

CO5: Explain various tests on fresh and hardened concrete.

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24PSEP202	ADVANCED PRESTRESSED CONCRETE	L	T	P	C
		3	0	0	3

Prerequisites:

- Nil

COURSE OBJECTIVES:

- To develop an understanding of the philosophy of design of prestressed concrete
- To be able to design indeterminate prestressed concrete structure
- To design the prestressed concrete bridge and composite sections.

UNIT-I	INTRODUCTION	9

Concepts of Prestressing – Materials and methods of prestressing – Design philosophy- Analysis methods, Time-dependent deformation of concrete and losses of prestress.

UNIT-II	DESIGN FOR FLEXURE, SHEAR AND TORSION	9

Behaviour of flexural members, determination of ultimate flexural strength using various Codal provisions - Design for Flexure, Shear, torsion and bond of pre-stressed concrete elements – Transfer of prestress – Box girders - Camber, deflection and crack control.

UNIT-III	DESIGN OF CONTINUOUS AND COMPOSITE BEAM	9

Statically indeterminate structures - Analysis and design of continuous beams and frames– Choice of cable profile - Methods of achieving continuity – concept of linear transformations, concordant cable profile and gap cables – Composite sections of prestressed concrete beam and cast in situ RC slab - Design of composite sections - Partial prestressing - Limit State design of partially prestressed concrete beams

UNIT-IV	DESIGN OF TENSION AND COMPRESSION MEMBERS	9

Pre-stressed concrete compression and tension members – application in the design of prestressed pipes and prestressed concrete cylindrical water tanks – Design of compression members with and without flexure – its application in the design of piles, flag masts and similar structures – Two way pre-stressed concrete floor systems – Connections for pre-stressed concrete elements

UNIT-V	DESIGN OF PRESTRESSED CONCRETE BRIDGES	9

Review of IRC and IRS loadings. Effect of concentrated loads on deck slabs, load distribution methods for concrete bridges. Analysis and Design of superstructures - Design of pre-stressed concrete bridges incorporating long-term effects like creep, shrinkage, relaxation, and temperature effects, Dynamic response of bridge decks

L:45	T:00	P:00	Total : 45 Periods

REFERENCES

1. Arthur H. Nilson, "Design of Prestressed Concrete", John Wiley and Sons Inc, New York, 2004.
2. Krishna Raju, "Prestressed Concrete", Tata McGraw Hill Publishing Co., New Delhi, 6th Edition, 2018.
3. Rajagopalan.N, "Prestressed Concrete", Narosa Publications, New Delhi, 2014.
4. Sinha.N.C.and.Roy.S.K, "Fundamentals of Prestressed Concrete", S.Chand and Co., 1998.

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5. Johnson Victor, D., Essentials of Bridge Engineering, Oxford and IBH Publishing Co., New Delhi 2019.

WEB RESOURCES

- https://archive.nptel.ac.in/courses/105/106/105106118/
- https://nptel.ac.in/courses/105106117
- https://archive.nptel.ac.in/content/storage2/courses/105106117/

COURSE OUTCOMES

At the end of the course students should be able to

CO1: Identify the various methods of prestressing and estimate the loss.
CO2: Design the beams for flexure, shear, bond and torsion.
CO3: Design the continuous beams and composite beams.
CO4: Design the water tank, piles and masts.
CO5: Analyze and design the prestressed concrete bridge

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24PSEP203	RELIABILITY ANALYSIS OF STRUCTURES	L	T	P	C
		3	0	0	3

Prerequisites:
• Nil

COURSE OBJECTIVES:
• To develop knowledge to solve structural analysis problems using reliability concepts.

UNIT-I	DATA ANALYSIS	9
Graphical representation Histogram, frequency polygon, Measures of central tendency- grouped and ungrouped data, measures of dispersion, measures of asymmetry. Curve fitting and Correlation: Fitting a straight line, curve of the form $y = ab^x$, and parabola, Coefficient of correlation		

UNIT-II	PROBABILITY CONCEPTS	9
Random events-Sample space and events, Venn diagram and event space, Measures of probability interpretation, probability axioms, addition rule, multiplication rule, conditional probability, probability tree diagram, statistical independence, total probability theorem and Baye's theorem		

UNIT-III	RANDOM VARIABLES	9
Probability mass function, probability density function, Mathematical expectation, Chebyshev's theorem. Probability distributions: Discrete distributions- Binomial and poison distributions, Continuous distributions, Normal, Log normal distributions		

UNIT-IV	RELIABILITY ANALYSIS	9
Measures of reliability-factor of safety, safety margin, reliability index, performance function and limiting state. Reliability Methods-First Order Second Moment Method (FOSM), Point Estimate Method (PEM), and Advanced First Order Second Moment Method (Hasofer-Lind's method).		

UNIT-V	SYSTEM RELIABILITY	9
Influence of correlation coefficient, redundant and non-redundant systems series, parallel and combined systems, Uncertainty in reliability assessments- Confidence limits, Bayesian revision of reliability. Simulation Techniques: Monte Carlo simulation- Statistical experiments, sample size and accuracy, Generation of random numbers, random numbers with standard uniform distribution, continuous random variables, discrete random variables		

L:45	T:0	P:0	Total : 45 Periods

REFERENCES

1. A Papoulis, Probability, Random Variables and Stochastic Processes, McGraw-Hill, New York, 2017.
2. R E Melchers, Structural Reliability Analysis and Prediction, Third Edition, John Wiley & Sons Ltd, Chichester, England,2018.
3. O. Ditlevsen, H. O. Madsen, Structural Reliability Methods, Wiley, 1st Edition, 1996.

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4. Srinivasan Chandrasekaran, Offshore Structural Engineering: Reliability and Risk Assessment, CRC Press, Florida, 2016.
5. Jack R Benjamin, C. Allin Cornell, Probability, Statistics, and Decision for Civil Engineers, Dover Publications, New York, 2014.

WEB RESOURCES

- https://archive.nptel.ac.in/courses/105/103/105103140/
- https://nptel.ac.in/courses/105103140

COURSE OUTCOMES

At the end of the course students should be able to

CO1: Achieve the Knowledge of design and development of problem-solving skills.

CO2: Understand the principles of reliability.

CO3: Design and develop analytical skills.

CO4: Summarize the Probability distributions.

CO5: Understands the concept of System reliability.

24PSEP204	DESIGN OF FORMWORK	L	T	P	C
		3	0	0	3

Prerequisites:

- Nil

COURSE OBJECTIVES:

- To study and understand the detailed planning of formwork, Design of forms for various elements such as foundation, slabs, beams, columns and walls.

UNIT-I	INTRODUCTION	9

General objectives of formwork building - Development of a Basic System - Key Areas of cost reduction - Requirements and Selection of Formwork.

UNIT-II	FORMWORK MATERIALS AND TYPES	9

Timber, Plywood, Steel, Aluminium, Plastic, and Accessories. Horizontal and Vertical Formwork Supports. Flying Formwork, Table Form, Tunnel Form, Slip Form, Formwork for Precast Concrete

UNIT-III	FORMWORK DESIGN	9

Concepts, Formwork Systems and Design for Foundations, Walls, Columns, Slab and Beams

UNIT-IV	FORMWORK DESIGN FOR SPECIAL STRUCTURES	9

Shells, Domes, Folded Plates, Overhead Water Tanks, Natural Draft Cooling Tower, Bridges.

UNIT-V	FORMWORK FAILURES	9

Formwork Management Issues – Pre- and Post-Award. Formwork Failures: Causes and Case studies in Formwork Failure. Formwork Issues in Multi story Building Construction

L:45	T:00	P:00	Total : 45 Periods

REFERENCES

1. Formwork for Concrete Structures, R.L.Peurifoy, McGraw Hill India, 2010.
2. Formwork for Concrete Structures, Kumar NeerajJha, Tata McGraw Hill Education, 2012.
3. IS 14687: 1999, False work for Concrete Structures - Guidelines, BIS.
4. Hurd, M.K., Formwork for Concrete, Special Publication No.4, American Concrete Institute, Detroit, 1996.
5. Michael P. Hurst, Construction Press, London and New York, 2003.

WEB RESOURCES

- https://digitalskills.iitmpravartak.org.in
- https://archive.nptel.ac.in/courses/105/104/105104030/
- https://egyankosh.ac.in/bitstream/123456789/28755/1/Unit-4.pdf

COURSE OUTCOMES

At the end of the course students should be able to

CO1: Select proper formwork, accessories and material.
CO2: Design the form work for Beams, Slabs, columns, Walls and Foundations
CO3: Design the form work for Special Structures.
CO4: Describe the working of flying formwork.
CO5: Judge the formwork failures through case studies.

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24PSEP205	MAINTENANCE, REPAIR AND REHABILITATION OF STRUCTURES	L	T	P	C
		3	0	0	3

Prerequisites:
• Nil

COURSE OBJECTIVES:
• To study the damages, repair and rehabilitation of structures.

UNIT-I	MAINTENANCE AND REPAIR STRATEGIES	9
Maintenance, Repair and Rehabilitation, retrofit and strengthening, need for rehabilitation of structures- Service life behaviour - importance of Maintenance, causes and effects of deterioration. Non-destructive Testing Techniques		

UNIT-II	STRENGTH AND DURABILITY OF CONCRETE	9
Quality assurance for concrete based on Strength, Durability and Microstructure of concrete - NDT techniques- Cracks- different types, causes – Effects due to Environment, Fire, Earthquake, Corrosion of steel in concrete, Mechanism, quantification of corrosion damage		

UNIT-III	REPAIR MATERIALS AND SPECIAL CONCRETES	9
Repair materials-Various repair materials, Criteria for material selection, Methodology of selection, Special mortars and concretes- Polymer Concrete and Grouting materials- Bonding agents-Latex emulsions, Epoxy bonding agents, Protective coatings-Protective coatings for Concrete and Steel, FRP sheets		

UNIT-IV	PROTECTION METHODS AND STRUCTURAL HEALTH MONITORING	9
Concrete protection methods – reinforcement protection methods- cathodic protection - Sacrificial anode - Corrosion protection techniques – Corrosion inhibitors, concrete coatings- Corrosion resistant steels, Coatings to reinforcement, Structural health monitoring		

UNIT-V	REPAIR, RETROFITTING AND DEMOLITION OF STRUCTURES	9
Various methods of crack repair, Grouting, Routing and sealing, Stitching, Dry packing, Autogenous healing, Repair to active cracks, Repair to dormant cracks. Repair of various corrosion damaged of structural elements (slab, beam and columns) Jacketing Techniques, Strengthening Methods for Structural Elements. Engineered Demolition -Case studies		

L:45	T:00	P:00	Total : 45 Periods

REFERENCES

1. Dodge Woodson, Concrete Structures, Protection, Repair and Rehabilitation, Butterworth, Heinemann, Elsevier, New Delhi 2012.
2. DovKominetzky.M.S., - Design and Construction Failures, Galgotia Publications Pvt. Ltd., 2001.
3. Ravishankar.K., Krishnamoorthy. T.S, Structural Health Monitoring, Repair and Rehabilitation of Concrete Structures, Allied Publishers, 2004.
4. Hand book on Seismic Retrofit of Buildings, CPWD and Indian Buildings Congress, Narosa Publishers, 2008.

5. Hand Book on "Repair and Rehabilitation of RCC Buildings" – Director General works CPWD, Govt of India, New Delhi – 2002.
WEB RESOURCES
• https://archive.nptel.ac.in/courses/105/106/105106202/ • https://archive.nptel.ac.in/courses/105/105/105105213/
COURSE OUTCOMES At the end of the course students should be able to CO1: Explain the importance of maintenance assessment and repair strategies. CO2: Acquire knowledge of strength and durability properties and their effects due to climate and temperature. CO3: Gain knowledge of recent developments in repair. CO4: Explain the techniques for repair and protection methods. CO5: Explain the repair, rehabilitation and retrofitting of structures and demolition methods.

24PSEP206	MECHANICS OF FIBER REINFORCED POLYMER COMPOSITE MATERIALS	L	T	P	C
		3	0	0	3

Prerequisites:

- Nil

COURSE OBJECTIVES:

- To study the behaviour of composite materials and to investigate the failure and fracture characteristics.

UNIT-I	INTRODUCTION	9

Introduction to Composites, Classifying composite materials, commonly used fiber and matrix constituents, Composite Construction, Properties of Unidirectional Long Fiber Composites and Short Fiber Composites

UNIT-II	STRESS STRAIN RELATIONS	9

Concepts in solid mechanics, Hooke's law for orthotropic and anisotropic materials, Linear Elasticity for Anisotropic Materials, Rotations of Stresses, Strains, Residual Stresses

UNIT-III	ANALYSIS OF LAMINATED COMPOSITES	9

Governing equations for anisotropic and orthotropic plates. Angle-ply and cross ply laminates – Static, Dynamic and Stability analysis for Simpler cases of composite plates, Inter laminar stresses

UNIT-IV	FAILURE AND FRACTURE OF COMPOSITES	9

Netting Analysis, Failure Criterion, Maximum Stress, Maximum Strain, Fracture Mechanics of Composites, Sandwich Construction

UNIT-V	APPLICATIONS AND DESIGN	9

Meal and Ceramic Matrix Composites, Applications of Composites, Composite Joints, Design with Composites, Review, Environmental Issues

L:45	T:00	P:00	Total : 45 Periods

REFERENCES

1. Agarwal. B.D. Broutman. L.J. and Chandrashekara. K. "Analysis and Performance of Fiber Composites", Fourth Edition, John-Wiley and Sons, 2017.
2. Daniel. I.M, and Ishai. O, "Engineering Mechanics of Composite Materials", Second Edition, Oxford University Press, 2005.
3. Hyer M.W., and White S.R., "Stress Analysis of Fiber-Reinforced Composite Materials", D.Estech Publications Inc., 2009.
4. Jones R.M., "Mechanics of Composite Materials", Taylor and Francis Group 1999.
5. Mukhopadhyay.M, "Mechanics of Composite Materials and Structures", Universities Press, India, 2005.

WEB RESOURCES

- https://archive.nptel.ac.in/courses/112/103/112103308/
- https://onlinecourses.nptel.ac.in/noc22_me40/preview

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COURSE OUTCOMES

At the end of the course students should be able to

CO1: Explain the various types of composites and their constituents.

CO2: Derive the constitutive relationship and determine the stresses and strains in a composite material.

CO3: Analyze a laminated plate.

CO4: Explain the various failure criteria and fracture mechanics of composites.

CO5: Design simple composite elements.

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24PSEP207	DESIGN OF STEEL -CONCRETE COMPOSITE STRUCTURES	L	T	P	C
		3	0	0	3

Prerequisites:

- Nil

COURSE OBJECTIVES:

- To develop an understanding of the behaviour and design concrete composite elements and structures..

UNIT-I	INTRODUCTION	9

Introduction to steel – concrete composite construction – Codes – Composite action – Serviceability and Construction issues in design

UNIT-II	DESIGN OF COMPOSITE MEMBERS	9

Design of composite beams, slabs, columns, beam – columns – Design of composite trusses.

UNIT-III	DESIGN OF CONNECTIONS	9

Shear connectors – Types – Design of connections in composite structures – Design of shear connectors – Partial shear interaction

UNIT-IV	COMPOSITE BOX GIRDER BRIDGES	9

Introduction –Design concepts of box girder bridges and corrugated web girder bridges

UNIT-V	CASE STUDIES	9

Case studies on steel – concrete composite construction in buildings – seismic behaviour of composite structures

L:45	T:0	P:0	Total : 45 Periods

REFERENCES

1. Johnson R.P., "Composite Structures of Steel and Concrete Beams, Slabs, Columns and Frames for Buildings", Vol. I, Fourth Edition, Blackwell Scientific Publications, 2018
2. Oehlers D.J. and Bradford M.A., "Composite Steel and Concrete Structural Members, Fundamental behaviour", Revised Edition, Pergamon press, Oxford, 2013.
3. Owens. G.W and Knowles. P,"Steel Designers Manual", Seventh Edition, Steel Concrete Institute (UK), Oxford Blackwell Scientific Publications, 2011.
4. Narayanan R, "Composite steel structures – Advances, design and construction", Elsevier, Applied science, UK, 1987
5. Teaching resource for, "Structural Steel Design," Volume 2 of 3, Institute for Steel Development and Growth (INSDAG), 2002

WEB RESOURCES

- https://archive.nptel.ac.in/courses/105/105/105105162//
- https://archive.nptel.ac.in/courses/105/105/105105104/
- https://nptel.ac.in/courses/105105162

COURSE OUTCOMES

At the end of the course students should be able to

CO1: Explain composite action.

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CO2: Design composite elements.
CO3: Design connections.
CO4: Explain the concept of design of composite box girder bridges.
CO5: Study and evaluate case studies.

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24PSEP208	DESIGN OF MASONRY STRUCTURES	L	T	P	C
		3	0	0	3

Prerequisites:

- Nil

COURSE OBJECTIVES:

- To design, detail and retrofit a masonry structure.

UNIT-I	INTRODUCTION	9

Introduction – Masonry construction – National and International perspective – Historical development, Modern masonry, Material Properties – Masonry units: clay and concrete blocks, Mortar, grout and reinforcement, Bonding patterns, Shrinkage and differential movements.

UNIT-II	DESIGN OF COMPRESSION MEMBER	9

Principles of masonry design, Masonry standards: IS 1905 and others - Masonry in Compression – Prism strength, Eccentric loading -Kern distance. Structural Wall, Columns and Plasters, Retaining Wall, Pier and Foundation – Prestressed masonry.

UNIT-III	DESIGN OF MASONRY UNDER LATERAL LOADS	9

Masonry under Lateral loads – In-plane and out-of-plane loads, Ductility of Reinforced Masonry Members Analysis of perforated shear walls, Lateral force distribution -flexible and rigid diaphragms. Behaviour of Masonry – Shear and flexure – Combined bending and axial loads – Reinforced and unreinforced masonry – Infill masonry.

UNIT-IV	EARTHQUAKE RESISTANT DESIGN OF MASONRY STRUCTURES	9

Structural design of Masonry – Consideration of seismic loads –concepts of confined masonry – Cyclic loading and ductility of shear walls for seismic design -Code provisions- Working and Ultimate strength design – In-plane and out-of-plane design criteria for load-bearing and infills, connecting elements and ties. *Modeling Techniques, Static Push Over Analysis and use of* Capacity Design Spectra – use of Software.

UNIT-V	RETROFITTING OF MASONRY	9

Seismic evaluation and Retrofit of Masonry – In-situ and non-destructive tests for masonry – properties – Repair and strengthening of techniques.

L:45	T:00	P:00	Total : 45 Periods

REFERENCES

1. Drysdale, R. G. Hamid, A. H. and Baker, L. R, "Masonry Structures: Behaviour & Design", Prentice Hall Hendry, 1994.
2. A.W. Hendry, B.P. Sinha and Davis, S. R, "Design of Masonry Structures", E & FN Spon, UK, 2017.
3. R.S. Schneider and W.L. Dickey, "Reinforced Masonry Design", Prentice Hall, 3rd edition, 1994.
4. Paulay, T. and Priestley, M. J. N., "Seismic Design of Reinforced Concrete and Masonry Buildings", John Wiley, 1992.

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5. A.W. Hendry, "Structural Masonry", 2nd Edition, Palgrave McMillan Press, 1998.
WEB RESOURCES
• https://archive.nptel.ac.in/courses/105/106/105106197/ • https://onlinecourses.nptel.ac.in/noc19_ce21/preview • https://archive.nptel.ac.in/content/syllabus_pdf/105106197.pdf
COURSE OUTCOMES At the end of the course students should be able to CO1: Explain the properties of a masonry unit and the various components. CO2: Design a masonry structure for compression. CO3: Design a masonry structure for lateral loads. CO4: Design an earthquake-resistant masonry wall. CO5: Suggest retrofitting techniques for existing masonry walls.

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24PSE301	DESIGN OF INDUSTRIAL STRUCTURES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To disseminate knowledge about planning and design of RCC and Steel Industrial structures

UNIT-I	PLANNING AND FUNCTIONAL REQUIREMENTS	9

Classification of Industries and Industrial structures - planning for Layout Requirements regarding Lighting, Ventilation and Fire Safety - Protection against noise and vibration - Guidelines of Factories Act.

UNIT-II	INDUSTRIAL BUILDINGS	9

Steel and RCC - Gantry Girder, Crane Girders - Design of Corbels and Nibs – Design of Staircase

UNIT-III	POWER PLANT STRUCTURES	9

Types of power plants – Containment structures - Cooling Towers - Bunkers and Silos - Pipe Rack and supporting structures

UNIT-IV	RANSMISSION LINE STRUCTURES AND CHIMNEYS	9

Analysis and design of steel monopoles, transmission line towers – Sag and Tension calculations, Methods of tower testing – Design of self-supporting and guyed chimney, Design of Chimney bases.

UNIT-V	FOUNDATION	9

Foundation for Towers, Chimneys and Cooling Towers –Design of Block foundations for machines - Design of Turbo Generator Foundation.

L:45	T: 00	P: 00	Total: 45 Periods

REFERENCES

1. Jurgen Axel Adam, Katharria Hausmann, Frank Juttner, Klauss Daniel, Industrial Buildings: A Design Manual, Birkhauser Publishers, 2004.
2. Santhakumar A.R. and Murthy S.S., Transmission Line Structures, Tata McGraw Hill,1992.
3. Swami saran, Analysis & Design of substructures, Limit state Design second Edition.2018.
4. N.Subramaniyan, Design of Steel Structures, United Press, 2018
5. N. Krishna Raju, Advanced Reinforced concrete Design, 3rd edition 2016

COURSE OUTCOMES

On completion of the course, the student is expected to be able to

CO1: Develop the concept of planning & functional requirements of industrial standards.
CO2: Analyse and design Steel Gantry girders & Crane girders and RCC design of corbels, nibs and staircase.

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CO3: Analyse & design cooling towers, bunkers, silos and pipe supporting structures. CO4: Analyse and design Steel transmission line towers and chimneys. CO5: Design foundations for cooling tower, chimneys and turbo generator.

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24PSE302	EXPERIMENTAL TECHNIQUES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- The course objective is to make students to know the concepts of measurements of static and dynamic response of Structures and to analyze the structure

UNIT-I	FORCES AND STRAIN MEASUREMENT	9

Choice of Experimental stress analysis methods, Errors in measurements – Strain gauge, principle, types, performance and uses. Photo elasticity - principle and applications - Hydraulic jacks and pressure gauges – Electronic load cells – Proving Rings – Calibration of Testing Machines – Long-term monitoring – vibrating wire sensors – Fibre optic sensors.

UNIT-II	VIBRATION MEASUREMENTS	9

Characteristics of Structural Vibrations – Linear Variable Differential Transformer (LVDT) – Transducers for velocity and acceleration measurements. Vibration meter – Seismographs – Vibration Analyzer – Display and recording of signals – Cathode Ray Oscilloscope – XY Plotter – Chart Plotters – Digital data Acquisition systems.

UNIT-III	DISTRESS MEASUREMENTS & CONTROL	9

Diagnosis of distress in structures – crack observation and measurements – corrosion of reinforcement in concrete – Half cell, construction and use – damage assessment – controlled blasting for demolition – Techniques for residual stress measurements.

UNIT-IV	NON-DESTRUCTIVE TESTING METHODS	9

Load testing on structures, buildings, bridges and towers – Rebound Hammer – acoustic emission – ultrasonic testing principles and application – Holography – use of laser for structural testing – Brittle coating, Advanced NDT methods – Ultrasonic pulse echo, Impact echo, impulse radar techniques, GECOR & GPR.

UNIT-V	MODEL ANALYSIS	9

Model Laws – Laws of similitude – Model materials – Necessity for Model analysis – Advantages – Applications – Types of similitude – Scale effect in models – Indirect model study – Direct model study - Limitations of models – investigations – structural problems – Usage of influence lines in model studies.

L:45	T: 00	P: 00	Total: 45 Periods

REFERENCES

1. Sadhu Singh, "Experimental Stress Analysis", Khanna Publishers, 4 thEdition, New Delhi, 2006.
2. Ganesan.T.P, "Model Analysis of Structures", University Press, India, 2000.
3. Dalley .J.W and Riley.W.F, "Experimental Stress Analysis", McGraw Hill Book Company, N.Y. 1991.
4. Srinath.L.S, Raghavan.M.R, ingaiah.K, Gargesha.G, Pant.B and Ramachandra.K, "Experimental Stress Analysis", Tata McGraw Hill Company, New Delhi, 1984.

5. C. S. Rangan, Instrumentation – Devices and Systems, Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 1983.

COURSE OUTCOMES

On completion of the course, the student is expected to be able to

CO1: Choose the methodology of measuring errors and strains and calibrate the machineries.
CO2: Use various vibration measuring instruments and analyze the structures
CO3: Measure distress in the structures using various electronic equipment
CO4: Perform advanced NDT methods in accessing the load testing of structures
CO5: To predict the behaviour of proto type structure by conducting model tests and analysis

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24PSEP303	OPTIMIZATION OF STRUCTURES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To study the optimization methodologies applied to structural engineering

UNIT-I	BASIC PRINCIPLES AND CLASSICAL OPTIMIZATION TECHNIQUES	9

Definition – Objective Function; Constraints – Equality and inequality – Linear and non-linear Side, Non-negativity, Behaviour and other constraints – Design space – Feasible and infeasible- Convex and Concave – Active constraint – Local and global optima. Differential calculus – Optimality criteria – Single variable optimization – Multivariable optimization with no constraints- - (Lagrange Multiplier method) – with inequality constraints (Khun – Tucker Criteria).

UNIT-II	LINEAR AND NON-LINEAR PROGRAMMING	9

LINEAR PROGRAMMING: Formulation of problems -Graphical solution – Analytical methods- Standard form - Slack, surplus and artificial variables – Canonical form – Basic feasible solution - simplex method – Two phase method – Penalty method- Duality theory – Primal – Dual algorithm, Dual Simplex method. Non-linear programming: One Dimensional minimization methods: Unidimensional - Unimodal function – Exhaustive and unrestricted search – Dichotomous search - Fibonacci Method – Golden section method -Interpolation methods. Unconstrained optimization Techniques.

UNIT-III	GEOMETRIC PROGRAMMING	9

Polynomial – degree of difficulty – reducing G.P.P to a set of simultaneous equations – Unconstrained and constrained problems with zero difficulty – Concept of solving problems with one degree of difficulty.

UNIT-IV	DYNAMIC PROGRAMMING	9

Bellman's principle of optimality – Representation of a multistage decision problem-concept of sub-optimization problems using classical and tabular methods

UNIT-V	STRUCTURAL APPLICATIONS	9

Methods for optimal design of structural elements, continuous beams and single storied frames using plastic theory -Minimum weight design for truss members - Fully stressed design –Optimization principles to design of R.C. structures such as multistory buildings, water tanks and bridges.

L:45	T: 00	P: 00	Total: 45 Periods

REFERENCES

1. Iyengar. N.G.R and Gupta. S.K, "Structural Design Optimization", Affiliated East West Press Ltd, New Delhi, 1997
2. Rao, S.S. "Engineering Optimization: Theory and Practice", Fourth Edition, Wiley Eastern (P) Ltd., 2013.

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3. Spunt, "Optimization in Structural Design", Civil Engineering and Engineering Mechanics Services, Prentice-Hall, New Jersey 1971.
4. Uri Kirsch, "Optimum Structural Design", McGraw Hill Book Co. 1981.
5. Haftka, R. T. and Gurdal, Z., Elements of Structural Optimization, Springer, 3 rd Edition, 1992

COURSE OUTCOMES

On completion of the course, the student is expected to be able to

CO1: Apply the knowledge of engineering fundamentals to formulate and solve engineering problems by classical optimization techniques.

CO2: Identify, formulate and solve engineering problems by linear and non-linear programming.

CO3: Analyse the problem and reduce G.P.P to a set of simultaneous equations.

CO4: Apply the Engineering knowledge to understand the concept of dynamic programming.

CO5: Design various structural elements with minimum weight.

24PSEP304	STRUCTURAL HEALTH MONITORING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To make the students familiar with various structural health monitoring tools and techniques.

UNIT-I	INTRODUCTION TO STRUCTURAL HEALTH MONITORING	9

Need for SHM, Structural Health Monitoring versus Non-Destructive Evaluation, Methods of SHM- Local & Global Techniques for SHM, Short & Long-Term Monitoring, Active & Passive Monitoring, Remote Structural Health Monitoring- Advantages of SHM - Challenges in SHM

UNIT-II	SENSORS AND INSTRUMENTATION FOR SHM	9

Sensors for measurements: Electrical Resistance Strain Gages, Vibrating Wire Strain Gauges, Fiber Optic Sensors, Temperature Sensors, Accelerometers, Displacement Transducers, Load Cells, Humidity Sensors, Crack Propagation Measuring Sensors, Corrosion Monitoring Sensors, Pressure Sensors, Data Acquisition – Data Transmission - Data Processing – Storage of processed data - Knowledgeable information processing

UNIT-III	STATIC AND DYNAMIC MEASUREMENT TECHNIQUES FOR SHM	9

Static measurement - Load test, Concrete core trepanning, Flat jack techniques, Static response measurement, Dynamic measurement -Vibration based testing- Ambient Excitation methods, Measured forced Vibration-Impact excitation, step relaxation test, shaker excitation method.

UNIT-IV	DAMAGE DETECTION	9

Damage Diagnostic methods based on vibrational response- Method based on modal frequency/shape/damping, Curvature and flexibility method, Modal strain energy method, Sensitivity method, Baseline-free method, Cross-correlation method, Damage Diagnostic methods based on wave propagation Methods-Bulk waves/Lamb waves, Reflection and transmission, Wave tuning/mode selectivity, Migration imaging, Phased array imaging, Focusing array/SAFT imaging

UNIT-V	DATA PROCESSING AND CASE STUDIES	9

Advanced signal processing methods -Wavelet, Hilbert-Huang transform, Neural networks, Support Vector Machine Principal component analysis, Outlier analysis. Applications of SHM on bridges and buildings, case studies of SHM in Civil/ Structural engineering.

L:45	T: 00	P: 00	Total: 45 Periods

REFERENCES

1. Daniel Balageas, Peter Fritzen, Alfredo Guemes, Structural Health Monitoring, John Wiley & Sons,2006.

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2. Douglas E Adams, Health Monitoring of Structural Materials and Components Methods with Applications, Wiley Publishers, 2007
3. Hua-Peng Chen, Structural Health Monitoring of Large Civil Engineering Structures, Wiley Publishers, 2018
4. Ansari, F Karbhari, Structural health monitoring of civil infrastructure systems, V.M,Woodhead Publishing, 2009
5. J. P. Ou, H. Li and Z. D, "Duan Structural Health Monitoring and Intelligent Infrastructure", Vol1, Taylor and Francis Group, London, UK, 2006.
6. Victor Giurglutiu, "Structural Health Monitoring with Wafer Active Sensors", Academic Press Inc, 2007.

COURSE OUTCOMES

On completion of this course, the student is expected to be able to

CO1: Understand the need, advantages and challenges of SHM
CO2: Know the different types of sensors and instrumentation techniques
CO3: Gain knowledge of the static and dynamic measurement techniques
CO4: Compare the various damage detection techniques
CO5: Know the various data processing methods through case studies

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24PSEP305	DESIGN OF OFFSHORE STRUCTURES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To impart knowledge about the concept of wave theories, forces, offshore foundation, analysis and design of jacket towers, pipes and cables.

UNIT-I	WAVE THEORIES	9

Wave generation process, small, finite amplitude and nonlinear wave theories.

UNIT-II	FORCES OF OFFSHORE STRUCTURES	9

Wind forces, wave forces on small bodies and large bodies - current forces - Morison equation.

UNIT-III	OFFSHORE SOIL AND STRUCTURE MODELLING	9

Different types of offshore structures, foundation modeling, fixed jacket platform structural modeling.

UNIT-IV	ANALYSIS OF OFFSHORE STRUCTURES	9

Static method of analysis, foundation analysis and dynamics of offshore structures.

UNIT-V	DESIGN OF OFFSHORE STRUCTURES	9

Design of platforms, helipads, Jacket tower, analysis and design of mooring cables and pipelines

L:45	T: 00	P: 00	Total: 45 Periods

REFERENCES

1. Chakrabarti, S.K., Handbook of Offshore Engineering by, Elsevier, 2005.
2. Chakrabarti, S.K., Hydrodynamics of Offshore Structures, Springer – Verlag, 2003.
3. Chakrabarti, S.K. 1994, Offshore Structure Modelling: World Scientific
4. Chandrasekaran, S. 2017. Dynamic analysis and design of ocean structures.
5. B. Gou, S.Song, J Chacko and A. Ghalambar, offshore pipelines, GPP publishers, 2006

COURSE OUTCOMES

On completion of the course, the student is expected to be able to

CO1: Develop the concept of wave theories
CO2: Apply the knowledge of wave forces and offshore structures
CO3: Explain the modeling for offshore structure and its foundation
CO4: Analyse offshore structures by means of static and dynamic methods
CO5: Design of jacket towers, mooring cables and pipelines

24PSEP306	PERFORMANCE OF STRUCTURES WITH SOIL STRUCTURE INTERACTION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To study the concept of soil-structure – interaction in the analysis and design of structures.

UNIT-I	SOIL-FOUNDATION INTERACTION	9

Introduction to soil-foundation interaction problems – Soil behaviour – Foundation behaviour- Interface behaviour- Scope of soil foundation interaction analysis- soil response models–Elastic continuum- Two parameter elastic models- Elastic-plastic behaviour- Time dependent behaviour.

UNIT-II	BEAM ON ELASTIC FOUNDATION- SOIL MODELS	9

Infinite beam – Two-parameters models – Isotropic elastic half space model – Analysis of beams of finite length – combined footings

UNIT-III	PLATES ON ELASTIC CONTINUUM	9

Thin and thick rafts – Analysis of finite plates - Numerical analysis of finite plates.

UNIT-IV	ANALYSIS OF AXIALLY AND LATERALLY LOADED PILES AND PILE GROUPS	9

Elastic analysis of single pile – Theoretical solutions for settlement and load distributions – Analysis of pile group – Interaction analysis – Load distribution in groups with rigid cap – Load deflection prediction for laterally loaded piles – Subgrade reaction and elastic analysis – Interaction analysis – Pile-raft system.

UNIT-V	GROUND-FOUNDATION-STRUCTURE INTERACTION	9

Effect of structure on ground-foundation interaction – Static and dynamic loads- Contact pressure and its estimation – Estimation of the settlement from the constitutive laws – Free-field response – Kinetic interaction – Inertial interaction

L:45	T: 00	P: 00	Total: 45 Periods

REFERENCES

1. John P. Wolf, (1985) Soil-structure interaction, Prentice Hall, 1987.
2. Bowels, J.E., "Analytical and Computer methods in Foundation" McGraw Hill Book Co., New York., 1974
3. Desai C.S. and Christian J.T., "Numerical Methods in Geotechnical Engineering" McGraw Hill Book Co. New York,1977.
4. Soil Structure Interaction, the real behaviour of structures, Institution of Structural Engineers, 1989.
5. A.P.S. Selvadurai, Elastic Analysis of Soil Foundation Interaction, Developments in Geotechnical Engg.vol-17, Elsevier Scientific Publishing Co., 1979.
6. Prakash, S., and Sharma, H. D., "Pile Foundations in Engineering Practice."John Wiley & Sons, New York, 1990.
7. Rolando P. Orense, Nawawi Chouw& Michael J. Pender – Soil-Foundation-Structure

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Interaction, CRC Press, Taylor & Francis Group, London, UK, 2010.

COURSE OUTCOMES

On completion of the course, the student is expected to be able to

CO1: Explain the concept of soil structure interaction.
CO2: Do a static analysis of infinite and finite beams resting on elastic foundation
CO3: Analyse finite thin and thick plates
CO4: Do a static and dynamic analysis of soil structure interaction problems
CO5: Analyze ground foundation and structure interaction problems

24PSE307	DESIGN OF BRIDGE STRUCTURES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To study the loads, forces on bridges and design principles of several types of bridges

UNIT-I	INTRODUCTION	9

Introduction-Selection of Site and Initial Decision Process - Classification of Bridges- General Features of Design- Standard Loading for Bridge Design as per different codes - Road Bridges – Railway Bridges - Design Codes - Working Stress Method- Limit State Method of Design

UNIT-II	SUPERSTRUCTURES	9

election of main bridge parameters, design methodologies -Choices of superstructure types - Orthotropic plate theory, load distribution techniques - Grillage analysis - Finite element analysis Different types of superstructures (RCC and PSC); Longitudinal Analysis of Bridge – Transverse Analysis of Bridge

UNIT-III	BRIDGE DESIGN PRINCIPLES	9

Analysis and Design of RCC solid slab culverts -Design of RCC Tee beam and slab bridges – Design principles of continuous girder bridges, box girder bridges, balanced cantilever bridges – Arch bridges – Box culverts – Segmental bridges–Design principles only

UNIT-IV	SUBSTRUCTURE, BEARINGS AND DECK JOINTS	9

Design of bridge bearings and substructure

UNIT-V	PRESTRESSED CONCRETE BRIDGES & STEEL BRIDGES	9

Design principles of PSC bridges – PSC girders –Design principles of steel bridges - Plate girder bridges – Box girder bridges – Truss bridges – Vertical and Horizontal stiffeners.3

L:45	T: 00	P: 00	Total: 45 Periods

REFERENCES

1. Jagadeesh. T.R. and Jayaram. M.A., "Design of Bridge Structures", Second Edition, Prentice Hall of India Pvt. Ltd. 2009.
2. Johnson Victor, D. "Essentials of Bridge Engineering", Sixth Edition, Oxford and IBH Publishing Co. New Delhi, 2019.
3. Ponnuswamy, S., "Bridge Engineering", Third Edition, Tata McGraw Hill, 2017.
4. Raina V.K." Concrete Bridge Practice" Tata McGraw Hill Publishing Company, New Delhi,2014.
5. Design of Highway Bridges, Richard M. Barker & Jay A. Puckett, John Wiley & Sons, Inc.,2021

COURSE OUTCOMES

On completion of this course, student will be able to

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CO1: Explain the different types of bridges and design philosophies
CO2: Design an RC solid slab culvert bridge
CO3: Design an RC Tee Beam and Slab bridge
CO4: Design the bridge bearings and substructure
CO5: Explain the design principles of PSC bridges, box girder bridges, truss bridges

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24PSEP308	DESIGN OF SHELL AND SPATIAL STRUCTURES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To study the behaviour and design of shells, folded plates, space frames and application of FORMIAN software

UNIT-I	CLASSIFICATION OF SHELLS	9

Classification of shells, types of shells, structural action, - Design of circular domes, conical roofs, circular cylindrical shells by ASCE Manual No.31

UNIT-II	FOLDED PLATES	9

Folded Plate structures, structural behaviour, types, design by ACI - ASCE Task Committee method – pyramidal roof- Prismoidal roof.

UNIT-III	INTRODUCTION TO SPACE FRAME	9

Space frames - configuration - types of nodes - Design Philosophy - Behaviour.

UNIT-IV	ANALYSIS AND DESIGN	9

Analysis of space frames – Design of Nodes – Pipes - Space frames – Introduction to Computer Aided Design.

UNIT-V	SPECIAL METHODS	9

Application of Formex Algebra, FORMIAN for generation of configuration

L:45	T: 00	P: 00	Total: 45 Periods

REFERENCES

1. Billington. D.P, "Thin Shell Concrete Structures", McGraw Hill Book Co., New York, ASCE Manual No.31, Design of Cylindrical Shells,1982.
2. Varghese. P.C., Design of Reinforced Concrete Shells and Folded Plates, PHI Learning Pvt. Ltd., 2010.
3. Subramanian. N," Space Structures: Principles and Practice", Multi-Science Publishing Co. Ltd. 2008.
4. Ramasamy, G.S., "Analysis, Design and Construction of Steel Space Frames", Thomas Telford Publishing, 2002.
5. Wilby. C "Concrete Folded Plate Roofs", Elsevier, 1998.

COURSE OUTCOMES

On completion of this course, the student is expected to be able to

CO1: Explain the different forms of shells and design the domes and shells
CO2: Evaluate the structural behaviour and design of folded plate structures
CO3: Explain the various functional configurations of space frames
CO4: Design of space frames and apply the knowledge of CAD for the analysis of space structures
CO5: Analyse the configurations of space structures using FORMIAN software

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24PCEO01	ENVIRONMENTAL SUSTAINABILITY	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To prepare students to take responsibility of Environmental protection
- To emphasize the concept of sustainable development
- To emphasize the importance of biodiversity protection
- To gain knowledge on impact of industrial pollution on the environment
- To acquire interest to sustainable development and pollution economics

UNIT-I	INTRODUCTION	9

Valuing the Environment: Concepts, Valuing the Environment: Methods, Property Rights, Externalities, and Environmental Problems

UNIT-II	CONCEPT OF SUSTAINABILITY	9

Sustainable Development: Defining the Concept, the Population Problem, Natural Resource Economics: An Overview, Energy, Water, Agriculture

UNIT-III	SIGNIFICANCE OF BIODIVERSITY	9

Biodiversity, Forest Habitat, Commercially Valuable Species, Stationary - Source Local Air Pollution, Acid Rain and Atmospheric Modification, Transportation

UNIT-IV	POLLUTION IMPACTS	9

Water Pollution, Solid Waste and Recycling, Toxic Substances and Hazardous Wastes, Global Warming

UNIT-V	ENVIRONMENTAL ECONOMICS	9

Development, Poverty, and the Environment, Visions of the Future, Environmental economics and policy by Tom Tietenberg, Environmental Economics

L:45	T: 00	P: 00	Total: 45 Periods

REFERENCES

1. Andrew Hoffman, Competitive Environmental Strategy - A Guide for the Changing Business Landscape, Island Press.
2. Stephen Doven, Environment and Sustainability Policy: Creation, Implementation,
3. Evaluation, the Federation Press, 2005
4. Robert Brinkmann., Introduction to Sustainability, Wiley-Blackwell., 2016
5. Niko Roorda., Fundamentals of Sustainable Development, 3rd Edn, Routledge, 2020
6. 5. Bhavik R Bakshi., Sustainable Engineering: Principles and Practice, Cambridge University Press, 2019

COURSE OUTCOMES

On successful completion of the course, the students will be able to

CO1: Understand the value of environment and the hidden losses caused by pollution
CO2: Understand the real economics of sustainable development

CO3: Realize the loss of habitat and extinction of species due to pollution CO4: Learn the irreversible impacts of pollution on the biosphere CO5: Understand the impact of pollution on social life of humans and poverty

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24PCEO02	VIBRATION AND NOISE CONTROL STRATEGIES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To appreciate the basic concepts of vibration in damped and undamped systems
- To appreciate the basic concepts of noise, its effect on hearing and related terminology
- To use the instruments for measuring and analyzing the vibration levels in a body
- To use the instruments for measuring and analyzing the noise levels in a system
- To learn the standards of vibration and noise levels and their control techniques

UNIT-I	BASICS OF VIBRATION	9

Introduction – Sources and causes of Vibration-Mathematical Models - Displacement, velocity and Acceleration - Classification of vibration: free and forced vibration, undamped and damped vibration, linear and non-linear vibration - Single Degree Freedom Systems - Vibration isolation – Determination of natural frequencies

UNIT-II	BASICS OF NOISE	9

Introduction - Anatomy of human ear - Mechanism of hearing - Amplitude, frequency, wavelength and sound pressure level - Relationship between sound power, sound intensity and sound pressure level - Addition, subtraction and averaging decibel levels - sound spectra -Types of sound fields - Octave band analysis - Loudness.

UNIT-III	INSTRUMENTATION FOR VIBRATION MEASUREMENT	9

Experimental Methods in Vibration Analysis. - Vibration Measuring Instruments - Selection of Sensors - Accelerometer Mountings - Vibration Exciters - Mechanical, Hydraulic, Electromagnetic and Electrodynamics – Frequency Measuring Instruments -. System Identification from Frequency Response -Testing for resonance and mode shapes

UNIT-IV	INSTRUMENTATION FOR NOISE MEASUREMENT AND ANALYSIS	9

Microphones - Weighting networks - Sound Level meters, its classes and calibration - Noise measurements using sound level meters - Data Loggers - Sound exposure meters - Recording of noise - Spectrum analyser - Intensity meters - Energy density sensors - Sound source localization.

UNIT-V	METHODS OF VIBRATION CONTROL, SOURCES OF NOISE AND ITS CONTROL	9

Specification of Vibration Limits – Vibration severity standards - Vibration as condition Monitoring Tool – Case Studies - Vibration Isolation methods - Dynamic Vibration Absorber – Need for Balancing - Static and Dynamic Balancing machines – Field balancing - Major sources of noise - Noise survey techniques – Measurement technique for vehicular noise - Road vehicles Noise standard – Noise due to construction equipment and domestic appliances – Industrial noise sources and its strategies – Noise control at the source – Noise control along the path – Acoustic Barriers – Noise control at the receiver -- Sound transmission through barriers – Noise reduction Vs Transmission loss - Enclosures

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REFERENCES

1. Singiresu S. Rao, "Mechanical Vibrations", Pearson Education Incorporated, 2017.
2. Graham Kelly. Sand Shashidhar K. Kudari, "Mechanical Vibrations", Tata McGraw – Hill Publishing Com. Ltd., 2007.
3. Ramamurti. V, "Mechanical Vibration Practice with Basic Theory", Narosa Publishing House, 2000.
4. William T. Thomson, "Theory of Vibration with Applications", Taylor & Francis, 2003.
5. G.K. Grover, "Mechanical Vibrations", Nem Chand and Bros.,Roorkee, 2014.
6. A.G. Ambekar, "Mechanical Vibrations and Noise Engineering", PHI Learning Pvt. Ltd., 2014.
7. David A. Bies and Colin H. Hansen, "Engineering Noise Control – Theory and Practice", Spon Press, London and New York, 2009.

COURSE OUTCOMES

On completion of the course, the student is expected to be able to

CO1: Apply the basic concepts of vibration in damped and undamped systems
CO2: Apply the basic concepts of noise and to understand its effects on systems
CO3: Select the instruments required for vibration measurement and its analysis
CO4: Select the instruments required for noise measurement and its analysis.
CO5: Recognize the noise sources and to control the vibration levels in a body and to control noise under different strategies.

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24PCEO03	INTEGRATED WATER RESOURCES MANAGEMENT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- Students will be introduced to the concepts and principles of IWRM, which is inclusive of the economics, public-private partnership, water & health, water & food security and legal & regulatory settings.

UNIT-I	CONTEXT FOR IWRM	9

Water as a global issue: key challenges – Definition of IWRM within the broader context of development – Key elements of IWRM - Principles – Paradigm shift in water management -Complexity of the IWRM process – UN World Water Assessment - SDGs.

UNIT-II	WATER ECONOMICS	9

Economic view of water issues: economic characteristics of water good and services – Non-market monetary valuation methods – Water economic instruments – Private sector involvement in water resources management: PPP objectives, PPP models, PPP processes, PPP experiences through case studies.

UNIT-III	LEGAL AND REGULATORY SETTINGS	9

Basic notion of law and governance: principles of international and national law in the area of water management - Understanding UN law on non-navigable uses of international water courses – International law for groundwater management – World Water Forums – Global Water Partnerships - Development of IWRM in line with legal and regulatory framework.

UNIT-IV	WATER AND HEALTH WITHIN THE IWRM CONTEXT	9

Links between water and health: options to include water management interventions for health – Health protection and promotion in the context of IWRM – Global burden of Diseases – Health impact assessment of water resources development projects – Case studies.

UNIT-V	AGRICULTURE IN THE CONCEPT OF IWRM	9

Water for food production: 'blue' versus 'green' water debate – Water foot print - Virtual water trade for achieving global water and food security — Irrigation efficiencies, irrigation methods – current water pricing policy– scope to relook pricing.

L:45	T: 00	P: 00	Total: 45 Periods

REFERENCES

1. Cech Thomas V., Principles of water resources: history, development, management and policy. John Wiley and Sons Inc., New York. 2003.
2. Mollinga.P. etal "Integrated Water Resources Management", Water in South Asia Volume I, Sage Publications, 2006.
3. Technical Advisory Committee, Integrated Water Resources management, Technical Advisory Committee Background Paper No: 4. Global water partnership, Stockholm, Sweden. 2002.

4. Technical Advisory Committee, Dublin principles for water as reflected in comparative assessment of institutional and legal arrangements for Integrated Water Resources Management, Technical Advisory Committee Background Paper No: 3. Global water partnership, Stockholm, Sweden. 1999.
5. Technical Advisory Committee, Effective Water Governance". Technical Advisory Committee Background Paper No: 7. Global water partnership, Stockholm, Sweden, 2003.

COURSE OUTCOMES

On completion of the course, the student is expected to be able to

CO1: Describe the context and principles of IWRM; Compare the conventional and integrated ways of water management.
CO2: Select the best economic option among the alternatives; illustrate the pros and cons of PPP through case studies.
CO3: Apply law and governance in the context of IWRM.
CO4: Discuss the linkages between water-health; develop a HIA framework.
CO5: Analyse how the virtual water concept pave way to alternate policy options.

24PCEO04	ENVIRONMENTAL IMPACT ASSESSMENT	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To make the students to understand environmental clearance, its legal requirements and to provide knowledge on overall methodology of EIA, prediction tools and models, environmental management plan and case studies.

UNIT-I	INTRODUCTION	9

Historical development of Environmental Impact Assessment (EIA). Environmental Clearance- EIA in project cycle. legal and regulatory aspects in India – types and limitations of EIA –EIA process- screening – scoping - terms of reference in EIA- setting – analysis – mitigation. Cross sectoral issues –public hearing in EIA- EIA consultant accreditation.

UNIT-II	IMPACT INDENTIFICATION AND PREDICTION	9

Matrices – networks – checklists – cost benefit analysis – analysis of alternatives – expert systems in EIA. prediction tools for EIA – mathematical modeling for impact prediction – assessment of impacts – air – water – soil – noise – biological — cumulative impact assessment

UNIT-III	SOCIO-ECONOMIC IMPACT ASSESSMENT	9

Socio-economic impact assessment - relationship between social impacts and change in community and institutional arrangements. factors and methodologies- individual and family level impacts. communities in transition-rehabilitation

UNIT-IV	EIA DOCUMENTATION AND ENVIRONMENTAL MANAGEMENT PLAN	9

Environmental management plan - preparation, implementation and review – mitigation and rehabilitation plans – policy and guidelines for planning and monitoring programmes – post project audit – documentation of EIA findings – ethical and quality aspects of environmental impact assessment

UNIT-V	CASE STUDIES	9

Mining, power plants, cement plants, highways, petroleum refining industry, storage & handling of hazardous chemicals, common hazardous waste facilities, CETPs, CMSWMF, building and construction projects

L:45	T: 00	P: 00	Total: 45 Periods

REFERENCES

1. EIA Notification 2006 including recent amendments, by Ministry of Environment, Forest and Climate Change, Government of India
2. Sectoral Guidelines under EIA Notification by Ministry of Environment, Forest and Climate Change, Government of India
3. Canter, L.W., Environmental Impact Assessment, McGraw Hill, New York. 1996
4. Lawrence, D.P., Environmental Impact Assessment – Practical solutions to recurrent problems, Wiley-Interscience, New Jersey. 2003

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5. Lee N. and George C. 2000. Environmental Assessment in Developing and Transitional Countries. Chichester: Willey
6. World Bank –Source book on EIA ,1999
7. Sam Mannan, Lees' Loss Prevention in the Process Industries, Hazard Identification Assessment and Control, 4th Edition, Butterworth Heineman, 2012.

COURSE OUTCOMES

On completion of the course, the student is expected to be able to

CO1: Understand need for environmental clearance, its legal procedure, need of EIA, its types, stakeholders and their roles

CO2: Understand various impact identification methodologies, prediction techniques and model of impacts on various environments

CO3: Understand relationship between social impacts and change in community due to development activities and rehabilitation methods

CO4: Document the EIA findings and prepare environmental management and monitoring plan

CO5: Identify, predict and assess impacts of similar projects based on case studies

24PECO01	IOT FOR SMART SYSTEMS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To study about Internet of Things technologies and its role in real time applications.
- To introduce the infrastructure required for IoT
- To familiarize the accessories and communication techniques for IoT.
- To provide insight about the embedded processor and sensors required for IoT
- To familiarize the different platforms and Attributes for IoT

UNIT-I	INTRODUCTION TO INTERNET OF THINGS	9

Overview, Hardware and software requirements for IOT, Sensor and actuators, Technology drivers, Business drivers, Typical IoT applications, Trends and implications.

UNIT-II	IOT ARCHITECTURE	9

IoT reference model and architecture -Node Structure - Sensing, Processing, Communication, Powering, Networking - Topologies, Layer/Stack architecture, IoT standards, Cloud computing for IoT, Bluetooth, Bluetooth Low Energy beacons.

UNIT-III	PROTOCOLS AND WIRELESS TECHNOLOGIES FOR IOT PROTOCOLS	9

NFC, SCADA and RFID, Zigbee MIPI, M-PHY, UniPro, SPMI, SPI, M-PCIe GSM, CDMA, LTE, GPRS, small cell.

Wireless technologies for IoT: WiFi (IEEE 802.11), Bluetooth/Bluetooth Smart, ZigBee/ZigBee Smart, UWB (IEEE 802.15.4), 6LoWPAN, Proprietary systems-Recent trends.

UNIT-IV	IOT PROCESSORS	9

Services/Attributes: Big-Data Analytics for IOT, Dependability, Interoperability, Security, Maintainability. Embedded processors for IOT: Introduction to Python programming - Building IOT with RASPERRY PI and Arduino.

UNIT-V	CASE STUDIES	9

Industrial IoT, Home Automation, smart cities, Smart Grid, connected vehicles, electric vehicle charging, Environment, Agriculture, Productivity Applications, IOT Defense

L:45	T:0	P:0	T.: 45 PERIODS

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REFERENCES

1. ArshdeepBahga and VijaiMadisetti : A Hands-on Approach "Internet of Things",Universities Press 2015.
2. Oliver Hersent , David Boswarthick and Omar Elloumi " The Internet of Things", Wiley,2016.
3. Samuel Greengard, " The Internet of Things", The MIT press, 2015.
4. Adrian McEwen and Hakim Cassimally"Designing the Internet of Things "Wiley,2014.
5. Jean- Philippe Vasseur, Adam Dunkels, "Interconnecting Smart Objects with IP: The Next Internet" Morgan Kuffmann Publishers, 2010.
6. Adrian McEwen and Hakim Cassimally, "Designing the Internet of Things", John Wiley and sons, 2014.
7. Lingyang Song/DusitNiyato/ Zhu Han/ Ekram Hossain," Wireless Device-to-Device Communications and Networks, CAMBRIDGE UNIVERSITY PRESS,2015.
8. OvidiuVermesan and Peter Friess (Editors), "Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems", River Publishers Series in Communication, 2013.
9. Vijay Madisetti , ArshdeepBahga, "Internet of Things (A Hands on-Approach)", 2014.
10. Zach Shelby, Carsten Bormann, "6LoWPAN: The Wireless Embedded Internet", John Wiley and sons, 2009.
11. Lars T.Berger and Krzysztof Iniewski, "Smart Grid applications, communications and security", Wiley, 2015.
12. JanakaEkanayake, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama and Nick Jenkins, " Smart Grid Technology and Applications", Wiley, 2015.
13. UpenaDalal,"Wireless Communications & Networks,Oxford,2015.

COURSE OUTCOMES

At the end of the course students should be able to

CO1: Analyze the concepts of IoT and its present developments.
CO2: Compare and contrast different platforms and infrastructures available for IoT
CO3: Explain different protocols and communication technologies used in IoT
CO4: Analyze the big data analytic and programming of IoT
CO5: Implement IoT solutions for smart applications

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24PCSO02	INTERNET OF THINGS AND CLOUD	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To understand Smart Objects and IoT Architectures
- To learn about various IOT-related protocols
- To build simple IoT Systems using Arduino and Raspberry Pi.
- To understand data analytics and cloud in the context of IoT
- To develop IoT infrastructure for popular applications

UNIT-I	FUNDAMENTALS OF IoT	9

Introduction to IoT – IoT definition – Characteristics – IoT Complete Architectural Stack – IoT enabling Technologies – IoT Challenges. Sensors and Hardware for IoT – Hardware Platforms – Arduino, Raspberry Pi, Node MCU. A Case study with any one of the boards and data acquisition from sensors

UNIT-II	PROTOCOLS FOR IoT	9

Infrastructure protocol (IPV4/V6/RPL), Identification (URIs), Transport (Wifi, Lifi, BLE), Discovery, Data Protocols, Device Management Protocols. – A Case Study with MQTT/CoAP usage-IoT privacy, security and vulnerability solutions.

UNIT-III	CASE STUDIES/INDUSTRIAL APPLICATIONS	9

Case studies with architectural analysis: IoT applications – Smart City – Smart Water – Smart Agriculture – Smart Energy – Smart Healthcare – Smart Transportation – Smart Retail – Smart waste management.

UNIT-IV	CLOUD COMPUTING INTRODUCTION	9

Introduction to Cloud Computing - Service Model – Deployment Model- Virtualization Concepts – Cloud Platforms – Amazon AWS – Microsoft Azure – Google APIs

UNIT-V	IoT AND CLOUD	9

IoT and the Cloud - Role of Cloud Computing in IoT - AWS Components - S3 – Lambda - AWS IoT Core -Connecting a web application to AWS IoT using MQTT- AWS IoT Examples. Security Concerns, Risk Issues, and Legal Aspects of Cloud Computing- Cloud Data Security

L:45	T:0	P:0	Total: 45 PERIODS

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REFERENCES

1. "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman ,CRC Press, 2017
2. Adrian McEwen, Designing the Internet of Things, Wiley,2013.
3. EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley publishers, 2015.
4. Simon Walkowiak, "Big Data Analytics with R" PackT Publishers, 2016
5. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", Wiley Publishers, 2015.

COURSE OUTCOMES

Upon completion of the course, the students will be able to

CO1: Understand the various concept of the IoT and their technologies

CO2: Develop IoT application using different hardware platforms

CO3: Implement the various IoT Protocols

CO4: Understand the basic principles of cloud computing.

CO5: Develop and deploy the IoT application into cloud environment

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24PCSO03	MACHINE LEARNING AND DEEP LEARNING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- Understanding about the learning problem and algorithms
- Providing insight about neural networks
- Introducing the machine learning fundamentals and significance
- Enabling the students to acquire knowledge about pattern recognition.
- Motivating the students to apply deep learning algorithms for solving real life problems

UNIT-I	LEARNING PROBLEMS AND ALGORITHMS	9

Various paradigms of learning problems, Supervised, Semi-supervised and Unsupervised algorithms

UNIT-II	NEURAL NETWORKS	9

Differences between Biological and Artificial Neural Networks - Typical Architecture, Common Activation Functions, Multi-layer neural network, Linear Separability, Hebb Net, Perceptron, Adaline, Standard Back propagation Training Algorithms for Pattern Association - Hebb rule and Delta rule, Hetero associative, Auto associative, Kohonen Self Organising Maps, Examples of Feature Maps, Learning Vector Quantization, Gradient descent, Boltzmann Machine Learning.

UNIT-III	MACHINE LEARNING – FUNDAMENTALS & FEATURE SELECTIONS & CLASSIFICATIONS	9

Classifying Samples: The confusion matrix, Accuracy, Precision, Recall, F1- Score, the curse of dimensionality, training, testing, validation, cross validation, overfitting, under-fitting the data, early stopping, regularization, bias and variance. Feature Selection, normalization, dimensionality reduction, Classifiers: KNN, SVM, Decision trees, Naïve Bayes, Binary classification, multi class classification, clustering.

UNIT-IV	DEEP LEARNING: CONVOLUTIONAL NEURAL NETWORKS	9

eed forward networks, Activation functions, back propagation in CNN, optimizers, batch normalization, convolution layers, pooling layers, fully connected layers, dropout, Examples of CNNs.

UNIT-V	DEEP LEARNING: RNNS, AUTOENCODERS AND GANS	9

State, Structure of RNN Cell, LSTM and GRU, Time distributed layers, Generating Text, Autoencoders: Convolutional Autoencoders, Denoising autoencoders, Variational autoencoders, GANs: The discriminator, generator, DCGANs

L:45	T:0	P:0	Total: 45 PERIODS

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REFERENCES

1. J. S. R. Jang, C. T. Sun, E. Mizutani, Neuro Fuzzy and Soft Computing - A Computational Approach to Learning and Machine Intelligence, 2012, PHI learning
2. Deep Learning, Ian Good fellow, YoshuaBengio and Aaron Courville, MIT Press, ISBN: 9780262035613, 2016.
3. The Elements of Statistical Learning. Trevor Hastie, Robert Tibshirani and Jerome Friedman. Second Edition. 2009.
4. Pattern Recognition and Machine Learning. Christopher Bishop. Springer. 2006.
5. Understanding Machine Learning. Shai Shalev-Shwartz and Shai Ben-David. Cambridge University Press. 2017.

COURSE OUTCOMES

At the end of the course the student will be able to

CO1: Illustrate the categorization of machine learning algorithms.

CO2: Compare and contrast the types of neural network architectures, activation functions

CO3: Acquaint with the pattern association using neural networks

CO4: Elaborate various terminologies related with pattern recognition and architectures of convolutional neural networks

CO5: Construct different feature selection and classification techniques and advanced neural network architectures such as RNN, Autoencoders, and GANs.

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24UPEEO01	ELECTRIC VEHICLE TECHNOLOGY	L	T	P	C
		3	1	0	3

COURSE OBJECTIVES

- To learn the structure of Electric Vehicle, Hybrid Electric Vehicle
- To study about the EV conversion components
- To know about the details and specifications for Electric Vehicles
- To understand the concepts of Plug-in Hybrid Electric Vehicle
- To model and simulate all types of DC motors

UNIT-I	VEHICLE ARCHITECTURE AND SIZING	9

Electric Vehicle History and Evolution of Electric Vehicles. Series, Parallel and Series parallel Architecture, Micro and Mild architectures. Mountain Bike - Motorcycle - Electric Cars and Heavy Duty EVs. - Details and Specifications.

UNIT-II	VEHICLE MECHANICS	9

Vehicle mechanics- Roadway fundamentals, Laws of motion, Vehicle Kinetics, Dynamics of vehicle motion, propulsion power, velocity and acceleration, Tire–Road mechanics; Propulsion System Design.

UNIT-III	POWER COMPONENTS AND BRAKES	9

Power train Component sizing- Gears, Clutches, Differential, Transmission and Vehicle Brakes. EV power train sizing, HEV Power train sizing, Example.

UNIT-IV	HYBRID VEHICLE CONTROL STRATEGY	9

Vehicle supervisory control, Mode selection strategy, Model Control strategies.

UNIT-V	PLUG-IN HYBRID ELECTRIC VEHICLE	9

Introduction-History - Comparison with electrical and hybrid electrical vehicle - Construction and working of PHEV-Block diagram and components-Charging mechanisms - Advantages of PHEVs.

L: 45	T: 00	P: 00	Total: 45 Periods

TEXT BOOKS

1. Mehrdad Ehsani, YiminGao, Sebastian E. Gay, Ali Emadi, 'Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design', CRC Press, 2004.
2. Build Your Own Electric Vehicle,Seth Leitman , Bob Brant, McGraw Hill, Third Edition 2013.

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REFERENCES
1. Advanced Electric Drive Vehicles, Ali Emadi, CRC Press, First edition 2017. 2. The Electric Vehicle Conversion Handbook: How to Convert Cars, Trucks, Motorcycles, and Bicycles -Includes EV Components, Kits, and Project Vehicles Mark Warner, HP Books, 2011. 3. Heavy-duty Electric Vehicles from Concept to Reality, Shashank Arora, Alireza Tashakori Abkenar, Shantha Gamini Jayasinghe, Kari Tammi, Elsevier Science, 2021
COURSE OUTCOMES
At the end of the course, the students will be able to: CO1: Summarize the History and Evolution of EVs, Hybrid and Plug-In Hybrid EVs. CO2: Describe the various EV components. CO3: Explain the power train components such as gears, clutches, differential, transmission, and braking systems used in EVs. CO4: Infer the hybrid vehicle control strategy. CO5: Explain the concepts related in the Plug-In Hybrid Electric Vehicles.

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24UPEEO02	RENEWABLE ENERGY TECHNOLOGIES	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES

- To know the Indian and global energy scenario.
- To learn the various solar energy technologies and its applications.
- To educate the various wind energy technologies.
- To explore the various bio-energy technologies.
- To study the ocean and geothermal technologies.

UNIT-I	ENERGY SCENARIO	9

Indian energy scenario in various sectors - domestic, industrial, commercial, agriculture, transportation and others - Present conventional energy status - Present renewable energy status - Potential of various renewable energy sources - Global energy status - Per capita energy consumption - Future energy plans.

UNIT-II	SOLAR ENERGY	9

Solar radiation - Measurements of solar radiation and sunshine - Solar spectrum - Solar thermal collectors - Flat plate and concentrating collectors - Solar thermal applications - Solar thermal energy storage - Fundamentals of solar photo voltaic conversion - Solar cells - Solar PV Systems - Solar PV applications.

UNIT-III	WIND ENERGY	9

Wind data and energy estimation - Betz limit - Site selection for wind farms - characteristics - Wind resource assessment - Horizontal axis wind turbine – components - Vertical axis wind turbine - Wind turbine generators and its performance - Hybrid systems - Environmental issues - Applications.

UNIT-IV	BIO-ENERGY	9

Bio resources - Biomass direct combustion - thermochemical conversion - biochemical conversion-mechanical conversion - Biomass gasifier - Types of biomass gasifiers Cogeneration- Carbonisation - Pyrolysis - Biogas plants - Digesters - Biodiesel production - Ethanol production - Applications.

UNIT-V	OCEAN AND GEOTHERMAL ENERGY	9

Small hydro - Tidal energy -Wave energy - Open and closed OTEC Cycles - Limitations - Geothermal energy - Geothermal energy sources - Types of geothermal power plants - Applications - Environmental impact.

L: 45	T: 00	P: 00	Total: 45 Periods

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TEXT BOOKS

1. Fundamentals and Applications of Renewable Energy, Indian Edition, by Mehmet Kanoglu, Yunus A. Cengel, John M. Cimbala, cGraw Hill; First edition (10 December 2020), ISBN-10 : 9390385636.
2. Renewable Energy Sources and Emerging Technologies, by Kothari, Prentice Hall India Learning Private Limited; 2nd edition (1 January 2011), ISBN-10 : 8120344707.

REFERENCES

1. Godfrey Boyle, "Renewable Energy, Power for a Sustainable Future", Oxford University Press, U.K., 2012.
2. Rai.G.D., "Non-Conventional Energy Sources", Khanna Publishers, New Delhi, 2014.
3. Sukhatme.S.P., "Solar Energy: Principles of Thermal Collection and Storage", Tata McGraw Hill Publishing Company Ltd., New Delhi, 2009.
4. Tiwari G.N., "Solar Energy – Fundamentals Design, Modelling and applications", Alpha Science Intl Ltd, 2015.
5. Twidell, J.W. & Weir A., "Renewable Energy Resources", EFNSpon Ltd., UK, 2015.

COURSE OUTCOMES

At the end of the course, the students will be able to:

CO1: Discuss the Indian and global energy scenario.

CO2: Describe the various solar energy technologies and its applications.

CO3: Elucidate the various wind energy technologies.

CO4: Explore the various bio-energy technologies.

CO5: Outline the ocean and geothermal technologies.

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24PECO02	BIOMEDICAL SIGNAL PROCESSING	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- Describe the properties and suitable models of biomedical signals
- Introduce the basic signal processing techniques in analyzing biomedical signals
- Develop computational skills in filtering of biomedical signals
- Develop an understanding on ECG signal compression algorithms
- Develop an understanding on feature extraction of biomedical signals

UNIT-I	INTRODUCTION TO BIOMEDICAL SIGNALS	9

Introduction to Biomedical Signals: The nature of Biomedical Signals, Examples of Biomedical Signals, Objectives and difficulties in Biomedical analysis. Electrocardiography: Basic electrocardiography, ECG lead systems, ECG signal characteristics. Signal Conversion :Simple signal conversion systems, Conversion requirements for biomedical signals, Signal conversion circuits

UNIT-II	SIGNAL AVERAGING	9

Signal Averaging: Basics of signal averaging, signal averaging as a digital filter, a typical averager, software for signal averaging, limitations of signal averaging. Adaptive Noise Cancelling: Principal noise canceller model, 60-Hz adaptive cancelling using a sine wave model, other applications of adaptive filtering

UNIT-III	DATA COMPRESSION TECHNIQUES	9

Data Compression Techniques: Turning point algorithm, AZTEC algorithm, Fan algorithm, Huffman coding, data reduction algorithms The Fourier transform, Correlation, Convolution, Power spectrum estimation, Frequency domain analysis of the ECG

UNIT-IV	CARDIOLOGICAL SIGNAL PROCESSING	9

Cardiological signal processing: Basic Electrocardiography, ECG data acquisition, ECG lead system, ECG signal characteristics (parameters and their estimation), Analog filters, ECG amplifier, and QRS detector, Power spectrum of the ECG, Bandpass filtering techniques, Differentiation techniques, Template matching techniques, A QRS detection algorithm, Realtime ECG processing algorithm, ECG interpretation, ST segment analyzer, Portable arrhythmia monitor

UNIT-V	NEUROLOGICAL SIGNAL PROCESSING	9

Neurological signal processing: The brain and its potentials, The electrophysiological origin of brain waves, The EEG signal and its characteristics (EEG rhythms, waves, and transients), Correlation. Analysis of EEG channels: Detection of EEG rhythms, Template matching for EEG, spike and wave detection

L:45	T:0	P:0	T: 45 PERIODS

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REFERENCES
1. Rangaraj M Rangayyan "Biomedical Signal Analysis – A case study approach" IEEE press series in biomedical engineering, First Edition, 2002 2. John G Proakis, Dimitris and G. Manolakis, "Digital Signal Processing Principles algorithms, applications" PHI Third Edition. 2006 3. Willis J. Tompkins " Biomedical Digital Signal Processing", EEE, PHI, 2004 4. D C Reddy "Biomedical Signal Processing: Principles and Techniques", Tata McGraw-Hill Publishing Co. Ltd, 2005 5. J G Webster "Medical Instrumentation: Application & Design", John Wiley & Sons Inc., 2001

COURSE OUTCOMES
At the end of the course students should be able to
CO1: Possess skills necessary to analyze ECG and EEG Signals CO2: Apply classical and modern filtering techniques for ECG and EEG Signals CO3: Apply classical and modern compression techniques for ECG and EEG Signals CO4: Develop an understanding on ECG feature extraction CO5: Develop an understanding on EEG feature extraction

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24PECO03	ROBOTICS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To Introduce the concepts of Robotic systems
- To understand the concepts of Instrumentation and control related to Robotics
- To understand the kinematics and dynamics of robotics
- To explore robotics in Industrial applications

UNIT-I	INTRODUCTION TO ROBOTICS	9

Robotics -History - Classification and Structure of Robotic Systems - Basic components - Degrees of freedom - Robot joints coordinates- Reference frames - workspace- Robot languages- Robotic sensors- proximity and range sensors, ultrasonic sensor, touch and slip sensor.

UNIT-II	ROBOT KINEMATICS AND DYNAMICS	9

Kinematic Modelling: Translation and Rotation Representation, Coordinate transformation, DH parameters, Forward and inverse kinematics, Jacobian, Dynamic Modelling: Forward and inverse dynamics, Equations of motion using Euler-Lagrange formulation, Newton Euler formulation.

UNIT-III	ROBOTICS CONTROL	9

Control of robot manipulator - state equations - constant solutions -linear feedback systems, singleaxis PID control - PD gravity control -computed torque control, variable structure control and impedance control.

UNIT-IV	ROBOT INTELLIGENCE AND TASK PLANNING	9

Artificial Intelligence - techniques - search problem reduction - predicate logic means and end analysis -problem solving -robot learning - task planning - basic problems in task planning - AI in robotics and Knowledge Based Expert System in robotics

UNIT-V	INDUSTRIAL ROBOTICS	9

Robot cell design and control - cell layouts - multiple robots and machine interference - work cell design - work cell control - interlocks – error detection deduction and recovery - work cell controller - robot cycle time analysis. Safety in robotics, Applications of robot and future scope.

L:45	T:0	P:0	T: 45 PERIODS

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REFERENCES

1. John J. Craig, 'Introduction to Robotics (Mechanics and Control)', Addison-Wesley, 2nd Edition, 2004.
2. Richard D. Klafter, Thomas A. Chmielewski, Michael Negin, 'Robotics Engineering: An Integrated Approach', PHI Learning, New Delhi, 2009.
3. K.S.Fu, R.C.Gonzalez and C.S.G.Lee, 'Robotics Control, Sensing, Vision and Intelligence', Tata McGraw Hill, 2nd Reprint,2008.
4. Reza N.Jazar, 'Theory of Applied Robotics Kinematics, Dynamics and Control', Springer, 1 st Indian Reprint, 2010.
5. Mikell. P. Groover, Michell Weis, Roger. N. Nagel, Nicolous G.Odrey, 'Industrial Robotics Technology, Programming and Applications ', McGraw Hill, Int 2012.

COURSE OUTCOMES

At the end of the course students should be able to

CO1: Describe the fundamentals of robotics
CO2: Understand the concept of kinematics and dynamics in robotics.
CO3: Discuss the robot control techniques
CO4: Explain the basis of intelligence in robotics and task planning
CO5: Discuss the industrial applications of robotics

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24PMBO01	SUSTAINABLE MANAGEMENT	L	T	P	C
		3	0	0	3

Prerequisites:
Nil

COURSEOBJECTIVES:

- To provide students with fundamental knowledge of the notion of corporate sustainability.
- To determine how organizations impacts on the environment and socio-technical systems, the relationship between social and environmental performance and competitiveness, the approaches and methods.
- To learn about sustainable development goals for modern business.

UNIT-I	MANAGEMENT OF SUSTAINABILITY	9

Management of sustainability -rationale and political trends: An introduction to sustainability management, International and European policies on sustainable development, theoretical pillars in sustainability management studies.

UNIT-II	CORPORATE SUSTAINABILITY AND RESPONSIBILITY	9

Corporate sustainability parameter, corporate sustainability institutional framework, integration of sustainability into strategic planning and regular business practices, fundamentals of stakeholder engagement.

UNIT-III	SUSTAINABILITY MANAGEMENT: STRATEGIES AND APPROACHES	9

Corporate sustainability management and competitiveness: Sustainability-oriented corporate strategies, markets and competitiveness, Green Management between theory and practice, Sustainable Consumption and Green Marketing strategies, Environmental regulation and strategic postures; Green Management approaches and tools; Green engineering: clean technologies and innovation processes; Sustainable Supply Chain Management and Procurement.

UNIT-IV	SUSTAINABILITY AND INNOVATION	9

Socio-technical transitions and sustainability, Sustainable entrepreneurship, Sustainable pioneers in green market niches, Smart communities and smart specializations. Climate resilience, sustainable supply chains, and the integration of environmental, social, and governance (ESG) practices. Sustainable Development Goals (SDGs).

UNIT-V	SUSTAINABLE MANAGEMENT OF RESOURCES, COMMODITIES AND COMMONS	9

Energy management, Water management, Waste management, Wild Life Conservation, Emerging trends in sustainable management, Case Studies.

L:45	T: 00	P:00	Total :45 Periods

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REFERENCES
1. Daddi, T., Iraldo, F., Testa, Environmental Certification for Organizations and Products: Management, 2015 2. Christian N. Madu, Handbook of Sustainability Management 2012 3. Petra Molthan-Hill, The Business Student's Guide to Sustainable Management: Principles and Practice, 2014 4. Margaret Robertson, Sustainability Principles and Practice, 2014 5. Peter Rogers, An Introduction to Sustainable Development, 2006
COURSE OUTCOMES
CO1: An understanding of sustainability management as an approach to aid in evaluating and minimizing environmental impacts while achieving the expected social impact. CO2: An understanding of corporate sustainability and responsible Business Practices CO3: Knowledge and skills to understand, to measure and interpret sustainability performances. CO4: Knowledge of innovative practices in sustainable business and community management CO5: Deep understanding of sustainable management of resources and commodities

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24PMBO02	MICRO AND SMALL BUSINESS MANAGEMENT	L	T	P	C
		3	0	0	3

Prerequisites:
Nil

COURSEOBJECTIVES:
• To familiarize students with the theory and practice of small business management. • To learn the legal issues faced by small business and how they impact operations. • To learn modern finance functions and technology and innovations.

UNIT-I	INTRODUCTION TO SMALL BUSINESS	9
Creation, Innovation, entrepreneurship and small business - Defining Small Business –Role of Owner – Manager – government policy towards small business sector –elements of entrepreneurship –evolution of entrepreneurship –Types of Entrepreneurship – social, civic, corporate - Business life cycle - barriers and triggers to new venture creation – process to assist start ups – small business and family business		

UNIT-II	SCREENING THE BUSINESS OPPORTUNITY AND FORMULATING THE BUSINESS PLAN	9
Concepts of opportunity recognition; Key factors leading to new venture failure; New venture screening process; Applying new venture screening process to the early stage small firm Role planning in small business – importance of strategy formulation – management skills for small business creation and development.		

UNIT-III	BUILDING THE RIGHT TEAM AND MARKETING STRATEGY	9
Management and Leadership – employee assessments – Tuckman's stages of group development- The entrepreneurial process model - Delegation and team building - Comparison of HR management in small and large firms - Importance of coaching and how to apply a coaching model. Marketing within the small business - success strategies for small business marketing - customer delight and business generating systems, - market research, - assessing market performance sales management and strategy - the marketing mix and		

UNIT-IV	FINANCING SMALL BUSINESS	9
Main sources of entrepreneurial capital; Nature of 'bootstrap' financing - Difference between cash and profit - Nature of bank financing and equity financing - Funding-equity gap for small firms.Importance of working capital cycle - Calculation of break-even point - Power of gross profit margin- Pricing for profit - Credit policy issues and relating these to cash flow management and profitability. Sustainable finance, circular economy, digitalization, and the evolving role of technology and innovation.		

UNIT-V	VALUING SMALL BUSINESS AND CRISIS MANAGEMENT	9
Causes of small business failure - Danger signals of impending trouble - Characteristics of poorly performing firms - Turnaround strategies - Concept of business valuation - Different valuation measurements - Nature of goodwill and how to measure it - Advantages and disadvantages of buying an established small firm - Process of preparing a business for sale.		

L:45	T: 00	P:00	Total :45 Periods

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DEAN - School of Management Studies
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REFERENCES
1. Hankinson,A.(2000). "The key factors in the profile of small firm owner-managers that influence business performance. The South Coast Small Firms Survey, 1997-2000." Industrial and Commercial Training 32(3):94-98. 2. Parker,R.(2000). "Small is not necessarily beautiful: An evaluation of policy support for small and medium-sized enterprise in Australia." Australian Journal of Political Science 35(2):239-253. 3. Journal articles on SME's.
COURSEOUTCOMES
CO1. Familiarize the students with the concept of small business CO2. In depth knowledge on small business opportunities and challenges CO3. Ability to devise plans for small business by building the right skills and marketing strategies CO4. Identify the funding source for small start ups CO5. Business evaluation for buying and selling of small firms

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24PMEO01	NANOCOMPOSITE MATERIALS	L	T	P	C
		3	0	0	3

Prerequisites:
Nil

COURSE OBJECTIVES:

To introduce the fundamentals of nanocomposites, including their nomenclature, properties, processing, and characterization.

To study metal-based nanocomposites and understand their synthesis methods, structural features, and functional properties.

To explore polymer-based nanocomposites, focusing on preparation techniques, structure–property relationships, and potential applications.

UNIT-I	BASICS OF NANOCOMPOSITES	9

Nomenclature, Properties, features and processing of nanocomposites. Sample Preparation and Characterization of Structure and Physical properties. Designing, stability and mechanical properties and applications of super hard nanocomposites.

UNIT-II	METAL BASED NANOCOMPOSITES	9

Metal-metal nanocomposites, some simple preparation techniques and their properties. Metal- Oxide or Metal-Ceramic composites, Different aspects of their preparation techniques and their final properties and functionality. Fractal based glass-metal nanocomposites, its designing and fractal dimension analysis. Core-Shell structured nanocomposites

UNIT-III	POLYMER BASED NANOCOMPOSITES	9

Preparation and characterization of diblock Copolymer based nanocomposites; Polymer Carbon nanotubes-based composites, their mechanical properties, and industrial possibilities.

UNIT-IV	NANOCOMPOSITE FROM BIOMATERIALS	9

Natural nanocomposite systems - spider silk, bones, shells; organic-inorganic nanocomposite formation through self-assembly. Biomimetic synthesis of nanocomposites material; Use of synthetic nanocomposites for bone, teeth replacement.

UNIT-V	NANOCOMPOSITE TECHNOLOGY	9

Nanocomposite membrane structures- Preparation and applications. Nanotechnology in Textiles and Cosmetics-Nano-fillers embedded polypropylene fibers – Soil repellence, Lotus effect - Nano finishing in textiles (UV resistant, anti-bacterial, hydrophilic, self-cleaning, flame-retardant finishes), Sun-screen dispersions for UV protection using titanium oxide – Colour cosmetics. Nanotechnology in Food Technology - Nano packaging for enhanced shelf life - Smart/Intelligent packaging.

L:45	T:0	P:0	Total :45 Periods

Head of the Department
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TEXT BOOKS

1.Introduction to Nanocomposite Materials. Properties, Processing, Characterization- Thomas E. Twardowski. 2007. DEStech Publications. USA.

2. Nanocomposites Science and Technology - P. M. Ajayan, L.S. Schadler, P. V.Braun 2006.

3. Physical Properties of Carbon Nanotubes- R. Saito 1998.

REFERENCES

1.Carbon Nanotubes (Carbon , Vol 33) - M. Endo, S. Iijima, M.S. Dresselhaus 1997.

2. The search for novel, super hard materials- Stan Vepr¡ek (Review Article) JVST A, 1999

3. Nanometer versus micrometer-sized particles-Christian Brosseau, Jamal BeN Youssef, Philippe Talbot, Anne-Marie Konn, (Review Article) J. Appl. Phys, Vol 93, 2003

4. Diblock Copolymer, - Aviram (Review Article), Nature, 2002

5. Bikramjit Basu, Kantesh Balani Advanced Structural Ceramics, A John Wiley & Sons, Inc., 9. P. Brown and K. Stevens, Nanofibers and Nanotechnology in Textiles, Woodhead publication, London, 2006

COURSE OUTCOMES:

At the end of the course the students would be able to

Explain the nomenclature, properties, and fabrication methods of nanocomposites and analyse their structural and mechanical characteristics.

Assess and compare metal-based nanocomposites, including metal–metal, metal–oxide, and core–shell systems, with respect to their preparation techniques, functionalities, and fractal behaviour.

Develop and characterize polymer-based nanocomposites, such as diblock copolymers and CNT–polymer composites, and evaluate their mechanical and industrial relevance.

Describe natural biomaterial nanocomposites and apply biomimetic strategies for synthesizing organic–inorganic nanocomposite materials for biomedical applications.

Apply nanocomposite technology in membranes, textiles, cosmetics, and food packaging.

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24PMEO02	ADDITIVE MANUFACTURING	L	T	P	C
		3	0	0	3

Prerequisites:
Nil

COURSE OBJECTIVES:

- To introduce the principles, classifications, and major technologies of additive manufacturing.
- To understand material behaviour, consolidation mechanisms, and process, structure property relationships in AM.
- To develop skills in digital modelling, slicing, and process planning for efficient and high-quality 3D printing.

UNIT-I	INTRODUCTION TO ADDITIVE MANUFACTURING	7

Introduction to layered manufacturing, Importance of Additive Manufacturing in Product Development, Classification of additive manufacturing processes, Common additive manufacturing technologies, Capabilities, materials, costs, advantages and limitations of different systems.

UNIT-II	MATERIALS AND MECHANISMS IN ADDITIVE MANUFACTURING	9

Material science for additive manufacturing-Mechanisms of material consolidation-FDM, SLS, SLM, 3D printing and jetting technologies. Polymers coalescence and sintering, photopolymerization, solidification rates, meso and macro structures, Process evaluation: process-structure relationships, structure property relationships, Applications: Prototyping, Industrial tooling, Aerospace, Automobile, Medical etc., Quality control and reliability: Defects in FDM, SLS and SLM, Critical process parameters: geometry, temperature, composition, phase transformation, Numerical and experimental evaluation: roles of process parameter combination, process optimization.

UNIT-III	CAD AND SOFTWARE TOOLS FOR 3D PRINTING	9

CAD Modelling for 3D printing: 3D Scanning and digitization, data handling &reduction Methods, AM Software: data formats and standardization, Slicing algorithms: uniform flat layer slicing, adaptive slicing, Process-path generation: Process-path algorithms, rasterization, part Orientation and support generation.

UNIT-IV	POWDER BED FUSION AND BINDER JETTING TECHNOLOGIES	10

Powder Bed Fusion: Selective Laser Sintering (SLS): Principles, Process, Indirect and Direct SLS – Powder Structure, Materials, Surface Deviation and Accuracy, Applications, Multi-jet Fusion Principles, Processes, Materials, Capabilities and Applications. Selective Laser Melting (SLM) and Electron Beam Melting (EBM): Principles, Processes, Materials, Limitations and Applications.

Binder Jetting: Three-Dimensional Printing (3DP): Principles, Process, Physics of 3DP, Materials Capabilities, Limitations and Applications.

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UNIT-V	DIRECT ENERGY DEPOSITION & HYBRID AM TECHNOLOGIES	10
Direct Energy Deposition: Laser Engineered Net Shaping (LENS): Processes, Materials, Capabilities Limitations and Applications. Ultrasonic Additive Manufacturing (UAM) Process, Parameters Capabilities, Applications. Case Studies. Hybrid Additive Manufacturing, Need, Principles, Part Quality and Process Efficiency. Wire Arc Additive Manufacturing (WAAM) Processes, Materials Capabilities, Limitations and Applications and Case Studies		

L:45	T:0	P:0	Total :45 Periods

TEXT BOOKS

1. Gibson, I., Rosen, D.W. and Stucker, B., "Additive Manufacturing Methodologies: Rapid Prototyping to Direct Digital Manufacturing", Springer, 2015.
2. Chua, C.K., Leong K.F. and Lim C.S., "Rapid prototyping: Principles and applications", Third edition, World Scientific Publishers, 2010.

REFERENCES

1. Liou, L.W. and Liou, F.W., "Rapid Prototyping and Engineering applications: A tool box for prototype development", CRC Press, 2011.
2. Kamrani, A.K. and Nasr, E.A., "Rapid Prototyping: Theory and practice", Springer, 2006.
3. Hilton, P.D. and Jacobs, P.F., Rapid Tooling: Technologies and Industrial Applications, CRC Press, 2000
4. Kruth, J.P., Froyen, L., et al., Selective Laser Sintering and Melting: Fundamentals and Applications.

COURSE OUTCOMES:

At the end of the course the students would be able to

- Explain the principles, classifications, and key technologies of additive manufacturing.
- Analyse material behaviour and consolidation mechanisms in various AM processes.
- Apply CAD modelling, data processing, slicing, and toolpath generation techniques for preparing digital models suitable for 3D printing.
- Evaluate Powder Bed Fusion, Binder Jetting, and Directed Energy Deposition processes with respect to their principles, materials, limitations, and industrial applications.
- Assess hybrid AM processes and advanced AM technologies and propose suitable process parameters and optimization strategies for improved part quality and reliability.

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24PAC001	ENGLISH FOR RESEARCH PAPER WRITING	L	T	P	C
		2	0	0	0

COURSE OBJECTIVES:

- Teach how to improve writing skills and level of readability
- Tell about what to write in each section
- Summarize the skills needed when writing a Title
- Infer the skills needed when writing the Conclusion
- Ensure the quality of paper at very first-time submission

UNIT-I	INTRODUCTION TO RESEARCH PAPER WRITING	6

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

UNIT-II	PRESENTATION SKILLS	6

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts, Introduction

UNIT-III	TITLE WRITING SKILLS	6

Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check

UNIT-IV	RESULT WRITING SKILLS	6

Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions

UNIT-V	VERIFICATION SKILLS	9

Useful phrases, checking Plagiarism, how to ensure paper is as good as it could possibly be the first- time submission

L:30	T: 00	P: 00	Total: 30 Periods

REFERENCES

1. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011
2. Day R How to Write and Publish a Scientific Paper, Cambridge University Press 2006
3. Goldbort R Writing for Science, Yale University Press (available on Google Books) 2006
4. Highman N, Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book 1998.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

CO1: Understand that how to improve your writing skills and level of readability
CO2: Learn about what to write in each section

CO3: Understand the skills needed when writing a Title CO4: Understand the skills needed when writing the Conclusion CO5: Ensure the good quality of paper at very first-time submission

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24PAC002	DISASTER MANAGEMENT	L	T	P	C
		2	0	0	0

COURSE OBJECTIVES:

- Summarizebasicsofdisaster
- Explainacriticalunderstandingofkeyconceptsindisasterriskreductionand humanitarian response.
- Illustratedisasterriskreductionandhumanitarianresponsepolicy andpractice from multiple perspectives.
- Describeanunderstandingofstandardsofhumanitarianresponseandpracticalrelevance in specific types of disasters and conflict situations.
- Developthestrengthsandweaknessesofdisastermanagementapproaches

UNIT-I	INTRODUCTION	6

Disaster:Definition,FactorsandSignificance;Differencebetween Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

UNIT-II	REPERCUSSIONS OF DISASTERS AND HAZARDS	6

Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. NaturalDisasters:Earthquakes,Volcanisms,Cyclones,Tsunamis,Floods,DroughtsandFamines, LandslidesAndAvalanches,Man-madedisaster:NuclearReactorMeltdown,Industrial Accidents,OilSlicksAndSpills,OutbreaksOfDiseaseAndEpidemics,WarAndConflicts.

UNIT-III	DISASTER PRONE AREAS IN INDIA	6

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-IV	DISASTER PREPAREDNESS AND MANAGEMENT	6

Preparedness: Monitoring Of Phenomena Triggering a Disaster or Hazard; Evaluation of Risk:ApplicationofRemoteSensing,DatafromMeteorologicalandOtherAgencies,Media Reports: Governmental and Community Preparedness.

UNIT-V	RISK ASSESSMENT	6

DisasterRisk:ConceptandElements, DisasterRiskReduction,Globaland NationalDisaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival

L:30	T:00	P:00	Total: 30 Periods

REFERENCES

1. Goel S. L., Disaster Administration and Management Text And Case Studies", Deep & Deep Publication Pvt. Ltd., New Delhi,2009.
2. NishithaRai,SinghAK,"DisasterManagementinIndia:Perspectives,issuesand strategies "'New Royal book Company,2007.

3.Sahni, Pardeep et.al.," Disaster Mitigation Experiences and Reflections", Prentice Hall of India, New Delhi,2001.

COURSE OUTCOMES Oncompletionof thecourse, the studentisexpectedtobeableto
CO1:Abilitytosummarizebasicsof disaster CO2: Ability to explain a critical understanding of key concepts in disaster risk reduction and humanitarian response. CO3:Abilitytoillustratedisasterriskreductionandhumanitarianresponsepolicyand practice from multiple perspectives. CO4:Abilitytodescribeanunderstandingofstandardsofhumanitarianresponseand practicalrelevance in specific types of disasters and conflict situations.. CO5:Abilitytodevelopthestrengthsandweaknessesofdisastermanagementapproaches

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24PAC003	CONSTITUTION OF INDIA	L	T	P	C
		2	0	0	0

COURSE OBJECTIVES:

- Understand the premises informing the twin themes of liberty and freedom from a civil rightsperspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional Role and entitlement to civil and economic rights as well as the emergence nation hood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in1917 and its impact on the initial drafting of the Indian Constitution.

UNIT-I	HISTORY OF MAKING OF THE INDIAN CONSTITUTION	6
History,DraftingCommittee,(Composition&Working)		

UNIT-II	PHILOSOPHY OF THE INDIAN CONSTITUTION	6
Preamble,SalientFeatures		

UNIT-III	CONTOURS OF CONSTITUTIONAL RIGHTS AND DUTIES	6
FundamentalRights,RighttoEquality,RighttoFreedom,RightagainstExploitation,Right toFreedomofReligion,CulturalandEducationalRights,Rightto ConstitutionalRemedies, Directive Principles of State Policy, Fundamental Duties.		

UNIT-IV	ORGANS OF GOVERNANCE	6
Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive,President,Governor,Councilof Ministers,Judiciary,AppointmentandTransfer of Judges, Qualifications, Powers and Functions.		

UNIT-V	LOCAL ADMINISTRATION	6
District's Administration head: Role and Importance Municipalities: Introduction, Mayor and role of Elected Representative, CEO, Municipal Corporation. Panchayat raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO Zila Panchayat: Positionandrole.Blocklevel:OrganizationalHierarchy(Differentdepartments),Village level:Role ofElectedandAppointedofficials,Importance ofgrassroot democracy.		

L:30	T:00	P:00	Total: 30 Periods

REFERENCES

1. TheConstitutionofIndia,1950(BareAct),Government Publication.
2. Dr.S.N.Busi,Dr.B.R.Ambedkar framingofIndianConstitution,1stEdition, 2015.
3. M.P.Jain,IndianConstitutionLaw,7thEdn.,LexisNexis,2014.
4. D.D.Basu,IntroductiontotheConstitutionofIndia,LexisNexis, 2015.

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COURSE OUTCOMES Oncompletionof thecourse, the studentisexpectedtobeableto
CO1:DiscussthegrowthofthedemandforcivilrightsinIndiaforthebulkofIndiansbefore the arrivalof Gandhi in Indian politics. CO2: Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India. CO3: Discuss the circumstances surrounding the foundation of the Congress Socialist Party[CSP]undertheleadershipofJawaharlalNehruandtheeventualfailureoftheproposal of direct elections throughadultsuffrageintheIndianConstitution. CO4:DiscussthepassageoftheHinduCodeBillof1956. CO5: