R18

M.Tech – T.E

Draft Course Structure (for I & II year)

Master of Technology

Thermal Engineering (ME)

I YEAR I SEMESTER

S No.	COURSE CODE	SUBJECT	L	T	P	C
1.	18ME3101	Thermodynamics and Combustion	3	0	0	3
2.	18ME3102	Advanced Fluid Dynamics	3	0	0	3
PROFESSIONAL ELECTIVE COURSE(PEC)-I						
3.	18ME3112	Nuclear Engineering	3	0	0	3
	18ME3113	Energy Conservation and Management				
PROFESSIONAL ELECTIVE COURSE(PEC)-II						
4.	18ME3114	Air Conditioning System Design	3	0	0	3
	18ME3115	Jet Propulsion and Rocketry				
5.	18ME3103	Thermal Engineering Lab	0	0	4	2
6.	18ME3104	Computer Aided Analysis Lab	0	0	4	2
7.	18HS0823	Research Methodology and IPR	2	0	0	2
AUDIT COURSE-1						
8	18HS0818	English for Research Paper writing	2	0	0	0
	18CE1029	Disaster Management				
	18HS0825	Sanskrit for Technical Knowledge				
	18HS0826	Value education				
Contact Periods / Week			**16**	**0**	**8**	**18**
			Total/Week 24			

I YEAR II SEMESTER

S No.	COURSE CODE	SUBJECT	L	T	P	C
1	18ME3105	Advanced Heat Transfer	3	0	0	3
2	18ME3106	Steam Engineering	3	0	0	3
PROFESSIONAL ELECTIVE COURSE(PEC)-III						
3	18ME3116	Refrigeration and Cryogenics	3	0	0	3
	18ME3117	Design of Heat Exchangers				
PROFESSIONAL ELECTIVE COURSE(PEC)-IV						
4	18ME3118	Computational Fluid Dynamics	3	0	0	3
	18ME3119	Modelling of IC Engines				
5	18ME3107	Computational Fluid Dynamics Lab	0	0	4	2
6	18ME3108	Thermal Engineering Virtual Lab	0	0	4	2
AUDIT COURSE-II						
7	18HS0829	Constitution of India	2	0	0	0
	18HS0827	Pedagogy Studies				
	18HS0828	Stress Management by Yoga				
	18HS0819	Personality Development through Life Enlightenment Skills				
8	18ME3109	Mini-Project	0	0	4	2
Contact Periods / Week			**14**	**0**	**12**	**18**
			Total/Week 24			

II YEAR I SEMESTER

S No.	COURSE CODE	SUBJECT	L	T	P	C
PROFESSIONAL ELECTIVE COURSE(PEC)-V						
1	18ME3120	Design of Solar and Wind System	3	0	0	3
	18HS0839	Advanced Mathematical Methods in Engineering				
OPEN ELECTIVE						
2	18HS0824	Business Analytics	3	0	0	3
	18ME3121	Industrial Safety				
	18ME3021	Advances in Operations Research				
	18CE1028	Cost Management of Engineering Projects				
	18ME3022	Composite Materials				
	18EE2128	Waste to Energy				
3	18ME3110	Dissertation Phase – I	0	0	20	10
Contact Periods / Week			**6**	**0**	**20**	**16**
			Total/Week 26			

II YEAR II SEMESTER

S No.	COURSECODE	SUBJECT	L	T	P	C
1	18ME3111	Dissertation Phase - II	0	0	32	16
Contact Periods / Week			**0**	**0**	**32**	**16**
			Total/Week 32			

Total Number of Credits= 18 +18+16+16 = 68

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
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I M.Tech-I Sem. (TE)

(18ME3101) Thermodynamics and Combustion

L	T	C
3	0	3

Course Objectives:

- *To learn about first and second law of thermodynamics.*
- *To learn about nonreactive ideal gas*
- *To learn about combustion and thermo chemistry.*
- *To learn about statistical thermodynamics and direct energy conversion*

Course Outcomes:

Students undergoing this course are able to

- *Understand the concepts of transient flow analysis and real gas mixture.*
- *Understand the concepts of chemical equilibrium.*
- *Understand the concepts of Nerst heat theorem.*
- *Understand the fuel cells and magneto hydro dynamic generators.*

UNIT - I:

Introduction: First law and State postulates, Second law and Entropy, Availability and Irreversibility, Transient flow analysis, Enthalpy of formation–Heating value of fuel - Adiabatic flame Temperature – Equilibrium composition of gaseous mixtures.

UNIT-II

Principles of combustion–Chemical composition–Flue gas analysis–dew point of products – Combustion stoichiometry. Combustion of fuel, droplets and sprays – Combustion systems – Pulverised fuel furnaces – fixed, Entrained and Fluidised Bed Systems.

UNIT – III:

Combustion and Thermo-chemistry, Second law analysis of reacting mixture, Chemical equilibrium, –Flame stability– Burning velocity of fuels – Measurement of burning velocity – factors affecting the burning velocity.

UNIT - IV:

Combustion Equipment–Oil Burners - Vaporizing Burners, Atomizing Burner s - Design of Burners. Gas Burners - Atmospheric Gas Burners - Air Aspiration Gas Burners Burners Classification according to Flame Structures - Factors Affecting Burners & Combustion.

UNIT - V:

Direct Energy Conversion- introduction – Fuel Cells – Thermo-electric energy – Thermo-ionic power generation -Thermodynamic devices Magneto Hydrodynamic Generators – Photo voltaic cell

Text Books:

1. Cengel, "*Thermodynamics*", Tata McGraw Hill Co., New Delhi, 2010
2. Howell and Dedcius, "*Fundamentals of Engineering Thermodynamics",* McGraw Hill Inc., U.S.A, 2009
3. Van Wylen & Sonntag, "*Thermodynamics*", John Wiley and Sons Inc., U.S.A, 2008

Reference Books:

1. *Thermo dynamics*, Holman, Mc Graw Hill, 2008
2. *Irreversible Thermo Dynamics*, HR De Groff, 2005

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
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I M.Tech-I Sem (TE)

(18ME3102) Advanced Fluid Dynamics

L	T	C
3	0	3

Course Objectives:

- *To learn about exact solutions of Navier stokes equations.*
- *To learn about Application of empirical relations to various geometries for Laminar and Turbulent flows.*
- *To learn about Boundary layer equations.*
- *To learn about data analysis of fluids and design of experiments*

Course Outcomes:

Students undergoing this course are able to

- *Understand the governing equations in fluid dynamics.*
- *Understand the concepts of potential and internal flows*
- *Understand the concepts of laminar boundary layers*
- *Understand the role of experiments on fluids and universal velocity distributions.*

UNIT- I:

Governing equations in Fluid Dynamics: Derivation of Continuity and Momentum equations using integral and differential approach, dimensionless form and special of governing equations, integral quantities, Exact Solutions of Navier-Stokes Equations: Fully developed flows, parallel flow in straight channel, Couette flow, Creeping flows.

UNIT - II:

Potential Flow: Kelvin's theorem, Irrotational flow, Stream function-vorticity approach Application of empirical relations to various geometries for Laminar and Turbulent flows.

Internal flows: use of empirical correlations. Reylolds – Colburn Analogy - Application of empirical relations to various geometries for Laminar and Turbulent flows.

UNIT - III:

Laminar Boundary layers: Boundary layer equations, flow over flat plate, Momentum integral equation for boundary layer, approximate solution methodology for boundary layer equations

UNIT - IV:

Turbulent Flow: Characteristics of turbulent flow, laminar turbulent transition, time mean motion and fluctuations, derivation of governing equations for turbulent flow, shear stress models, universal velocity distribution.

UNIT-V

Experimental Techniques: Role of experiments in fluid, layout of fluid flow experiments, sources of error in experiments, data analysis, design of experiments, review of probes and transducers, Introduction to Hot wire Anemometry, Laser Doppler Velocimetry and Particle Image Velocimetr.

Text Books:

1. Muralidhar and Biswas, *Advanced Engineering Fluid Mechanics*, Alpha Science International, 2005
2. Irwin Shames, *Mechanics of Fluids*, McGraw Hill, 2003
3. Fox R.W., McDonald A.T, *Introduction to Fluid Mechanics*, John Wiley and Sons Inc, 1985

Reference Books:

1. Heat Transfer, A basic approach – Yunus Cengal (MH), 2007.
2. Heat and Mass Transfer, D.S. Kumar, 2006.
3. Heat Transfer, P.K. Nag (TMH), 2005.

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M.Tech – T.E

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I M.Tech-I Sem (TE)

PROFESSIONAL ELECTIVE COURSE (PEC)-I
(18ME3112) Nuclear Engineering

L	T	C
3	0	3

Course Objectives:

- *To learn about Basics of nuclear fission and power from fission.*
- *To learn about Neutron transport and diffusion*
- *To learn about Multi group, multi region diffusion equation, concept of criticality.*
- *To learn about Reactor kinetics and control and radiation protection*

Course Outcomes:

Students undergoing this course are able to

- *Understand the power from fission and conversion and breeding.*
- *Understand the concepts of criticality of thermal reactors.*
- *Understand the concepts of solutions for simple cases of reactivity additions*
- *Understand the Reactor safety philosophy and radiation protection standards*

UNIT – I:

Basics of nuclear fission and power from fission: Radioactivity, nuclear reactions, cross sections, nuclear fission, power from fission, conversion and breeding, fertile material

UNIT-II

Neutron transport and diffusion: Neutron transport equation, diffusion theory approximation, Fick's law, solutions to diffusion equation for point source, planar source, etc., energy loss in elastic collisions, neutron slowing down.

UNIT – III

Multi group, multi region diffusion equation, concept of criticality: Solution of multi group diffusion equations in one region and multi region reactors, concept of criticality of thermal reactors.

Types of Reactors: Pressurized Water Reactor, Boiling Water Reactor, Sodium-Graphite Reactor, Fast breeder Reactor, Homogeneous Reactor, Gas Cooled Reactor,

UNIT-IV

Reactor kinetics and control: Derivation of point kinetics equations, in hour equation, solutions for simple cases of reactivity additions, fission product poison, reactivity coefficients.Radiation Hazards and Shielding –Radioactive Waste Disposal.

UNIT – V

Heat removal from reactor core: Solution of heat transfer equation in reactor core, temperature distribution, critical heat flux

Reactor safety, radiation protection: Reactor safety philosophy, defense in depth, units of radioactivity exposure, radiation protection standards

Text Books:

1. *Introduction to Nuclear Engineering* (3rd Edition) by John R. Lamarsh, Anthony J.Barrata, Prentice Hall, (2001)
2. *Introduction to Nuclear Engineering*, John.R Lamarsh & Anthony J. Baratta.., 3rd Edition Pearson Education, Incorporated, 2017.
3. *Fundamentals of Nuclear Science and Engineering*, J. Kenneth Shultis, Richard E. Faw., CRC Press, 2016.

Reference Books:

1. *Fundamentals of Nuclear Engineering*, Brent J. Lewis, E. Nihan Onder, Andrew A. Prudil, John Wiley & Sons 2017.
2. *Nuclear Reactor Engineering (Principles and Concepts*) Dr.G. Vaidyanathan Repro Knowledge cast Limited, 2017.
3. *Nuclear Physics* D. C. Tayal, 2nd edition, Himalaya Publishing House, 2009.

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M.Tech – T.E

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I M.Tech-I Sem (TE)

L	T	C
3	0	3

PROFESSIONAL ELECTIVE COURSE (PEC)-I
(18ME3113) Energy Conservation and Management

Course Objectives:

- *To learn about Principles of Energy Management.*
- *To learn about Design for Conservation of Energy materials.*
- *To learn about planning, utilization pattern and future strategy*
- *To learn about Pros and Cons of the common methods of analysis*

Course Outcomes:

Students undergoing this course are able

- *Understand the Initiating, Organizing and Managing, Energy Management Programs*
- *Understand the concepts critical assessment of energy usage and Importance of energy management*
- *Understand the concepts of Energy auditing.*
- *Understand the relevant international standards and laws.*

UNIT – I

Introduction – Principles of Energy Management–Managerial Objectives–Energy Management in Functional Areas like Manufacturing Industry, Process Industry, and Commerce - Government- Role of Energy Manager in each of this organization. Initiating, Organizing and Managing, Energy Management Programs

UNIT – II

Energy Conservation: Technologies for Energy Conservation , Design for Conservation of Energy materials – energy flow networks – critical assessment of energy usage – formulation of objectives and constraints – synthesis of alternative options and technical analysis of options – process integration.

UNIT – III

Energy Audit: Definition and Concepts, Types of Energy Audits–B asic Energy Concepts – Resources for Plant Energy Studies – Data Gathering – Analytical Techniques.

The energy market: Scope, Characterization of an Investment Project – Types of Depreciation – Time Value of money – budget considerations, Risk Analysis.

UNIT-IV

Methods of Evaluation of Projects: Payback – Annualized Costs – Investor's Rate of return – Present worth – Internal Rate of Return – Pros and Cons of the common methods of analysis – replacement analysis. Energy Consultant: Need of Energy Consultant – Consultant Selection Criteria-Energy Regulatories- Institutions.

UNIT – V

Energy conservation in industries, Cogeneration, Combined heating and power systems, Relevant international standards and laws.

Alternative Energy Sources: Solar Energy – Types of devices for Solar Energy Collection – Thermal Storage System – Control Systems-Wind Energ y – Availability – Wind Devices – Wind Characteristics – Performance of Turbines and systems.

Text Books:

1. *Energy Conservation and Management,* S. S. Thipse Alpha Science International Limited 2014.
2. *Energy Engineering and Management,* Amlan Chakrabarti, Kindle Edition, PHI (30 January 2011)**.**
3. *Energy Management and Conservation Kindle Edition,* K V Sharma P Venkataseshaiah., I K International Publishing House (3 September 2011).

Reference Books:

1 *Energy Management Principles: Applications, Benefits, Savings,* Craig B. Smith, Kelly E. Parmenter Elsevier, 2015.
2 *Energy Conversion and Management,* S. K. Shukla, Jeewan V. Tirkey., publisher Narosa, 2010.

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M.Tech – T.E

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I M.Tech-I Sem (TE)

PROFESSIONAL ELECTIVE COURSE (PEC)-II
(18ME3114) Air Conditioning System Design

L	T	C
3	0	3

Course Objectives

- *To learn about Psychrometric properties and processes*
- *To learn about Cooling load Estimation.*
- *To learn about Air–conditioning Systems*
- *To learn about Air–conditioning Components.*

Course Outcomes:

Students undergoing this course are able to

- *Understand the Parameters influencing the Effective Temperature.*
- *Understand the concepts summer, winter and year round air – conditioning systems.*
- *Understand the concepts of Humidification and dehumidification equipment.*
- *Understand the Design conditions and load calculation*

UNIT - I:

Air–conditioning: Psychrometric properties and processes–Construction of Psychrometric chart. Requirements of Comfort Air –conditioning – Thermodynamics of human body – Effective temperature and Comfort chart – Parameters influencing the Effective Temperature

UNIT – II

Cooling load Estimation: Occupants, equipments, heat gain due to- infiltration, fan load, Fresh air load (Ventilation). Summer, Winter and year round air – conditioning systems.

UNIT – III

Air–conditioning Systems: All Fresh air, Re-circulated air with and without bypass, with reheat systems – Calculation of Bypass Factor, ADP,RSHF, ESHF and GSHF for different systems.

UNIT-IV

Components: Humidification and dehumidification equipment– Grills and diffusers – Fans and blowers

UNIT-V

Design conditions and load calculations, air distribution, pressure drop, duct design, Performance & selection, noise control

Text Books:

1. *Handbook of air-conditioning system design*, Carrier Incorporation, McGraw Hill Book Co. 2009.
2. *Refrigeration and air-conditioning*, ARI, Prentice Hall, New Delhi, 1993.
3. Norman C. Harris, "*Modern Air Conditioning*", New York, McGraw-Hill, 1974.

Reference Books:

1. *Air Conditioning Engineering*, Jones W.P., Edward Arnold Publishers Ltd., London, 1984.
2. *Control Systems for Heating Ventilation and Air-Conditioning*, Hainer R.W., Van Nostrand, 2009.

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I M.Tech-I Sem (TE)

PROFESSIONAL ELECTIVE COURSE (PEC)-II
(18ME3115) Jet Propulsion and Rocketry

L	T	C
3	0	3

Course Objectives:

- *To learn about performance and characteristics of Jet Propulsion.*
- *To learn about gas dynamics and blade*
- *To learn about Rocketry and its reactions*
- *To learn about Jet propulsion cycles and their analysis*

Course Outcomes:

Students undergoing this course are able to

- *Understand the improvement and applications of Jet Propulsion*
- *Understand the concepts practical air cooled blades Combustion Systems*
- *Understand the concepts of thermodynamic flow analysis of Jet Propulsion*
- *Understand the environmental considerations and applications.*

UNIT - I:

Turbo Jet Propulsion System: Gas turbine cycle analysis–layout of turbo jet engine. Turbo machinery- compressors and turbines, combustor, blade aerodynamics, engine off design performance analysis.

Flight Performance: Forces acting on vehicle–Basic relations of motion– multi stage vehicles

UNIT – II

Principles of Jet Propulsion and Rocketry: Fundamentals of jet propulsion, Rocket sand air breathing jet engines – Classification – turbo jet , turbo fan, turbo propulsion, rocket (Solid and Liquid propellant rockets) and Ramjet engines.

Nozzle: Theory and Characteristics and Parameters**:** Theory of one dimensional convergent – divergent nozzles – aerodynamic choking of nozzles and mass flow through a nozzle – nozzle exhaust velocity – thrust, thrust coefficient, A_c / A_t of a nozzle, Supersonic nozzle shape, non-adapted nozzles, summer field criteria, departure from simple analysis – characteristic parameters – 1) characteristic velocity, 2) specific impulse 3) total impulse 4) relationship between the characteristic parameters 5) nozzle efficiency, combustion efficiency and overall efficiency.

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UNIT – III

Aero Thermo Chemistry of The Combustion Products: Review of properties of mixture of gases – Gibbs – Dalton laws – Equivalent ratio, enthalpy changes in reactions, heat of reaction and heat of formation – calculation of adiabatic flame temperature and specific impulse – frozen and equilibrium flows.

UNIT-IV

Solid Propulsion System: Solid propellants–classification, homogeneous and heterogeneous propellants, double base propellant compositions and manufacturing methods. Composite propellant oxidizers and binders. Effect of binder on propellant properties. Solid propellant rocket engine – internal ballistics, equilibrium mo tor operation and equilibrium pressure to various parameters. Transient and pseudo equilibrium operation, end burning and burning grains, grain design. Rocket motor hard ware design. Heat transfer considerations in solid rocket motor design.

UNIT-V

Liquid Rocket Propulsion System: Liquid propellants–classification, Mono and Bipropellants, Cryogenic and storage propellants, ignition delay of hypergolic propellants, physical and chemical characteristics of liquid propellant. Liquid propellant rocket engine– system layout, pump and pressure feed systems, feed system components. Design of combustion chamber, characteristic length, constructional features, and chamber wall stresses. Heat transfer and cooling aspects. Uncooled engines, injectors – various types, injection patterns, injector characteristics, and atomization and drop size distribution, propellant tank design.

Text Books:

1. *Mechanics and Dynamics of Propulsion*, Hill and Peterson, 1992.
2. *Rocket propulsion elements*, Sutton, 2012.

References Books:

1. *Gas Turbines*, B.Ganesan (TMH), 2010.
2. *Gas Turbines and Propulsive Systems*, Khajuria & Dubey (Dhanpatrai), 2013.
3. *Rocket propulsion*, Bevere, 2010.
4. *Jet propulsion*, Nicholas Cumpsty, 2nd Edition, 2003.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
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I M.Tech-I Sem (TE)

(18ME3103) Thermal Engineering Lab

L	P	C
0	4	2

Course Objectives:

- *To learn about Performance of Heat Exchangers.*
- *To learn about Flame propagation analysis of gaseous fuels*
- *To learn about Heat Balance sheet*
- *To learn about Performance test on variable compression ratio of diesel engines*

Course Outcomes:

Students undergoing this course are able to

- *Understand the COP estimation of vapour compression refrigeration*
- *Understand the concepts Performance test on variable compression ratio of diesel engines*
- *Understand the concepts of Solar Flat Plate Collector performance*
- *Understand the Calibration of temperature measurement.*

List of Experiments

1. Performance of Heat Exchangers.
2. Flame propagation analysis of gaseous fuels.
3. Emission measurement of an I.C. Engine.
4. Heat Balance sheet, Volumetric Efficiency and air fuel ratio estimation of an I.C. Engine.
5. Performance test on variable compression ratio of diesel engines.
6. COP estimation of vapour compression refrigeration test rig.
7. Performance analysis of Air conditioning unit.
8. Performance analysis of heat pipe.
9. Solar Flat Plate Collector Performance.
10. Calibration of temperature measurement apparatus

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I M.Tech-I Sem (TE)

(18ME3104) Computer Aided Analysis Lab

L	P	C
0	4	2

Course Objectives:

- *To learn about Structural Analysis of solid*
- *To learn about thermal analysis of 2D dimension component.*
- *To learn about computational fluid dynamics of gas.*

Course Outcomes:

Students undergoing this course are able to

- *Understand the Analysis of a truss member under loading*
- *Understand the concepts Analysis of Tapered plate under transverse load*
- *Understand the concepts of the flow of incompressible gas through an S-bend for laminar flow*
- *Understand the air flow over a simple geometry (aero foil) in a wind*

I. Introduction to Analysis Software Package

II. Structural Analysis

1. Analysis of a rectangular plate with a hole.
2. Analysis of a truss member under loading.
3. Static Analysis of a Simply supported beam
4. Analysis of Tapered plate under transverse load

III. Thermal Analysis

1. Conductive Heat Transfer Analysis in Rectangular 2D Component
2. Conductive Heat Transfer Analysis in Different Geometry 2D Components

IV. Computational Fluid Dynamics

1. Determine the flow of incompressible gas through an S-bend for laminar flow.
2. Determine the flow of incompressible gas through an S-bend for turbulent flow.
3. Determine that of incompressible water flowing over a cylinder.
4. Determine air flow over a simple geometry (aero foil) in a wind tunnel (2-D).

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I M.Tech - I Sem (TE)

(18HS0823) Research Methodology and IPR

L	T	C
2	0	2

Course Educational Objectives:

- *Understand some basic concepts of research and its methodologies.*
- *Identify appropriate research topics.*
- *Enrich knowledge to their research field.*
- *Process for filing Patent.*

Course Outcomes:

- *Understood the Meaning of research problem, Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem.*
- *Got the knowledge of How to get new ideas.*
- *Acquired the knowledge of various government and NGO or agencies for Research Funding.*

UNIT-I:

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

UNIT–II

Literature Studies: Effective literature studies approaches, analysis, Plagiarism, Research ethics.

UNIT–III

Report Writing: Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

UNIT-IV

Nature of Intellectual Property: Patents, Designs, Trade and Copyright.

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

UNIT-V

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications**,** New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

Text Books:

1. *Resisting Intellectual Property*, Taylor & Francis Ltd ,2007.
2. *Industrial Design*, Mayall ,McGraw Hill, 2002
3. *Product Design*, Niebel , McGraw Hill, 2004

Reference Books:

1. *Research methodology*: *An introduction for science & engineering students*. Stuart Melville and Wayne Goddard, 2005
2. *Research Methodology*: *A Step by Step Guide for beginners*, Ranjit Kumar, 2 nd Edition, 2006

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I M.Tech - I Sem (TE)

(18HS0818) English for Research Paper Writing

L	T	C
2	0	0

Course objectives:

Students will be able to:

- *Understand that how to improve your writing skills and level of readability.*
- *Learn about what to write in each section.*
- *Understand the skills needed when writing a Title.*
- *Ensure the good quality of paper at very first-time submission.*

Unit-I

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

Unit-II

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

Unit-III

Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.

Unit-IV

Key skills needed when writing a Title, key skills needed when writing abstract, key skills needed when writing an Introduction, skills when writing a Review of the Literature.

Unit-V

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

Text Books:

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

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I M.Tech - I Sem (TE)

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2 0 0

(18CE1029) Disaster Management

Course *Objective:-*

- *The objectives of this subject is to give the basic knowledge of Environmental Hazards and disasters.*
- *The syllabus includes the basics of Endogenous and Exogenous hazards and gives a suitable picture on the different types of hazard and disaster mitigation methods.*

Course Outcomes:

On completion of the course the students will have knowledge on

- *Types of disasters and their effects on environment*
- *Causes of disasters*
- *Disaster management through engineering applications*

UNIT-I

Environmental Hazards & Disasters: Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Different approaches & relation with human Ecology - Landscape Approach - Ecosystem Approach - Perception approach - Human ecology & its application in geographical researches.

UNIT –II

Types of Environmental hazards & Disasters: Natural hazards and Disasters – Man induced hazards & Disasters - Natural Hazards- Planetary Hazards/ Disasters – Extra Planetary Hazards/ disasters - Planetary Hazards- Endogenous Hazards – Exogenous Hazards

UNIT–III

Endogenous Hazards - Volcanic Eruption – Earthquakes – Landslides – Volcanic Hazards/ Disasters - Causes and distribution of Volcanoes - Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions – Earthquake Hazards/ disasters - Causes of Earthquakes - Distribution of earthquakes – Hazardous effects of - earthquakes - Earthquake Hazards in India - - Human adjustment, perception & mitigation of earthquake.

UNIT –IV

Exogenous hazards/ disasters - Infrequent events- Cumulative atmospheric hazards/ disasters infrequent events: Cyclones – Lightning – Hailstorms Cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms (causes, distribution human adjustment, perception & mitigation) Cumulative atmospheric hazards/ disasters: - Floods- Droughts- Cold waves- Heat waves. Floods:- Causes of floods- Flood hazards India- Flood control measures (

Human adjustment, perception & mitigation).Droughts:- Impacts of droughts- Drought hazards in India- Drought control measures- Extra Planetary Hazards/ Disasters- Man induced Hazards /Disasters- Physical hazards/ Disasters-Soil Erosion Soil Erosion:-- Mechanics & forms of Soil Erosion- Factors & causes of Soil Erosion- Conservation measures of Soil Erosion. Chemical hazards/ disasters: Release of toxic chemicals, nuclear explosion- Sedimentation processes. Sedimentation processes: - Global Sedimentation problems- Regional Sedimentation problems- Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation. Biological hazards/ disasters: - Population Explosion.

UNIT –V

Emerging approaches in Disaster Management- Three Stages

1. Pre- disaster stage (preparedness)
2. Emergency Stage
3. Post Disaster stage-Rehabilitation

Text books:

1. Disaster Management by Rajib Shah, Universities Press, India, 2003
2. Disaster Science and Management by Tushar Bhattacharya, TMH Publications.
3. Disaster Mitigation: Experiences and Reflections by Pardeep Sahni
4. Natural Hazards & Disasters by Donald Hyndman & David Hyndman – Cengage Learning.

References:

1. The Environment as Hazards by Kates, B.I & White, G.F, Oxford Publishers, New York, 1978
2. Disaster Management by R.B. Singh (Ed), Rawat Publication, New Delhi, 2000
3. Disaster Management by H.K. Gupta (Ed), Universiters Press, India, 2003
4. Space Technology for Disaster Mitigation in India (INCED) by R.B. Singh, University of Tokyo, 1994.

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I M.Tech - I Sem (TE)

L	P	C
2	0	0

(18HS0825) Sanskrit for Technical Knowledge

Course Objectives:

- *To get a working knowledge in illustrious Sanskrit, the scientific language in the world.*
- *Learning of Sanskrit to improve brain functioning.*
- *Learning of Sanskrit to develop the logic in mathematics, science & other subjects Enhancing the memory power.*
- *The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature.*

Course Output

Students will be able to

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

Unit-I

Alphabets in Sanskrit, Past/Present/Future Tenses, Simple Sentences

Unit-II

Order, Introduction of roots, Technical information about Sanskrit Literature

Unit-III

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

Text Books:

1. "Abhyaspustakam" – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi
2. "Teach Yourself Sanskrit" Prathama Deeksha-VempatiKutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
(AUTONOMOUS)

I M.Tech - I Sem (TE)

L	P	C
2	0	0

(18HS0826) Value Education

Course Objectives

Students will be able to

- *Understand value of education and self- development*
- *Imbibe good values in students*
- *Let the should know about the importance of character*

Course outcomes

- Students will be able to:
- Knowledge of self-development.
- Learn the importance of Human values.

Unit-I

Values and self-development – Social values and individual attitudes. Work ethics and Indian vision of humanism. Moral and non-moral valuation. Standards and principles. Value judgements.

Unit-II

Importance of cultivation of values; Sense of duty. Devotion, Self-reliance; Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism. Love for nature and Discipline.

Unit-III

Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline, Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature.

Unit-IV

Character and Competence –Holy books vs Blind faith. Self-management and Good health. Science of reincarnation. Equality, Nonviolence, Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively.

Text Books:

1. *Values and Ethics for organizations Theory and practice*, Chakroborty, S.K. Oxford University Press, New Delhi, 2010.
2. *Value Education*, N. Venkataiah, APH Publishing Corporation, 1998.

Reference Books:

1. *Value Education and Quality Teaching*: The double Helix effect, 2010
2. *Values Education and lifelong learning*: Principles, Policies, and Programs, N Aspin, D Chapman, Springer Publication, 2012.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
(AUTONOMOUS)

I M.Tech-II Sem (TE)

(18ME3105) Advanced Heat Transfer

L	T	C
3	0	3

***Course Objectives*:**

- *To learn about the modes of heat transfer.*
- *To learn about the flow process, forced convection and free convection*
- *To learn about the boiling and condensation*
- *To learn about the radiation and heat exchangers*

***Course Outcomes*:**

Students undergoing this course are able to

- *Understand the basic phenomena of heat transfer*
- *Understand the concepts of laminar and turbulent flows*
- *Understand the concepts of Integral analysis on laminar free convective heat transfer*
- *Understand the Radiant heat exchange in grey, non-grey bodies*

UNIT- I:

Brief Introduction to different **modes of heat transfer**; Conduction: General heat conduction equation. **Steady State Heat Transfer**: Simplified heat transfer in 1D and 2D–Fins. **Transient heat conduction**; Lumped system analysis- Heisler's charts-semi-infinite solid-use of shape factors in conduction – problem solutions

UNIT - II:

Forced Convection: Flow over a flat plate: Critical Reynolds Number - - Methods to determine heat transfer coefficient: Analogy between heat and momentum transfer - Similarity Parameters - Analytical Methods - Exact and Integral methods - Application of empirical relations to various geometries for Laminar and Turbulent flows

Internal flows: use of empirical correlations. Reylolds – Colburn Analogy - Application of empirical relations to various geometries for Laminar and Turbulent flows.

Free convection: Integral analysis on laminar free convective heat transfer – Different geometries – combined free and forced convection

UNIT - III:

Boiling and condensation: Pool Boiling–Boiling regimes-Correlations. Nusselt's theory of film condensation on a vertical plate – Assumptions and correlations of film condensation for different geometrics. Two phase flow mass transfer, cooling, fluidized bed combustion, Heat pipes.

UNIT - IV:

Heat Exchangers: Design procedure - LMTD and NTU methods–Crossflow and 1 shell 2,4,6,8 pass heat exchangers – Use of charts and empirical correlations.

UNIT - V:

Radiation Heat Transfer: Radiant heat exchange in grey, non-grey bodies, with transmitting, reflecting and absorbing media, specular surfaces, Radiation, shape factor, analogy, shields, Radiation of gases & vapours.

Text Books:

1. *Heat Transfer*, Necati Ozisik (TMH), 2010
2. *Heat Transfer*, McGraw Hill Book Company, New York, 2002
3. *Introduction to Heat Transfer*, J.P. Holman, Frank P. Incropera, David P. Dewitt, 4th Edition, 2010

Reference Books:

1. *Heat Transfer*, P.S. Ghoshdastidar (Oxford Press), 2008.
2. *Heat Transfer*, Holman.J.P, Tata Mc Graw Hill, 2002.
3. *Fundamentals of Engineering Heat and Mass Transfer*, R.C. Sachdeva Wiley Eastern Ltd., India, 2006.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
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I M.Tech-II Sem (TE)

(18ME3106) Steam Engineering

L	T	C
3	0	3

***Course Objectives*:**

- *To learn about fundamentals of steam generation*
- *To learn about piping, insulation and its applications*
- *To learn about assessment of steam distribution losses, Steam leakages*
- *To learn about energy Conservation and Waste Minimization*

***Course Outcomes*:**

Students undergoing this course are able to

- *Understand the combustion in boilers and flame temperature.*
- *Understand the heat savings and application criteria*
- *Understand the performance evaluation of accessories*
- *Understand the control and monitoring devices of boiler*

UNIT- I:

Introduction Fundamentals of steam generation, Quality of steam, Use of steam table, Mollier Chart Boilers ,Types, Mountings and Accessories, Combustion in boilers, Determination of adiabatic flame temperature, quantity of flue gases, Feed Water and its quality, Blow down; IBR, Boiler standards

UNIT - II:

Piping & Insulation Water Line, Steam line design and insulation; Insulation-types and application, Economic thickness of insulation, Heat savings and application criteria, Refractory-types, selection and application of refractory, Heat loss.

UNIT - III:

Steam Systems Assessment of steam distribution losses, Steam leakages, Steam trapping, Condensate and flash steam recovery system, Steam Engineering Practices; Steam Based Equipment / Systems.

UNIT - IV:

Boiler Performance Assessment Performance Test codes and procedure, Boiler Efficiency, Analysis of losses; performance evaluation of accessories; factors affecting boiler performance.

UNIT –V

Energy Conservation and Waste Minimization Energy conservation options in Boiler; waste minimization, methodology; economical viability of waste minimization

Instrumentation & Control

Process instrumentation; control and monitoring. Flow, pressure and temperature measuring and controlling instruments, its selection

Text Books:

1. *Applied Thermodynamics*, A. McConkey, T. D. Estop, Parson Publication,2009.
2. *A Course in Power Plant Engineering*; Domkundwar; Dhanapat Rai and Sons, 2010.
3. *Engineering Thermodynamics* ,Yunus A. Cengel and Boles, Tata McGraw-Hill Publishing Co. Ltd, 2009.

Reference Books:

1. *Energy Efficiency in Thermal Utilities;* Book II Bureau of Energy Efficiency, 2010.
2. *Energy Performance Assessment for Equipment & Utility Systems*; Book IV - Bureau of Energy Efficiency,2008.
3. *Boiler Operation Engineering*: Questions and Answes; P. Chatopadhyay; Tata McGraw Hill Education Pvt Ltd, N Delhi, 2007.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
(AUTONOMOUS)

I M.Tech-II Sem (TE)

PROFESSIONAL ELECTIVE COURSE (PEC)-III
(18ME3116) Refrigeration and Cryogenics

L	T	C
3	0	3

***Course Objectives*:**

- *To learn about the refrigeration and its units*
- *To learn the performance characteristics of compressor*
- *To learn about the various alternative refrigerants*
- *To learn about the liquefactions of gases*

***Course Outcomes*:**

Students undergoing this course are able to

- *Understand the working principle of refrigator*
- *Understand the design, selection of evaporators, condensers, control systems*
- *Understand the different types of refrigeration systems.*
- *Understand the concept of cryogenic system.*

UNIT-I

Introduction: Necessity of low temperature, Vapour compression refrigeration, Multistage compression with inter-cooling, Multi-evaporator systems, Cascade systems, Manufacturing of dry ice.

UNIT-II

Performance characteristics and capacity control of reciprocating and centrifugal compressors, screw compressor and scroll compressor.

UNIT-III

Design, selection of evaporators, condensers, control systems, motor selection, Refrigerants, alternative refrigerants, CFC/HCFC phase-out regulations, Refrigeration applications, food preservation, transport.

UNIT- IV

Insulation: Low temperature insulation-reflective-Evacuated powders- Rigid forms- super Insulation.

Cooling by adiabatic demagnetization- Gas separation and Cryogenic systems- Air separating-storage and handling of cryogenic liquids

UNIT-V

Liquification of air - Linde system- Analysis- Dual pressure cycle analysis-Liquefaction of Hydrogen and Helium-problems.

Application of Lower temperatures- Effects on the properties of metals-strength-Thermal properties-super conductivity-super fluidity

Text Books:

1. *Cryogenic Research and Applications*, Marshall Sitting, Von Nostrand Inc, New Jersey, 2001
2. *Cryogenics Engineering* Edit by B.A.Hands, Academic Press, 1996
3. *Principles of Refrigeration*, R.J.Dossat, Pearson Education Asia, 2001.
4. *Refrigeration and Air-conditioning*, C.P.Arora, Tata McGraw-Hill, 2000.

Reference Books:

1. Cryogenics Engineering, R. B. Scott, Von Nostrand Inc, New Jersey, 1999
2. Cryogenics process Engineering, K.D.Timmerhaus & TM Flynn, Plenum press, 1998
3. *Thermal Environmental Engineering*, J.L.Threlkeld, Prentice Hall, 1970.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
(AUTONOMOUS)

I M.Tech-II Sem (TE)

PROFESSIONAL ELECTIVE COURSE (PEC)-III
(18ME3117) Design of Heat Exchangers

L	T	C
3	0	3

Course Objectives

- *To learn the different types of heat exchangers.*
- *To learn about heat exchanger design methodology*
- *To learn about shell and Tube heat exchangers*
- *To learn about the compact heat exchanger*

***Course Outcomes*:**

Students undergoing this course are able to

- *Understand the design feature of heat exchangers*
- *Understand the concepts of LMTD and fouling factors of heat exchanger.*
- *Understand the concepts of design of Shell and Tube heat exchangers*
- *Understand the thickness calculations of heat exchanger*

UNIT-I

Heat Exchangers – Classification according to transfer process, number of fluids, surface compactness, and construction features. Tubular heat exchanger, plate type heat exchangers, extended surface heat exchangers, heat pipe, Regenerators. Classification according to flow arrangement: counter flow, parallel flow, cross flow exchanger.

UNIT-II

Heat exchanger design methodology, assumption for heat transfer analysis, problem formulation, e-NTU method, *P*-NTU method, Mean temperature difference method, fouling of heat exchanger, effects of fouling, categories of fouling, fundamental processes of fouling.

UNIT-III

Double Pipe Heat Exchangers: Thermal and Hydraulic design of inner tube, Thermal and hydraulic analysis of Annulus, Total pressure drop

UNIT- IV.

Compact Heat Exchangers: Thermal and Hydraulic design of compact heat exchanger
Shell and Tube heat exchangers – Tinker's, kern's, and Bell Delaware's methods, for thermal and hydraulic design of Shell and Tube heat exchangers

UNIT-V

Mechanical Design of Heat Exchangers – design standards and codes, key terms in heat exchanger design, material selection, and thickness calculation for major components such as tube sheet, shell, tubes, flanges and nozzles. Introduction to simulation and optimization of heat exchangers, flow induced vibrations.

Text Books:

1. *Fundamentals of Heat Exchanger Design*, Ramesh K. Shah and Dusan P. Sekulic,John Wiley & sons Inc., 2003.
2. *Process Heat Transfer*, D.C. Kern, McGraw Hill, 2009.
3. *Heat Exchangers: Selection, Rating and Thermal Design*, Sadik Kakac and Hongton Liu, CRC Press, 2008.

Reference Books:

1. *Heat Exchanger Design,* A .P. Frass and M.N. Ozisik,McGraw Hill, 1984
2. *Hand Book of Heat Exchanger Design,T.E.M.A. Standard*", T. Kuppan, New York, 1999.
3. *Industrial Heat Exchangers-A Basic Guide*, G. Walkers, McGraw Hill, 1982.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
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I M.Tech-II Sem (TE)

PROFESSIONAL ELECTIVE COURSE (PEC)-IV
(18ME3118) Computational Fluid Dynamics

L	T	C
3	0	3

***Course Objectives*:**

- *To learn about the basic governing equations*
- *To learn about finite volume method.*
- *To learn about Solution of N-S Equations for Incompressible Flows*

***Course Outcomes*:**

Students undergoing this course are able to

- *Understand the experimental and hyperbolic equations.*
- *Understand the geometry modeling and Grid Generation*
- *Understand the methodology of computational fluid dynamics*

UNIT- I

Introduction to CFD: with experimental and Hyperbolic Equations.

Computational approach to Fluid Dynamics and its comparison analytical methods, Basics of PDE: Elliptic, Parabolic.

UNIT- II.

Governing Equations: Review of Navier-Stokes Equation and simplified forms, Solution Methodology: FDM and FVM with special emphasis on FVM, Stability, Convergence and Accuracy.

Finite Volume Method: Domain discretization, types of mesh and quality of mesh, SIMPLE, pressure velocity coupling, Checkerboard pressure field and staggered grid approach

UNIT- III.

Geometry Modeling and Grid Generation: Practical aspects of computational modeling of flow domains, Grid Generation, Types of mesh and selection criteria, Mesh quality, Key parameters and their importance

UNIT- IV.

Methodology of CFDHT: Objectives and importance of CFDHT, CFDHT for Diffusion Equation, Convection Equation and Convection-Diffusion Equation

UNIT- V.

Solution of N-S Equations for Incompressible Flows: Semi-Explicit and Semi-Implicit Algorithms for Staggered Grid System and Non Staggered Grid System of N-S Equations for Incompressible Flows.

Text Books:

1. *Introduction to Computational Fluid Dynamics: Development, Application and Analysis,* Atul Sharma., John Wiley & Sons, 2016.
2. *Computational Fluid Dynamics,* T. J. Chung., 2nd edition Cambridge University Press, 2010.
3. *Essential Computational Fluid Dynamics,* Oleg Zikanov., John Wiley & Sons, 2011.

Reference Books:

1. *Computational Fluid Dynamics*, John Wendt., Springer Science & Business Media, 3rd edition, 2008.
2. *Computational Fluid Dynamics,* Frederic Magoules, CRC Press, 2011.
3. *Applied Computational Fluid Dynamics Techniques: An Introduction Based on Finite Element Methods,*, Rainald Löhner., John Wiley & Sons, 2001.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
(AUTONOMOUS)

I M.Tech-II Sem (TE)

PROFESSIONAL ELECTIVE COURSE (PEC)-IV
(18ME3119) Modelling of I.C Engines

L	T	C
3	0	3

***Course Objectives*:**

- *To learn the combustion chamber modeling*
- *To learn about Thermodynamic Combustion Models of CI Engines.*
- *To learn about Modeling of charging system*
- *To learn about Simulation of Otto cycle*

***Course Outcomes*:**

Students undergoing this course are able to

- *Understand the approaches of modeling, model building and integration methods*
- *Understand the concept fuel spray behavior*
- *Understand the Mathematical models of SI Engines*

UNIT- I

Fundamentals: Governing equations, Equilibrium charts of combustion chemistry, chemical reaction rates, and approaches of modeling, model building and integration methods, gas exchange through valves, engine and porting geometry, exhaust gas recirculation, valve lift curves.

UNIT- II

Thermodynamic Combustion Models of CI Engines: Single zone models, premixed and diffusive combustion models, combustion heat release using wiebe function, wall heat transfer correlations, ignition delay, internal energy estimations, two zone model, application of heat release analysis.

UNIT- III.

Fuel spray behavior: Fuel injection, spray structure, fuel atomization, droplet turbulence interactions, droplet impingement on walls.

UNIT- IV.

Modeling of charging system: Constant pressure and pulse turbo charging, compressor and turbine maps, charge air cooler.

UNIT- V.

Mathematical models of SI Engines: Simulation of Otto cycle at full throttle, part throttle and supercharged conditions. Progressive combustion, Auto ignition modeling, single zone models, mass burning rate estimation, SI Engine with stratified charge. Friction in pumping, piston assembly, bearings and valve train etc. friction estimation for warm and warm up engines.

Text Books:

1. *I.C. Engines*, Haywood, Mc Graw Hill, 2001
2. *Internal Combustion Engine Modeling***.** Ramos J, Hemisphere Publishing Company, 2009
3. *Operation Principles of Operation and Simulation Analysis*", Springer, 2009.

Reference Books:

1. *Internal Combustion Engines*, V. Ganeshan, Tata McGraw Hill, New Delhi, 1996
2. *Modeling Diesel Combustion*, P.A. Lakshmi Narayanan and Y. V. Aghav, Springer, 2010
3. *Diesel Engine Reference Book*, Bernard Challen and Rodica Baranescu, Butterworth-Heinemann, 1999.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
(AUTONOMOUS)

I M.Tech-II Sem (TE)

(18ME3107) Computational Fluid Dynamics Lab

L	P	C
0	4	2

***Course Objectives*:**

- *To learn about the basic governing equations.*
- *To learn about finite volume method*
- *To learn about Solution of N-S Equations for Incompressible Flows*

***Course Outcomes*:**

Students undergoing this course are able to

- *Understand the experimental and hyperbolic equations.*
- *Understand the geometry modeling and Grid Generation*
- *Understand the methodology of computational fluid dynamics*

List of Experiments

1. Simulation of Plane Poiseuille flow through long Parallel and Stationary Plates and Plotting Velocity Contours and Velocity Variation along the horizontal central line. Take the distance between the plates as 4 cm. Properties of fluid are v=0.000217 m^2/s p=800 kg/m^2

2. Simulation of Couette flow when the upper plates are moving with a velocity of 40 m/s. Take the distance between the plates as 4 cm properties of fluid are v=0.000217 m^2/s, p=800 kg/m^3. Make simulations for a pressure gradient of 0-30000 $N/m^2/m$ and 20000 N m^2/m and report the variation of velocity contours for each case

3. Simulation of a channel flow (Tube flow) for a tube of diameter. 5 cm and take the fluid As water at 30^0C at the entry of the tube of length 0.7m. A heat flux of 3000 W/m^2 is Imposed along a wall. Obtain the contours of velocity and temperature along the length of the tube and also obtain the center line temperature and velocity of fluid.

4. Simulation of a channel flow (Tube flow) for a tube of diameter 5 cm and take the fluid as water at 30^0C at the entry of the tube length 0.7m . A Constant wall temperature of 300^0C is imposed along the wall. Obtain the contours of Velocity and temperature along the length of the tube and also obtain the center line temperature and velocity of fluid.

5. Unsteady simulation of compressible flow of air through 2D a convergent – Divergent nozzle, with inlet and outlet of 0.2m size and both are joined by a throat section where the flow area is reduced by 10% and is of sinusoidal shape. Air enters the nozzle at a pressure of 0.9 bar and leaves at 0.73 bar. Obtain the contours of velocity, pressure and Mach number.

6. Simulation of flow over a circular cylinder of size 5 cm for different Reynold's number values of air and plotting the contours of velocity and vorticity

7. Simulation of temperature counters for a square plate of size 0.2m subjected to different types of boundary conditions.

8. Simulation of temperature counters for a pin fin in natural and forced convective conditions.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
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I M.Tech-II Sem (TE)

(18ME3108) Thermal Engineering Virtual Lab

L	P	C
0	4	2

***Course Objectives*:**

- *To learn about the basic rise of tylor bubble through vertical circular conditions.*
- *To learn about cryogenic vessel*
- *To learn about Solution of* Conductivity Probes and Signals in Two-Phase Flow.

***Course Outcomes*:**

Students undergoing this course are able to

- *Understand the experimental and Bubble Generation, Growth and Departure from a Submerged Orifice.*
- *Understand the Virtual Lab on Steam Condensation in Micro channels*
- *Understand the methodology of Torque Crank Angle Curve of a SI Engine*

Advanced Thermal Engineering Lab

- Rise of Taylor Bubble through Vertical Circular Conduits.
- Gas-Liquid Two-Phase Flow through a Vertical Tube.
- Evaporation Loss from a Cryogenic Vessel
- Characteristics of an Air Lift Pump
- Conductivity Probes and Signals in Two-Phase Flow.
- Bubble Generation, Growth and Departure from a Submerged Orifice.
- Virtual Lab on Steam Condensation in Micro channels
- Two phase flow in a natural circulation loop

Remote Triggered Virtual Lab on Automotive Systems

- PV Diagram of a SI Engine
- Torque Crank Angle Curve of a SI Engine
- Load Test on a SI Engine
- Mechanical Efficiency of a SI Engine
- Determination of Cylinder Mean Effective Pressure.
- Engine Health Monitoring by Vibration Analysis
- Variation of Exhaust Noise with Engine Speed
- Torsional Vibrations of an Engine

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
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I M.Tech - II Sem (TE)

(18HS0829) Constitution of India

L	T	C
2	0	0

Course Objectives:

Students will be able to:

- *Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.*
- *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 of nationhood in the early years of Indian nationalism.*
- *To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.*

Unit-I

History of Making of the Indian Constitution:

History, Drafting Committee, (Composition & Working)

Unit-II

Philosophy of the Indian Constitution: Preamble, Salient Features.

Unit-III

Contours of Constitutional Rights & Duties:

Fundamental Rights- Right to Equality- Right to Freedom- Right against Exploitation- Right to Freedom of Religion- Cultural and Educational Rights- Right to Constitutional Remedies Directive Principles of State Policy- Fundamental Duties.

Unit-IV

Organs of Governance: Parliament- Composition- Qualifications and Disqualifications- Powers and Functions- Executive- President- Governor- Council of Ministers- Judiciary, Appointment and Transfer of Judges, Qualifications- Powers and Functions

Unit-V

Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation.

Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO ZilaPachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

Election Commission:

Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

Text Books:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
(AUTONOMOUS)

I M.Tech - II Sem (TE)

(18HS0827) Pedagogy Studies

L	T	C
2	0	0

Course Objectives:

Students will be able to:

- *Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers.*
- *Identify critical evidence gaps to guide the development.*

Course Outcomes

Students will be able to understand:

- *What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?*
- *What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?*
- *How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?*

Unit-I

Introduction and Methodology: Aims and rationale, Policy background, Conceptual framework and Terminology. Theories of learning, Curriculum, Teacher education.Conceptual framework, Research questions**.** Overview of methodology and Searching.

Unit-II

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

Unit-III

Evidence on the effectiveness of pedagogical practices: Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.

Unit-IV

Professional development: alignment with classroom practices and follow-up support. Peer support Support from the head teacher and the community. Curriculum and assessment Barriers to learning: limited resources and large class sizes

Unit-V

Research gaps and future directions: Research design – Contexts- Pedagogy- Teacher education- Curriculum and assessment- Dissemination and research impact.

Text Books:

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
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I M.Tech - II Sem (TE)

(18HS0828) Stress Management by Yoga

L	T	C
2	0	0

Course Objectives:

- *To achieve overall health of body and mind*
- *To overcome stress*

Course Outcomes:

Students will be able to:

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

Unit-I

Definitions of Eight parts of yoga (Ashtanga)

Unit-II

Yam and Niyam. Do`s and Don'ts in life:

i) Ahinsa, satya, astheya, bramhacharya and aparigraha.

ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan.

Unit-III

Asan and Pranayam:

i) Various yog poses and their benefits for mind & body.

ii) Regularization of breathing techniques and its effects-Type of pranayam.

Text Books:

1. 'Yogic Asanas for Group Tarining-Part-I" :Janardan Swami Yogabhyasi Mandal, Nagpur Model Curriculum of Engineering & Technology PG Courses [Volume-I] [47].
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, AdvaitaAshrama (Publication Department) Kolkata.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
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I M.Tech - II Sem (TE)

(18HS0819) Personality Development through Life Enlightenment Skills

L	T	C
2	0	0

Course Objectives:

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

Course Outcomes

Students will be able to:

- *Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life.*
- *The person who has studied Geeta will lead the nation and mankind to peace and prosperity.*
- *Study of Neetishatakam will help in developing versatile personality of students.*

Unit-I

Neetisatakam-Holistic development of personality

Verses- 19,20,21,22 (wisdom)
Verses- 29,31,32 (pride & heroism)
Verses- 26,28,63,65 (virtue)
Verses- 52,53,59 (dont's)
Verses- 71,73,75,78 (do's)

Unit-II

Approach to day to day work and duties.
Shrimad BhagwadGeeta : Chapter 2-Verses 41, 47,48,
Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35,
Chapter 18-Verses 45, 46, 48.

Unit-III

Statements of basic knowledge.
Shrimad BhagwadGeeta: Chapter2-Verses 56, 62, 68
Chapter 12 -Verses 13, 14, 15, 16,17, 18
Personality of Role model. Shrimad BhagwadGeeta:
Chapter2-Verses 17, Chapter 3-Verses 36,37,42,
Chapter 4-Verses 18, 38,39
Chapter18 – Verses 37,38,63

Text Books.

1. "Srimad Bhagavad Gita" by Swami SwarupanandaAdvaita Ashram (Publication Department), Kolkata.
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath, 4. Rashtriya Sanskrit Sansthanam, New Delhi.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
(AUTONOMOUS)

II M.Tech-I Sem (TE)

PROFESSIONAL ELECTIVE COURSE (PEC)-V
(18ME3120) Design of Solar and Wind Systems

L	T	C
3	0	3

***Course Objectives*:**

- *To learn about Alternative energy sources*
- *To learn about Solar Energy and Nuclear Energy*
- *To learn about Wind Energy Characteristics.*
- *To learn about Availability of Geothermal Energy and bio chemical methods of hydrogen production*

***Course Outcomes*:**

Students undergoing this course are able to

- *Understand the prediction & measurement, Solar energy utilization.*
- *Understand the concepts Nuclear Waste Disposal and Nuclear Fusion.*
- *Understand the concepts of Wind Energy Conversion Systems and Various Types of Systems to use Geothermal Energy*
- *Understand the Direct Energy Conversion*

UNIT - I:

Introduction to Conventional sources of energy, Alternative energy sources,

Solar Energy: Solar Radiation–Capturing Solar Radiation- Types of Collectors–Concentric Solar Power (CSP)- Applications. Solar Radiation-estimation, prediction & measurement, Solar energy utilization.

UNIT - II:

Nuclear Energy: Potential of Nuclear Energy, International Nuclear Policies and Regulations. Nuclear Energy Technologies – Fuel enrichment, Different types of Nuclear Reactors, Nuclear Waste Disposal and Nuclear Fusion.

UNIT - III:

Wind Energy: Wind Energy Characteristics–Site Location Factors–Wind Energy Conversion Systems – Betz Model-Applications

Geothermal Energy : Availability of Geothermal Energy-size and Distribution , Various Types of Systems to use Geothermal Energy , Direct heat applications , Power Generation using Geothermal Heat, Sustainability of Geothermal Sources, Status of Geothermal Technology , Economics of Geothermal Energy.

UNIT - IV:

Hydrogen Energy: Hydrogen as a renewable energy source, Hydrogen Fuel for Vehicles. **Hydrogen Production:** Direct electrolysis of water, thermal decomposition of water, biological and bio chemical methods of hydrogen production.

Storage of Hydrogen: Gaseous, Cryogenic and Metal hydride

UNIT - V:

Direct Energy Conversion: introduction – Fuel Cells – Thermo-electric energy - Magneto Hydrodynamic Generators – Photo voltaic cell.

Text Books:

1. *Renewable Sources of Energy and Conversion Systems*, N.K.Bansal and M.K Kleeman, 2007.
2. *Principles of Thermal Process*, Duffie, Beckman, 2010.
3. *Solar Energy Handbook*, Kreith and Kreider (McGrawHill), 2006.

Reference Books:

1. *Suitable Energy*, Choosing Among Options, Jefferson, 2010.
2. *Renewable Energy Sources*, John Twidell & Tony Weir, Taylor & Francis, 2006.
3. *Hydrogen Technology for Energy*, D.A.Maths (Noyes Data Corp.), 2002.
4. Handbook, *Batteries and Fuel cell*, Linden (MC. Graw Gill), 2010.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
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II M. Tech-I Sem (TE)

PROFESSIONAL ELECTIVE COURSE (PEC)-V
(18HS0839) Advanced Mathematical Methods in Engineering

L	T	C
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Course Objectives:

- *To develop the essential tool of Ordinary and Partial Differential Equations in a comprehensive manner.*
- *To train the students thoroughly in Mathematical concepts fundamentals of probability, test of hypothesis, Test of significance.*
- *To prepare students for lifelong learning and successful careers using mathematical concepts of probability, test of hypothesis, Test of significance.*
- *To develop the skill pertinent to the practice of the mathematical concepts including the Student abilities to formulate and modeling the problems, to think creatively and to Synthesize information*

Course Outcomes:

At the end of the course, students will demonstrate the ability to:

- *Students will be able to analyse and develop the mathematical model of thermal system.*
- *Student should able analyse the reliability and maintainability of the series and parallel thermal system.*
- *Students will be able to solve differential equations using numerical techniques.*

UNIT-I
Ordinary Differential Equations:

First-order equations (Linear, Equidimensional, Separable,Exact, Homogeneous,); Second-order linear differential equations (homegeneous and non-homogeneous); Solution methods such as undertermined coefficients and variation of parameters.

UNIT-II
Partial Differential Equations:

First order partial differential equations; Second order linear partial differential equations; Canonical forms; Fourier series, Second order equation (Parabolic, Elliptic and Hyperbolic) in rectangular system;

UNIT-III

Solution techniques such as separation of variables, eigen function expansions, integral transforms (Fourier and Laplace transforms); D'Alembert's solution for the Wave equation;

Maximum principle for Elliptic equations; Variational methods for approximate solutions of differential equations.

UNIT-IV

Standard discrete and continuous distributions like Binomial, Poisson, Normal, Exponential etc. Central Limit Theorem and its significance. Some sampling distributions like chi-square, t, F.

UNIT-V

ANOVA:

One–way,Two – way with/without interactions, Latin Squares ANOVA technique, Principles of Design Of Experiments, some standard designs such as CRD, RBD, LSD.

Text/References:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 42nd Edition,2000.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.
3. J.B. Doshi, "Differential Equations for Scientists and Engineers", Narosa, 2010.
4. Peter O'Neil, "Advanced Engineering Mathematics", Seventh Edition, Cengage Learning, 2012 (Indian Edition).
5. Michael Greenberg, "Advanced Engineering Mathematics", Second Edition, Pearson Education, 2002 (Indian Edition).
6. Jennings. A., Matrix Computation for Engineers and Scientists. John Wiley and Sons, 1992.

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M.Tech – T.E

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
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II M.Tech-I Semester (TE)

L	T	C
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OPEN ELECTIVE
(18HS0824) Business Analytics

Course Objective:

- *The course is to understand the management and administration,*
- *functions of management, formal and informal organization, staffing,*
- *creativity and innovation, process of communication.*

Course Outcomes:

- *Design, device, and query relational databases for operative data.*
- *Design, implement, populate and query data warehouses for informational data.*
- *To integrate very large data sets to make business decisions.*
- *Evaluate the use of data from acquisition through cleansing, warehousing, analytics, and visualization to the ultimate business decision.*

Unit I

Introduction to Descriptive analytics, Descriptive Statistics, Probability Distributions, Inferential Statistics through hypothesis tests, Permutation & Randomization Test

Unit II

Regression, ANOVA (Analysis of Variance), Machine Learning Introduction and ConceptsDifferentiating, algorithmic and model based frameworks, Regression: Ordinary Least Squares, Ridge Regression, Lasso Regression, K Nearest Neighbors', Regression &Classification

Unit III

Supervised Learning with Regression and Classification techniques- Bias-Variance Dichotomy, Model Validation Approaches, Logistic Regression, Linear DiscriminantAnalysis, Quadratic Discriminant Analysis, Regression and Classification Trees, Support Vector Machines, Ensemble Methods: Random Forest, Neural Networks, Deep learning

Unit IV

Unsupervised Learning and Challenges for Big Data Analytics- Clustering, Associative Rule Mining, Challenges for big data analytics

Unit V

Prescriptive analytics Creating data for analytics through designed experiments, creating data for analytics through Active learning, creating data for analytics through Reinforcement learning, Graph Visualization, Data Summaries, Model Checking & Comparison

References:

1. Hastie, Trevor, et al. The elements of statistical learning.Vol.2.No. 1. New York: springer, 2009.

2. Montgomery, Douglas C., and George C. Runger. Applied statistics and probability for engineers. John Wiley & Sons, 2010

3. Bekkerman et al. Scaling up Machine Learning

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M.Tech – T.E

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
(AUTONOMOUS)

II M.Tech-I Semester (TE)

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OPEN ELECTIVE
(18ME3121) Industrial Safety

Course Learning Objectives:

- *To learn about mechanical and electrical hazards.*
- *To learn about P mechanical and electrical hazards.*
- *To learn about Wear and Corrosion and their prevention.*
- *To learn about Periodic and preventive maintenance.*

Course Outcomes:

Students undergoing this course are able to

- *Understand the points of factories act 1948 for health and safety.*
- *Understand the cost & its relation with replacement economy.*
- *Understand the concepts of sequence of fault finding activities*
- *Understand the Program and schedule of preventive maintenance of mechanical and electrical equipment.*

UNIT-I:

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

UNIT-II:

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

UNIT-III:

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

UNIT-IV:

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

UNIT-V:

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

Text Books:

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

Reference Books:

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

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(AUTONOMOUS)

II M.Tech - I Sem (TE)

OPEN ELECTIVE **L T C**
(18ME3021) Advances in Operations Research **3 0 3**

Course Educational Objectives:

- *To provide knowledge and training in using optimization techniques under limited resources for the engineering and business problems*

Course Outcomes:

Students undergoing this course are able to

- *Upon completion of this course, the students can able to use the optimization techniques for use engineering and Business problems*

UNIT-I

Introduction to OR and Linear Programming-OR definition– Classification of Models –Types of Operations Research models; Linear Programming- Problem Formulation, Graphical Method, Simplex Method, Big-M Method, Duality, Dual Simplex Method Degeneracy.

UNIT-II

Transportation Problem – Formulation; Different Methods of Obtaining Initial Basic Feasible Solution-North-West Corner Rule, Least Cost Method, Vogel's Approximation Method Modified Distribution (MODI) Method, Unbalanced Transportation Problem, Degenerate Problem. Assignment Problem – Formulation, Optimal Solution -Traveling Salesman problem.

UNIT-III

Game Theory - Introduction – Minimax (Maximin) Criterion and Optimal Strategy, Saddle Point, Solution of Games with Pure Strategy –Games with Mixed Strategies – 2 X 2 Games – Dominance Principle– Solution by Graphical Method of m X 2 & 2 X n games.

Queuing Theory- Introduction –Terminology, Service Channel, Arrival Pattern, Population, Departure Pattern(Service Pattern), Queue Discipline, Birth & Death Process, Balking, Reneging, Jockeying; Single Channel Models with Poisson Arrivals, Exponential Service Times with finite queue length and non-finite queue length; Multichannel Models with Poisson Arrivals, Exponential Service Times with finite queue length and nonfinite queue length.

UNIT-IV

Sequencing -Assumptions-n-jobs x 2 Machines model, n-jobs x 3 machines models. PERT & CPM: Introduction to Project Management, Activities, Events, Predecessor Relationships, AOA Diagram, Early Start, Early Finish, Late Start & Late Finish Times, Earliest Occurrence and Latest Occurrence of the Event, Total Float, Free Float, Independent Float CPM- Deterministic

Model- Critical Path, Crashing, Optimal Project Duration, Least Possible Project Duration ,PERT-

Probabilistic Model- Various types of Activity Time Estimates, Standard Deviation and Variance of the Activities and Projects, and Probability of Completing the Project within scheduled time.

UNIT-V

Dynamic Programming - Introduction – Bellman's Principle of Optimality – Applications of Dynamic Programming- Capital Budgeting Problem – Shortest Path Problem. Introduction to maintenance– Types of Maintenance, Types of Replacement Problem, Determination of Economic Life of an Asset, and Simple Probabilistic Model for Items which completely fail-Individual Replacement Model, Group Replacement Model.

Text Books:

1. *Operations Research* by R Panneerselvam, PHI, 2nd edition, 2012.
2. *Operations Research* by Manohar Mahajan DhanpatRai & Co, 2013

References:

1. *Operations Research* by Er. Premkumar Guptha & Dr.D.S. Hira

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II M.Tech - I Sem (TE)

OPEN ELECTIVE **L T C**
(18CE1028) Cost Management of Engineering Projects **3 0 3**

Course Objectives:

- *To Implement CPM and PERT concepts in construction*
- *To provide techniques to develop personal skills of practical use in the Management and implementation of Civil Engineering projects*
- *To know the Management techniques, the development of personal, interpersonal and Project Management skills*
- *To provide a fundamental of understanding of the social, economic, resource management within which the Construction Project takes place.*

Course Outcomes:

After completion of this course, the student shall be able to

- *Implement generic and special Construction Project Management skills to a higher level*
- *Understand the special management skills required in multidisciplinary and global Construction Industry*
- *Integrate and apply theoretical concepts, ideas, tools and techniques to Construction practice.*
- *Can plan, execute, monitor and control construction projects using Construction Project Management Tools such as CPM & PERT*

UNIT-I

FUNDAMENTALS OF CONSTRUCTION TECHNOLOGY: Definitions and Discussion – Construction Activities – Construction Processes - Construction Works – Construction Estimating – Construction Schedule – Productivity and Mechanized Construction – Construction Documents – Construction Records – Quality – Safety – Codes and Regulations.

PREPARATORY WORK AND IMPLEMENTATION: Site layout – Infrastructure Development – Construction Methods – Construction Materials – Deployment of Construction Equipment – Prefabrication in Construction – False work and Temporary Works

UNIT- II

EARTH WORK: Classification of Soils – Project Site – Development – Setting Out - Mechanized Excavation – Groundwater Control – Trenchless (No-dig) Technology – Grading – Dredging. Rock Excavation – Basic Mechanics of Breakage – Blasting Theory – Drillability of Rocks – Kinds of Drilling – Selection of the Drilling Method and Equipment – Explosives – Blasting Patterns and Firing Sequence – Smooth Blasting – Environmental Effect of Blasting

UNIT-III

PROJECT MANAGEMENT AND BAR CHARTS AND MILESTONE CHARTS:

Introduction – Project planning – Scheduling – Controlling – Role of decision in project management – Techniques for analyzing alternatives Operation research – Methods of planning and programming problems – Development of bar chart – Illustrative examples – Shortcomings of bar charts and remedial measures – Milestone charts – Development of PERT network problems.

UNIT- IV

ELEMENTS OF NETWORK AND DEVELOPMENT OF NETWORK: Introduction – Event – Activity – Dummy – Network rules – Graphical guidelines for network – Common partial situations in network – Numbering the events – Cycles Problems – Planning for network construction – Modes of network construction – Steps in development of network – Work breakdown structure –Hierarchies – Illustrative examples – Problems.

UNIT-V

PERT: Uncertainties: Use of PERT – Time estimates – Frequency distribution – Mean, variance and standard deviation – Probability distribution – Beta distribution – Expected time Problems - Earliest expected time – Formulation for T_E - Latest allowable occurrence time – Formulation for T_L - Combined tabular computations for T_E and T_L problems.

CPM: Slack – Critical path – Illustrative examples – Probability of meeting scheduled date Problems – CPM: process – CPM: Networks – Activity time estimate – Earliest event time – Latest allowable occurrence time – Combined tabular computations for T_E and T_L - Start and finish times of activity – Float – Critical activities and critical path – Illustrative examples Problems.

Text Books:

1. Construction Technology by Subir K. Sarkar and Subhajit Saraswati, Oxford Higher Education- Publishing, Univ.Press, Delhi.
2. Project Planning and Control with PERT and CPM by Dr.B.C. Punmia, K.K. Khandelwal, Lakshmi Publications New Delhi.

Reference Books:

1. Optimal design of water distribution networks by P.R. Bhave, Narosa Publishing house 2003.
2. Total Project management, the Indian context by: P.K.JOY, Mac Millan Publishers India Limited.
3. Construction project management by Jha, Pearson publications, New Delhi.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
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II M.Tech - I Sem (TE)

OPEN ELECTIVE
(18ME3022) Composite Materials

L	T	C
3	0	3

Course Educational Objectives:

- *To understand the mechanical behavior of composite materials*
- *To get an overview of the methods of manufacturing composite materials.*

Course Outcomes:

- *Upon completion of this course, the students will have an overview of the mechanical behavior and application of composite materials.*

UNIT-I:

Introduction To Composites

Fundamentals of composites – need– enhancement of properties – classifications —Introduction to Reinforcement composites–types. Applications. Fiber production techniques for glass, carbon and ceramic fibers –Resin materials-Types.

UNIT-II:

Polymer Matrix Composites

Fabrication of PMC's :- Fabrication of Fibers, Plastic Fiber Forms, Prepregs, Molding Compounds-Processes, Lay-Ups, Filament Winding, Pultrusion, and Recycling. ; Matrix – Reinforcement Interface, Wettability.

UNIT-III:

MMC&CMC

Fabrication of MMC'S: Liquid Infiltration- Casting, Solid State Processes-Diffusion Bonding &In Situ Technique.

Fabrication of CMC's: Hot-Pressing, Infiltration, In Situ Chemical reaction Techniques.CVD& CVI, Sol-gel.

UNIT-IV:

Mechanics of Composites:

Basic assumptions of laminated anisotropic plates, symmetric laminates, angle ply laminates, cross ply laminates, laminate structural moduli, evaluation of lamina properties, determination of lamina stresses, maximum stress and strain criteria, von Mises Yield criterion for isotropic materials, generalized Hill's criterion for anisotropic materials, Tsai-Hill's criterion for composites, prediction of laminate failure, thermal analysis of composite laminates

UNIT-V :

Applications Of Composites

Applications of advanced composite materials. Environmental effects in Composites, Green composites, Synthesis and Properties of Nano composites. Surface Composites & Surface metal matrix composites: Need, Synthesis, Properties and applications.

Text Books:

1. Mathews F. L. and Rawlings R. D., "Composite Materials: Engineering and Science", 1st Edition, Chapman and Hall, London, England, 1994.
2. Chawla K. K., "Composite materials", Second Edition, Springer – Verlag, 1998.

References:

1. Clyne, T. W. and Withers, P. J., "Introduction to Metal Matrix Composites", Cambridge University Press, 1993.
2. Strong, A.B., "Fundamentals of Composite Manufacturing", SME, 1989.
3. Sharma, S.C., "Composite materials", Narosa Publications, 2000.

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
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II M.Tech - I Sem (TE)

OPEN ELECTIVE
(18EE2128) Waste to Energy

L	T	C
3	0	3

Course Educational Objectives:

- *To understand the importance of gaining energy from the waste*
- *To Understand and analyze the pattern of renewable energy resources Suggest methodologies / technologies for its utilization Economics of the utilization and environmental aspects.*
- *To undusted the need and production of for bio gas.*

Course Outcomes:

- *Upon completion of this course, the students can able to identify the new methodologies / technologies for effective utilization of renewable energy sources.*

UNIT-I

INTRODUCTION TO ENERGY FROM WASTE:

Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors.

UNIT-II

BIOMASS PYROLYSIS:

Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods -Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

UNIT-III

BIOMASS GASIFICATION:

Gasifiers – Fixed bed system – Downdraft and updraft gasifiers –Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

UNIT-IV

BIOMASS COMBUTION:

Biomass stoves – Improved chullahs, types, some exotic designs, fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

UNIT-V

PROPERTIES OF BIOGAS (CALORIFIC VALUE AND COMPOSITION)

Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical

conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

REFERENCES:

1. Non-Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.
3. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
4. Biomass Conversion

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
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II M.Tech-I Sem (TE)

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(18ME3009)Dissertation Phase-I

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II M.Tech-II Sem (TE)

L	P	C
0	32	16

(18ME3010)Dissertation Phase-II

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