### Semester I

<table>
<thead>
<tr>
<th>Course code</th>
<th>Name of the Subject</th>
<th>Teaching scheme Hrs per week</th>
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<tr>
<td>MTE 601</td>
<td>Advanced Thermodynamics</td>
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<td>MTE 602</td>
<td>Advanced Heat Transfer</td>
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<td>MTE 621</td>
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### Elective – I
- MTE 641-A Computational Fluid Dynamics
- MTE 641-B Cryogenics Engineering
- MTE 641-C Tribology

### Elective – II
- MTE 691-A Energy Management in Thermal Systems
- MTE 691-B Design of Thermal Systems
- MTE 691-C Simulated Design of Solar Engineering System

L: Lecture hours per week  
T: Tutorial Hours per week  
P: Practical hours per week  
CH: Contact hours

**Total Credits = SEM I + SEM II + SEM III + SEM IV**  
= 24 + 24 + 12 + 20  
= 80
Semester I

MTE 601 ADVANCED THERMODYNAMICS

Teaching Scheme:
Theory: 3 hrs per week
Tutorial: 1 hrs per week
Credit: 4

Examination Scheme:
Theory: 80 Marks (3 hrs.)
Class Test: 20 Marks (1 hr)


Unit II The Two Laws Combined: Review on some consequences of first Law, Limitations of first Law, Thermodynamic Temperature Scale, Clausius-Clapeyron Equation, Stefan’s Law, Helmholtz and Gibbs Functions, Availability in Steady Flow, Irreversibility and Effectiveness, Combined First and Second Laws, Isothermal and Adiabatic Compressibility; Joule-Kelvin Coefficient, Maxwell Equation, Vander Wall's Gas Equation; (5 hrs.)

Unit III The Destruction Of Exergy: Lost Available Work, Mechanisms of Entropy Generation or Exergy Destruction, Entropy Generation Minimization. (5 hrs.)

Unit IV Multi Phase Systems: General considerations, Dalton & Amagat Model, Mixture of gases and vapors. Changes in Molar Properties upon Mixing, Gibbs Entropy Equation and Gibbs -Duhem Equation. (5 hrs.)


Unit VI Thermodynamic Optimization: Exergy analysis of Vapor and Gas Power Cycles, Guideline for improving Thermodynamic Effectiveness; Exergy analysis of Simple Power Plant (Steam Plant) (5 hrs.)

Recommended Books:

MTE 602 ADVANCED HEAT TRANSFER

Teaching Scheme:
Theory: 3 hrs per week
Tutorial: 1 hrs per week
Credit: 4

Examination Scheme:
Theory: 80 Marks (3 hrs)
Class Test: 20 Marks (1 hr)

Unit I Conduction heat transfer: General heat conduction equation in Cartesian, cylindrical and spherical co-ordinates – Composite geometries – Variable thermal conductivity – Uniform heat generation- Extended surfaces - Two and three dimensional heat conduction – Numerical and analytical methods. (3 hrs.)

Unit II Transient Heat Conduction: General Lumped capacitance analysis, spatial effects, plane wall with convection, Transient heat flow in semi infinite solid-const, Multidimensional systems, use of Heisler chart, heat conduction with moving boundary – heat conduction in melting and solidification, moving heat source. (5 hrs.)

Unit III Convective Heat Transfer: Boundary layers – Continuity, momentum and energy equations, Boundary layers equations, Dimensional analysis, Exact and approximate solutions to forced convection in laminar and turbulent, internal and external flow. Reynolds and Colburn analogies, forced convection correlations, Solution to free convection problems, Heat transfer at high velocity and incompressible fluid, Liquid metal heat transfer. (5 hrs.)

Unit IV Radiation heat transfer: Basic laws of radiations, Emissive power, Stefan–Boltzmann’s Law, Lambert’s Law, Wien’s Law and Kirchhoff’s laws, Emissivity, Radiation intensity. (2 hrs.)

Unit V Radiative exchange between black isothermal surfaces: Diffuse grey surface, Reflecting surfaces, Radiation shape factor, Shape factor algebra, Radiation shields. Combined convective and radiation, Electrical network analogy solution, Radiosity, Solar radiation, Radiation from gases and vapours. (5 hrs.)

Unit VI Boiling and condensation heat transfer with phase change: Boiling and Condensation, Flow boiling, Correlations. (5 hrs.)

Unit VII Mass Transfer – Concentration, velocities, Mass fluxes Fick’s law, Species – Conservation equation – Steady state molecular diffusion, Equimolar counter diffusion, diffusion through a stagnant gas film. (5 hrs.)

Books Recommended: (Note: Heat transfer data book will be permitted in Exam hall)
MTE 603 RESEARCH METHODOLOGY

Teaching Scheme:                                                                 Examination Scheme:
Theory: 3 hrs per week                                               Theory: 80 Marks (3 hrs)
Tutorial: 1 hrs per week                                               Class Test: 20 Marks (1 hr)
Credit: 4

Unit. I Research Concept: Concept, meaning, objectives, motivation; Types of research, approaches (descriptive research, conceptual, theoretical, applied and experimental research) (2 hrs.)

Unit. II Formulation of Research Task: Literature Review: importance & methods, sources, field study, laboratory experiments, critical analysis of already generated facts, hypothetical proposal for future development and testing, selection of research task, prioritization of research, introduction to hypothesis testing. (3 hrs.)

Unit. III Mathematical Modeling and Simulation: Concept of modeling, classification of mathematical models, modeling with ordinary differential equations, differential equations, partial differential equations, graphs. Simulation concept, types (quantitative, experimental, computer, statistical), process of formulation of model based on simulation. (4 hrs.)

Unit. IV Experimental Modeling: Definition of experimental design, examples, single factor experiments, guidelines for designing experiments. (2 hrs.)

Unit. V General model of process: Input factors/variables, Output parameters/variables, controllable/ uncontrollable variables, dependent/ independent variables, compounding variables, extraneous variables and experimental validity. (4 hrs.)

Unit. VI Process optimization and designed experiments: methods for study of response surface, First order design. Determining optimum combination of factors, determination of steepest ascent, Taguchi approach to parameter design. (3 hrs.)

Unit.VII Analysis of Results (Parametric and Non parametric, Descriptive and Inferential Data): types of data, Methods and techniques of data collection, sampling and sample design, Non parametric test, error analysis, analysis of variance, significance of variance, analysis of co-variance, multiple regression, Introduction to Analytical hierarchical process, Factor analysis, Cluster analysis, Fuzzy logic, testing linearity/ non linearity of model, testing adequacy of model. (5 hrs.)

Unit. VIII Report Writing: types of report, layout of research report, interpretation of results, layout and format, style of writing, typing, references, pagination, tables, figures, conclusions, appendices. (3 hrs.)
Unit. IX Landscape of Creativity: Convergent Vs. divergent thinking, creativity, creativity Vs intelligence, creativity abilities, determination of Creativity, increasing creativity, creative achievement, techniques of creativity, collective creativity. (4 hrs.)

Books Recommended:

MTE 604 MODERN ENERGY SOURCES

Teaching Scheme:
Theory: 3 hrs per week
Tutorial: 1 hrs per week
Credit: 4

Examination Scheme:
Theory: 80 Marks (3 hrs)
Class Test: 20 Marks (1 hr)

Unit. I Solar Energy: Flat plate and concentrating collectors- design, analysis and performance, applications. Thermal Power, Photovoltaic power; Economic Analysis. (7 hrs.)

Unit. II Wind Energy: Atmospheric circulation, classification, factors influencing wind, wind shear, turbulence, wind speed monitoring, Betz limit, WECS: classification, characteristics, application, design aspects. (8 hrs.)

Unit. III Tidal and Ocean Energy: Applications, Design aspects, Power generation methods, various cycles and analysis. (5 hrs.)

Unit. IV Geothermal Energy And Magneto Hydrodynamics: Study of various components, Performance and methods of energy conversion. (5 hrs.)

Unit. V Nuclear Energy: Fusion and fission, study of various components, Design aspects, Performance and methods of power generation. (5 hrs.)

Books Recommended:
MTE 641-A COMPUTATIONAL FLUID DYNAMICS (ELECTIVE-I)

Teaching Scheme:
Theory: 3 hrs per week
Tutorial: 1 hrs per week
Credit: 4

Examination Scheme:
Theory: 80 Marks (3 hrs)
Class Test: 20 Marks (1 hr)

Unit. I Review of Governing Equations: Governing Equations of Fluid flow and heat transfer, review of numerical methods. (3 hrs.)

Unit. II Discretization: Introduction to finite differences, difference equations, explicit and implicit approaches: definition and contrasts, errors and analysis of stability. (6 hrs.)

Unit. III Classification of Partial Differential Equations: Explicit and Implicit methods, solution of select model equations; Laplace heat and wave equation, laminar boundary layer solution. (6 hrs.)

Unit. IV CFD Techniques: The lax-wendroff technique, Mac Cormack's technique, Relaxation technique and its use with low speed inviscid flows, aspects of numerical dissipation and dispersion; artificial viscosity, Alternating Direction Implicit (ADI) technique, pressure correction technique with application to incompressible viscous flow. (10 hrs.)

Unit. V Initial And Boundary Value Problems: Free falling of a spherical body, two dimensional motions of a body through a fluid radial flow. (5 hrs.)

Books Recommended:
MTE 641-B CRYOGENIC ENGINEERING (ELECTIVE-I)

Teaching Scheme:                                                   Examination Scheme:
Theory: 3 hrs per week                                           Theory: 80 Marks (3 hrs.)
Tutorial: 1 hr per week                                           Class Test: 20 Marks (1 hr)
Credit: 4


Unit. II Gas Separation and Purification - Principles - Plate Calculations - Air, Hydrogen and Helium separation systems. (8 hrs.)

Unit. III Cryogenic systems - Ideal and practical systems - Cryogenic Fluid Storage and Transfer systems - Storage vessels, Insulation - Two Phase Flow in Cryogenic Transfer Systems - Cool Down Process. (7 hrs.)

Unit. IV Cryogenic Fluid Vacuum Technology - Low Temperature Properties of Materials.
Properties of Cryogenic Fluids - Pump Down Time - Applications of Cryogenic Systems - Super Conductive Devices, Rockets and Space Simulation, Cryogenics in Biological and Medicine - Cryo pumping. (8 hrs.)

Books Recommended:

1. Randall Baron, Cryogenic System, Mc Graw Hill
3. Russel B Scott, Cryogenic Engineering, Van Nostrand
MTE 641-C TRIBOLOGY (ELECTIVE-I)

Teaching Scheme: 
Theory: 3 hrs per week 
Tutorial: 1 hrs per week 
Credit: 4

Examination Scheme: 
Theory: 100 Marks,(3 hrs) 
Class Test: 20 Marks (1 hr)

Unit. I Introduction - Tribology in design, Tribology in industry. Lubricants- Properties-physical and chemical, Types of additives, extreme pressure lubricants. Lubrication-introduction, basic modes of lubrication. (7 hrs.)

Unit. II Friction - friction measurement, theory of friction. Wear: Types of wear, various factors affecting wear, measurement of wear, wear between solids and liquids, theory of wear. Gas Lubrication. Lubrication in metal working: Rolling, Forging, Drawing and extrusion. (8 hrs.)

Unit. III Solid tribological coatings and materials – surface treatments –surface modification processes. (5 hrs.)

Unit. IV Tribological properties of metallic and ceramic coatings. (3 hrs.)

Unit. V Surface topography measurements - Electron microscope, friction and wear measurements. Use of transducers and instruments in Tribology- film thickness measurement using modern techniques – Development of test rigs for Tribology research. (7 hrs.)

Books Recommended:


MTE 621 LABORATORY PRACTICE-I

Teaching Scheme: Practical: 4 hrs per week
Credit: 2

Examination Scheme: Term Work: 50 Marks

Laboratory Practice shall constitute laboratory experiments, design, Simulation, Programming Assignments, Industrial Visits with reports and its outcome, etc. Any one experiment from the courses viz., Steam Turbine, Case study on Modern Energy Sources.

Steam Turbine Module/Test Rig (1 kW capacity) (50 Marks)
Steam turbine working principle, requirement, measure the steam turbine efficiency, steam quality, flow rate and condenser effectiveness

or

Case Study (25 Marks)
Thermal performance of domestic solar water heater installed for furnace water heater etc
Industrial visits with reports and its outcome
Identify the problems of biogas plant, operating or non operating, in nearby village

Term Work: Term Work will be based on the work carried out by student with respect to any one topic mentioned above.
The seminar shall consist of study of a particular topic based on 4-6 research papers or case study of industry. The marks shall be awarded as the basis of performance of the individual student during his/her seminar presentation. Each student is also required to submit a report based on above study in the prescribed format. Viva Voce will be based on the work carried out by student with respect to seminar topic.
MTE 623 THERMAL LAB-I

Teaching Scheme:  
Practical: 2 hrs per week  
Credit: 1

Examination Scheme:  
Viva voce: 50 Marks

Laboratory Practice shall constitute laboratory experiments on any one from the courses viz., Modern Energy Sources: Solar Water Heater, Solar Photovoltaic, Computational Fluid Dynamics (CFD-FLUENT).

Modern Energy Sources (25 Marks)


or

Fluid Dynamics (25 Marks)

Generation of streamlines, velocity potential, equi-pressure lines for some standard geometry such as, circular cylinder, square cylinder, plate, placed in (some) flowing fluid using standard software package such as FLUENT. Investigate the effect of various fluid properties on streamlines, velocity potential for some geometry used in experiment No. 1 above.

Viva Voce: Viva Voce will be based on the work carried out by student with respect to any one topic mentioned above.
Semester II

MTE 651 ADVANCED REFRIGERATION AND AIR CONDITIONING

Teaching Scheme:
Theory: 3 hrs per week
Tutorial: 1 hrs per week
Credit: 4

Examination Scheme:
Theory: 80 Marks (3 hrs)
Class Test: 20 Marks (1 hr)

Unit.I Actual vapor compression system – Multi-pressure vapour compression system – Environment friendly refrigerants – cascade system. (7 hrs.)

Unit.II Absorption refrigeration system – Three fluid absorption system – comparison of absorption with compression system - Analysis of multistage systems. (8 hrs.)

Unit.III Advanced psychometric calculations - Cooling load calculations – Determination of U factor short method calculation. (5 hrs.)

Unit.IV Low temperature refrigeration - Joule Thompson coefficient – liquefaction of air – hydrogen –helium - Applications of cryogenics. (5 hrs.)

Unit.V Room air distribution – Friction losses in ducts - Duct design, Air filters clean rooms – Air Curtain. (5 hrs.)

Term Work: It shall consist of at least four assignments based on above syllabus.

Books Recommended:

MTE 652 SOLAR THERMAL SYSTEMS AND GREEN BUILDING

Teaching Scheme:
Theory: 3 hrs per week
Tutorial: 1 hrs per week
Credit: 4

Examination Scheme:
Theory: 80 Marks (3 hrs)
Class Test: 20 Marks (1 hr)

Unit.I SOLAR RADIATION Availability- Measurement and Estimation - Introduction to Solar Collectors (Liquid Flat - Plate Collector, Air Heater and Concentrating Collectors) and Thermal Storage (PCM)- Steady State Transient Analysis - Solar Pond - Solar Refrigeration. (5 hrs.)

Unit.II SOLAR THERMAL SYSTEMS Active Systems - Water Heating Systems - Active and Passive - Passive Heating and Cooling of Buildings - Solar Distillation - Solar Drying. (5 hrs.)


Unit.VI GREEN BUILDING Background of Green/Solar building, both solar passive and active heating and cooling of buildings, various solar house concepts, Solar heating and cooling using Earth-air heat exchanger. Solar water heater applications in both residential and industrial sectors. Importance of Daylighting in building, Energy efficient building materials, Utility for natural thermal comfort buildings in rural and urban areas, Energy management in residential and office buildings, Emissions from construction sector of building. (5 hrs.)
**Books Recommended:**


**Websites:**

1. www.solstice.crest.orgl
2. www.res-ltd-com
3. www.maes.mic.in
4. www.ireada.org
MTE 653 I.C. ENGINE THEORY AND PERFORMANCE

Teaching Scheme:
Theory: 3 hrs per week
Tutorial: 1 hrs per week
Credit: 4

Examination Scheme:
Theory: 80 Marks (3 hrs)
Class Test: 20 Marks (1 hr)


Unit. II Compression ignition engines, Stages of combustion in C.I. Engine – Direct and indirect injection systems – Combustion chambers – Fuel spray behaviour – spray structure, spray penetration and evaporation – Air motion – Introduction to Turbo charging and supercharging. (8 hrs.)

Unit. III Alternative fuels, Alcohol, Hydrogen, Natural Gas Bio diesel, fuel cell. Other possible fuels and Liquefied Petroleum Gas-Properties, Suitability, Merits and Demerits as fuels, Engine Modifications. Dual fuel operation. (7 hrs.)

Unit. IV Recent trends, Lean Burn Engines – Stratified charge Engines – homogeneous charge compression ignition engines – Plasma Ignition – Zero Emission Vehicles, Engines for special applications – Mining, Defence, Off-highway -Tractor, Bulldozer etc. Submarines, Race car Engine systems, Flexible fuel systems. Surface ignition, (8 hrs.)

Books Recommended:

MTE 654 ADVANCED FLUID MECHANICS

Teaching Scheme:
Theory: 3 hrs per week
Tutorial: 1 hrs per week
Credit: 4

Examination Scheme:
Theory: 80 Marks (3 hrs)
Class Test: 20 Marks (1 hr)


Unit.II Laminar Flow of Viscous Incompressible Fluids: Introduction to compressible viscous flows, governing equations, Fanno and Rayleigh lines, normal and oblique shocks. Flow between parallel flat plates, couette flow, plane Poiseuille flow, flow between two co-axial cylinders, flow between two concentric rotating cylinder, unsteady motion of a flat plates. (8 hrs.)

Unit.III Exact Solution of Navier – Stokes Equation: Ideal and non-ideal flows, General equations of fluid motion, Navier-Stokes equations and their exact solutions, Hele Shaw flow stagnation point flow, creeping flow over sphere and circular cylinder. (8 hrs.)

Unit.IV Boundary- Basics, boundary layer theory, solutions to flow over external surfaces, flow through internal surfaces, integral methods, steady laminar and turbulent incompressible flows. (7 hrs.)

Books Recommended:

# MTE 691-A ENERGY MANAGEMENT IN THERMAL SYSTEMS (ELECTIVE II)

**Teaching Scheme:**
- **Theory:** 3 hrs per week
- **Tutorial:** 1 hrs per week
- **Credit:** 4

**Examination Scheme:**
- **Theory:** 80 Marks (3 hrs)
- **Class Test:** 20 Marks (1 hr)

## Unit I
**Importance of Energy Management. Energy Auditing:** Methodology, Analysis of Past Trends (Plant Data), Closing the Energy Balance, Laws of Thermodynamics, Measurements, Portable and on-line instruments. (7 hrs.)

## Unit II
**Co-generation Concept, Options** (Steam/Gas Turbines /Diesel Engine based), Selection Criteria, Control Strategy, Heat Exchanger Networking Concept of Pinch, Target Setting, Problem table Approach, Composite curves. Demand side Management. Financing Conservation. (8 hrs.)

## Unit III

## Unit IV
**Electrical Systems:** Demand Control, Power factor Correction, Load Scheduling / Shifting, Motor Drives - Motor Efficiency Testing, Energy Efficient Motors, Motor Speed Control. (6 hrs.)

## Unit V
**Lighting-** Lighting Levels, Efficient Options, Fixtures, Daylighting, Timers, Energy Efficient Windows (3 hrs.)

## Books Recommended:
   (http://www.beeindia.in/energy_managers_auditors/ema.php?id=4)
Unit.I Modeling of Thermal Systems: types of models, mathematical modeling, curve fitting, linear algebraic systems, numerical model for a system, system simulation, methods for numerical simulation. (4 hrs.)

Unit.II Acceptable Design of a Thermal System: initial design, design strategies, design of systems from different application areas, additional considerations for large practical systems; Economic Considerations: calculation of interest, worth of money as a function of time, series of payments, raising capital, taxes, economic factor in design, application to thermal systems. (11 hrs.)

Unit.III Problem Formulation for Optimization: optimization methods, optimization of thermal systems, practical aspects in optimal design, Lagrange multipliers, optimization of constrained and unconstrained problems, applicability to thermal systems; search methods: single-variable problem, multivariable constrained optimization, examples of thermal systems; geometric, linear, and dynamic programming and other methods for optimization, knowledge-based design and additional considerations, professional ethics. (15 hrs.)

Books Recommended:

5. N.V. Suryanarayana, Design & Simulation of Thermal Systems - MGH, 2002
MTE 691-C SIMULATED DESIGN OF SOLAR ENERGY ENGINEERING SYSTEM
(ELECTIVE II)

Teaching Scheme:
Theory: 3 hrs per week
Tutorial: 1 hrs per week
Credit: 4

Examination Scheme:
Theory: 80 Marks (3 hrs)
Class Test: 20 Marks (1 hr)

Unit.I SOLAR HEAT SYSTEMS: General System, solar collectors, solar DHW systems; liquid based and air based solar space heating systems; solar radiation collection. (5 hrs.)

Unit.II PROGRAMMING, SCHEMATIC DESIGN AND ITS DEVELOPMENT: Programming phase and checklist; schematic design and checklist; Solar collector operational consideration; thermal storage for solar heating systems and its design; design of heat exchangers; selection of pumps, fluids and tubes; design of fans and ducts; solar energy cost equation and its constituents. (5 hrs.)

Unit.III SIMULATIONS IN SOLAR PROCESS DESIGN: Simulation programs; the utility of simulations; information from simulations; TRNSYS, a thermal process simulation program; simulations and experiments, metrological data limitations of simulations. (5 hrs.)

Unit.IV DESIGN OF ACTIVE SYSTEMS BY F-CHART: Review of design methods; the f-chart methods, the f-chart for liquid systems; the f-chart for air systems; service water heating systems; f-chart results; parallel solar energy-heat pump systems. (5 hrs.)

Unit.V DESIGN OF ACTIVE SYSTEMS BY UTILIZABILITY METHODS: Hourly Utilizability, daily Utilizability; the phi-bar f-chart method. (5 hrs.)

Unit.VI DESIGN OF PASSIVE AND HYBRID HEATING SYSTEMS: Approaches to passive design; the solar-load ratio method; the Utilizability design method: direct gain; Utilizability design method: collector-storage walls; hybrid systems: active collection with passive storage. (5 hrs.)

Books Recommended:
2. Solar Engineering of thermal process by Duffie & Beckman; Wiley
3. The Solar Heating Design process by Kreider; MGH
4. Applied Solar Energy by Meinel & Meinel ; Addison
5. Solar Heating and Cooling by Kreider & Kreith; MGH
MTE 671 LABORATORY PRACTICE-II

Teaching Scheme:
Practical: 4 hrs per week
Credit: 2

Examination Scheme:
Term work: 50 Marks

Laboratory practice shall constitute laboratory experiments, design, simulation, programming assignments, etc.

At least two experiments from each of the courses viz., I.C. Engine, Fluid Mechanics, Solar Thermal Systems, Green Building etc

**Petrol/Diesel Engine Test Rig:** Experimental Study of Petrol/ Diesel Engine Test Rig (optional Morse Test Setup/ emission analyzer etc).

Or

**Solar Thermal Systems:** Solar thermal application of water heater for furnace water input

Or

**Green Building:** Skylight a natural light for artificial light energy conservation in Green Building

**Term Work:** Term work will be based on the work carried out by student with respect to any one topic mentioned above.
MTE 672 SEMINAR-II

Teaching Scheme:
Practical: 2 hrs per week
Credit: 1

Examination Scheme:
Viva-voce: 50 Marks

The SEMINAR-II shall consist of few particulars amongst the following:

Literature review from sizable number of publications. Design/Development/Synthesis related to a particular area. Implementation of existing theory for applications, pilot experiments etc. Each student is required to prepare a report and deliver a talk based on the work carried out in mini-project under the guidance of a faculty member(s). The work carried out should be preferable related to his/her dissertation topic. Viva voce will be based on contents of the topic.
MTE 673 THERMAL LAB-II

Teaching Scheme:
Practical: 2 hrs per week
Credit: 1

Examination Scheme:
Viva-voce: 50 Marks

Laboratory practice shall constitute laboratory experiments, design, simulation, programming assignments, etc.

At least two experiments from each of the courses viz., I.C. Engine, Fluid Mechanics, Solar Thermal Systems, Green Building etc

**Solar Energy:** Hybrid Wind-Photovoltaic power unit, Grid connected Photovoltaic systems
Or
**CFD:** Computational fluid dynamics software application
Or
**Fluid Mechanics:** Test Rig for Turbine (Francis/Kaplan turbine etc)

**Viva Voce:** Viva Voce will be based on the work carried out by student with respect to any one topic mentioned above.
It shall include the problem definition, literature survey, approaches for handling the problem, finalizing the methodology for the dissertation work and design calculations/experimental design etc. A report of the work shall be submitted at the end of Semester III after approval by the Guide and endorsement of the Head of Department. It will be assessed and guided by Departmental committee with guide suggestions and final approval for set of experiments for final project presentation. Students are advised to bring trial runs results if any with literature review and discuss regularly.

The evaluation committee appointed by the Head of the Department, for appropriateness, sufficiency of contents and offer suggestions if any.

Note: The evaluation committee shall consist of the Guide, one senior expert faculty member from other institute appointed by University, and the Head of Department or his/her representative.
The candidate shall submit the detailed report as per the synopsis approved by the university, of the dissertation work in the prescribed format after approval by the guide and endorsement by the Head of Department. It will be assessed for term work by the evaluation committee appointed by the University, for completion of the proposed work.

**Note:** The evaluation committee shall consist of the Guide, one senior expert faculty member from other institute appointed by University, and the Head of Department or his/her representative.