CHHATTSARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

SCHEME OF TEACHING AND EXAMINATION

M. E. Mechanical Engineering (Energy Management)
3rd Semester

<table>
<thead>
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<th>S.No.</th>
<th>Board Of Studies</th>
<th>Sub. Code</th>
<th>Subject</th>
<th>Periods Per Week</th>
<th>Scheme of Exam</th>
<th>Total Marks</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td>L(T+P)/2</td>
<td>Theory/Practical</td>
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<td>Mechanical Engg</td>
<td>583311(37)</td>
<td>Green Building Technologies</td>
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<td>Mechanical Engg</td>
<td>583321(37)</td>
<td>Preliminary work on Dissertation</td>
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<td>4</td>
<td>Mechanical Engg</td>
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<td>Seminar on Industrial Training and Dissertation</td>
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</table>

L – Lecture, T – Tutorial, P – Practical, ESE – End Semester Exam, CT – Class Test, TA – Teacher’s Assessment

List of Electives III

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Mechanical Engg</td>
<td>583331(37)</td>
<td>Wind Energy utilization</td>
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<tr>
<td>2</td>
<td>Mechanical Engg</td>
<td>583332(37)</td>
<td>Alternative Fuels</td>
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<tr>
<td>3</td>
<td>Mechanical Engg</td>
<td>583333(37)</td>
<td>Bio &amp; Fossil fuel technology</td>
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<td>4</td>
<td>Mechanical Engg</td>
<td>583334(37)</td>
<td>Nuclear Measurement and Detection</td>
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Chhattisgarh Swami Vivekanand Technical University, Bhilai

Semester: **III M.E (Energy Management)**  
Branch: **Mechanical Engineering**

Subject: **Green Building Technologies**  
Code: **583311(37)**

Total Theory Periods: **40**  
Total Tutorial Periods: **12**

Total Marks in End Semester Exam: **100**

Minimum number of class test to be conducted: **02**

**Unit I**  

**Unit II**  
**Thermal Comfort:** Criteria and various Parameters, Psychometric Chart, Thermal Indices. Indoor air quality; Requirements in residential, Commercial, Hospital Buildings.

**Unit III**  
**Passive heating concepts:** Direct gain, indirect gain, isolated gains and suspense  
**Passive cooling concepts:** Evaporative Cooling, Evaporative Air and Water Coolers, Water and Earth for Cooling, use of isolation, Shading, Paints and cavity walls for cooling.  
**Passive heating and cooling concepts:** Roof pond/sky therm, roof radiation trap, vary-thermwall, earth air tunnels; selective ventilation

**Unit IV**  
**Heat Transmission in Buildings:** Surface Coefficient, Air cavity, Internal and External Surface, Overall Thermal Transmittance, Heat Transfer due to ventilation/ infiltration, Building loss coefficient Internal Heat gains, Solar Temperature, Steady State Method, Degree Day method

**Unit V**  
**Modeling of Building:** Correlation methods - solar load ratio, load collector ratio, thermal time constant method, Analytical methods - thermal circuit analysis, periodic solutions - thermal modeling of AC / Non AC buildings, ASHRAE Methods and standards for estimates of Heating and cooling and Ventilation

**Text Books & References :**

Unit I
Wind Characteristics: Sources of wind, wind hazards, sitting in flat terrain, sitting in non-flat terrain, ecological indicators of site suitability, site analysis methodology.

Unit II
Wind Energy System: Energy from the wind, work-energy and power, different types of rotors, over speed control, electric power generation and storage. Water pumping systems – major components – lift – transport – storage sitting and sizing.

Unit III

Unit IV

Unit V
Applications: Potential application of wind energy conversion systems, residential applications, wind power use in agriculture.

Text Books and References:
1 V. Daniel Hunt, Wind Power, Van Nostrand Reinhold Company
3 Recent Advances in Wind Engineering, New Age International Publishers Ltd.
4 Renewable Energy: Wind Power's Contribution to Electric Power Generation And Impact on Farms And Rural Communities, Lawrence J. Dyckman, James R. Jones, Diane Pub Co
5 Wind Turbines: Fundamentals, Technologies, Application, Economics, Erich Hau, Springer
Unit I
Introduction: Need of alternative gaseous fuels, future automotive gaseous fuels, hydrogen, Compressed Natural Gas (CNG), Liquefied Natural Gas (LNG), and Producer gas, biogas, Liquefied Petroleum Gas (LPG).

Unit II
Stoichiometric air fuel ratio, Physical properties of different gaseous fuels, mode of engine operations, spark ignition and dual fuel mode, multi fuel mode, combustion and performance of engines, specific problems, safety and environmental aspects, economic aspects, production.

Unit III
Use of alcohol in four stroke spark ignition engines and diesel engines, use of alcohol in twostroke engines, use of bio diesels, combustion and performance of engines, stoichiometric air fuel ratio, specific problems, safety and environmental aspects, economic aspects, production.

Unit IV
Impact of alternative fuels on engine test and test procedures, guidelines for emission measurements, emission norms for engines using alternative fuels.

Unit V

Text Books and Reference:
3. SAE hand book, volume III, Engines, fuels, lubricants, emissions and noise
5. Gaseous fuels for transportation I, proceedings of the conference held at Vancouver, british Columbia, Canada
Unit I

Unit II
**Biochemical Process:** Aerobic and Anaerobic Bioconversion process, Biogas production process, Effect of Feed and operational parameters, Types of digesters and their suitability, Applications. Design criterion of some Bio-methanation Plants, optimum sizing of landfill digesters & Gas storage systems.

Unit III

Unit IV

Unit V
**Solid Fuels:** Clean coal technology, Underground combustion and gasification of coal, Carbon Capture and storage
**Liquid Fuels:** D G set for generation of Electricity
**Gaseous Fuels:** Natural gases, methane from coal mines, manufactured gases, producer gas, water gas, biogas, refinery gas, LPG, Cleaning and purification of gaseous fuels.

Text Books & References:

1. Biomass – Thermo-chemical Characteristics Edited by PVR Iyer, T R Rao, P D Grover and N P Singh, Published by Biomass gasifier Action Research Centre, Dept of Chemical Engineering, IIT Delhi
2. Kaup and Goss “Small Scale Gas Producer Engine System” Published by Friedr, Vieweg &Sohn Braunschweig / Wiesbaden.
3. ABETS, IISc, Bangalore “Biomass to Energy – The science and technology of the IISc Bio-energy systems” Published by Science & Technology of the Indian Institute of Science, Bangalore
5. K M Mital ,Biogas System - Principles & Applications Published by new Age international (p) Ltd
7. Orion Polinsky “A Bio-fuels Handbook” Published by Oasis Publishing
9. J. D. Gilchrist, Fuels, Furnaces & Refractories, Pergamom Press,
12. Samir Sarkar, Fuels & Combustion, Orient Longman
Unit I
Radiometric quantities and interaction coefficients: Radiation field, fluence (rate), energy fluence (rate), cross section, mass attenuation coefficient, mass stopping power

Unit II
Dosimetric quantities & calculations: Exposure (rate), kerma (rate), energy imparted, absorbed dose (rate), linear energy transfer (LET), lineal energy, organ dose, Relationship between fluence, kerma and absorbed dose, air kerma rate constant, calculation of kerma and absorbed dose Bragg-Gray cavity principle, measurement of absorbed dose with ionization in gas filled cavity, electronic equilibrium, composition of homogeneous cavity, large cavity, small cavity, recombination effects

Unit III
Radiation protection quantities: Equivalent dose (rate), radiation weighting factor (wR), Effective dose, tissue weighting factor (wT), operational quantities: ambient dose equivalent, directional dose equivalent, personal dose equivalent, intake, committed dose

Unit IV
Detectors: Gas filled detectors Ionization chambers with current measurements, condenser chambers, pressure ionization chamber, extrapolation chambers, proportional chambers, GM tubes Scintillation detectors Solid and liquid scintillators, quenching Semiconductor detectors Photographic emulsions Thermo luminescent detectors Nuclear track detectors Neutron detectors Detectors using reactions or activation or others Imaging detectors Other detectors: electrets, self-powered detectors, thermally stimulated exoelectron emission (TSEE), radio-photo luminescent detectors (RPLD)

Unit V
Measurement: Efficiency (geometric and intrinsic), background, geometry, statistics, pulse counting scalers and rate meters, discriminators, resolution, pulse height analysis – coincidence and anticoincidence, pulse shape analysis, computer analysis of spectra.

Text and Reference Books:
4. S.S. Kapoor, V. Ramamurthy, Nuclear Radiation Detectors, New Age
Chhattisgarh Swami Vivekanand Technical University, Bhilai

SCHEME OF TEACHING AND EXAMINATION

M. E. Mechanical Engineering (Energy Management)
4\textsuperscript{th} Semester

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<tbody>
<tr>
<td>1</td>
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<td>Dissertation + Seminar</td>
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Scheme of Allotment of Marks

<table>
<thead>
<tr>
<th>Semester</th>
<th>Total Marks</th>
<th>Grand Total</th>
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<td>I</td>
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