Chhattisgarh Swami Vivekanand Technical University, Bhilai

SCHEME OF TEACHING AND EXAMINATION

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

S No.	Board Of Studies	Sub. Code	Subject	Periods Per Week			Scheme of Exam Theory/Practical			Total Marks	Credit L+(T+P)/2
				L	T	P	ESE	CT	TA		
1	Mechanical Engg	**583311(37)**	Green Building Technologies	3	1		100	20	20	140	4
2	**Elective - III**			3	1		100	20	20	140	4
3	Mechanical Engg	**583321(37)**	Preliminary work on Dissertation			28	100		100	200	14
4	Mechanical Engg	**583322(37)**	Seminar on Industrial Training and Dissertation			3			20	20	2
				6	2	31	300	40	160	500	24

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

List of Electives III

S.No.	Board of Study	Subject Code	Subject
1	Mechanical Engg	**583331(37)**	Wind Energy utilization
2	Mechanical Engg	**583332(37)**	Alternative Fuels
3	Mechanical Engg	**583333(37)**	Bio & Fossile fuel technology
4	Mechanical Engg	**583334(37)**	Nuclear Measurement and Detection

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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
Green Building Design Strategies and Building Codes: Energy use in Buildings, Factors effecting Energy use, Energy Conservation options. External Factors – Climate, Building Orientation, Shading, types of shading devices.

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 :

1. M.S.Sodha, N.K. Banaal, P.K.Bansal, A.Rumaar and M.A.S. Malik, Solar Passive:Building Science and Design, Pergamon Preen
2. Jamee; L. Threlked, Thermal Environment Engineering, Prentice Hall, INC-, RaglevoodCliffs, New Jersey
3. T.A. Markus and R.N. Morris, Building, Climate and Energy SpottwoodeBallantype Ltd-,London U.K.
4. Solar Thermal Energy Storage, H. P. Garg et.al, D. Reidel Publishing Company
5. Mathematical Modeling of Melting and Freezing Process, V Alexiades& A.D. Solomon, Hemisphere Publishing Corporation, Washington

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Semester: **III M.E (Energy Management)** Branch: **Mechanical Engineering**
Subject: **Wind Energy Utilisation** Code: **583331(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
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
Applied Aerodynamics: Role of aerodynamics in wind power – cross wind axis machines – wind axis machines – general momentum theory – vortex strip theory, forces and moments due to vertical wind gradient. Towers And Systems Installation: Specific types of tower, Tower height, Tower and systems raising, wiring, lightning protection, Installation, maintenance of other equipments.

Unit IV
Energy Conversion And Storage: Synchronous inverters, dc/ac inverters, battery storage, battery characteristics, battery system installation, other types of storage systems.
Wind Energy Conversion Systems: Specifications and characteristics of commercial waterpumping wind mills, electricity producing wind energy. Conversion systems, selection of systems-case study. Environmental aspects.

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
2 Wind Energy Basics: A Guide to Small and Micro Wind Systems, Paul Gipe, Chelsea Green Pub Co, April
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

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Semester: **III M.E (Energy Management)** Branch: **Mechanical Engineering**
Subject: **Alternative Fuels In I.C. Engines** Code: **583332(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
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
Stochiometric 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, stochiometric 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
Legal Aspects: Legal aspects of blending alternative fuels into conventional liquid fuels, properties of blends, comparison of neat versus blended fuels, fuel testing.
Computer simulation: Computer simulation of engines using alternative fuels.

Text Books and Reference :
1. Future automotive fuels, Edited by Joseph M. Colucci and Nicoles C. Gallopoulos, Plenum press, New York
2. Dual fuel engines, edited by R.L.Evans, Plenum Press
3. SAE hand book, volume III, Engines, fuels, lubricants, emissions and noise
4. Automotive fuels and fuel systems, volume II, T.K.Garrett, Pantech Press, London
5. Gaseous fuels for transportation I, proceedings of the conference held at Vancouver, british Columbia, Canada
6. Pandel U, Poonia M.P., Energy Technologies for Sustainable Development,.,Prime Publishing House

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Semester: **III M.E (Energy Management)** Branch: **Mechanical Engineering**
Subject: **Bio and Fossil Fuel Technology** Code: **583333(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
Biomass & Biomass management: Biomass availability, Characteristics of Biomass or organic wastes, Energy Plantation. Waste Biomass /Organic utilization Technology options. Potential, Process and technologies, characteristics of Briquettes and their use

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
Thermo chemical Process: Biomass Gasification Process, Types of Gasifiers and their working, Feed and operational parameters on output Gas production, properties of output gases (mainly producer gas), Design of criterion, design of a Gasifier. Biomass Pyrolysis: Process of slow and fast Pyrolysis for solid and liquid fuel Production, Technologies, Applications.

Unit IV
Bio-oils and Composting: Characteristics of Bio-diesel, Materials and Methods, and its applications, Alcoholic Fermentation Process, Technologies and its applications.
Composting: Process Material and operational, Parameters, characteristics of manure, applications. Vermicomposting, Process, Types of Species, Materials and Methods, Characteristics of Manure, Applications.

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
4. Reed, T. B. and Das, A. "Hand book of biomass down draft gasifier engine systems". Published by Solar Energy Research Institute, U.S. Dept. of Energy
5. K M Mital ,Biogas System - Principles & Applications Published by new Age international (p) Ltd
6. Klaus von Mitzlaff, "Engines for biogas- theory, modification & economic operation" Published by friedr. Vieweg & Sohn Braunschweig / Wiesbaden
7. Orion Polinsky "A Bio-fuels Handbook" Published by Oasis Publishing
8. S.P. Sharma &Chander Mohan, Fuels & Combustion, Tata McGraw Hill Publishing Co.Ltd.
9. J. D. Gilchrist, Fuels, Furnaces & Refractories, Pergamom Press,
10. Blokh A.G, Heat Transmission in Steam Boiler furnaces, Hemisphere Publishing Corpn,
11. Gupta O.P, Elements of Fuels, Furnaces & Refractories, 3rd edition, Khanna Publishers,
12. Samir Sarkar, Fuels & Combustion, Orient Longman
13. Bhatt, Vora, Stoichiometry, Tata McGraw Hill

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Semester: **III M.E (Energy Management)** Branch: **Mechanical Engineering**
Subject: **Nuclear Measurement and Detection** Code: **583334(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
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 Lecture notes

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:
1. Glenn F. Knoll, Radiation Detection and Measurement, John Wiley & Sons
2. Michael Fiederle, Arnold Burger, Larry Franks, Nuclear Radiation Detection Materials – 2011, Materials Research Society
3. Glenn F. Knoll, Radiation Detection and Measurement, John Wiley & Sons
4. S.S. Kapoor, V. Ramamurthy, Nuclear Radiation Detectors, New Age

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SCHEME OF TEACHING AND EXAMINATION

M. E. Mechanical Engineering (Energy Management)
4th Semester

Sr	**Board Of Studies**	**Sub. Code**	**Subject**	**Periods Per Week**			**Scheme of Exam Theory/Practical**			**Total Marks**	**Credit L+(T+P)/2**
				L	T	P	ESE	CT	TA		
1	Mechanical Engg	**583421(37)**	Dissertation + Seminar	6		34	300		200	500	23
				6		34	300		200	500	23

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

Scheme of Allotment of Marks

Semester	Total Marks	Grand Total
I	1000	3000
II	1000	
III	500	
IV	500	