

**Scheme of Examination:**

Question from Part A: 40 marks

Question from Part B: 40 Marks

Viva voce: 20 Marks

Total: 100 Marks

B. E. MECHANICAL ENGINEERING			
Choice Based Credit System (CBCS) and Outcome Based Education (OBE)			
SEMESTER - VIII			
ENERGY ENGINEERING			
Course Code	18ME81	CIE Marks	40
Theory Hours /Week (L:T:P)	3:0:0	SEE Marks	60
Credits	03	Exam Hours	03
<b>Learning Objectives:</b> Understand energy scenario, energy sources and their utilization Learn about energy conversion methods Study the principles of renewable energy conversion systems.			
<b>UNIT - I</b> <b>STEAM GENERATORS</b> Coal and ash handling, Generation of steam using forced circulation, high and supercritical pressures, LaMount, Benson, Velox, Loeffler, Schmidt steam generators, Cooling towers and accessories such as Superheaters, De-superheater, Economizers, Air preheaters.			
<b>UNIT - II</b> <b>Solar Energy:</b> Introduction, Solar radiation at the earth's surface, Solar radiation measurements, Flat plate collectors, Focussing collectors, Solar pond, Solar electric power generation-Solar photovoltaics. <b>Bio Energy:</b> Photosynthesis, photosynthetic oxygen production, energy plantation. Bio Chemical Route: Production from organic wastes by anaerobic fermentation, Bio gas plants-KVIC, Janta, Deenbandu factors affecting bio gas generation. Thermal gasification of biomass, updraft and downdraft			
<b>UNIT - III</b> <b>Geothermal Energy:</b> Forms of geothermal energy, Dry steam, wet steam, hot dry rock and magmatic systems. <b>Tidal Energy:</b> Tidal power, Site selection, Single basin and double basin systems, Advantages and disadvantages of tidal energy. <b>Wind Energy:</b> Wind energy-Advantages and limitations, wind velocity and wind power, Basic components of wind energy conversion systems, horizontal and vertical axis wind mills, coefficient of performance of a wind applications of wind energy.			
<b>UNIT - IV</b> <b>Hydroelectric plants:</b> Advantages & disadvantages of water power, Hydrographs and flow duration curves-Storage and pondage, General layout of hydel power plants- components such as Penstock, surge tank, draft tube and their applications, pumped storage plants, Detailed classification of hydroelectric plants, water hammer. <b>Ocean Thermal Energy:</b> Ocean thermal energy conversion, Principle and working of Rankine cycle, Problems associated with OTEC.			
<b>UNIT - V</b> <b>Nuclear Energy</b> Principles of release of nuclear energy-Fusion and fission reactions. Nuclear fuels used in reactors, Chain reaction, Moderation, breeding, Multiplication and thermal utilization factors. General description of a nuclear reactor and materials, Brief description-Pressurized water reactor, Boiling water reactor, Sodium graphite reactor, Fast Breeder reactor, Homogeneous graphite reactor and gas cooled reactors, Radiation hazards, Shielding, Nuclear waste, Radioactive waste disposal.			
<b>Outcomes:</b> At the end of the course the student will be able to: Understand the construction and working of steam generators and their accessories.			

CO2: Identify renewable energy sources and their utilization.

CO3: Understand principles of energy conversion from alternate sources including wind, geothermal, ocean, biomass, nuclear, hydel and tidal.

**Question paper pattern:**

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub- questions) from each module.
- Each full question will have sub- question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Sl No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
<b>Textbook/s</b>				
1	Power Plant Engineering	P. K. Nag	Tata McGraw Hill Education Private Limited, New Delhi	Third Edition, 2012.
2	Power Plant Engineering	Arora and Domkundwar	Dhanpat Rai & Co. (P) Ltd.	Sixth Edition, 2012.
3	Non-conventional Sources of Energy	G.D.Rai	Khanna Publishers, New Delhi	Fifth Edition, 2015.
4	Non-conventional energy resources	B H Khan	McGraw Hill Education	3rd Edition
<b>Reference Books</b>				
1	Power Plant Engineering	R. K. Rajput	Laxmi publication New Delhi	
2	Principles of Energy conversion	A. W. Culp Jr	McGraw Hill	1996
3	Power Plant Technology	M.M. EL-Wakil	McGraw Hill International	1994
4	Solar Energy: principles of Thermal Collection and Storage	S.P. Sukhatme	Tata McGraw-Hill	1984