INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

Department of Electrical and Electronics Engineering

QUESTION BANK

Course Name	:	Renewable Energy Sources
Course Code	:	**A80234**
Class	:	**IV B. Tech II Semester**
Branch	:	**Electrical and Electronics Engineering**
Year	:	**2018– 2019**
Course Faculty	:	Mr.A.Sathish Kumar, Assistant Professor

OBJECTIVES

It introduces solar energy its radiation, collection, storage and application. It also introduces the wind energy, biomass energy, geothermal energy and ocean energy as alternative energy sources.

S. No	Question	Blooms Taxonomy Level	Course Outcome
	UNIT -1 **PRINCIPLES OF SOLARRADIATION**		
	Part - A (Short Answer Questions)		
1	Write a note on total solar energy received in India.	Understand	1
2	Define solar insulation	Understand	1
3	Define solar altitude angle	Remember	1
4	What are the advantages, and limitations of renewable energy sources	Understand	1
5	Explain briefly the different types of solar energy measuring instruments	Understand	1
6	Distinguish between diffuse radiation and beam radiation	Understand	2
7	Describe about solar geometry	Remember	2
8	What are conventional sources of energy	Remember	2
9	Explain the importance of solar energy in the present day energycrisis?	Understand	2
10	Explain solar azimuth angle and Zenith angle	Understand	2
	Part - B (Long Answer Questions)		
1	Distinguish between renewable and nonrenewable source	Understand	1
2	Discuss about solar constant	Remember	1
3	Derive expression for beam and diffuse radiation	Understand	1
4	Summarize the reasons for variation in the amount of solar energy reaching earth surface.	Understand	1
5	Discuss why it is necessary to develop non-conventional method of generating electrical energy	Understand	2
6	List out the different types of solar energy measuring instruments and explain it	Understand	2
7	Describe about the suns declination and hour angle	Remember	2
8	Describe the working principle of a Pyrehliometer.	Understand	2
9	Discuss about sunshine recorder	Understand	2
10	Explain the working principle of a Pyranometer	Remember	2
	Part – C (Analytical Questions)		
1	Describe solar radiation data? Explain the information contained in it	Understand	2

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2	Calculate the angle made by beam radiation with the normal to a flat collector on December 1 at 9AM solar time for location at 28 Degree 35Min North the collector is tilted at an angle of latitude + 10 Degree with horizontal and pointing due south	Understand	2
3	Discuss about diffuse radiation	Remember	2
4	Describe about solar geometry	Understand	2
5	Distinguish between the conventional and non conventional energy sources	Understand	2
6	Explain in detail the different types of solar energy measuring instruments	Understand	2
7	Determine the local solar time and declination at a location of latitude 25Degree 15 Min N, Longitude of 77 Degree 30Min E at 12.30 IST on June 19 time correction=(-1'01'')}	Remember	2
8	Determine the local solar time and declination at a location of latitude 25Degree 15 Min N, Longitude of 97 Degree 40 Min E at 11.30 IST on June 25 time correction=(-1'01'')}	Remember	2
9	Describe the principle of Angstrom type Pyrheliometer	Remember	2
10	Distinguish between the working of Pyrheliometer and pyranometer	Remember	2
	UNIT – II **SOLAR ENERGYCOLLECTION,SOLAR ENERGY STORAGE ANDAPPLICATIONS**		
	Part - A (Short Answer Questions)		
1	List out main components of a flat plate solar collector	Remember	3
2	List out classification of solar energy collectors	Remember	3
3	Define flat plate collector	Remember	3
4	List out the different types of line focusing type concentrating type collectors	Remember	3
5	List out the applications of solar air heaters	Understand	3
6	Identify the different types of point focusing type concentrating type collectors	Understand	3
7	Distinguish between non focusing type concentrating collectors	Remember	3
8	Define central receiver tower	Remember	3
9	Discuss Compound Parabolic Concentrator(CPC)	Understand	3
10	Describe the effects of various parameters affecting the performance of a collector?	Understand	3
11	List out the different types of solar energy storage systems	Understand	3
12	Define solar pond?	Remember	3
14	Define solar water heating	Remember	3
15	Explain in detail solar space cooling	Understand	3
16	List out different applications of solar PV system in rural India plot	Remember	3
	Part - B (Long Answer Questions)		
1	Explain the principle of conversion of solar energy in to heat	Understand	3
2	List out classification of solar energy collectors and explain each	Understand	3
3	Define flat plate collector and explain its operation	Remember	3
4	Distinguish between advantages and disadvantages of flat plate collectors	Understand	3
6	Discuss advantages of concentrating collectors over flat plate collectors	Understand	3
7	Describe the principle of operation of Fresnel lens collector	Remember	3
8	Discuss Compound Parabolic Concentrators	Understand	3
9	Describe the performance analysis of Cylindrical Parabolic Concentrator	Remember	3
10	List out the different methods of sun tracking	Understand	3

S. No	Question	Blooms Taxonomy Level	Course Outcome
11	Summarize mechanical solar energy storage systems	Understand	3
	Part – C (Analytical Questions)		
1	List out main components of a flat plate solar collector, explain the function of each	Understand	3
2	List out the applications of solar ponds and explain	Understand	3
3	Explain in detail solar Space heating and discuss PV effect	Remember	3
4	Describe detail of solar distillation and drying	Understand	3
5	With the help of a neat sketch describe a solar heating system using water heating solar collectors. What are the advantages and disadvantages of this method?	Understand	3
6	Discuss the advantages and disadvantages of PV solar energy conversion system	Understand	3
7	Explain with a neat sketch the working principle of standalone and grid Connected solar system.	Remember	3
8	Describe the working of a solar power plant	Understand	3
9	Compare solar PV system with solar thermal system	Remember	3
10	With the help of a neat sketch describe a solar heating system using water heating solar collectors. What are the advantages and disadvantages of this method?	Understand	3
11	Explain with a neat sketch the working principle of standalone and grid Connected solar system	Understand	3
	UNIT - III **WINDENERGY, BIO-MASS**		
	Part - A (Short Answer Questions)		
1	Mention two important wind turbine generator installations in India.	Understand	4
2	List out type of generator used in wind power plant?	Remember	4
3	List out the classification of wind mills	Understand	4
4	List out disadvantages of wind power?	Understand	4
5	Define pitch angle?	Remember	4
6	Explain vertical wind mills with neat sketch	Understand	4
7	Define Constant speed and constant frequency in WTG unit	Remember	4
8	Define variable speed in WTG system	Understand	4
9	Define Nearly constant speed in WTG system	Remember	4
10	Explain the mechanism of production of local winds	Understand	4
11	Define wind Power?	Remember	4
12	Discuss the advantages of wind power?	Understand	4
13	Define the constituents of biogas	Understand	5
14	List out some organic materials used in bio-mass plant.	Remember	5
15	List out the factors affecting biogas generation	Understand	5
16	Define liquefaction?	Understand	5
17	Discuss wet processes used for producing biogas	Remember	5
18	List out the classification of bio gas plants	Understand	5
19	Describe Deenbandhu type plant	Understand	5
20	Explain the utilization of biogas plant	Remember	5
21	Explain dry processes	Understand	5
22	Discuss continuous and batch processes	Remember	5
23	Define biogas plant	Understand	5

S. No	Question	Blooms Taxonomy Level	Course Outcome
24	Discuss advantages of biogas plant.	Understand	5
	Part - B (Long Answer Questions)		
1	Derive wind power equation	Remember	4
2	Explain Tip speed ratio and its limitations	Understand	4
3	List out the advantages of wind power?	Understand	4
4	Define Vertical Axis Wind Turbine (VAWT).	Understand	4
5	Explain Horizontal axis wind mills with neat sketch	Remember	4
6	What is meant by pitch control and yaw control	Understand	4
7	Explain the Constant speed constant frequency WTG unit.	Understand	4
8	Describe the principle used in the measurement of speed of the wind?	Remember	4
9	List out main applications of wind energy and its applications	Understand	4
10	What is the difference between Bio mass and biogas	Understand	5
11	Discuss about dry and wet fermentation process	Understand	5
12	Explain pyrolysis	Remember	5
13	List out the classification of biogas plants	Understand	5
14	Describe Chinese Type plants	Understand	5
15	Explain floating drum type biogas plants	Remember	5
16	Examine the operation of IC engine with biogas and discuss their performance characteristics	Understand	5
17	List out the classifications of geo thermal sources?	Understand	5
18	List out the various factors affecting bio digestion of a gas?	Remember	5
19	Explain working principle of KVIC Digester and its applications	Understand	5
	Part – C (Analytical Questions)		
1	Explain lift and drag forces	Understand	4
2	Analyze Aero Dynamic forces acting on the blade	Remember	4
3	Explain brief about Darrieus Rotor	Understand	4
4	Discuss in brief about Savonius Rotor	Understand	4
5	Discuss the scheme for electric generation	Remember	4
6	Describe pitch control and yaw control	Understand	4
7	Explain Betz criterion and derive an expression for the same.	Understand	4
8	What is the type of generator used in wind power plant?	Remember	4
9	How the wind mills are classified	Remember	4
10	List the main applications of wind power?	Remember	4
11	Distinguish between Bio mass and bio gas	Understand	5
12	Explain about dry and wet fermentation process	Remember	5
13	How are Gasifies classified ?Explain pyrolysis	Understand	5
14	Explain the classification of biogas plants	Understand	5
15	Describe Chinese Type plants	Remember	5
16	Explain the classification of biogas plants	Understand	5
17	Explain the modification of SI engines to use biogas	Remember	5
18	What is the community Bio Gas plant	Understand	5
19	Explain the modification of CI engines to use biogas	Understand	5
20	What is meant by energy plantation	Remember	5

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	UNIT - IV **GEOTHERMALENERGY, OCEAN ENERGY**		
	Part - A (Short Answer Questions)		
1	Define geothermal power?	Understand	6
2	List out the classifications of geo thermal fields	Understand	6
3	Describe a vapor dominated or dry steam field	Remember	6
4	Discuss the disadvantages of geothermal l plant	Remember	6
5	Write about the concept of interconnecting geo thermal-fossil system	Understand	6
6	Discuss the advantages of geothermal plant	Remember	6
7	What is the potential of geothermal energy in India	Understand	6
8	Explain the working of a vapor-dominated power plant	Remember	6
9	What are the types of liquid dominated hydrothermal convective systems	Understand	6
10	Explain the applications of geothermal energy	Understand	6
11	Explain the different types of energy that can be generated from ocean	Remember	7
12	Discuss the principles of OTEC energy utilization	Understand	7
13	Explain in brief the principles of obtaining energy from the tides	Understand	7
14	List out the advantages and limitations of tidal power generation	Remember	7
15	List out the classifications of small hydro power stations	Understand	7
16	Describe how electrical energy can be generated from tidal plant	Understand	7
17	List out the main types of OTEC power plants	Understand	7
18	Write short note about wave energy conversion methods	Remember	7
19	Explain in brief the single basin arrangement	Understand	7
20	List out the advantages of small scale hydroelectric power generation	Understand	7
	Part - B (Long Answer Questions)		
1	What are the classifications of geo thermal sources	Understand	6
2	Explain Hot Dry rocks (petro thermal) resources of geothermal energy and how they can be exploited as a source of energy	Understand	6
3	What are liquid dominated hydrothermal Convective systems? Write about them	Understand	6
4	With the help of a neat diagram, explain the working of a liquid dominated single flash steam system	Remember	6
5	Describe the fossil superheat hybrid system with a neat schematic	Understand	6
6	List out the application of geothermal energy	Understand	6
7	Discuss the principle on which OTEC plants are based on	Remember	7
8	Explain OTEC open cycle	Understand	7
9	Explain OTEC closed (Anderson)cycle	Understand	7
10	Summarize the minimum tidal range required for the working of tidal power plant?	Remember	7
11	Draw the schematic layout of a tidal powerhouse	Remember	7
12	Explain how power can be generated using single basin arrangement in detail	Understand	7
	Part – C (Analytical Questions)		
1	Explain vapour dominated hydrothermal power plant with neat sketch and its representation on T-S diagram	Remember	6
2	With the help of neat diagram, explain the working of geothermal-preheat hybrid system	Remember	6
3	Explain how electrical energy can be generated from geothermal energy	Understand	6
4	With the help of neat diagram, explain the working of geothermal-preheat hybrid system	Remember	6
5	What are the advantages and limitations of wave energy	Understand	7

S. No	Question	Blooms Taxonomy Level	Course Outcome
6	Explain in brief about wave energy conversion devices	Understand	7
7	Explain in detail about mini hydel plants	Understand	7
	UNIT - V **Direct Energy Conversion**		
	Part - A (Short Answer Questions)		
1	Define Direct Energy Conversion	Remember	8
2	Define Carnot cycle?	Remember	8
3	Define joule Thomson effect	Understand	8
4	What is thermo electric generator	Understand	8
5	Define thermo electric effect	Remember	8
6	Discuss disadvantages of MHD generation	Understand	8
7	Define efficiency in MHD generation	Understand	9
8	What are the advantages of MHD generation	Understand	9
9	List out the materials used in MHD generation	Understand	9
10	List out advantages of thermo electric effect	Understand	9
	Part - B (Long Answer Questions)		
1	Explain Carnot cycle and Thomson effect?	Remember	8
2	Discuss See beck thermo electric effect	Understand	8
3	Describe the working principle of MHD generators.	Understand	8
4	Discuss about various fuel cells and list out its applications	Understand	8
5	Explain the working of a thermoelectric generator	Understand	8
6	Distinguish between advantages and disadvantages of direct energy conversion	Understand	9
7	Summarize the working of a Seebeck effect thermo couple	Remember	9
8	Write short notes on superconductivity and gas conductivity	Remember	9
	Part – C (Analytical Questions)		
1	Derive the expression for the power and efficiency of thermionic generator	Understand	8
2	List out the needs of Direct Energy Conversion system	Understand	8
3	Describe the working principle of direct energy conversion system	Understand	8
4	Explain different examples of direct energy conversion system	Remember	9
5	Distinguish between the thermo electric effect and Thomson effect	Understand	9
6	List out the limitations of direct energy conversion system	Remember	9
7	Explain different types of limitations with examples of direct energy conversion system	Remember	9

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