

## Model Question Paper -1 with effect from 2022-23(CBCS Scheme)

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**First Semester B.E. Degree Examination**  
**RENEWABLE ENERGY SOURCES**

TIME: 03 Hours

Max. Marks: 100

Note: Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

<b>Module – 1</b>		<b>Marks</b>
<b>Q.1</b>	<b>(a)</b>	Define hour angle, latitude angle, zenith angle, declination angle, and solar altitude angle with formula and relevant figure. <span style="float: right;">5</span>
	<b>(b)</b>	List various non-conventional energy resources. Give their availability, relative merits, and their classification. <span style="float: right;">8</span>
	<b>(c)</b>	Distinguish between renewable and non-renewable energy sources <span style="float: right;">7</span>
<b>OR</b>		
<b>Q.2</b>	<b>(a)</b>	Explain primary and secondary energy sources. <span style="float: right;">6</span>
	<b>(b)</b>	Distinguish between beam radiations and diffuse radiations. Which is applicable during a cloudy atmosphere. <span style="float: right;">7</span>
	<b>(c)</b>	Discuss the main features of various types of renewable and non-renewable energy sources and explain the importance of non-conventional energy sources in the context of global warming <span style="float: right;">8</span>
<b>Module – 2</b>		
<b>Q.3</b>	<b>(a)</b>	What are solar collectors? Give their classification and <b>compare</b> them based on construction and area of application. <span style="float: right;">6</span>
	<b>(b)</b>	Draw and <b>explain</b> the electrical equivalent circuit model and current-voltage characteristics of solar cell <span style="float: right;">7</span>
	<b>(c)</b>	With a neat diagram, <b>explain</b> the solar pond and write any one advantage of it. <span style="float: right;">7</span>
<b>OR</b>		
<b>Q.4</b>	<b>(a)</b>	How do pyranometers and pyrheliometers differ in their measurement of solar radiation? <span style="float: right;">7</span>
	<b>(b)</b>	How does a solar pond electric power plant work, and what are its advantages and limitations as a renewable energy source? <span style="float: right;">8</span>
	<b>(c)</b>	What are the different types of solar thermal systems used for energy generation, and how do they differ in their design and operation? <span style="float: right;">6</span>
<b>Module – 3</b>		
<b>Q.5</b>	<b>(a)</b>	With a neat schematic diagram, explain fixed -dome type of biogas plant? <span style="float: right;">7</span>
	<b>(b)</b>	Discuss the factors or guidelines for wind turbine site selection. <span style="float: right;">7</span>
	<b>(c)</b>	Describe the construction of a three-bladed horizontal shaft wind turbine generator unit. Explain the terms yaw control, pitch control, and tethering control. <span style="float: right;">6</span>
<b>OR</b>		

<b>Q.6</b>	<b>(a)</b>	Explain with figure down draft gasifier?	7
	<b>(b)</b>	What is biogas, <b>explain</b> with a block diagram and the main stages of Anaerobic digestion.	7
	<b>(c)</b>	<b>List</b> the advantages of vertical-axis windmills over horizontal type. Describe a rotor for relatively low-velocity wind.	6
<b>Module – 4</b>			
<b>Q.7</b>	<b>(a)</b>	Explain the ‘single-basin’ and ‘two-basin’ systems of tidal power harnessing. Further, discuss their advantages and limitations	8
	<b>(b)</b>	Derive the expression for power developed due to tides.	6
	<b>(c)</b>	With the block diagram, explain the working of open cycle OTEC system.	6
<b>OR</b>			
<b>Q.8</b>	<b>(a)</b>	List the advantages and disadvantages of tidal power generation.	6
	<b>(b)</b>	Described the Closed cycle OTEC System with the help of diagram.	8
	<b>(c)</b>	What are the advantages, disadvantages, and benefits of OTEC	6
<b>Module – 5</b>			
<b>Q.9</b>	<b>(a)</b>	What is a fuel cell? How are fuel cells classified?	6
	<b>(b)</b>	What are the main factors that affect the performance of a fuel cell?	7
	<b>(c)</b>	Explain the thermochemical hydro production technology.	7
<b>OR</b>			
<b>Q.10</b>	<b>(a)</b>	What are the main challenges associated with using hydrogen as a fuel?	7
	<b>(b)</b>	Explain electrolytic production technologies used to produce hydrogen	7
	<b>(c)</b>	List the advantages and disadvantages of hydrogen energy	6

Table showing Bloom's Taxonomy Level, Course Outcome and Programme Outcome			
Question	Bloom's Taxonomy Level attached	Course Outcome	Programme Outcome
Q.1	(a)	Understanding: $L_2$	CO1 PO1,PO6,PO7,PO8,PO12
	(b)	Understanding: $L_2$	CO1 PO1,PO6,PO7,PO8,PO12
	(c)	Understanding: $L_2$	CO1 PO1,PO6,PO7,PO8,PO12
Q.2	(a)	Understanding: $L_2$	CO1 PO1,PO6,PO7,PO8,PO12
	(b)	Understanding: $L_2$	CO1 PO1,PO6,PO7,PO8,PO12
	(c)	Understanding: $L_2$	CO1 PO1,PO6,PO7,PO8,PO12
Q.3	(a)	Understanding: $L_2$	CO2 PO1,PO6,PO7,PO8,PO12
	(b)	Understanding: $L_2$	CO2 PO1,PO6,PO7,PO8,PO12
	(c)	Understanding: $L_2$	CO2 PO1,PO6,PO7,PO8,PO12
Q.4	(a)	Understanding: $L_2$	CO2 PO1,PO6,PO7,PO8,PO12
	(b)	Understanding: $L_2$	CO2 PO1,PO6,PO7,PO8,PO12
	(c)	Understanding: $L_2$	CO2 PO1,PO6,PO7,PO8,PO12
Q.5	(a)	Understanding: $L_2$	CO4 PO1,PO6,PO7,PO8,PO12
	(b)	Understanding: $L_2$	CO3 PO1,PO6,PO7,PO8,PO12
	(c)	Understanding: $L_2$	CO3 PO1,PO6,PO7,PO8,PO12
Q.6	(a)	Understanding: $L_2$	CO4 PO1,PO6,PO7,PO8,PO12
	(b)	Understanding: $L_2$	CO3 PO1,PO6,PO7,PO8,PO12
	(c)	Understanding: $L_2$	CO3 PO1,PO6,PO7,PO8,PO12
Q.7	(a)	Understanding: $L_2$	CO3 PO1,PO6,PO7,PO8,PO12
	(b)	Understanding: $L_2$	CO3 PO1,PO6,PO7,PO8,PO12
	(c)	Understanding: $L_2$	CO5 PO1,PO6,PO7,PO8,PO12
Q.8	(a)	Understanding: $L_2$	CO3 PO1,PO6,PO7,PO8,PO12
	(b)	Understanding: $L_2$	CO5 PO1,PO6,PO7,PO8,PO12
	(c)	Understanding: $L_2$	CO5 PO1,PO6,PO7,PO8,PO12
Q.9	(a)	Understanding: $L_2$	CO4 PO1,PO6,PO7,PO8,PO12
	(b)	Understanding: $L_2$	CO4 PO1,PO6,PO7,PO8,PO12
	(c)	Understanding: $L_2$	CO4 PO1,PO6,PO7,PO8,PO12
Q.10	(a)	Understanding: $L_2$	CO4 PO1,PO6,PO7,PO8,PO12
	(b)	Understanding: $L_2$	CO4 PO1,PO6,PO7,PO8,PO12
	(c)	Understanding: $L_2$	CO4 PO1,PO6,PO7,PO8,PO12
Bloom's Taxonomy Levels	<b>Lower order thinking skills</b>		
	Remembering: $L_1$	Understanding: $L_2$	Applying: $L_3$
	<b>Higher order thinking skills</b>		
	Analyzing: $L_4$	Evaluating: $L_5$	Creating: $L_6$



## Model Question Paper -2 with effect from 2022-23(CBCS Scheme)

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### First Semester B.E. Degree Examination RENEWABLE ENERGY SOURCES

TIME: 03 Hours

Max. Marks: 100

Note: Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

<b>Module – 1</b>		<b>Marks</b>	
<b>Q.1</b>	<b>(a)</b>	Define the term energy and energy resources. Discuss different ways of their classification with examples in each category.	8
	<b>(b)</b>	Discuss the causes of energy scarcity and the solution to the energy crisis.	6
	<b>(c)</b>	Distinguish between renewable and non-renewable energy sources	6
<b>OR</b>			
<b>Q.2</b>	<b>(a)</b>	Explain primary and secondary energy sources.	6
	<b>(b)</b>	What is the current worldwide availability of renewable energy sources, and how does it compare to traditional sources of energy?	7
	<b>(c)</b>	What is the Internet of Energy (IOE), and how does it differ from the traditional energy grid system?	8
<b>Module – 2</b>			
<b>Q.3</b>	<b>(a)</b>	What are solar collectors? Give their classification and compare them based on construction and area of application.	6
	<b>(b)</b>	Draw and explain the electrical equivalent circuit model and current-voltage characteristics of solar cell	7
	<b>(c)</b>	With a neat diagram, explain the solar pond and write any one advantage of it.	7
<b>OR</b>			
<b>Q.4</b>	<b>(a)</b>	How much energy actually reaches the earth's surface from the sun? State and explain the thermal terms solar time and solar isolation.	6
	<b>(b)</b>	What are the advantages and disadvantages of concentrating collectors over a flat plate collector?	6
	<b>(c)</b>	What are the different types of solar radiation measurements, and how are they obtained?	8
<b>Module – 3</b>			
<b>Q.5</b>	<b>(a)</b>	What are the differences between the Savonius and Darrieus types of vertical-axis wind turbines, and how do they compare in terms of efficiency, cost, and suitability for different applications?	10
	<b>(b)</b>	Discuss the advantages and disadvantages of WEC system.	4
	<b>(c)</b>	Derive the expression for power developed due to wind	6
<b>OR</b>			
	<b>(a)</b>	What are the different types of biomass feedstocks used for energy generation, and how do they differ in their composition and availability?	7

<b>Q.6</b>	<b>(b)</b>	How does the process of photosynthesis in plants and other organisms contribute to the generation of biomass, and how can this biomass be converted into renewable energy through various conversion technologies?	7
	<b>(c)</b>	What are the basic components of a Wind Energy Conversion System (WECS), and how do they work together to generate electricity from wind energy?	6
<b>Module – 4</b>			
<b>Q.7</b>	<b>(a)</b>	What are the fundamental characteristics of tidal power, and how is it generated from the natural movement of ocean tides?	7
	<b>(b)</b>	List the advantages and limitations of tidal power as a renewable energy source?	6
	<b>(c)</b>	What are some of the environmental concerns associated with the implementation of OTEC technology, and how can they be addressed?	7
<b>OR</b>			
<b>Q.8</b>	<b>(a)</b>	List the advantages and disadvantages of tidal power generation.	6
	<b>(b)</b>	Explain the thermodynamic cycle involved in OTEC and how it generates power.	7
	<b>(c)</b>	Where are the existing OTEC power stations located in the world, and what are their capacities?	7
<b>Module – 5</b>			
<b>Q.9</b>	<b>(a)</b>	Explain the operating principles of a hydrogen fuel cell.	6
	<b>(b)</b>	What are the main factors that affect the performance of a fuel cell?	6
	<b>(c)</b>	Explain the thermochemical hydro production technology.	8
<b>OR</b>			
<b>Q.10</b>	<b>(a)</b>	What are the major challenges and limitations associated with hydrogen energy as a potential alternative to fossil fuels, and how can they be overcome?	8
	<b>(b)</b>	Explain electrolytic production technologies used to produce hydrogen	8
	<b>(c)</b>	List the applications of hydrogen energy	4

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