

Subject Teacher : Md. Husne Fahad
 Instructor, Electrical Technology.

Subject Name : Renewable Energy

Subject Code : 66753

Technology : Electrical

Semester : 5th

BTEB Text Book Name : (Publisher: HAQUE PUBLICATION)

Reference Book : Principles of Electronics - V. K. Mehta

AIMS

Upon completion of these content students will be able to achieve and acquire knowledge, skill and attitude in the area of Renewable Energy with special emphasis on;

Overview of renewable energy.

Main features of renewable energy generation.

Challenges and problems associated with the use renewable energy in Bangladesh.

Availability and implementation of potential renewable energy.

SHORT DESCRIPTION

Sources of Renewable energy; Types of renewable energy; Solar energy, Wind power, Fuel cells, Biomass, Geo-thermal and alternative fuels for transportation.

Date	Lecture	Chapter/ Exam / Industrial Visit	Learning Area	Learning Outcome	Class/Lab Supporting Equipment's
	01	Overview of Renewable energy.	1.1 Concept of Renewable energy 1.2 Discuss historical overview of renewable energies. 1.3 State brief description of green power. (ii) Voltmeter, (iii) AVO meter, (iv) Function Generator, (v) Logic Probe, (vi) Semiconductor Device Tester and (vii) Oscilloscope.	To know about Renewable energy.	Basic Class Materials & Projector YouTube Link: https://www.youtube.com/watch?v=nqA0R56mMIE

Marks	Grade Point	Letter Grade	Marks	Grade Point	Letter Grade
80>	4.00	A+	55-59	2.75	B-
75-79	3.75	A	50-54	2.50	C+
70-74	3.50	A-	45-49	2.25	C
65-69	3.25	B+	40-44	2.00	D
60-64	3.00	B	0-39	0.00	F

Mark Distribution (for 150 Marks)			
Theory Marks		Practical Marks	
Midterm	20	PC	25
Class test	10	PF	25
Quiz test	10	-	-
Final	60	-	-
Total	100	Total	50

Class Timing Distribution	
Particulars	Time
Greeting with students	10 Minutes
Previous Class Review	10 Minutes
Present Class Topic Discussion and Lecture Delivery	60 Minutes
Present Class Topics Review	10 Minutes

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	02	Overview of Renewable energy.	1.4 Describe the different sources of renewable energy. 1.5 List global renewable energy scenario and scenario of Bangladesh.	To know about Renewable energy.	Basic Class Materials & Projector You Tube Link: https://www.youtube.com/watch?v=nqA0R56mMIE
	03		1.6 Assess renewable energy systems for their environmental, economic and Political impacts.	To know about Renewable energy.	
	04	Understand the concept of non-conventional renewable energy sources.	2.1 List non-conventional renewable energy sources. 2.2 Discuss potential renewable energy sources of Bangladesh 2.3 Describe measurement of solar radiation and solar radiation at earth surface.	To know about concept of non-conventional renewable energy sources.	Basic Class Materials & Projector Link. https://www.youtube.com/watch?v=A4d6yxbPb5w
	05		2.4 Explain the uses of solar radiation. 2.5 Mention four types of solar electric application 2.6 Describe measurement of solar radiation and solar radiation at earth surface.	To know about concept of non-conventional renewable energy sources.	
	06	Class Test-1	Examination Topic: Chapter 1,2 Examination mark: 20 Passing Mark: 08	Through class tests students will learn to evaluate themselves on their own	1)Basic Class Materials 2)Note Copy
	07	Quiz Test 1	Examination Topic: Chapter 1,2 Examination mark: 10 Passing Mark: 04	Through Quiz Test students will learn the intellectual intelligence on the topics discussed.	1)Basic Class Materials 2)Note Copy
	08	Lab 1	Evaluate a solar energy system for its cost effectiveness.	Students will know about the solar system	Solar panel, controlling device, battery

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	09	Conceive the concept of solar power generation.	3.1 Discuss solar insolation and heat transfer 3.2 Describe operating principle of solar cell. 3.3 Demonstrate different types of solar cell.	Learn about solar power generation.	Basic Class Materials & Projector solar cell. https://www.youtube.com/watch?v=9U8MOVGpdxk
	10		3.4 Describe principle of solar thermal power generation. 3.5 Explain solar collector: solar pool heater, solar hot water heaters, solar air panels and transpired air collectors.	Learn about solar power generation.	solar cell. Projector, Internet Link. https://www.youtube.com/watch?v=XrfEAUTDnY
	11		3.6 Discuss passive solar heating and Day lighting. Illustrate solar active space heating and solar cooling. 3.7 Enumerate sizing, storage of energy and system efficiency.	Learn about solar power generation.	solar cell. Projector, Internet Link. https://www.youtube.com/watch?v=9U8MOVGpdxk
	12	Lab 2	Measure open circuit voltage and short circuit current of a solar panel.	open circuit voltage and short circuit current	solar panel, Battery, Cable, multi-meter etc.
	13	Interpret wind energy	4.1 Discuss the concept of wind energy conversion system.4.2 Interpret small scale system, intermediate scale system and large-scale system of wind energy generation. 4.3 Describe the different components of wind machine.	To know about wind energy generation.	Basic Class Materials & Projector YouTube Link: https://www.youtube.com/watch?v=qSWm_nprfqE

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	14		4.4 Demonstrate different types of wind machines. 4.5 Discuss different types of wind energy conversion system. 4.6 Point out wind energy prospects of Bangladesh (coastal regions).	To know about wind energy generation.	Basic Class Materials & Projector YouTube Link: https://www.youtube.com/watch?v=qSWm_nprfqE
	15	Lab 3	Measure voltage and current for series and parallel combination of solar panel.	series and parallel combination of solar panel.	solar panel, Battery, Cable, multi-meter etc.
	16	Review Class	Review Class of Lecture 09-14 (Regarding students' problem)	Through the review class, students can solve their problem	Basic Class Materials
	17	Quiz Test 2	Examination Topic: Chapter 3,4 Examination mark: 10 Passing Mark: 04	Through Quiz Test students will learn the intellectual intelligence on the topics discussed.	1) Basic Class Materials 2) Examination Copy
	18	Class Test 2	Examination Topic: Chapter 3,4 Examination mark: 20 Passing Mark: 08	Through class tests students will learn to evaluate themselves on their own	1) Basic Class Materials 2) Examination Copy
	19	Recognize Photovoltaics' Cells.	5.1 Discuss the basic principles of photovoltaics cell. 5.2 Mention the types of photovoltaics cell. 5.3 Describe the photo voltaic energy conversion system	To know about Photo voltaic Cells.	Photo voltaic Cells. Projector, Internet Link: https://www.youtube.com/watch?v=Rq5Nzv_6v98
	20		5.4 Describe the application of photo voltaic energy conversion system - Residential, Community and central station. 5.5 State the environmental impacts of fossil fuels vs. photovoltaics and fuel cells.	To know about Fuel Cells.	Projector, Internet, Link: https://www.youtube.com/watch?v=esuAIB4NVi0

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	21	Exam Syllabus Review			
	22	Exam Syllabus Review			
MID EXAM					
	23	Perceive Fuel Cells.	6.1 Discuss the concept of Fuel cell. 6.2 Mention the types of Fuel cell.	To know about Fuel Cells.	Projector, Internet, Link: https://www.youtube.com/watch?v=esuAlB4NVi0
	24		6.3 Describe the photon exchange membrane fuel cell (PEMFC) and phosphoric acid fuel cell (PAFC).	To know about Fuel Cells.	
	25		6.4 Describe the solid acid fuel cell (SAFC) and alkaline fuel cell (AFC). 6.5 Mention the uses of PEMFC, PAFC, SAFC, SOFC, MCFC and AFC.	To know about Fuel Cells.	Projector, Internet, Link: https://www.youtube.com/watch?v=imV_uflzxPY
	26		6.6 Describe the High Temperature Fuel Cell: Solid Oxide Fuel Cell (SOFC), <u>Molten carbonate fuel cells</u> (MCFC) etc.	To know about Fuel Cells.	
	27	Review Class	Review Class of Lecture 22-25 (Regarding students' problem)	Through the review class, students can solve their problem	Basic Class Materials
	28	Lab 4	Prepare a circuit for DC lighting system by solar panel	Gathering details knowledge about dc lighting system.	solar panel, controller, Battery, Cable, multi-meter
	29	Quiz Test 3	Examination Topic: Chapter 6 Examination mark: 10 Passing Mark: 04	Through Quiz Test students will learn the intellectual intelligence on the topics discussed.	3) Basic Class Materials 4) Examination Copy
	30	Class Test 3	Examination Topic: Chapter 6 Examination mark: 20 Passing Mark: 08	Through class tests students will learn to evaluate themselves on their own	3) Basic Class Materials 4) Examination Copy

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	31	Conceive Biomass and Geothermal energy generation.	7.1 Discuss the concept of Biomass energy system. 7.2 Mention the sources of Biomass. 7.3 List the Biomass yields. 7.4 Explain Biomass conversion system: Thermal, Chemical, Biochemical and Electrochemical conversion.	To know about Biomass and Geothermal energy generation.	Projector, Internet, Link: https://www.youtube.com/watch?v=xGBklpO_A08
	32		7.5 Brief the Geothermal energy. 7.6 Describe different types of Geothermal energy. 7.7 Explain Geothermal electricity production and Geothermal heat pumps	To know about Biomass and Geothermal energy generation.	Projector, Internet, Link: https://www.youtube.com/watch?v=mCRDf7QxjDk
	33	Realize non-conventional sources of energy.	8.1 Describe wave energy generation. 8.2 Describe tidal energy generation. 8.3 Describe Ocean thermal energy conversion (OTEC).	To know about nonconventional sources of energy.	Projector, Internet, Link: https://www.youtube.com/watch?v=A4d6yxbPb5w
	34	Understand non-conventional sources of energy.	9.1 State the concept of Waste-to-Energy (Municipal Solid Waste) 9.2 Sketch the block diagram and mention the steps how waste to energy plant works. 9.3 List the advantages of Waste-to-Energy (Municipal Solid Waste). 9.4 Analyze economic and environmental impact for sample Renewable Energy. 9.5 State the barriers to implementation of renewable energies and its remedies.	To know about nonconventional sources of energy.	Projector, Internet, Link: https://www.youtube.com/watch?v=Zgp86PVXXuQ
	35	Recognize the transportation and alternative fuels.	10.1 Define alternative fuels for transportation. 10.2 Identify the alternative fuels for transportation. 10.3 Describe utility of hydrogen, ethanol, bio-diesel and propane as alternative fuels. 10.4 Explain benefit and challenges for	To know about the alternative fuels.	Projector, Internet, Link: https://www.youtube.com/watch?v=pEQmKNxVjp4

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			using alternative fuels. 10.5 Mention the environmental impact of conventional fuels vs alternative fuels for transportation.		
	36	Quiz Test 4	Examination Topic: Chapter 7,8 Examination mark: 10 Passing Mark: 04	Through Quiz Test students will learn the intellectual intelligence on the topics discussed.	5) Basic Class Materials 6) Examination Copy
	37	Class Test 4	Examination Topic: Chapter 7,8 Examination mark: 20 Passing Mark: 08	Through class tests students will learn to evaluate themselves on their own	5) Basic Class Materials 6) Examination Copy
	38	Presentation	Short presentation by individual student.	Be confident on practical life.	Laptop, projector
	39	MODEL TEST	All Syllabus	After the Class, Students will be highly confident for Final exam	Basic Class Materials
	40	Final Exam Syllabus Review			
	41	Final Exam Syllabus Review			
	42	Final Exam Syllabus Review			