Total No. of Questions: 6 *Total No. of Printed Pages:2*

Enrollment No.....

Faculty of Engineering

End Sem (Even) Examination May-2019

ME2EL09 Non-Conventional Sources of Energy

Programme: Diploma Branch/Specialisation: ME

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. In what form, solar energy is radiated from sun? **1**
(a) Ultraviolet radiation (b) Infrared radiation
(c) Electromagnetic radiation (d) Transverse waves

ii. Which of the following energy has the greatest potential among all the sources of renewable energy? **1**
(a) Wind energy (b) Solar energy
(c) Thermal energy (d) Hydro-electrical energy

iii. Which of the following is not a part of wind energy conversion system? **1**
(a) Turbine (b) Generator (c) Rotor (d) Compressor

iv. What is the main source for the formation of wind? **1**
(a) Uneven land (b) Sun
(c) Vegetation (d) Season

v. Which is an organic matter produced by plants in direct or indirect forms? **1**
(a) Solar energy (b) Biomass
(c) Wind energy (d) Bio-fuel

vi. What does natural decay of biomass produce? **1**
(a) Ozone (b) Methane (c) Ethane (d) Hydrogen

vii. Kaplan turbines are the type of _____ **1**
(a) Reaction turbines (b) Radial flow turbine
(c) Impulse turbine (d) None of these

viii. Hydroelectric power plant is _____ **1**
(a) Non-renewable source of energy
(b) Conventional source of energy
(c) Non-conventional source of energy
(d) Continuous source of energy

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ix. The process of producing energy by utilizing heat trapped inside the earth surface is called _____ **1**
(a) Hydrothermal energy (b) Geo-Thermal energy
(c) Solar energy (d) Wave energy

x. The energy of the fuel cells _____ **1**
(a) Can be recharged (b) Cannot be recharged
(c) Is stored (d) Cannot be said

Q.2 i. What are extra-terrestrial and terrestrial solar radiations? **4**

ii. Draw a neat sketch of solar flat plate collector and explain its construction and working principle. **6**

OR iii. What are the radiation measuring instruments? Explain in detail. **6**

Q.3 i. What is the basic principle of wind energy conversion? **2**

ii. Describe with neat sketch the working of a horizontal axis wind turbine with main components. **8**

OR iii. Describe the main considerations in selecting a site for wind energy system. **8**

Q.4 i. What is Biomass? **2**

ii. Explain construction and working of fixed dome biogas plant with neat sketch. **8**

OR iii. Differentiate between the following methods of biogas generation **8**
(a) Pyrolysis (b) Combustion
(c) Gasification (d) Anaerobic Digestion.

Q.5 i. What are the advantages of small hydro-electric power stations? **4**

ii. Write the complete classification of water turbines. **6**

OR iii. Explain about small hydropower stations with a neat layout diagram. **6**

Q.6 Attempt any two:

i. Explain working principle of fuel cell and describe energy storage system using fuel cells? **5**

ii. Write the merits and demerits of hydrogen energy. **5**

iii. List various types of geothermal resources. Explain any one. **5**

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Marking Scheme

ME2EL09 Non-Conventional Sources of Energy

Q.1	i.	In what form, solar energy is radiated from sun? (c) Electromagnetic radiation		**1**
	ii.	Which of the following energy has the greatest potential among all the sources of renewable energy? (b) Solar energy		**1**
	iii.	Which of the following is not a part of wind energy conversion system? (d) Compressor		**1**
	iv.	What is the main source for the formation of wind? (b) Sun		**1**
	v.	Which is an organic matter produced by plants in direct or indirect forms? (b) Biomass		**1**
	vi.	What does natural decay of biomass produce? (b) Methane		**1**
	vii.	Kaplan turbines are the type of _____ (a) Reaction turbines		**1**
	viii.	Hydroelectric power plant is _____ (b) Conventional source of energy		**1**
	ix.	The process of producing energy by utilizing heat trapped inside the earth surface is called _____ (b) Geo-Thermal energy		**1**
	x.	The energy of the fuel cells _____ (c) Is stored		**1**
Q.2	i.	Extra-terrestrial solar radiations	2 marks	**4**
		Terrestrial solar radiations	2 marks	
	ii.	Solar flat plate collector		**6**
		Diagram	2 marks	
		Construction	2 marks	
		Working principle.	2 marks	
OR	iii.	Radiation measuring instruments		**6**
		Three instrument 2 marks each	(2 marks * 3)	
Q.3	i.	Basic principle of wind energy conversion	1 mark	**2**
		Expression of wind power available	1 mark	
	ii.	Working of a horizontal axis wind turbine with main components.		**8**
		Diagram	4 marks	
		Name of components	2 marks	
		Working	2 marks	
OR	iii.	Main considerations in selecting a site for wind energy system.		**8**
		At least four considerations 2 marks each	(2 marks * 4)	
Q.4	i.	Biomass		**2**
	ii.	Fixed dome biogas plant		**8**
		Diagram	4 marks	
		Construction	2 marks	
		Working	2 marks	
OR	iii.	Methods of biogas generation		**8**
		(a) Pyrolysis	2 marks	
		(b) Combustion	2 marks	
		(c) Gasification	2 marks	
		(d) Anaerobic Digestion.	2 marks	
Q.5	i.	Advantages of small hydro-electric power stations		**4**
		Two points	1 mark	
		Three points	+ 1 mark	
		Four points	+ 1 mark	
		More than six points	+ 1 mark	
	ii.	Classification of water turbines.		**6**
		At least four classifications 1.5 marks each	(1.5 marks * 4)	
OR	iii.	Small hydropower stations		**6**
		Diagram	2 marks	
		Name of components	2 marks	
		Working	2 marks	
Q.6		Attempt any two:		
	i.	Diagram	2 marks	**5**
		Working principle and energy storage system	3 marks	
	ii.	Merits of hydrogen energy		**5**
		At least 5 points 0.5 mark for each (0.5 mark* 5)	2.5 marks	
		Demerits of hydrogen energy		
		At least 5 points 0.5 mark for each (0.5 mark* 5)	2.5 marks	
	iii.	Types of geothermal resources		**5**
		At least 4 types 1.25 mark for each	(1.25 mark* 4)	

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