Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem Examination Dec 2024

OE00095

Renewable & Distributed Energy Technologies

Programme: B.Tech. Branch/Specialisation: All

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. Assume suitable data if necessary. Notations and symbols have their usual meaning.

			Marks	BL	PO	CO	PSO
Q.1	i.	What are the non-renewable energy sources of energy? (a) Energy from wind and sun (b) Energy from ocean waves (c) Fossil fuels (d) Both a and b	**1**	1	1,7	1	
	ii.	What is the S.I unit of solar constant? (a) W^2 / m^2 (b) Wm^2 (c) W / m^2 (d) None of these	**1**	1	1	1	
	iii.	The equivalent electrical circuit of a solar PV cell has a- (a) Transistor (b) Diode (b) Capacitor (d) Inductor	**1**	1	1	1	
	iv.	The voltage of single solar cell is (a) 0.5 V (b) 0.7 V (c) 1.2 V (d) 1.5 V	**1**	1	1	2	
	v.	What is the average wind velocity observed on earth? (a) 14 m/sec (b) 4 m/sec (c) 9 m/sec (d) 1 m/sec	**1**	1	1	2	

vi.	If the speed of a wind stream remains unchanged while passing through the rotor, then- (a) A large power will be generated. (b) Zero power will be generated. (c) The flow is known as stalled flow. (d) The speed of the rotor will be extremely high.	**1**	1	1	1
vii.	A kaplan turbine is (a) Inward flow, impulse turbine (b) Outward flow, reaction turbine (c) A high lead mixed flow turbine (d) Low head axial flow turbine	**1**	1	1	2
viii.	Which of the following converts energy from the combustion of fuel directly to the electrical energy? (a) Ni-Cd cell (b) Dynamo (b) Fuel cell (d) Electrolytic cell	**1**	1	1	2
ix.	If one site fails in distributed system, then. (a) the remaining sites can continue operating. (b) all the sites will stop working. (c) directly connected sites will stop working. (d) none of these	**1**	1	1	1
x.	Which energy storage system uses spinning rotors to store kinetic energy? (a) Flywheels (b) Compressed air energy storage (c) Batteries (d) All of these	**1**	1	1	2
Q.2	i. Define the scope of renewable energy.	**2**	1	1	1
	ii. State solar irradiance and sun peak hours.	**3**	2	1,7	2
	iii. Explain renewable energy and its classification with the help of flow chart. also, state solar radiation and the conversion process happening directly from the sun.	**5**	2	1,7	2
OR	iv. Explain the present status of various modes of renewable power generations in India.	**5**	2	1,7	2

Q.3	i.	With a neat diagram explain solar cell characteristics.	**2**	2	1	2
	ii.	Write short notes on: (a) Perturb and observe (P&O) technique. (b) Hill climbing technique.	**8**	2	1,2,7	3
OR	iii.	Explain sizing and necessity with reference to energy storage. Also, discuss two applications of solar PV systems with block diagrams.	**8**	2	1,2	3
Q.4	i.	Determine the power in the wind if the wind speed is 20 m/s and blade length is 50 m.	**3**	1	1,2	1
	ii.	Explain Wind energy and its importance in detail. Describe briefly about the main components of the windmill.	**7**	3	7	2
OR	iii.	Derive the expression of power for wind turbine.	**7**	3	2	2
Q.5	i.	Explain the importance of biomass programme in India.	**4**	2	1	1
	ii.	A hydroelectric generating plant is supplied from a reservoir of capacity 3.6 x 10^6 m^3 at a head of 100m. Find the total energy available in kWh if the overall efficiency is 75%.	**6**	3	1,2,7	4
OR	iii.	List out the advantages and disadvantages of a tidal power plant.	**6**	3	1	4
Q.6		Attempt any two:				
	i.	Elucidate the necessity of energy storage in the context of renewable sources of energy.	**5**	2	1	2
	ii.	Discuss the voltage controlling techniques for distributed generation system.	**5**	2	2,7	2
	iii.	With a neat diagram explain the power electronics interface-based hybrid mode of distributed system.	**5**	4	1,2,7	5

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P.T.O.

Marking Scheme

OE00095 (T) Renewable & Distributed Energy Technologies (T)

			Marks
Q.1	i.	(c) Fossil fuels	**1**
	ii.	(c) W / m^2	**1**
	iii.	(b) diode	**1**
	iv.	(a) 0.5 V	**1**
	v.	(c) 9 m/sec	**1**
	vi.	(b) zero power will be generated.	**1**
	vii.	A Kaplan turbine is (d) low head axial flow turbine	**1**
	viii.	(c) Fuel cell	**1**
	ix.	If one site fails in distributed system, then. (a) the remaining sites can continue operating.	**1**
	x.	(a) Flywheels	**1**
Q.2	i.	Explanation …..equal to 2 marks	**2**
	ii.	Each definition equal to 1.5 marks,……2 definitions ….3marks	**3**
	iii.	Definition …….. 1 mark Flowchart…….2 marks Conversion…….2 marks	**5**
OR	iv.	Each statement equal to 1 mark,..... 5 statements.....5 marks	**5**
Q.3	i.	Diagram ……..1 mark Characteristics & explain ……..1 mark	**2**
	ii.	Each short note equal to a) P & O -Algorithm 2 marks b) Hill Climb -Algorithm 2 marks,…..2 short notes . 8 marks	**8**
OR	iii.	Sizing and necessity…….2 marks. Block diagrams ..…...…..3 marks Explanation …….3 marks	**8**
Q.4	i.	Power = 38622W……..3 marks	**3**
	ii.	Statement…… 1 mark Importance ……..2 marks Explanation of components ……4 marks	**7**
OR	iii.	Derivation ……..7 marks	**7**

Q.5	i.	Explanation …….4 marks	**4**
	ii.	Total energy = 732795 kWh ……6 marks	**6**
OR	iii.	Each advantage equal to 1 mark, ….3 advantages…..3 marks Each disadvantage equal to 1 mark, ….3 advantages…..3 marks	**6**
Q.6		Attempt any two:	
	i.	Explanation ……5 marks	**5**
	ii.	Voltage Control Techniques At least two 2-5 marks for each	**5**
	iii.	Diagram ……..3 marks Explanation ……2 marks	**5**

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