APJ ABDULKALAM TECHNOLOGICAL UNIVERSITY
08 PALAKKAD CLUSTER

Q. P. Code :PE0819221(C)-I **(Pages: 2)** **Name: .....**

Reg. No:.....

THIRD SEMESTER M.TECH. DEGREE EXAMINATION December 2019

Branch: Electrical & Electronics Engineering **Specialization: Power Electronics**

08EE7221(C)RENEWABLE ENERGY TECHNOLOGIES

Time:3 hours **Max.marks: 60**

Answer all six questions.

Modules 1 to 6: Part 'a' of each question is compulsory and answer either part 'b' or part 'c' of each question.

(Add any other instruction specific to course here like the use of IS codes/design tables etc.)

Q.no.	Module 1	Marks
1.a	Draw the block diagram of hybrid renewable energy system	3
	Answer b or c	
b	Explain the concept of standalone renewable energy system with necessary diagram	6
c	Discuss the grid connected wind energy system with a neat diagram	6

Q.no.	Module 2	Marks
2.a	Derive the equation for torque on wind turbine rotor	3
	Answer b or c	
b	Discuss about the aerodynamic operation of wind turbines and what is meant by the terms drag and lift with respect to wind energy.	6
c	Explain about the horizontal axis wind turbines with a neat figure	6

Q.no.	Module 3	Marks
3.a	Draw the power speed characteristics of wind turbine. Also define Cut-in speed, rated speed and Cut-out speed wind turbine	3
	Answer b or c	

b	What are the different methods of estimation of wind energy potential? Explain with necessary equations	6
c	A Wind Energy System generates 1500 watts at rated speed of 24 kmph at the atmospheric pressure and temperature of 20 °C. Calculate the change in output if the wind generator is operated at an altitude of 1600m, temperature 10 °C, wind speed 25kmph and at pressure 0.88 atmosphere	6

Q.no.	Module 4	Marks
4.a	A solar cell has terminal voltage of 0.7 V under operating conditions. What will be the terminal voltage of a PV module in which 27 cells are connected in series?	3

Answer b or c

b	What is maximum power point tracking in solar PV systems ? Explain with necessary diagrams	6
c	An SPV module having total area of 1.546m^2 and gives a current of 8.05A and voltage of 29.72V at maximum power point. The short circuit current of the module is 8.45A and open circuit voltage is 27.24 V. What is the fill factor, maximum power point and efficiency of solar cell	6

Q.no.	Module 5	Marks
5.a	(i)List out the various types of water turbines. (ii) It is required to develop 15000kW at 214 rpm under a head of 100m with a single runner. What type of turbine should be installed?	4

Answer b or c

b	Explain (i)downdraft gasifier, (ii) Fluidized bed gasifier with neat diagrams	8
c	Discuss about the major components of small hydropower project	8

Q.no.	Module 6	Marks
6.a	Derive the equation for energy potential and average power for a (i) single basin tidal project and (ii) double cycle single basin tidal system	4

Answer b or c

b	What are the different types of tidal power plants? Explain briefly with necessary figures	8
c	Draw and explain (i)vapour dominated geothermal power plant and (ii)flashed steam geothermal power plant	8