.... B E (ELECTRICAL) 4th Year, 2nd Sem .... EXAMINATION, 20 18 ....

(1st/2nd Semester/Repeat/Supplementary/Spl. Supplementary/Old/Annual/Bi-Annual)

SUBJECT .... Energy Systems ....
(Name in full)

PAPER ....

Full Marks 30/ 100

Time : Two hours/Three hours/Four hours/Six hours

(15/50 marks for each part)

Use a separate Answer-Script for each part

No. of questions	Part I Answer any three from the following. Two marks for well organized answers.	Marks
Q1 a) b)	With neat diagram explain the principle of wind energy conversion and hence derive the expression for power extracted from wind. Explain the term drag, lift, and angle of attack in case of a wind turbine. Discuss the properties desired in semiconductors for solar cell use.	10+6
Q2 a) b)	Sketch the diagram of a Horizontal axis Wind Turbine and explain the functions of of its main components. What .are the effects of solidity on the performance of wind turbine? Describe the principle of solar photovoltaic energy conversion.	10+6
Q3 a) b)	Discuss the advantages and disadvantages of horizontal and vertical axis wind turbine. What is energy demand management and its working principle?	10+6

Q4
a)
 	
b)
	A propeller type, horizontal shaft wind turbine having the following wind characteristics.
	Speed of wind 10 m/s at 1 atm and at 15°C. The turbine has a diameter of 120 m and its operating speed is 40 rpm at maximum efficiency. Calculate
	   i) The total power density in the wind stream
	   ii) Total power produced (in kW) and
	   iii) The Torque.
	What is energy planning? Discuss in brief.
		10+6

Q5	Write short notes on the following
	   a) V- I Characteristic of Photovoltaic (PV) module.
	   b) Tip-speed Ratio and Torque for Wind Turbine.
		8+8

B.E. ELECTRICAL ENGINEERING
FOURTH YEAR
SECOND SEMESTER EXAM 2018

ENERGY SYSTEMS

Time: Three Hours

Full Marks: 100

(50 marks for each part)
Use a separate Answer-Script for each Part

PART-II

Answer *any three* questions from this part.
Two marks are reserved for neat and well organised answer

1.	a) Discuss the different types of biomass conversion technologies.	8
	b) Discuss the environmental impacts of biomass energy.	4
	c) Describe the types of biogas plants.	4

2. a) Explain the different ocean tidal energy conversion schemes. What are the environmental impacts of tidal energy? **8**

  b) A tidal project has installed capacity of 2176 MW in 64 units, each of 34 MW rated output. The generation is 5 hours at every tidal cycle. The head at rated output is 5.52 m and the embankment is 6.4 km long. Assume density of sea water to be 1025 kg/ m^3 and 93% efficiency for both turbine and generator. Determine i) the quantity of water flowing through each turbine and the total flow out of the tidal basin. ii) The surface area of reservoir behind the embankment, and the wash. iii) Energy produced in MWh per year. **8**

3.	a) Discuss the different types of geothermal resources.	10
	b) What are the merits and demerits of geothermal energy?	6

4.	a) What do you understand by energy audit? Discuss the Preliminary and Detailed energy audit.	8
	b) List some general principles of energy conservation.	8

5. Write short notes on any four: **4x4**

   a) Kyoto Protocol b) Carbon Credit c) Flywheel energy storage device d) Electrostatic energy storage device e) Cogeneration