BACHELOR OF ENGINEERING (ELECTRICAL ENGINEERING)
FIFITH YEAR
FIRST SEMESTER EXAM 2019

ENERGY SYSTEMS

Time: Three Hours **Full Marks:** 100

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

PART-I

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

1.	a) List some general principles of energy conservation.	6
	b) Explain the necessity of energy storage. Discuss thermal energy storage device.	10
2.	a) Biomass is carbon neutral – Justify.	3
	b) Discuss the different sources of biomass for energy generation.	6
	c) Describe any two biomass conversion technologies for energy generation.	7
3.	a) Discuss the harmful effects of thermal power plants.	6
	b) What do you understand by carbon credit? Discuss how carbon credit can mitigate the rise of greenhouse gases.	3+5
	c) What is Kyoto Protocol?	2
4.	a) Discuss what you know about hydrothermal energy resource.	8
	b) What are the different modes of operation of tidal power plant?	4
	c) Discuss the environmental impacts of tidal energy generation.	4
5.	Write short notes on: a) Biogas plants b) Environmental effects of geothermal energy c) Electromagnetic energy storage device d) Cogeneration	4x4

Form A: Paper-setting Blank *Ref. No. Ex* /EE/5/T/513D/2019

B E (ELECTRICAL) 5th Year, 1st Sem **EXAMINATION, 20** 19

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

SUBJECT Energy Systems
(Name in full)

PAPER .....

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

Full Marks ~~30~~/ 100
(~~15~~/50 marks for each part)

Use a separate Answer-Script for each part

No. of questions	Part II Answer any three from the following. Two marks for neatness.	Marks
Q1		10+6
a)	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.	
b)	Write briefly on properties desired for choice of materials for solar cell. Discuss the constraints in photovoltaic Power Generation	
Q2		7+9
a)	Explain how the variation of insolation and temperature affects the I-V characteristics of a solar cell.	
b)	Write briefly about a) Tip Speed Ratio b) Solidity c) Torque generated in a wind turbine	
Q3		
a)	Explain the working of a Fuel Cell. What are the merits and Demerits of Storage Cells?	8+8
b)	What are the basic subsystems of a wind turbine? With neat diagram explain the operation of Horizontal Axis wind Turbine.	
Q4		
a)	With neat diagram discuss the technology of Ocean Thermal Energy Conversion.	8+8
b)	Deduce the expression for Short Circuit Current and Open Circuit Voltage in case of semiconductor material based solar cell.	
Q5	Write Short Notes on the following I) Working of a Fuel Cell – Bio-Chemical Cells. II) Photovoltaic Modules	8+8