

B E (ELECTRICAL) 4th Year, 2nd Sem

EXAMINATION, 20 19

(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 / Part-II Answer any three from the following. Two marks for well organized answers.	Marks
Q1		
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.	10+6
b)	What do you mean by cell mismatch in a solar module and what are its implications?	
Q2		
a)	Sketch the diagram of a Horizontal axis Wind Turbine and explain the functions of its main components. What are the effects of solidity on the performance of wind turbine?	10+6
b)	Clearly, explain the construction of a p-n junction and its use to convert sunlight directly into electricity. What distinguishes a solar cell from a conventional p-n junction diode?	
Q3		
a)	Following data are given for a HAWT: Speed of wind: 10mtr/s, air density: 1.266kg/m ³ , rotor diameter = 120 mtr, Rotor speed= 40 rpm; Coefficient of performance = 40%, Calculate a) Power density in wind system, b) Total power available in the wind, c) Maximum Extractable power	10+6
b)	Sketch the diagram for a Close cycle mode operation of a Ocean Thermal Energy Conversion system and hence explain its operation.	
Q4		
a)	Determine the expression to deduce efficiency of a fuel cell.	10+6
b)	With respect to solar photovoltaic cell with the help of I-V characteristic plot explain the following term a) Open circuit voltage b) Short circuit current	
Q5	Explain in details the following I) Various types of geothermal resources II) Classify different types of fuel cell	8+8

[Turn over

B.E. Electrical Engineering Fourth Year Second Semester Exam 2019

Energy Systems

Time: Three hours

(50 marks for each part)

Full Marks: 100

Use separate answer script for each part.

PART II

Answer **any FIVE** questions.

1. a) Briefly discuss Green house effect 5
 - b) Discuss the environmental impacts of coal fired power plants 8
 - c) What do you mean by the term green power? 3
2. a) Discuss the importance of cogeneration. 4
 - b) How can hot dry rocks be used as geothermal energy resources? Briefly discuss. 4
 - c) An industry has a daily requirement of 200 tonnes of coal to meet its electrical energy and thermal energy requirement of 1.2×10^6 MJ and 1.6×10^6 MJ respectively. It uses cogeneration plant for this purpose. What is the overall efficiency of the plant? If it makes use of two separate plants instead of cogeneration, what will be the combined overall efficiency? The efficiency of the individual electrical and thermal plants is 30% and 80% respectively. The heating value of the coal may be assumed as 20 MJ/kg. 8
3. a) Discuss the different resources for biomass energy generation 8
 - b) Discuss different tidal energy conversion schemes 8
- 4 a) Advantages and disadvantages of conventional and non conventional energy resources over another 8
 - b) Discuss how buying carbon credit can reduce emissions. 8
- 5 Write short notes on any two of the following: 8x2
 - a) energy policy in India
 - b) salient features of energy conservation act 2001
 - c) pumped storage