

710605

Roll No.

710605

Total No. of Pages: 3

B. Tech. VII - Sem. (Main) Exam., (Academic Session 2021-2022)  
Open Elective-I  
(7EE6-60.2) - Power Generation Sources

Time: 3 Hours

Maximum Marks: 120  
Min. Passing Marks:

**Instructions to Candidates:**

**Part - A:** Short answer questions (up to 25 words)  $10 \times 2$  marks = 20 marks.  
All ten questions are compulsory.

**Part - B:** Analytical/Problem solving questions  $5 \times 8$  marks = 40 marks.  
Candidates have to answer five questions out of seven.

**Part - C:** Descriptive/Analytical/Problem Solving questions  $4 \times 15$  marks = 60 marks.  
Candidates have to answer four questions out of five.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.  
(Mentioned in form No. 205)

1. NIL

2. NIL

**PART - A**

- Q.1 Draw V-I characteristic of fuel cell and indicate various types of polarizations. [2]
- Q.2 Comment on the possibilities of hydrogen as potential energy carrier in future. [2]
- Q.3 Draw power versus wind speed characteristics of a wind turbine. [2]
- Q.4 What do you understand by gust? [2]

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[80]

- Q.5 What do you understand by energy pay back period? [2]
- Q.6 What do you understand by energy farming? [2]
- Q.7 What do you understand by cell mismatch in a solar module. [2]
- Q.8 The effective head of water in a pelton wheel is 40m from fore bay to the turbine runner. Calculate the velocity of water in the jet. [2]
- Q.9 How collector coating can be used to improve the performance of a collector? [2]
- Q.10 Define Betz law associated with wind energy. [2]

12.

### PART - B

- Q.1 Discuss various types of speed governors used in small hydro plants, which type is justified in micro hydro scheme. [8]
- Q.2 Enumerate different government of India's initiatives in reducing the carbon foot print. [8]
- Q.3 Prove Betz limit indicates that only 59 percent of energy available in the wind can be captured. <https://www.btubikaner.com> [8]
- Q.4 Define the terms : altitude angle, incident angle, zenith angle, solar azimuth angle, in relation to solar radiation measurement.   
 *meridian below sun* *↓ to profile* [8]
- Q.5 Explain the process of gasification of solid bio-fuels. What is the general composition of the gas produced and what is its heating value? [8]
- Q.6 What is pumped storage technique? How does it helps in making power plant as peak load power plant? [8]
- Q.7 Explain the I-V characteristics of a solar cell and define fill factor and explain its significance. [8]

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## PART - C

- Q.1 Draw a schematic diagram of solar pond based electric power plant with cooling tower and explain its working. [15]
- Q.2 A PV system feeds a dc motor to produce 1 hp power at the shaft. The motor efficiency is 85% each module has 36 multi crystalline silicon solar cells arranged in 9×4 matrix. The cell size is 125 mm × 125 mm and cell efficiency is 12%. Calculate the number of modulus required in the PV array. Assume global radiation incident normally to the panel is 1kW/m<sup>2</sup>. [15]
- Q.3 A propeller type wind turbine has following data speed of free wind at a height of 10 m = 12 m/s : [15]
- Air density = 1.226 kg/m<sup>3</sup>
- $\alpha = 0.14$
- Height of tower = 100 m
- Diameter of rotor = 80 m
- wind velocity at the turbine reduces by 20% governor efficiency = 85%
- Find -
- (i) Total power available in wind
- (ii) Power extracted by turbine
- Q.4 (a) Explain working of solar still with help of neat diagram. [7]
- (b) Explain working of solar pond with help of neat diagram. [8]
- Q.5 (a) Comment on the origin and distribution of geothermal energy. [7]
- (b) Comment on the variation of tides with location. [8]
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