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PRESIDENCYUNIVERSITY BENGALURU

 SCHOOL OF ENGINEERING

MAKE UP EXAMINATION – JULY 2024

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| **Semester: III** | **Date: 02.07.2024**  |
| **Course Code: EEE3024** | **Time: 09.30am to 12.30pm** |
| **Course Name: Solar photovoltaic & Wind Energy Systems** | **Max Marks: 100** |
| **Program: B. Tech EEE** | **Weightage: 50** |

**Instructions:**

1. *Readallquestionscarefullyandansweraccordingly.*
2. *Questionpaperconsistsof3parts.*
3. *Scientificandnon-programmablecalculatorare permitted.*
4. *DonotwriteanyinformationonthequestionpaperotherthanRoll Number.*

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| **PART A** |
|  **ANSWER ANY 4 QUESTIONS 4Q X 5M=20M** |
| 1 | List out the various applications of Solar Energy. | (CO 1) | [Knowledge] |
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| 2 | Describe the need of for Renewable Energy. | (CO 1) | [Knowledge] |
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| 3 | Define the following terms;1. Irradiance.
2. Solar Panel.
3. Photovoltaic (PV) Cell.
4. Solar Array.
5. Solar Photovoltaic System
 | (CO 2) | [Knowledge] |
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| 4 | List out the advantages and disadvantages of wind energy.  | (CO 3) | [Knowledge] |
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| 5 | Identify and List Key aspects and objectives of integrated energy system modeling. | (CO 4) | [Knowledge] |
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| 6 | Define the term Integrated Energy Systems and list all the components associated it with. | (CO 4) | [Knowledge] |
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| **PART B** |
|  **ANSWER ANY 5 QUESTIONS 5Q X 10M=50M** |
| 7 | Distinguish the key differences in the environmental, economic, and societal impacts between renewable and non-renewable energy sources, and how can we effectively leverage this understanding to transition towards a more sustainable energy future? | (CO 1) | [Comprehension] |
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| 8 | Draw and explain in brief about the equivalent Circuit of a Photovoltaic Cell | (CO 1) | [Comprehension] |
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| 9 | To effectively establish a solar energy database across multiple sites within a university campus, precise measurement of solar radiation is crucial. This ensures the identification of optimal spots for installing solar power infrastructure. Various instruments can be employed to achieve this objective. Identify and suggest the suitable device to measure the solar radiation. | (CO 2) | [Comprehension] |
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| 10 | Explain the various factor to be considered to select the site for Solar Power plant. | (CO 2) | [Comprehension] |
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| 11 | Wind Power plants are a collection of wind turbines either horizontal or vertical type. These turbines collect the energy individually and are connected to a common plant. The wind turbine is also similar to the normal turbine, as it converts kinetic energy into mechanical energy. And they are designed in such a way that the height and length of the blades are maintained at some ratio. Among all the power plants Wind plant is one of the major plants with more than 20 years of life span. It usually requires maintenance every six months. The overall efficiency of a Wind turbine power plant is 20% - 40%. In order to generate the electrical power from wind energy requires systematic of various components- how these components are arranged describe in brief with supporting diagram.  | (CO 3) | [Comprehension] |
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| 12 | 1. Describe the term Wind Energy and list the formula to compute wind energy with usual notations.
2. A wind turbine with the following characteristics:
3. Swept area (A) = 200 square meters
4. Air density (ρ) = 2.225 kg/m³ (at sea level)
5. Wind speed (v) = 20 meters per second
6. Coefficient of performance (Cp) = 0.50 (typical for modern turbines).

Calculate the power output of the turbine and the energy it can produce over a Certain period. | (CO 3) | [Comprehension] |
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| 13 | Explain the Various Integrated energy schemes, their cost benefit analysis. | (CO 4) | [Comprehension] |
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| **PART C** |
|  **ANSWER ANY 2 QUESTIONS 2Q X 15M=30M** |
| 14 | With suitable sketches describe the function of the Process of Generating Electricity from Grid Connected PV Systems? | (CO 2) | [Application] |
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| 15 | Explain the classification of wind power plants based on their capacity and scale, highlighting the distinguishing characteristics of utility-scale and distributed wind power systems. | (CO 3) | [Application] |
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| 16 | Integrated energy system modeling is a comprehensive approach to analyzing and optimizing energy systems by considering multiple energy sources, conversion technologies, and end-use sectors. It involves the integration of various components such as electricity, heat, and transportation fuels to create a holistic view of energy flows within a given system. Explain the key aspects and objectives of integrated energy system modeling. | (CO 4) | [Application] |
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