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# B.M.S. College of Engineering, Bengaluru-560019

**Autonomous Institute Affiliated to VTU**

## January / February 2025 Semester End Main Examinations

**Programme: B.E.** **Semester: VII**

**Branch: Institutional Elective** **Duration: 3 hrs.**

**Course Code: 22CH7OEAET** **Max Marks: 100**

**Course: Advances in Energy Technology**

**Instructions**: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

**Important Note:** Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

| | | | UNIT - I | *CO* | *PO* | Marks |
|---|---|---|---|---|---|---|
| 1 | a) | | Define energy and comment on the current world and India's primary energy consumption sources. | *CO1* | *PO2* | **10** |
| | b) | | Define and distinguish between conventional and non-conventional energy sources. Give a few examples for each. | *CO1* | *PO2* | **10** |
| | | | **OR** | | | |
| 2 | a) | | Define primary and secondary energy sources. List a few examples for each. | *CO1* | *PO2* | **04** |
| | b) | | Define and distinguish between renewable and non-renewable energy sources. Give a few examples for each. | *CO2* | *PO7* | **10** |
| | c) | | Delineate the obstacles in the implementation of alternative energy sources. | *CO2* | *PO7* | **06** |
| | | | **UNIT - II** | | | |
| 3 | a) | | Define terrestrial and extra-terrestrial radiation. Discuss the phenomena of attenuation of solar radiation. | *CO5* | *PO3* | **08** |
| | b) | | With the aid of neat sketches, demonstrate the construction and working of solar flat plate and parabolic collectors. | *CO3* | *PO2* | **08** |
| | c) | | How much energy can a single solar PV cell produce? Comment on its efficiency. | *CO6* | *PO2* | **04** |
| | | | **OR** | | | |
| 4 | a) | | What is solar radiation? Elaborate on the spectrum of solar radiation and comment on its composition. | *CO5* | *PO3* | **10** |

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| | | b) | With the aid of a neat sketch, demonstrate the construction and working of a solar PV cell. Mention in detail the materials used for the PV cell. | *CO5* | *PO3* | **10** |
| | | | **UNIT - III** | | | |
| | 5 | a) | What is biomass? List the different biomass resources and the biofuels derived from them. Discuss the constraints in the utilization of biomass energy. | *CO4* | *PO6* | **10** |
| | | b) | With a detailed process flow diagram, demonstrate the generation of power from geothermal energy. | *CO5* | *PO3* | **10** |
| | | | **OR** | | | |
| | 6 | a) | With a detailed sketch and relevant chemical reactions, demonstrate the process of biomass gasification. | *CO5* | *PO3* | **10** |
| | | b) | With a detailed process flow diagram, demonstrate the generation of power from municipal solid waste. | *CO5* | *PO3* | **10** |
| | | | **UNIT - IV** | | | |
| | 7 | a) | Compare and contrast HAWT and VAWT. | *CO5* | *PO3* | **06** |
| | | b) | Is hydropower a renewable energy? Comment. | *CO1* | *PO2* | **04** |
| | | c) | Wind at 1 std. atm. pressure and 15 $^{o}$C has a velocity of 15 m/s and density of 1.226 kg/m3. A turbine of diameter 120 and efficiency of 35 % is operating at 40 rpm in the wind. Calculate the total power contained in the wind and the power output of the generator. | *CO5* | *PO3* | **10** |
| | | | **OR** | | | |
| | 8 | a) | Derive the expression from the maximum power obtainable from wind. | *CO5* | *PO3* | **10** |
| | | b) | With a neatly labeled sketch, demonstrate the working of a hydropower plant. | *CO5* | *PO3* | **10** |
| | | | **UNIT - V** | | | |
| | 9 | a) | What is a fuel cell? List the difficulties in the utilization of fuel cells. | *CO3* | *PO2* | **10** |
| | | b) | With a neat sketch, explain the working of a phosphoric acid fuel cell. Mention the cell reactions, electrode materials and electrolyte of the cell. | *CO3* | *PO2* | **10** |
| | | | **OR** | | | |
| | 10 | a) | Present the classification of fuel cells. | *CO1* | *PO2* | **10** |
| | | b) | With a neat sketch, explain the working of an alkaline fuel cell. Mention the cell reactions, electrode materials and electrolyte of the cell. | *CO3* | *PO2* | **10** |

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