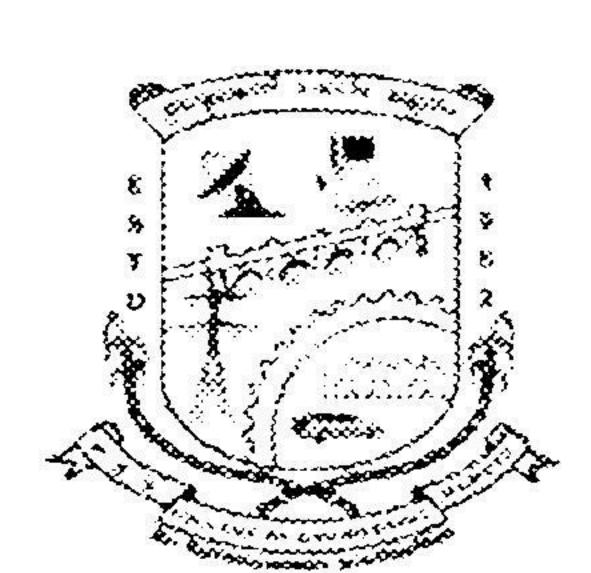
U.S.N



P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Eighth Semester, B.E. - Electrical and Electronics Engineering

Note: i) Answer TWO full questions, selecting ONE full question from UNIT - I and UNIT - Warmer TWO full questions, choosing from UNIT - III, UNIT

l a. Explain the concept of energy consumption as a measure of prosperity of any nation.

b. What are the renewable and non-renewable energy sources? Explain the various ways of classifying energy sources, giving example.

Discuss the negative impact of fossil fuel utilization and compare them with renewable energy sources.

- 2 a. Differentiate between:
 - i) Beam and Diffuse solar radiation

- ii) Terrestrial and Extra-Terrestrial solar radiation
- b. Calculate the angle made by beam radiation with the normal on a flat collector on December 1st at 9 AM solar time for a location at 28.35°, N. The collector is tilted at an angle of latitude plus 10° with the horizontal and a pointing due south.

c. With neat sketch, explain how the solar radiation reaches the earth surface and estimate the value of solar radiation on a tilted surface.

UNIT - II

3 a. What are concentrating type collectors? Explain in brief the line focusing type collectors.

- b. Find out the thermal efficiency of a flat plat collector on March 10 at 10 AM for which solar radiation data on a horizontal surface are direct = 570 W/m^2 and diffuse = 140 W/m^2 . The collector is tilted at an angle of 30° at a place having latitude of 20°, N. Other parameters for the collector are;
 - i) Number of glasses = 2

ii) Heat removal factor = 0.82

- iii) Transmittance of glass = 0.88
- iv) Absorptance of plate = 0.95
- v) Reflectivity of glass and ground and are 0.24 and 0.75 respectively
- vi) Overall loss coefficient for the collector = 8.0 W/m^2
- vii) Fluid temperature rise = 50° C, Ambient temperature = 15° C.

OR.

4 a. Derive the expression efficiency and power output of a solar cell.

b. Daily energy demand for a typical remote village is given below:

Appliances	Number	AC/DC	Rating of appliances	Operating
			(Watts)	Hour
Indoor Room Lights	30	DC (40 V)	9	4
Kitchen Lights	10	DC (40 V)	7	4
Street Lights	5	DC (40 V)	11	10
TV sets	8	DC (40 V)	25	4

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Determine the following;

- i) Total daily load
- ii) Number of modules for the solar radiation of 6.8 kWhr/day, if the module output is 80 Wp and nominal voltage is 20 V.

UNIT - III

5 a. Show that the maximum power generated by wind energy system is equal to $0.593 \times P_{total}$.

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- b. Wind at 1 standrd atmospheric pressure (density = 1.226 kg/m³) and 15°C has velocity of 15 m/s, calculate;
 - i) The power density in the wind stream
 - ii) Maximum obtainable power density

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- iii) A reasonably obtainable power desity
- iv) The total power and the torque corresponding to maximum efficiency

Given turbine diameter = 120 m, turbine operating speed = 40 rpm at maximum efficiency. Propeller type wind turbine is considered.

6 a. With a neat sketch, explain the working of wind energy conversion system for generation of electrical energy.

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b. Explain the factors that determine the location of wind electric generators.

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UNIT - IV

7 a. What is biomass? Give a description on classification of biomass resources.

8 a. With a suitable diagram, explain the KVIC and Janatha model of biogas plant.

b. Explain the following as applied to biomass conversion:

- i) Thermo chemical conversion
- ii) Anaerobic digestion
- iii) Fermentation

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b. Describe the process of biogas generation and explain the factors affecting the generation of biogas.

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UNIT - V

9 a. What is the basic principle of tidal power? With neat sketch, explain the various components of tidal power plant.

b. With neat sketch, explain the single basin operation tidal power plant.

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- 10 a. A tidal power plant of the simple single basin type has a basin area of 30×10^6 m². The tide has a range of 12 m. The turbine, however, stops operating when the head on it falls below 3 m. Calculate the energy generated in one filling (or emptying) process, in kWhr, if the turbine generator efficiency is 0.73.
 - b. With suitable diagram, explain closed cycle OTEC system for ocean thermal energy.

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