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B. E. (Sixth Semester) Examination, April-May 2020

(New Scheme)

(Mech. Branch)

ENERGY SYSTEMS

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Part (a) of each question is compulsory. Solve any two from part (b), (c) and (d). Give suitable sketches. Part (a) is of 2 marks & (b), (c), (d) is of 7 marks.

Unit - I

1. (a) Define propulsive efficiency as applied to set propulsion.
- (b) Describe the working of a Ram Jet engine with a neat sketch and show the process on Enthalpy-Entropy plot.

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- (c) State the difference between Turbojet Engine and Turboprop Engine.
- (d) A turbojet engine draws air at the rate of 1 kg/sec while flying at a speed of 900 kmph. The velocity of gases of the exit of the mode is 620 m/sec. The engine uses fuel at the rate of 0.0125 kg/sec. of C.V. 45000 kJ/kg.

Find :

- (i) Fuel-air ratio
- (ii) Fuel consumption in kg/hr.
- (iii) Thrust, Thrust power and TSFC
- (iv) Propulsive power and efficiency
- (v) Thermal and overall efficiency

Unit - II

2. (a) What is propellant?
- (b) Draw the sketch explaining the several working of a liquid propellant rocket engine.
- (c) Difference between jet propulsion and rocket propulsion.
- (d) The specific impulse of a rocket is 125 sec. and the flow rate of propellant is 44 kg/sec. The work

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throat area is 18 cm^2 and the pressure in the combustion chamber is 25 bar. Determine the thrust coefficient, propellant coefficient, specific propellant consumption and characteristics velocity.

Unit - III

3. (a) What are the primary sources of energy?
- (b) Write a short note on :
- (i) Pyranometer
- (ii) Pyrheliometer
- (c) Define the following :
- (i) Hour angle
- (ii) Zenith angle
- (iii) Altitude angle
- (iv) Day length
- (v) Latitude
- (d) Describe the solar photo voltaic power generation, system and mention its advantages.

Unit - IV

4. (a) Define biomass and biomass energy.

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- (b) Discuss the factors which affect the biogas production in detail.
- (c) Write a notes on advantages and disadvantages of wind energy utilization.
- (d) Describe the main considerations in selecting a site for wind generators.

Unit - V

5. (a) Define fuel cells.
- (b) Discuss open cycle OTEC system with the help of a neat diagram.
- (c) Explain the principle of working of a MHD generator with the help of schematic diagram for its system arrangement.
- (d) Write a notes on advantages and disadvantages of geothermal energy. Also write application of geothermal energy.