

337613(37)

B. E. (Sixth Semester) Examination 2020

(Old Scheme)

(Mech. Engg. Branch)

ENERGY CONVERSION SYSTEMS

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Attempt all questions. Part (a) of each question is compulsory and carries 2 marks. Attempt any two parts from (b), (c) and (d) which carry 7 marks each.

Unit - I

1. (a) Explain the Speed Ratio in Aircraft propulsion?
- (b) Derive equation for "Propulsive efficiencies and thermal efficiencies of turbojet engine".

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- (c) Describe the working of pulse jet engine with neat sketch. Also state the main advantages.
- (d) The diameter of the propeller of an aircraft is 2.5 m; it flies at a speed of 400 kmph at altitude of 8000 m. For a flight to jet speed ratio of 0.75. Determine.
- The flow rate of air through the propeller
 - Thrust produced
 - Specific thrust
 - Specific impulse
 - Thrust power
- Take $\rho_{air} = 0.525 \text{ kg/m}^3$

Unit - II

2. (a) Differentiate between jet propulsion and Rocket propulsion.
- (b) With suitable diagram give basic theory of operation of rocket engines. Define and write the expression for thrust, thrust power, propulsive efficiency and specific impulse.
- (c) Prove that in a rocket engine overall efficiency is the product of thermal efficiency and propulsive efficiency.

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- (d) Calculate the orbital and escape velocity of a rocket at mean sea level and an altitude of 500 km from the following data :

Radius of earth at mean sea level is 6341.6 km

Acceleration due to gravity at mean sea level = 9.809 m/sec^2 .

Unit - III

3. (a) List the various non conventional energy sources.
- (b) Define "Beam Radiation" and "Diffuse Radiation" with the help of diagram.
- (c) Describe the flat plate collectors and what are the main component.
- (d) Give the applications of solar photo voltaic.

Unit - IV

4. (a) Explain the term photo synthesis.
- (b) Explain the site selection consideration made in the wind energy for wind energy conversion system.

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- (c) Explain the constructional detail and working of KVIC digestion.
- (d) How the following factors effect of generation of Bio gas :
 - (i) Temperature of substrate
 - (ii) pH value (or) hydrogen ion concentration
 - (iii) Solid Concentration.

Unit - V

5. (a) Write two disadvantages of OTEC system.
- (b) Explain principle of MHD power generation.
- (c) Explain with neat sketch open cycle OTEC system.
- (d) Explain the principle and application of fuel cells.