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B.Tech. AEROSPACE ENGINEERING (BTAE)

Term-End Examination, 2019

BAS-013 : PROPULSION-I

Time : 3 Hours]   [Maximum Marks: 70

Note : Attempt **any seven questions** out of nine questions. **All** questions carry **equal** marks. Use the scientific calculator is permitted.

1.   Explain the following :   [5×2=10]

     (a)   Clausius Inequality

     (b)   Zeroth law of thermodynamics

     (c)   Latent heat

     (d)   Degree of sub-cooling

     (e)   Indicator diagram

2.   Write notes on the following :   [2×5=10]

     (a)   Diesel cycle

(b)   Brayton cycle

3.   (a)   A mass of 0.25 kg of an ideal gas has a pressure
           of 300 Kpa, a temperature of 80° C and a volume
           of 0.07m³. The gas undergoes an irrevessible
           adiabatic process to a final pressure of 300 Kpa
           and a final volume of 0.1m³ during which the work
           done on gas is 25 kJ. Evaluate Cp and Cv of the
           gas and increase in entropy of the gas.   [6]

     (b)   What do you understand by 'available energy and
           availability' ?   [4]

4.   (a)   Distinguish between C.I. engine and S.I. engine.
                                                       [5]

     (b)   Define the second law efficiency. How is it
           different from the first law efficiency.   [5]

5.   Explain the following terms briefly :   [10×1=10]

     (a)   Saturation state

     (b)   Degree of super heat

     (c)   Air standard efficiency

(d) Dryness fraction

(e) Dead state

(f) Entropy

(g) Degree of sub-cooling

(h) Available energy

(i) Energy

(j) Useful work

6. Why lubrication of reciprocating engine is required ? Explain various lubricating systems. [2+8=10]

7. Explain Dual cycle with the help of a neat diagram and derive the expression for efficiency of Dual cycle.

[3+7=10]

8. (a) Discuss the working of a simple carburettor with the help of a neat sketch. [6]

(b) A cyclic heat engine operates between a source temperature of 900°C and a sink of 50°C. What is the least rate of heat rejection per KW net output of the engine ? [4]

9. In a gas turbine plant, working on the Brayton cycle with a regenerator of 75% effectiveness, the air at the inlet to the compressor is at 0.1 MPa, 30°C, the pressure ratio is 6 and maximum cycle temperature is 900° C. If the turbine and compressor have each an efficiency of 80%, find the percentage increase in the cycle efficiency due to regeneration. [10]

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