KUMARAGURU
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Register Number: …….

B.E DEGREE EXAMINATIONS: DEC 2014

(Regulation 2013)

Third Semester

AERONAUTICAL ENGINEERING

U13AET303:Aero Engineering Thermodynamics

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Which of the following laws is applicable for the behavior of a perfect gas
   a) Boyle's law b) Charles' law
   c) Gay-Lussac law d) all of the above
2. Kelvin Planck's law deals with ……..
3. According to kinetic theory of gases, the absolute zero temperature is attained when
   a) volume of the gas is zero b) pressure of the gas is zero
   c) kinetic energy of the molecules is zero d) specific heat of gas is zero
4. Carnot cycle has maximum efficiency for……
5. A device designed to control the direction or characteristics of a fluid flow (especially to increase velocity) as it exits (or enters) an enclosed chamber is called
   a) Nozzle b) Diffuser
   c) Motor d) CD- Nozzle
6. Any devices that extracts energy from or imparts energy to a continuously moving stream of fluid (liquid or gas) can be called ……..
7. The law which describes the electromagnetic radiation emitted by a black body in thermal equilibrium at a definite temperature is
   a) Planck's law b) Fourier,S Law
   c) Zeroth Law d) Fan Law
8. The transfer of heat from one place to another by the movement of fluids is called ……..

9. If heat to be exchanged in a reversible manner, which of the following property of the working substance will change accordingly

a) temperature b) enthalpy

c) internal energy d) entropy

10. The COP of Vapor Compression Refrigeration system is always _____.

PART B (10 x 2 = 20 Marks)

(Not more than 40 words)

11. Define first law of thermodynamics.
12. What is meant by quasi-static process?
13. Compare Otto & diesel cycle on the basis of compression ratio & maximum temperature in the cycle by Ts Diagram
14. What is the significance of Mean Effective Pressure?
15. Define specific impulse & specific propellant consumption.
16. Differentiate Isothermal Vs Isotropic efficiency
17. What is swept volume? Write down the swept volume for single and double acting compressors.
18. What are the classification of Air-compressor?
19. State any four properties of a good refrigerant.
20. Differentiate Super Heating Vs Sub cooling of Refrigerant

PART C (5 x 14 = 70 Marks)

(Not more than 400 words)

Q.No. 21 is Compulsory

21. "Heat and work are the energy in transit and inexact differentials", Explain briefly.

22. a) What is the need for PV diagram? How does it vary for four strokes and two stroke IC Engines? Explain briefly with a neat sketch.

(OR)

b) An ideal Otto cycle with air as the working fluid has a compression ratio of 8.0.A the beginning of compression, air is at 100KPa, 27°C. The maximum temperature in the cycle is 1340K.Consider air to be an ideal gas and constant composition and specific heats in the cycle. Determine

(i) The amount of heat added heat rejected and network done per 1kg of air (7)

(ii) Mean effective pressure and Thermal efficiency (7)

23. a) An air standard diesel cycle has a compression ratio of 16 and a cut-off ratio of 2.At the beginning of the compression air is at 95 KPa and , 27°C.Determine,

(i) The temperature after the heat addition process. (7)

(ii) The thermal efficiency and The mean effective pressure. (7)

(OR)

b) Consider a steam power plant operating on the ideal Rankine cycle. the steam enters the turbine at 3 Mpa, and 350 C. is condensed in the condenser at 10 Kpa. Determine ,

(i) The properties at all the four important states in the cycle. (7)

(ii) The thermal efficiency and The network output in KJ/Kg. (7)

24. a) A turboprop aircraft flies at a speed of 520 kmph at an altitude of 8km.The diameter of the propeller is 240 cm and its flight to jet speed ratio is 0.74.Find the following

(i)The rate of air flow through the propeller and Thrust produced (7)

(ii) Specific thrust and Specific impulse (7)

(OR)

b) Sketch and briefly explain the working of single stage reciprocating Air compressor

25. a) Explain briefly the most important Dimensionless Numbers used in Heat Transfer

(OR)

b) Explain the function of simple vapour compression refrigeration system giving clearly its flow diagram

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