Roll No. | | | | | | | | |

B.E / B.Tech (Full Time) End Semester DEGREE EXAMINATION, APRIL / MAY 2012

Fourth Semester / Mechanical Engineering

ME 284 – THERMAL ENGINEERING I

70

(Regulation 2004)

Time : 3 Hours | Answer ALL Questions | Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. Define mean effective pressure.
2. What is meant by a two stroke engine?
3. What is the principle of reaction type steam turbine?
4. What is the use of nozzle governors?
5. Define Turbocharging.
6. Draw the symmetrical port timing diagram of a two stroke engine.
7. Define knocking in diesel engine.
8. What is the difference between air fuel ratio and equalance ratio?
9. Which basic thermodynamic cycle used in gas turbines?
10. How the performance of a gas turbine is assed?

Part – B (5 x 16 = 80 marks)

11. a) In a constant volume 'Otto cycle', the pressure at the end of compression is 15 times that ar the start, the temperature of air at the beginning of compression is 38°C and maximum temperature attained in the cycle is 1950°C. Determine :
    i) Compression ratio
    ii) Thermal efficiency of the cycle
    iii) Work done

    Take γ for air = 1.4

12. a) The outlet angle of the blade of Parson's turbine is 20° and the axial velocity of flow of steam is 0.5 times the mean blade velocity. If the diameter of the ring is 1.25 m and the rotational speed is 3000 r.p.m. determine:
    i) Inlet angles of blades.
    ii) Power developed if dry saturated steam at 5 bar passes through the blade whose height may be assumed as 6 cm. Neglect the effect of blade thickness.

    OR

    b) Explain in detail about a multi stage steam turbine and its performance.

13. a) Explain with neat sketch, the piston connecting rod, rocker arm and rocker shaft.

    OR

    b) Explain the electronic ignition system used in modern petrol engines.

14. a) Explain the stages of combustion and detonation in petrol engines.

OR

b) Explain in detail about the exhaust gas analysis in petrol and diesel engines.

15. a) A gas turbine unit has a pressure ratio of 6:1 and maximum cycle temperature of 610°C. The isentropic efficiencies of the compressor and turbine are 0.80 and 0.82 respectively. Calculate the power output in kilowatts of an electric generator geared to the turbine when the air enters the compressor at 15°C at the rate of 16 kg/s.

Take c_p = 1.005 kJ/kg K and γ = 1.4 for the compression process, and take c_p = 1.11 kJ/kg K and γ = 1.333 for the expansion process.

OR

b) Explain the construction, principle and working of open and closed cycle gas turbine.