12. A four cylinder, four stroke petrol engine has a bore of 57 mm and stroke of 90 mm. Its rated speed is 2800 rpm, torque is 55.2 Nm. The fuel consumption is 6.74 liters/hour. The density of the petrol is 735 kg/m^3 and petrol has a calorific value of 44200 kJ/kg. Calculate brake power, brake thermal efficiency and brake specific fuel consumption.

13. Discuss about the stages of combustion in a Diesel Engine using a sketch of Pressure Vs. Crank angle diagram.

14. a) Explain the working principle of Locomotive boiler. **6**

    b) Differentiate between Surface and Jet type steam condensers. **4**

15. Steam enters a convergent-divergent nozzle at 2 MPa and 400° C with a negligible velocity and mass flow rate of 2.5 kg/s and it exits at a pressure of 300 kPa. The flow is isentropic between the nozzle entrance and throat and overall nozzle efficiency is 93%. Determine a) throat and b) exit areas

16. The steam is supplied to a steam turbine at a pressure of 32 bar and a temperature 410°C. The steam then expands isentropically to a pressure of 0.08 bar. Find the dryness fraction of steam at the end of expansion and thermal efficiency of the cycle.

    If the steam is reheated at 5.5 bar to a temperature of 395° C, and then expands isentropically to 0.08 bar, what will be the dryness fraction at the end of final expansion and the thermal efficiency of the cycle ?

17. a) Differentiate between Battery and Magneto ignition systems. **6**

    b) What are the advantages of multi staging in reciprocating air compressors ? **4**

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Code No. : **6099/S**

FACULTY OF ENGINEERING
B.E. 3/4, (Mechanical Engg.) I – Semester (Supple.) Examination, July 2014
APPLIED THERMODYNAMICS

Time: 3 Hours] [Max. Marks: 75

Instructions *: 1) Answer* ***all*** *the questions from Part –* ***A*** *and* ***any five*** *questions from Part –* ***B****.*
2) Steam tables are permitted. Assume ***any missing*** *data suitably.*

PART – A **(2.5×10=25 Marks)**

1. Explain how intercooling enhances performance of a reciprocating air compressor.
2. In what respects does the actual cycle on PV plot differs from ideal cycle for a single stage reciprocating air compressor ?
3. Define indicated thermal efficiency of an IC Engine.
4. What does a heat balance sheet of an IC Engine indicate ?
5. What is a premixed flame ?
6. List the pollutants released from exhaust of IC engines.
7. List the mountings used in Locomotive boiler.
8. Why is high level Jet condenser called so ?
9. Justify why supercritical portion of nozzle is divergent ?
10. What is cogeneration ?

PART – B **(10×5=50 Marks)**

11. A single stage, single acting, reciprocating air compressor has a bore of 20 cm and a stroke of 30 cm. The compressor runs at 600 rpm. The clearance volume is 4% of the swept volume and the index of expansion and compression is 1.3. The suction conditions are at 0.97 bar and 27° C and delivery pressure is 5.6 bar. The atmospheric conditions are at 1.01 bar and 17°C. Determine
    a) The free air delivery in m^3/min
    b) The volumetric efficiency referred to the free air conditions and
    c) The indicated power.