FACULTY OF ENGINEERING

B.E. 3/4 (Mechanical) I – Semester (New) (Supplementary) Examination, May 2013

Subject : Applied Thermodynamics

Time : 3 hours   Max. Marks : 75

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1. What is the advantage of using after cooler in reciprocating air compressors?

2. Define volumetric efficiency for reciprocating air compressor.

3. Represent 'Dual cycle' on T-s diagram and label the processes on it.

4. How is Frictional power of IC engines found out experimentally?

5. Why petrol cannot be used as fuel in diesel engines?

6. What is premixed flame?

7. Discuss the principle of Natural circulation of water in water tube boiler.

8. What is the function of Fusible plug?

9. Write down the expression for area change for a C-D nozzle in terms of Mach No. and pressure change of steam flow through it.

10. What is a hot well?

PART – B (5 x 10 = 50 Marks)

11. A single stage double acting reciprocating air compressor delivers air at 8 bar pressure. The amount of free air delivered is 2.2 m^3 at 320 rpm.
The pressure and temperature at the end of suction stroke are 1 bar and 27^0c.
The ambient conditions are 1.03 bar and 20^0c. The clearance is 6% of the stroke.

    Find i) Brake power required to run the compressor if the mechanical efficiency is 80%.
         ii) The diameter and stroke of the cylinder if they are equal.
Assume that compression and re-expansion occur with process index = 1.3.   (10)

12. A four stroke, four cylinder, single acting, spark ignition engine develops 18 kW brake power at 3000 rpm. Using the following data, find the specific fuel consumption on I.P. basis.

    The diameter of the cylinder is 65mm, stroke length is 95 mm, clearance volume is 65 c.c. Relative efficiency on B.P. basis is 50%. C.V. of fuel used is 46 MJ/kg. Mechanical efficiency is 80%. For air, take ratio of specific heats as 1.4.   (10)

13. Discuss the differences in the nature of occurrence of knocking phenomena in SI and C.I. engines.   (10)

14. Sketch and label the following. Also explain their functioning :

    a) La Mont Boiler   5
    b) Surface condenser   5

15. a) Obtain an expression for maximum flow rate of steam through in a C-D steam nozzle.   4

    b) For a Rankine cycle operating between boiler pressure of 60 bar and condenser pressure 1 bar, determine a) Thermal efficiency b) Work ratio and   c) Specific steam consumption.   The steam enters the turbine at a temperature 400^0C.   6

16. a) What factors influence flame speed in S.I. engine?   5

    b) Show the process of 2 stage compression in reciprocating air compressor using intercooler and aftercooler on P-V and T-s diagrams.   5

17. a) Describe briefly the functioning of dry sump lubrication system with a neat sketch.   5

    b) How are the design parameters like diameters for divergent portion of the C-D nozzle evaluated? What is the limitation on the divergence angle?   5

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