FACULTY OF ENGINEERING
B.E. 3/4 (Mech.) I Semester (Main) Examination, December 2010
APPLIED THERMODYNAMICS

Time : 3 Hours]   [Max. Marks : 75

Note : Answer all questions from Part – A. Answering five questions from Part – B.

PART – A   **(25 Marks)**

1. Mention atleast four practical applications of compressed air.   2

2. Define "Clearance factor" as referred to a reciprocating air compressor and give its physical significance.   3

3. Mention the functions performed by

   i) Carburetor in SI engines and

   ii) Fuel injection pump in CI engines.   2

4. Define "brake specific fuel consumption" and "indicated specific fuel consumption" as applied to an IC engine. Which one of the two has more practical relevance ?   3

5. Define "Ignition delay" as referred to a SI (petrol) engine and give its significance.   2

6. How does IC engine exhaust contribute to "air pollution" ? What are main pollutants in it ?   3

7. Differentiate between"Fire-tube" and "water-tube" boilers.   2

8. Briefly mention the "evaporative cooling principle" adopted in cooling towers.   3

9. How does "regeneration" contribute to improvement of the efficiency of a Rankine cycle ?   2

10. What is the function of a"steam nozzle" performs in a steam plant?

    How does this differ from that performed by a "diffuser" ?   3

(This paper contains 2 pages)   1   **P.T.O.**

PART – B   (5×10=50 Marks)

11. Dry saturated steam enters a steam nozzle at a pressure of 12 bar (abs) and is discharged at a pressure of 1.2 bar (abs). If the dryness fraction of discharged steam is 0.92, calculate the final velocity of steam. Neglect the initial velocity of steam. If 10% of the heat drop is lost due to friction, calculate the percentage reduction in the final velocity.   **10**

12. With appropriate neat sketches, explain the principle of working of
    i) Battery Ignition system and
    ii) Magneto Ignition system as referred to an S.I. engine.   **10**

13. Mention the circumstances under which combustion process in a C.I. engine turns "Uncontrolled". Define "Cetane Number" and give its significance.   **10**

14. Explain the working principle of a Babcock and Wilcox water-tube steam boiler with a neat sketch.   **10**

15. Calculate the "bore" and "stroke" of a double-acting compressor of 36.8 kW indicated power, in which the air is drawn in at 1 bar (abs) and $15°$ C, and compressed according to the law $PV^{1.2}$ = constant to 6 bar (abs). The rotative speed of the compressor is 100 rpm, the average piston speed is 150 m/min. Neglect clearance volume.   **10**

16. Starting from first principles, arrive at the relation for the thermal efficiency of the Rankine vapor cycle. Explain any one method of improving its efficiency.   **10**

17. a) Define "Mountings" and "accessories" as referred to steam boilers. Mention the functions of atleast two under each category.   **5**

    b) Mention different types of cooling systems typically used for IC engines. Explain any one of them clearly.   **5**