



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. Answer any 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

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 $PV^{1.2} = \text{constant}$ 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