

FACULTY OF ENGINEERING**B.E. 3/4 (MECH.) I-Semester (Suppl.) Examination, May/June 2018****Subject: APPLIED THERMODYNAMICS****Time: 3 Hours****Max. Marks: 75****Note: Answer all questions of Part-A & Answer any FIVE Questions from Part-B.****PART-A (25 marks)**

1. What is multistage compression what are its advantages.
2. What is the effect of clearance volume on work done by reciprocating air compressors?
3. Sketch and label a simple carburetor.
4. What is variable specific heat?
5. What is delay period in engine combustion?
6. Define knocking in SI engines?
7. What is boiler draught?
8. Differentiate between Jet & Surface condensers.
9. Explain the process of regeneration of improving efficiency
10. Explain Rankine cycle with the help of P-V graph

PART-B (50 Marks)

11. (a) Derive the expression for the work done in case of two stage reciprocating air compressor with perfect intercooling.

(b) A two stage double acting air compressor, operating at 220 rpm takes in air at 1.0 bar and 27°C. The size of LP cylinder is 360*400 mm; the stroke of HP cylinder is same as that of LP cylinder and the clearance of both cylinders is 4%. The LP cylinder discharges the air at a pressure of 4.0 bar. The air passes through the inter cooler so that it enters the HP cylinder at 27°C and 3.80 bar, finally it is discharged from the compressor at 15.2 bar. The value of n in both the cylinders is 1.3, $c_p = 1.0035$ kJ/kg K, $R = 0.287$ kJ/kg K.
Calculate (i) The heat rejected in the intercooler
(ii) Diameter of HP cylinder
(iii) The power required to drive HP cylinder.
12. (a) Explain the reason of deviation of actual cycles from air standard cycles.
(b) An engine is required to develop 100kW, the mechanical efficiency of the engine is 86% and the engine uses 55 kg/hr of fuel. Due to improvement in the design and operating conditions, there is reduction in engine friction to extent of 4.8 kW. If the indicated thermal efficiency remains the same, determine the saving in fuel in kg/hr.

13. Explain the stages of combustion in SI engines with the help of P- θ diagram.
14. (a) Explain the construction and working of Babcock & Wilcox Boiler.
(b) What are Jet Condensers explain any one of Jet condenser.
15. In steam nozzle, the steam expands from 4 bar to 1 bar, the initial velocity is 60 m/s and the initial temperature is 200°C. determine the exit velocity if the nozzle efficiency is 92%
16. (a) Classify Compressors.
(b) Explain splash lubrication system.
17. (a) How air pollution is caused by engine exhaust & how to control it.
(b) What are FBC Boilers?
(c) Define critical pressure ratio in nozzles.
