

**FACULTY OF ENGINEERING****B.E. 3/4 (Prod.) I-Semester (Supplementary) Examination, June 2016****Subject : Applied Thermodynamics and Heat Transfer****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 Define efficiency of multi stage compressor and give mathematical expression. 3
- 2 What are the effects of perfect multistage intercooling in multistage reciprocating air compressor? 3
- 3 Why there are deviations of actual cycles from air standard cycles in an I.C. engine? 3
- 4 How indicated power is determined in an I.C. engine? 3
- 5 How spark ignition is initiated in a S.I. engine? 2
- 6 What are the ranges of pressures that fuel injectors develop in a diesel engine and why? 3
- 7 What is Stefan-Boltzman law of radiation? 2
- 8 Define critical radius of insulation. 2
- 9 Define absorptivity, reflectivity and transmissivity. 2
- 10 Explain the term variable specific heat. 2

**PART – B (50 Marks)**

- 11 a) Explain the effect of increase in compression ratio in single stage with the help of p-v diagram.
- b) An air compressor delivers air to receiver at constant pressure of 10 bar. It takes in air at 1 bar and 15°C. The index of compression,  $n = 1.25$ . Calculate i) the temperature at the end of compression ii) the work done per kg of air and the heat transferred during compression iii) the work done during delivery.
- 12 a) Explain briefly the effect of engine variables on ignition delay and flame speed in S.I. engines.
- b) The volume of the fuel and the pump barrel before the commencement of effective stroke is 6 c.c. The diameter and length of the fuel line from the pump of injector is 0.3 cm and 75cm respectively. The fuel in the injection valve is 2.6 c.c.  
Calculate the pump displacement necessary to deliver fuel of 0.1 c.c. at a pressure of 150 bar. The sump pressure is 1 bar.
- 13 a) Explain briefly detonation and knocking due to different phenomenon.
- b) Describe with a neat sketch zenith carburetor.

- 14 a) How supercharging is achieved in a C.I. engine and compute its efficiency. Is it more or less ordinary C.I. engine, in either case, the reason for it.  
b) Explain with neat sketches different types of combustion chambers, highlight the major advantages and disadvantages.
- 15 a) Explain briefly the Fourier's law of heat conduction.  
b) Explain briefly Fourier's general conduction equation. Compute mathematically the heat conduction in a composite cylinder.
- 16 a) Explain Buckingham theorem.  
b) Air at atmospheric pressure and  $30^{\circ}\text{C}$  flow over a flat plate at a velocity of 1.5 m/s. The plate is maintained at  $90^{\circ}\text{C}$ . The length of the plate is 2m. Calculate the heat transfer rate per unit width using exact solution
- 17 Write short notes on the following :  
a) LMTD  
b) Black body  
c) Plank's Distribution Law

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