

B.TECH SEM - III (2007 COURSE) (PRODUCTION ENGG.) :

SUMMER - 2018

SUBJECT: THERMAL ENGINEERING

Day : **Friday**
Date : **25/05/2018**

S-2018-2591

Time **02.30 PM TO 05.30 PM**
Max. Marks: 80

N. B.:

- 1) **Q. No. 1 and Q. No. 5 are COMPULSORY.** Out of remaining attempt ANY **TWO** questions from each sections.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answer to both the section should be written in **SEPARATE** answer book.
- 4) Use non-programmable **CALCULATOR** is allowed.
- 5) Assume suitable data, if necessary.

SECTION - I

- Q.1**
- a) Explain heat engine, refrigerator and heat pump with neat sketch (06)
 - b) What is sub-cooling and superheating? Explain with the help of diagram. (04)
 - c) Discuss applications of air conditioning. (04)
- Q.2**
- a) A heat engine of 27% efficiency drives a heat pump of 4 C.O.P. Heat is supplied into water from the exhaust of heat engine and the heat pump. Determine the ratio of heat transferred to the circulating water to the heat supplied to the heat engine. (08)
 - b) Write a short on equivalent evaporation and boiler efficiency. (05)
- Q.3**
- a) Explain in detail vapour compression refrigeration cycle with neat sketch. (05)
 - b) In an ammonia vapour compression system, the pressure in the evaporator is 2 bar. Ammonia at exit is 0.85 dry and at entry is dryness fraction is 0.19. During compression the work done Per Kg of ammonia is 150KJ. Calculate the C.O.P. and the volume of vapour entering the compressor per minute, If the rate of ammonia circulation is 4.5Kg/min. The latent heat and specific volume at 2 bar are 1325KJ/Kg and $0.58\text{m}^3/\text{Kg}$ respectively. (08)
- Q.4**
- a) Explain with neat sketch Humidification and Dehumidification process in detail. (07)
 - b) Explain winter air conditioning system with neat sketch. (06)

SECTION - II

- Q.5**
- a) Comment on the assumption made in air standard cycles. (05)
 - b) List the types of nozzles for fuel feeding systems of diesel engine and explain multi-hole nozzle (05)
 - c) Explain need of multistaging of air compressor. (04)
- Q.6**
- a) An ideal reciprocating compressor has a displacement volume of 14 litre and clearance volume of 0.7 litre. It receives air at 1 bar and displaces at 5 bars. The compression is polytropic with index = 1.3 The expansion is isentropic with index $k = 1.4$. Determine net cycle work. (08)
 - b) Explain volumetric efficiency isentropic efficiency and mechanical efficiency for air compressor. (05)
- Q.7**
- a) Explain magneto ignition system with neat sketch. (07)
 - b) Explain M.P.F.I. system for modern automobile engines. (06)
- Q.8**
- a) Compare Otto, Diesel and dual cycle with PV diagram (05)
 - b) A four stroke diesel engine has a bore of 80 mm and stroke of 110 mm. The torque developed is 23.5 N.m. Calculate brake mean effective pressure of the engine. (08)

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