



R18 Regulation

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY  
(Autonomous, Accredited by NAAC with 'A' Grade)

Subject code: 2P5CB

**B.TechV Semester Supplementary Examinations, June 2022**  
**THERMAL ENGINEERING-I**

Maximum Marks: 70

Date:04.07.2022 Duration: 3 hours

- Note: 1. This question paper contains two parts A and B.  
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.  
3. Part B consists of 5 Units. Answer any one full question from each unit.  
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks

- 1 Write the advantages of liquid cooling system. (10x2M=20 Marks)
- 2 What is the importance of valve and port timing diagrams of I C Engines.
- 3 How the fuel injection system function in CI Engine?
- 4 What are different power loss resources during combustion of SI Engine?
- 5 Name four important variables that affect the volumetric efficiency.
- 6 According to ASME, mention the values of pressure ratio for a fan, blower and a compressor.
- 7 What is a dynamic compressor? Explain the significance.
- 8 Give the working details of roots blower.
- 9 What is COP of refrigeration system? Explain the importance.
- 10 What are the commonly used refrigerants in vapour compression system?

Part-B

Answer All the following questions.

- 11 a) Distinguish among air standard cycle, fuel air cycle and ideal cycle. (10M X 5=50Marks)  
b) What are the limitations of simple carburetor and how to rectify them? Explain. [5M]  
OR [5M]
- 12 a) Explain the actual valve timing diagram of a four stroke SI engine and compare with ideal valve timing diagram. [10M]
- 13 a) Briefly explain the stages of combustion in SI engine elaborating the flame front propagation. [7M]  
b) What is delay period and what are the factors that affect the delay period. [3M]  
OR
- 14 a) Explain in detail various factors that influence the flame speed. [5M]  
b) Write a short note on abnormal combustion. [5M]
- 15 a) Differentiate between rotary and reciprocating compressors. [4M]  
b) Develop an expression for the calculation of indicated power of an engine. [6M]  
OR
- 16 a) A 4 cylinder, 4 stroke gasoline engine having a bore of 80 mm and stroke of 90 mm has a compression ratio of 8. The relative efficiency is 65% when indicated fuel specific consumption (ifsc) is 200 gm/kwhr. Estimate: i) Calorific value of fuel ii) Corresponding fuel consumption, given that indicated mean effective pressure (imep) is 7.5 bar and speed is 2000 RPM.

- [10M]
- 17 a) With a neat sketch explain the working of centrifugal compressor. [5M]  
b) Derive an expression for efficiency of a root blower in terms of pressure ratio and ratio of specific heats. [5M]

OR

- 18 a) A rotary compressor receives air at 1 bar and  $16^{\circ}\text{C}$  and delivers it at a pressure of 6 bar. Determine per kg of air delivered, work done by the compressor and heat exchanged with the jacket water when the compression is isothermal, isentropic by the relation  $PV^{1.6}=\text{const.}$   
[10M]

- 19 a) What are the desirable properties of an ideal refrigerant? Explain. [4M]  
b) Differentiate between vapour compression refrigeration system with vapour absorption refrigeration system. [6M]

OR

- 20 a) In a 15 TR ammonia refrigeration plant, the condensing temperature is  $25^{\circ}\text{C}$  and evaporating temperature is  $-10^{\circ}\text{C}$ . The refrigerant ammonia is sub cooled by  $5^{\circ}\text{C}$  before passing through the throttle valve. The vapor leaving the evaporator is 0.97 dry. Find COP and power required to drive the plant? Take  $C_{Pl} = 4.6 \text{ kJ/kg-K}$ ,  $C_{Pv} = 2.8 \text{ kJ/kg-K}$  respectively.  
[10M]