R20 Regulation *Subject code: 3P4CF*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech IV Semester Regular Examinations, July 2022

THERMAL ENGINEERING - I

(Mechanical Engineering)

Maximum Marks: 70 Date:02.08.2022 Duration: 3 hours

Note: Allow the Psychrometry chart

Part-A

All the following questions carry equal marks (10x2M=20 Marks)

1 List the functions of a carburettor.
2 Mention the advantages of battery ignition system.
3 List the characteristics of a good combustion chamber.
4 What is air-fuel ratio in IC engine?
5 Define indicated power.
6 What are the major losses in an IC engine?
7 Define isentropic efficiency of compressor.
8 What is slip factor in compressor?
9 Define dry bulb temperature and wet bulb temperature.
10 Name any three commonly used refrigerants.

Part-B

Answer All the following questions. (10M X5=50Marks)

11 Compare the following: (a) Two stroke and four stroke engine (b) CI and SI engines. (10M)

OR

12 Discuss the working of a magneto- ignition system with a neat sketch. (10M)
13 Explain the different phases of abnormal combustion in CI engine and add a note on various factors affecting delay period in CI engine. (10M)

OR

14 (a)Compare Knocking in SI and CI Engines. (b) Significance of octane and cetane number. (10 marks)
15 The following readings were taken during the test of a single cylinder four stroke oil engine: Cylinder diameter = 250 mm, Stroke length = 400 mm, Gross MEP = 7 bar, Pumping MEP = 0.5 bar, Engine speed = 250 rpm, Net load on the brake = 1080 N, Effective diameter of the brake = 1.5 m; Fuel used per hour = 10 kg, Calorific value of fuel = 44300 kJ/kg. Calculate: (a) Indicated power, (b) Brake power, (c) Mechanical efficiency and (d) Indicated thermal efficiency. (10M)

OR

16 Derive the expression for work done by a single stage air compressor with and without clearance. (10M)
17 Describe the following with sketches: (a) Axial flow compressor (b) Vane type compressor. (10M)

OR

18 Explain the construction of velocity diagrams for a centrifugal compressor. (10M)
19 Describe the working of vapour compression refrigeration system. Also bring out any four differences between vapour absorption and vapour compression system. (10M)

OR

20 (a) Consider a room that contains air at 1 atm, 308 K and 40% relative humidity. Using the psychrometric chart, determine: the specific humidity, enthalpy, wet bulb temperature, dew point temperature and specific volume of air. (6M)
(b) What is COP? A refrigerator's food compartment is kept at 4 degrees Celsius by eliminating heat at a rate of 360 kJ/min. If the refrigerator's needed power input is 2 kW. Find the refrigerator's COP. (4M)