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R20 Regulation

Subject code: 3P4CF

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Supplementary Examinations, December 2025

THERMAL ENGINEERING-I (ME)

Maximum Marks: 70

Date: 29.12.2025

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 (10X2M=20 Marks)		Marks	CO	BTL
1	What are the different strokes in two stroke engines?	2M	1	L1
2	List out the differences between the SI engine and CI engine.	2M	1	L1
3	On which principle the centrifugal pump works?	2M	2	L1
4	List out the functions of compressors.	2M	2	L1
5	Why the axial compressors are more suitable for gas turbines?	2M	3	L1
6	What are commonly used refrigerants in vapour compression system?	2M	3	L1
7	Define isothermal efficiency of air compressor.	2M	4	L1
8	List out various factors influencing delay period.	2M	4	L1
9	What is COP of refrigeration system?	2M	5	L1
10	List out the advantages of reciprocating compressors.	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	Explain the working of battery ignition system with the neat sketch and applications.	10M	1	L2
OR				
12	Draw a neat sketch and explain the working of splash lubricating system.	10M	1	L2
13	Analyse the stages of combustion in SI engines elaborating the flame front propagation.	10M	2	L2
OR				
14	What are anti knock agents? Indicate the substances used and their effects on reducing of knocking.	10M	2	L2
15	The following data was recorded during testing of a four stroke cycle gas engine. Area of indicator diagram = 900 mm ² ; Length of indicator diagram = 70 mm; spring scale = 0.3 bar/mm; Diameter of piston = 200 mm; Length of stroke = 250mm; Speed = 300 rpm. Determine i) Indicated mean effective pressure ii) Indicated power.	10M	3	L2
OR				

16	Derive the expression for work done when compression is isentropic for a single stage reciprocating air compressor.	10M	3	L2
17	With a neat sketch explain the working of roots blower and derive the expression for roots efficiency.	10M	4	L2
OR				
18	A multistage axial compressor is required for compressing air at 293 K through a pressure ratio of 5 to 1. Each stage is to be 50% reaction and the mean blade speed 275 m/s, flow coefficient 0.5, and stage loading factor 0.3, are taken, for simplicity, as constant for all stages. Determine the flow angles and the number of stages required if the stage efficiency is 88.8%. Assume $C_p = 1.005 \text{ kJ/kg K}$ and $\gamma = 1.4$ for air.	10M	4	L2
19	Explain the working of Vapour compression refrigeration system with a neat diagram.	10M	5	L2
OR				
20	a) A Bell-Coleman refrigerator works between 4 bar and 1 bar pressure limits. After compression, the cooling water reduces the air temperature to 17°C . What is the lowest temperature produced by the ideal machine? b) Compare the coefficient of performance of this machine with that of the ideal Carnot cycle machine working between the same pressure limits, the temperature at the beginning of compression being -13°C .	5M 5M	5	L2