R17 Regulation *Subject code:1P3CB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech II Year I Semester Supplementary Examinations, March/April 2018

THERMODYNAMICS

(Mechanical Engineering)

Maximum Marks: 70 Date:29.03.2023 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)

1 State the causes of irreversibility.
2 Define Intensive and Extensive properties.
3 State the Kelvin-Plank statement.
4 State the PMM 1.
5 Derive the expression for work done in a non-flow process, if the process is adiabatic.
6 Define dryness fraction?
7 Write the Mass fraction in the Mixture of Perfect gas?
8 What is the Volumetric Analysis of mixtures?
9 Write the processes involved in Brayton cycle?
10 Sketch T-S diagrams of Bell-Coleman cycle.

Part-B

Answer All the following questions. (5X10M=50Marks)

11 A piston cylinder device operates 1kg of fluid at 20atm pressure with initial volume is $0.04m^3$. Fluid is allowed to expand reversibly following $pV^{1.45}=C$. So that the volume becomes double. The fluid is cooled at constant pressure until the piston comes back. Determine the work done in each process? [10]

OR

12 Explain thermodynamic equilibrium in detail. [10]

13 A heat engine working on Carnot cycle converts 1/5th of the heat input into work. When the temperature of the sink is reduced by 80^0C, the efficiency gets doubled. Determine the temperature of sink? [10]

OR

14 State the Claussius inequality? Explain. [10]

15 Derive the expressions for work done and relation between P-V-T in a non-flow process, if the process is adiabatic. [10]

OR

16 A fluid at 250^0C and 300kPa is compressed reversibly and isothermally to 1/16th of its original volume. Calculate the final pressure, work done and change of internal energy per kg of fluid, if the fluid is air? [10]

17 Atmospheric air at 1.0132bar has DBT of 32^0C and a WBT of 26^0C. Compute partial pressure of the water vapor, specific humidity, dew point temperature and relative humidity? [10]

OR

18 Differentiate the Relation between specific humidity and relative humidity and derive the relation between them? [10]

19 An engine working on Otto cycle has a volume of $0.45m^3$ pressure 1bar and temperature 30^0C at the beginning of the compression stroke. At the end of the compression stroke the pressure is 11bar. 210kJ of heat is added at constant volume. Determine efficiency and mean effective pressure. [10]

OR

20 Derive an expression for air standard efficiency of diesel cycle. [10]

Note: Allow the steam tables