

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIFTH SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2018

Course Code: MP303

Course Name: THERMAL ENGINEERING (PE)

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any three full questions, each carries 10 marks

Marks

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| 1 | Explain the following terms:
i) Thermodynamic equilibrium ii) Forms of energy
iii) Thermodynamic system, surroundings, boundary | (10) |
| 2 | a) Derive the equation for energy balance of steady flow system. | (6) |
| | b) A blower handles 1kg/s of air at 200°C and consumes a power of 15 KW. The inlet and outlet velocities of air are 100m/s and 150m/s respectively. Find the exit air temperature, assuming adiabatic conditions, take Cp of air is 1.005KJ/KgK. | (4) |
| 3 | a) What is a Carnot cycle? What are the four processes which constitute the cycle? | (5) |
| | b) A Carnot engine absorbs 200J of heat from a reservoir at the temperature of normal boiling point of water and rejects heat to a reservoir at the temperature of the triple point of water. Find the heat rejected, the work done by the engine and the thermal efficiency. | (5) |
| 4 | a) Explain the operation of a cyclic refrigerator plant with a block diagram. | (7) |
| | b) Define COP of a refrigerator. | (3) |

PART B

Answer any three full questions, each carries 10 marks

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| 5 | Draw phase equilibrium diagram on P-v coordinates for pure substances. Explain in detail. | (10) |
| 6 | Distinguish between the vapour compression and vapour absorption refrigeration system. | (10) |
| 7 | Explain the following terms;
i) Relative humidity ii) Specific humidity iii) Degree of saturation
iv) Dew point temperature v) Wet and Dry bulb temperature | (10) |
| 8 | Atmospheric air at 1.0132 bar has a dbt of 32°C and a wbt of 26°C. Compute:
i) The partial pressure of water vapour ii) The specific humidity
iii) The dew point temperature iv) The relative humidity
v) The degree of saturation | (10) |

PART C

Answer any four full questions, each carries 10 marks

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| 9 | Briefly explain the following:
i) Fourier law of steady state heat conduction
ii) Newton's law of cooling iii) Critical radius | (10) |
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- 10 Briefly explain about Conduction through hollow cylinders, spheres, composite walls. (10)
- 11 State and derive the equation for one-dimensional steady state equation. (10)
- 12 Briefly explain the following: (10)
- i) Parallel flow heat exchanger ii) Counter flow heat exchanger
- 13 a) Explain briefly about radiation and radiation properties of surfaces. (6)
- b) A surface having an area of 1.5m^2 and maintained at 300°C exchanges heat by radiation with another surface at 40°C . The value of factor due to the geometric location and emissivity is 0.52. Determine the: (4)
- i) Heat lost by radiation ii) The value of thermal resistance.
- 14 a) Write short notes on effectiveness of heat exchanger. (6)
- b) Explain briefly monochromatic emissive power and monochromatic emissivity. (4)
