| G.R. No. | |
|---|---|

## OCTOBER 2018/ IN-SEM (T1)
## S. Y. B. TECH. (MECHANICAL ENGINEERING) (SEMESTER - I)
**COURSE NAME : Thermodynamics**

**COURSE CODE : MEUA21175**

### (PATTERN 2017)

**Time: [1 Hour]**                                                                 [Max. Marks: 30]

**(*) Instructions to candidates:**
1) Answer Q. 1 OR Q. 2 and Q. 3 OR Q. 4
2) Figures to the right indicate full marks
3) Use of scientific calculator is allowed
4) Use suitable data where ever required

Q.1) a) Explain the difference between microscopic and macroscopic aspect of thermodynamics.                                                    **6**

b) In a steady flow process, the fluid passes through a machine at the rate of 4 kg/s. Between the entrance and exit of machine, the working fluid has the following parameters.

| Parameter | Entrance | Exit |
|---|---|---|
| Pressure, bar | 6 | 1.25 |
| Velocity, m/s | 300 | 200 |
| Internal Energy, kJ | 2000 | 1500 |
| Specific Volume, m³/kg | 0.3 | 1.2 |

40 kJ/kg of heat from the fluid is lost to the surroundings during the passage. Assuming entrance and exit pipes to be at the same level, calculate power transferred by the machine.          **6**

c) Explain the difference between extensive and intensive properties of a system.                                                             **4**

Q.2)  a)  Give two different statements of first law of thermodynamics. Also prove that energy is a property of the system.  **6**

b)  During thermodynamic cycle of processes (A-B-C-D-A), the heat transferred during each process is: 120 kJ, -16 kJ, - 48 kJ and 12 kJ respectively. Estimate network transferred during the thermodynamic cycle, direction of work transfer, change in internal energy and total energy during the cycle using the first law for thermodynamic cycle.  **6**

c)  Distinguish between reversible and irreversible processes.  **4**

Q.3)  a)  Find the COP and heat transfer rate in the condenser of a refrigerator in kJ/h which has a refrigeration capacity of 12000 kJ/h when power input is 0.75 kW.  **6**

b)  Define the following :
   i.   Clausius statement
   ii.  Kelvin Plank statement  **4**

c)  Draw the sketch of heat engine, refrigerator or heat pump using source and sink concept.  **4**

**OR**

Q.4)  a)  A heat engine receives heat at the rate of 1500 kJ/min and gives an output of 8.2 kW. Determine,
   i.   Thermal efficiency
   ii.  Rate of heat rejection  **6**

b)  Explain the concept of Clausius inequality  **4**

c)  Discuss limitations of first law of thermodynamics.  **4**

***************All The Best***************