Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Code :** | **18ME2027** | Duration : | **3hrs** |
| **Sub. Name :** | **Fundamentals of Thermal Sciences and Fluid Mechanics** | Max. marks : | **100** |

|  |  |  |  |
| --- | --- | --- | --- |
| **Q. No.** | **Questions** | **Course Outcome** | **Marks** |
|  | **PART-A(10X1=10 MARKS)** | | |
| 1. | What are positive and negative work interactions? | 1 | 1 |
| 2. | Define zeroth law of thermodynamics. | 1 | 1 |
| 3. | State the first law for a closed system undergoing a cycle. | 2 | 1 |
| 4. | The heat transfer is a point function or a path function (TRUE/FALSE). | 2 | 1 |
| 5. | The work is done by a force as it acts upon a body moving in the -------- of the force. | 2 | 1 |
| 6. | Define steady flow. | 3 | 1 |
| 7. | State Kelvin planck statement. | 3 | 1 |
| 8. | Write the units of kinematic viscosity. | 4 | 1 |
| 9. | Define laminar flow. | 4 | 1 |
| 10. | Write the Eulers equation. | 5 | 1 |

|  |  |  |  |
| --- | --- | --- | --- |
|  | **PART B (6 X 3= 18 MARKS)** | | |
| 11. | Write short notes on Quasi-static processes. | 1 | 3 |
| 12. | How is PMM1 impossible machine? | 2 | 3 |
| 13. | What is the efficiency of Heat pump? | 3 | 3 |
| 14. | Calculate the density, specific weight and weight of 2 litre of petrol of specific gravity 0.7 | 4 | 3 |
| 15. | Differentiate between steady flow and unsteady flow. | 5 | 3 |
| 16. | Write short notes on boundary layer thickness. | 6 | 3 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **PART C (6 X 12= 72 MARKS)**  **(Answer any five Questions from Q.no 17 to 23. Q.No 24 is a Compulsory Question)** | | | | |
| 17. | a. | State and derive the displacement work with a neat sketch. | 1 | | 6 |
| b. | Explain different types of equilibriums. | 1 | | 6 |
| 18. | a. | A fluid is confined in a cylinder by a spring and the pressure is a linear function as  U = 34+3.15pV if the fluid changes from an initial state of 170kPa, 0.03m3to a final state of 400kPa, 0.06m3 , with no work other than that done on the piston when it is linear function of the volume(p=a+bv), find the direction and magnitude of the work and heat transfer. | 2 | | 12 |
| 19. | a. | Explain with a neat sketch the working principle of a carnot cyle. | 3 | | 12 |
| 20. | a. | Air flows steadily at the rate of 0.5 kg/s through an air compressor,entering at 7 m/s velocity, 100 kPa pressure, and 0.95 m3/kg volume, and leaving at 5m/s ,700 kPa,and 0.19 m3/kg. The internal energy of the air leaving is 90 kJ/kg greater than that of the air entering. Cooling water in the compressor jackets absorbs heat from the air at the rate of 58 kW. (a) Compute the rate of shaft work input to the air in kW. (b) find the ratio of the inlet pipe diameter to outlet pipe diameter. | 3 | | 12 |
| 21. | a. | The pressure ourside the droplet of water of diameter 0.04mm is 10.32 N/cm2 . Calculate the pressure within the droplet if surface tension is given as 0.0725 N/m of water. | 4 | | 6 |
| b. | The capillary rise in the glass tube is not to exceed 0.2mm of water.Determine its mimimum size,given that surface tension for water in contact with air = 0.0725N/m. | 4 | | 6 |
| 22. | a. | The velocity vector in a fluid flow is given V = 4x3 I – 10x2 yj + 2tk. Find the velocity and acceleration of a fluid particle at (2,1,3) at time t = 1. | 5 | | 12 |
| 23. | a. | Write short notes on different types of flows. | 5 | | 6 |
| b. | State Bernoullis equation and write the assumptions. | 5 | | 6 |
|  | **Compulsory:** | | | | |
| 24. | a. | Find the head lost due to friction in a pipe of diameter 300 mm and length 50 m,through which water is flowing at a velocity of 3 m/s using (1) Darcy formula (ii) Chezys formula for which C = 60.take v (kinematic viscosity) for water = 0.01 stoke. | | 6 | 12 |