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



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – Nov/Dec – 2017**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Code :** | **14ME2016** | **Duration :** | **3hrs** |
| **Sub. Name :** | **THERMAL ENGINEERING II** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Explain the fuel system for diesel engines with a neat sketch. | CO1 | 10 |
| b. | A four cylinder four stroke diesel engine is to develop 30 kW at 1000 rev/min. The stroke is 1.4 times the bore and the indicated mean effective pressure is 6 bar. What should be the stroke and diameter of the engine? | CO1 | 10 |
| (OR) | | | | |
| 2. | a. | In a test of a single cylinder 4 stroke oil engine, the following data were recorded.  Mean effective pressure = 7.5 bar  Cylinder diameter = 16 cm  Piston stroke = 20 cm  Engine speed = 400 rpm  Brake wheel diameter = 120 cm  Net load on the brake wheel = 330 N.  Calculate indicated power, brake power and mechanical efficiency. | CO1 | 10 |
| b. | Explain the working principle of magneto ignition system with a neat diagram. | CO1 | 10 |
|  |  |  |  |  |
| 3. |  | Derive an expression for air standard efficiency of a Diesel cycle. | CO1 | 20 |
| (OR) | | | | |
| 4. |  | In an air standard dual cycle, the compression ratio of 16 and compression begins at 1 bar and 50°C. The maximum pressure is 70 bar. The heat transferred to air at constant pressure is equal to that at constant volume. Estimate:   1. The pressure and temperature at the cardinal points of the cycle, 2. The cycle efficiency and 3. The mean effective pressure. Take Cp = 1.005 kJ/kgK, Cv = 0.718 kJ/kgK). | CO1 | 20 |
|  |  |  |  |  |
| 5. |  | Explain summer air-conditioning system for hot and wet weather with a neat sketch and psychrometric chart. | CO4 | 20 |
| (OR) | | | | |
| 6. | a. | A hall is to be maintained at 240 C DBT and 60% RH under the following conditions:  Outdoor conditions : 380 C DBT and 280 C WBT  Sensible heat load in the room : 46.4 kW  Latent heat load in the room : 11.6 kW  Infiltrated air : 20 m3/min  Determine Room Sensible Heat Factor (RSHF). | CO4 | 10 |
|  | b. | Explain window air-conditioning system with a neat sketch. | CO4 | 10 |
|  |  |  |  |  |
| 7. | a. | Derive the following expression for Mach number variation for isentropic flow with variable area. | CO2 | 10 |
|  | b. | The entry and exit diameters of a diffuser are 0.15 m and 0.3 m respectively. The pressure, temperature and velocity of air at entry are 0.69 bar, 670C and 180 m/s respectively. Determine   1. The exit pressure and 2. The exit velocity. | CO2 | 10 |
| (OR) | | | | |
| 8. |  | The Mach number at the exit of a combustion chamber is 0.9. The ratio of the stagnant temperatures at exit and entry is 3.74. If the pressure and temperature of the gas at exit are 2.5 bar and 10000 C respectively. Determine i. Mach number, pressure and temperature of the gas at entry. ii. The heat supplied per kg of the gas and iii.maximum heat that can be supplied. Take γ = 1.3, Cp=1.218 kJ/kg K. | CO2 | 20 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. | a. | Explain the working principle of Ramjet Engine with a neat sketch. | CO3 | 10 |
|  | b. | Explain closed cycle constant pressure gas turbine with a neat sketch. | CO3 | 10 |

ALL THE BEST