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

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**End Semester Examination – Nov/Dec – 2018**

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

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

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. |  | In an engine working on the Otto cycle, the compression ratio is 5.5. The pressure and temperature at the beginning of compression are  1 bar and 270C, respectively. The peak pressure is 30 bar. Determine the pressure, temperature at the salient points, the air standard efficiency and mean effective pressure. Assume ratio of specific heat to be 1.4 for air. | CO1 | 20 |
| (OR) | | | | |
| 2. |  | Derive an expression for the air standard efficiency of a Dual cycle. | CO1 | 20 |
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| 3. | a. | Describe the fuel system for diesel engine with a neat sketch. | CO1 | 10 |
| b. | Explain pressure lubrication system of an IC engine with a neat sketch. | CO1 | 10 |
| (OR) | | | | |
| 4. | a. | A four stroke, four- cylinder petrol engine develops 18 kW brake power at 3000 rpm. The diameter of the cylinder = 65 mm, stroke of the engine = 85 mm, clearance volume =65cm3, relative efficiency on BP basis = 50%, Calorific Value of fuel used = 46,000 kJ/kg and mechanical efficiency = 80%. Calculate the air standard efficiency, brake thermal efficiency and specific fuel consumption. | CO1 | 15 |
| b. | Compare two stroke and four stroke IC engines. | CO1 | 5 |
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| 5. |  | Explain summer air-conditioning system suitable for hot and wet weather with a neat sketch and show the various air-conditioning processes on psychrometric chart. | CO4 | 20 |
| (OR) | | | | |
| 6. |  | An air-conditioning system is to be designed for a restaurant with the following data:  Outside design conditions : 400C DBT and 280C WBT  Inside design conditions : 250C DBT and 50% RH  Solar heat gain through walls, roof and floor : 5.87 kW  Solar heat gain through glass : 5.52 kW  Occupants : 25  Sensible heat gain per person : 58 W  Latent heat gain per person : 58 W  Lightening load : 2.3 kW  Sensible heat gain from other sources : 11.63 kW  Infiltrated air : 15 m3/min  Determine the Room sensible heat factor of the air conditioning plant. | CO4 | 20 |
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| 7. |  | A nozzle in a wind tunnel gives a test section Mach number of 2. Air enters the nozzle from a large reservoir at 0.69 bar and 310K. The cross sectional area of the throat is 1000 cm2. Determine the following quantities for the tunnel for one dimensional isentropic flow:   1. Pressure, temperature and velocity at the throat and test section. 2. Mass flow rate 3. Power required driving the compressor. | CO2 | 20 |
| (OR) | | | | |
| 8. | a. | Derive the expression of area ratio as a function of Mach number. | CO2 | 10 |
| b. | Air (Cp =1.05 kJ/kg.K, γ =1.38) at P1 = 3 X 105 N/m2 and T1=500K flows with a velocity of 200 m/s in a 30 cm diameter duct. Calculate:   1. Mass flow rate, 2. Stagnation temperature, and 3. Stagnation pressure values assuming the flow as compressible and incompressible. | CO2 | 10 |
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|  | | **Compulsory**: |  |  |
| 9. | a. | Explain the principle of operation of a Turbojet engine with a neat sketch. | CO3 | 10 |
| b. | Explain the principle of operation of a rocket engine with a neat sketch. | CO3 | 10 |