

B.E./B.TECH. Degree Examination, December 2020

Semester - VI

AE16004 ADVANCE THEORY OF IC ENGINES

(Regulation 2016)

Time: Three hours

Maximum : 80 Marks

Answer **ALL** questions

PART A - (8 X 2 = 16 marks)

1. The fuels in order of decreasing knock tendency for spark ignition engines are
 - a) Paraffin, Aromatic, Napthene
 - b) Paraffin. Napthene, Aromatic
 - c) Napthene, Aromatic, Paraffin
 - d) Napthene, Paraffin, Aromatic
2. The _____ is due to the leaking of gas flow through crevices / gaps between the piston, piston rings and cylinder walls. The gas usually leaks / flows through them to the crankcase.
 - a) Power loss
 - b) Pumping loss
 - c) Blow by loss
 - d) Heat loss
3. The titles given to thermodynamics models is
 - a) Zero dimensional model
 - b) Quasi dimensional model
 - c) Multi-dimensional model
 - d) All the above
4. In an I.C Engine Computerized Data Acquisition system, the piezo-electric transducer is used to measure
 - a) Combustion chamber pressure
 - b) Heat release rate
 - c) Combustion duration
 - d) All the above
5. Calculate the equivalence ratio for the given actual fuel air ratio = 0.051 and stoichiometric fuel air ratio 0.0666.
6. Enlist the various assumptions made in air standard cycle analysis.
7. Enlist the significance of engine modeling.
8. List out the various non-conventional engines.

PART B - (4 X16 = 64 marks)

09. (a) Octane is used in a S.I Engine having a bore of 125mm and stroke 130mm. The Compression ratio is 9. The percentage of dry products of combustion by volume is $\text{CO}_2 = 11.5\%$, $\text{CO} = 1.0\%$, $\text{O}_2 = 3.25\%$, $\text{N}_2 = 84.15\%$. Calculate the Fuel Air ratio and mass of the gasses left in the cylinder at the end of the exhaust stroke, if the pressure and temperature are 1.06 bar and 700K respectively. **(16)**

(OR)

- (b) The Gasoline (C_8H_{18}) is burnt with dry air. The Volumetric analysis of products on dry basis is $\text{CO}_2=10.00\%$, $\text{O}_2=5.66\%$, $\text{CO}=0.90\%$ and $\text{N}_2=83.44\%$. Determine (a). Air fuel ratio, (b). Equivalence ratio (c). Stoichiometric air used in percentage. **(16)**
10. (a) Investigate in detail about the Air Standard cycles and Fuel-Air cycles. Enumerate the comparison of air standard cycle with actual cycles. **(16)**

(OR)

- (b) Enlist the various losses in actual cycles and investigate about any two in detail. **(16)**
11. (a) Illustrate with neat sketch and compare the construction and working of a reciprocating engine with a rotary Wankel engine. **(16)**

(OR)

- (b) Illustrate with neat sketch and compare the construction and working of Diesel-Mechanical and Diesel-Electric Locomotive engines. **(16)**
12. (a) Investigate in detail about the analysis of Pressure-Crank angle diagram of a compression ignition engine. **(16)**

(OR)

- (b) Investigate the optical flow-visualization method with neat sketches of the Laser Doppler Anemometer **(16)**