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Total No. of Pages : 02

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B.Tech.(AE) (2011 & 2012) (Sem.–4)

INTERNAL COMBUSTION ENGINES

Subject Code : BTAE-401

M.Code : 54122

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Answer briefly :

a) What is scavenging process?

b) What are the differences between 2-stroke and 4-stroke engine?

c) What is the function of thermostat in cooling system of automobile?

d) What do you understand by octane number and cetane number?

e) What are the main functions of piston rings?

f) What are the difference between ignition lag and delay period?

g) Write the advantages of water-cooling system.

h) What is the physical significance of mean effective pressure?

i) Write-down the objectives of supercharging.

j) Write down the full form of following terms :

i) CRDI

ii) ABS

SECTION-B

2. Sketch Otto, diesel and dual cycle on p-v and T-s diagrams. Prove that Otto cycle is more efficient than diesel cycle for the same compression ratio and same heat input.
3. What do you understand by stoichiometric A:F ratio. Find stoichiometric A:F ratio for fuel C_8H_{18}.
4. What are the functions of nozzles? Explain various types of nozzles with neat sketches.
5. How the lubricating oils are graded as per SAE?
6. Discuss the limitation of turbocharging.

SECTION-C

7. Write short notes :
   a) Limitations of simple carburetor.
   b) Explain the types of injection system in CI engine.
8. The following observations are made during a trial on an oil engine
   a) Motor power to start the engine =10 KW.
   b) RPM = 1750.
   c) Brake torque = 327.5 Nm.
   d) Fuel used =15kg/hr.
   e) CV of fuel used = 42 MJ/kg.
   f) Air supplied = 4.75kg/min.
   g) Quantity of cooling water = 16kg/min.
   h) Outlet temperature of cooling water = 65.8 °C.
   i) Room temperature = 20.8 °C.
   j) Exhaust gas temperature = 400 °C, Take : C_{pw} = 4.2KJ/kg.K and C_{pg} = 1.25KJ/kg.K

   Determine :
   a) Brake power
   b) Mechanical Efficiency
   c) bsfc
   d) Draw a heat balance sheet on KW basis and percentage basis.
9. The compression ratio of an engine working on Otto cycle is 8.The initial condition of air is 1 bar and 373 K. The max pressure of a cycle is limited to 50 bar. Determine volume, pressure and temperature at all salient points of the cycle. Also find the ratio of (Q_S/Q_R) on the basis of one kilogram of air.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.