

Roll No. ....

**24260**

**B. Tech. 5th Semester (ME)**  
**Examination – December, 2014**

**INTERNAL COMBUSTION ENGINES AND GAS TURBINES**

**Paper : ME-307-F**

***Time : Three Hours ]***

***[ Maximum Marks : 100***

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

***Note :*** Attempt any *five* questions in all. Question No. 1 is *compulsory* and select at least *one* question from each Section.

1. (a) What are the various assumptions made in various air standard cycle ? 4
- (b) Define the working of catalytic converter and show by way of figure where it is placed. 4
- (c) Write short note on stages of combustion in S. I. Engines. 4

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- (d) Explain the Euro norms for pollution. 2
- (e) What is octane number of petrol ? 2
- (f) Explain the various methods of scavenging. 2
- (g) What is volumetric efficiency ? 2

### SECTION – A

- 2. (a) State the essential requirement of a diesel injection system. 10
- (b) Derive an expression for the calculation of air fuel ratio for the carburetor. 10
- 3. An engine working on Dual cycle takes air at 1 bar and  $20^{\circ}\text{C}$ . The maximum pressure of the cycle is limited to 70 bar. The compression ratio of the engine is 15. Find out air standard efficiency and MEP of the cycle. Assume heat added at constant volume is equal to heat added at constant pressure. 20

### SECTION – B

- 4. What is cooling system ? Mention its types. What are disadvantages of overcooling ? 20

5. (a) Explain the phenomenon of knock in CI Engine and compare the same with SI engine knock. 10
- (b) Explain the octane rating of fuels. 10

### SECTION – C

6. A two stroke diesel engine was motored when meter reading was 1.5 kW. Then the test on the engine was carried out for one hour and following observations were recorded :

1. Brake torque = 120 Nm, 2. RPM = 600, 3. Fuel used = 2.5 kg, 4. C.V. of fuel = 40.3 MJ/kg, 5. Cooling water used = 818 kg, 6. Rise in cooling water temperature =  $10^{\circ}\text{C}$ , 7. Exhaust gas temperature =  $345^{\circ}\text{C}$ , 8. Room temperature =  $25^{\circ}\text{C}$ , 9. A : F used = 32 : 1

Take  $C_{eg} = 1.05 \text{ kJ/kg}$ . K Determine (a) B.P., I.P. and mechanical  $\eta$  and indicated thermal  $\eta$  (b) Draw up heat balance on minute and percentage basis. 20

7. (a) Explain briefly various alternate fuels that can be used for I. C. Engines. 10
- (b) Describe the method used to measure the B. P. of a small engine. Mention the assumptions made. 10

## SECTION - D

8. (a) With a neat diagram, explain the inlet and exit velocity triangles for various of blades. 10
- (b) Define slip factor and derive an expression for the same. 10
9. Explain the methods that can adopted for improvements of the basic gas turbine cycle. 20