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Paper Code : PE-ME601A/PE-ME602A Internal Combustion Engines and Gas Turbines

UPID : 006654

Time Allotted : 3 Hours *Full Marks :70*

The Figures in the margin indicate full marks.
Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer any ten of the following : [1 x 10 = 10]

(I) What is brake thermal efficiency?

(II) Write the composition of natural gas.

(III) A Gas Turbine is which type of combustion plant?

(IV) Write two requirements of ideal rocket propellant.

(V) Name the four different strokes in case of 4S engine.

(VI) What are the reference fuels for Octane number?

(VII) State one limitation of Morse test.

(VIII) Write the composition of biogas.

(IX) What is the range of pressure ratio for a gas turbine plant?

(X) What is Ram jet engine?

(XI) Why is a choke used in a carburettor?

(XII) Write one factor on which delay period depends.

Group-B (Short Answer Type Question)

Answer any three of the following : [5 x 3 = 15]

2. Write the advantages and disadvantages of using alternative fuels. [5]
3. Write a short note on Morse Test. [5]
4. Discuss the effect of regeneration on the simple gas turbine cycle. [5]
5. How are gas turbines classified? [5]
6. Explain briefly the combustion phenomenon in CI Engine. [5]

Group-C (Long Answer Type Question)

Answer any three of the following : [15 x 3 = 45]

7. In an engine working on dual cycle, the temperature and pressure at the beginning of the cycle are 900C and 1 bar. The compression ratio is 9. The maximum pressure is limited to 68 bar and the total heat supplied per kg of air is 1750 kJ. Determine (a) Pressure and temperature at all salient points (b) Air standard efficiency (c) Mean effective pressure. [15]
8. One kg of etahne is burned with 90% theoretical air. Assuming complete combustion of hydrogen in the fuel, determine the volumetric analysis of the dry products of combustion. [15]
9. (a) Explain briefly the combustion phenomenon in SI Engine [5]
   (b) How tetraethyl lead improves the quality of fuel for SI engine? [5]
   (c) Explain briefly the phenomenon of diesel knock. [5]
10. A four-cylinder four-stroke engine, having diameter and length of stroke as 100 mm and 120 mm respectively is running at 1800 rpm. Its carburetor venturi has a 28 mm throat. Assuming the co-efficient of airflow 0.8, the density of air is 1.2 kg/m^3 and the volumetric efficiency of the engine is 75%, determine the suction at the throat. [15]
11. (a) Explain with a neat sketch the basic working cycle for turbo-jet engines. [10]
    (b) Write the advantages and disadvantages of turbo-jet engine. [5]

*** END OF PAPER ***