Code: ME4T3

II B.Tech - II Semester – Regular/Supplementary Examinations October 2020

IC ENGINES AND GAS TURBINES
(MECHANICAL ENGINEERING)

Duration: 3 hours   Max. Marks: 70

PART – A

Answer **all** the questions.   All questions carry equal marks

11 x 2 = 22

1.
a) Define mean effective pressure.
b) How the engines are classified based on the strokes?
c) How the compression ratio is effecting knocking in S.I. Engine?
d) Define Equivalence ratio.
e) Define Brake Thermal Efficiency and Brake Specific Fuel Consumption.
f) Write any one advantage and disadvantage of alcohol as alternative fuel.
g) What are essential components of Gas turbine?
h) What are the parts need to be lubricated in I.C engines?
i) What are the methods to improve the thermal efficiency of Gas turbine plant?
j) How the Propulsions are classified based on the Air stream jet engines?
k) Write any two Advantages of Turbojet Engines.

PART – B

Answer any ***THREE*** questions.   All questions carry equal marks.

$$3 \times 16 = 48 \text{ M}$$

2. a) Explain the Exhaust Blow down with a neat sketch.   6 M

   b) Compare between the Two stroke engine and Four stroke
      engine.   10 M

3. a) Explain the stages of combustion in C.I engine.   8 M

   b) Explain the Knocking phenomenon in S.I Engine.   8 M

4. a) A 2-stroke diesel engine has a bore of 110mm and a stroke
      of 150mm.The engine runs at a   mean piston speed of
      5m/s. It develops a torque of 56.3 N-m .The mechanical
      efficiency of the engine is 80% and the indicated thermal
      efficiency is 40%.Assuming a calorific value of 44800kJ/kg
      for the fuel, calculate   8 M
        i.   IP
       ii.   IMEP
      iii.   BSFC

   b) Explain the method of conducting the Heat Balance Test
      in your lab.   8 M

5. a) The air enters the compressor of an open cycle constant pressure gas turbine at a pressure of 1 bar and temperature of 20^0C .The pressure of air after compression is 4bar. The maximum temperature in the cycle is 927^OC. The isentropic efficiencies of compressor and turbine are 80% and 85% respectively. The air-fuel ratio used is 90:1. If the rate of air is 3kg/s, find: 8 M
   i.   Power developed
   ii. Thermal Efficiency of the cycle.

   b) Explain the working principle of closed cycle Gas Turbine with neat sketch and draw its P-V diagram.   8 M

6. A turbo jet engine consumes air at the rate of 60.2kg/s when flying at a speed of 1000km/hr. Calculate: 16 M
   i.   Exit velocity of the jet when the enthalpy change for the nozzle is 230kJ/kg and velocity co-efficient is 0.96.
   ii.   Fuel flow rate in kg/s when air fuel ratio is 70:1
   iii. Thrust specific Fuel Consumption.
   iv.   Thermal Efficiency of the plant when the combustion efficiency is 92% and calorific value of the fuel used is 42000kJ/kg.
   v.   Propulsive Power.
   vi.   Propulsive Efficiency.
   vii. Overall efficiency.