R16

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B
consists of 5 Units. Answer any one full question from each unit. Each question carries
10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	What is the function of fuel injection system in CI Engines?	[2]
b)	Draw port timing diagram of a two stroke petrol engine.	[3]
c)	List out different types of antiknock additives.	[2]
d)	Draw a sketch of F Type combustion chamber?	[3]
e)	Define positive displacement compressor.	[2]
f)	How does frictional losses vary with speed in IC Engine.	[3]
g)	Define polytropic efficiency in axial flow compressor.	[2]
h)	What do you understand by slip in centrifugal compressor?	[3]
i)	Define Tonne of Refrigeration.	[2]
j)	What is the effect of COP in sub cooling process?	[3]

PART – B

(50 Marks)

2.   Write the reasons why actual cycles are deviating from Air standard cycles.   [10]

OR

3.a)   With the aid of a sketch, explain the mixture requirements of an automotive engine.
under:
i) Idling range   ii) Normal running   iii) Power range
  b)   Compare between battery Ignition and magneto Ignition regarding: [5+5]
i) Quality of Spark   ii) Maintenance

4.   With the aid P-θ diagrams, explain the three stages of combustion in SI engine. And the
four stages of combustion in CI engine.   [10]

OR

5.a)   What is cetane number?
  b)   What are the factors affecting the delay period in CI engine?   [3+7]

6. What are the instruments or equipment used for measuring the following parameters of an I.C. Engine.
   a) Brake power   b) No emissions   c) Air flow rate
   d) Pressure of combustion gases   e) co emissions.   [10]

OR

7. A single stage, single acting, reciprocating air compressor takes in air at 1 bar and 303^0K. Air is discharged at 6 bar at a flow rate of 0.6 kg /min. The bore and stroke of the compressor are 100 mm and 150 mm respectively. Assume clearance factor as 0.03. The law of compression is PV $^{1.3}$ = Constant. Take R=287 J/kg K.
   Calculate:
   a) Volumetric efficiency
   b) Power required if mechanical efficiency is 85% and   [10]
   c) Speed of the compressor.

8. In a centrifugal compressor, the air enters at 26^0C and leaves at 98^0C. The air is compressed through a pressure ratio of 3. Calculate the isentropic efficiency and power required by the compressor, if 28 kg of air is compressed per minute. Take C_P= 1kJ/kg^{0}K and C_V= 0.716 kJ/kg^{0}K.   [10]

OR

9.a) Explain the working of Roots blower Air compressor with a sketch.
  b) What is a centrifugal compressor? How does it differ from an axial flow compressor?
       [5+5]

10. An air refrigeration open system working between 1Mpa and 100 kPa is required to produce a cooling effect of 2000kJ/min. The temperature of air leaving the cold chamber is -5^0C and at leaving the cooler is 30^0C. Neglect losses and clearance in the compressor and expander determine.
    a) Mass of air circulated per minute.
    b) Compressor work, expander work and the cycle work.
    c) COP and   [10]
    d) Power required to drive the machine.

OR

11. A standard vapour compression refrigeration system using R-12 as the refrigerant operates between the condenser pressure of 10 bar and the evaporator pressure of 2 bar. The evaporator absorbs 75kJ/min of energy as heat and the vapour is dry at the exit of the compressor. Represent the cycle on P-V and T-s planes and calculate.
    a) Mass flow rate of refrigerant
    b) Power consumed by the system
    c) COP of the cycle and
    d) Carnot cycle COP.   [10]
    The properties of the R-12 is given below

Pressure (bar)	Saturation temperature °C	Enthalpy (kJ/kg)		Entropy (kJ/kg)	
		Liquid	vapour	Liquid	vapour
10	42	77	204	---	0.683
1.5	-20	17.85	178	0.074	0.709

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