Code No: 114DU

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, October/ November- 2016
THERMAL ENGINEERING – I
(Common to ME, AME)

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, c as sub questions.

PART- A

(25 Marks)

1.a)	What are the different compositions of CNG?	[2]
b)	Explain what is meant by cruising range?	[3]
c)	What is meant by equivalence ratio and give its significance?	[2]
d)	What is meant by cetane number? Give the details.	[3]
e)	Why retardation test is conducted?	[2]
f)	Explain the significance of Sankey diagram in engine performance parameters.	[3]
g)	Give the working details of roots blower.	[2]
h)	Explain the concept of slip factor in centrifugal compressor.	[3]
i)	What is meant by deuce air refrigeration system and when it is used?	[2]
j)	Explain the effect of liquid sub cooling on the refrigerating effect.	[3]

PART-B

(50 marks)

2.a)	What is the purpose of venture in SI engine fuel supply system?	
b)	Draw the neat sketch and explain the working of carter carburettor.	[5+5]
	OR	
3.a)	Draw the line diagram and explain typical fuel feed system for a CI engine.	
b)	Compare and contrast dry sump lubrication and crank case ventilation.	[5+5]
4.a)	What is meant by flame speed and how to measure it?	
b)	What is meant by knock in SI engines and what are the parameters are causing their effect on it?	[5+5]
	OR	
5.a)	What is meant by ignition delay in CI engines and explain it with p-Θ diagram.	
b)	At least two combustion chambers required in CI engines represent by line diagram and explain its working.	[5+5]

6.a) Explain the details of exhaust gas composition with the percentage of each component.

b) A four cylinder, four stroke petrol engine has a 10 cm bore, 15 cm stroke and uses a compression ratio of 6. The engine develops 25 kW indicated power at 2000 rpm. Find the mean indicated pressure and air standard efficiency. Also calculate the fuel consumption per hour, if the indicated thermal efficiency is 30%. Take the calorific value of fuel as 42 MJ/kg. [5+5]

OR

7.a) Compare and contrast fans, blowers and compressors.

b) A single acting, single cylinder reciprocating air compressor is compressing 20 kg/min. of air from 110kPa. 30^0C to 600 kPa and delivers it to a receiver. Law of compression is $pV^{1.25}$ = constant. Mechanical efficiency is 80%. Find the power input to compressor, neglecting losses due to clearance, leakages and cooling. [5+5]

8.a) Classify the Rotary compressors and give the salient features.

b) 1 kg of air per second is taken into a root blower compressor at 1 bar and 27^0C. The delivery pressure of air is 1.5 bar. Calculate the motor power required to run the compressor; if mechanical efficiency is 80%. [5+5]

OR

9.a) Explain the concept of stalling and losses of axial flow compressor.

b) An axial flow compressor draws air at 20^0C and delivers it at 50^0C. Assuming 50% reaction, calculate the velocity of flow, if blade velocity is 100 m/s, work factor is 0.85. Take Cp=1kJ/kg.K. Assume $\alpha=10^0$, and $\beta=40^0$, Find the number of stages. [5+5]

10.a) Draw the line diagram and explain the working of Bell Coleman cycle and derive for COP of the same.

b) Air enters the compressor of an air craft cooling system at 100kPa, and 283K. Air is now compressed to 2.5 bar with an isentropic efficiency of 72%. After being cooled to 320K at constant pressure in a heat exchanger, the air then expands in a turbine to 1 bar with an isentropic efficiency of 75%. The cooling load of the system is 3 tonnes of refrigeration. After absorbing heat at constant pressure, the air re-enters the compressor, which is driven by the turbine, Find the COP of the refrigerator, driving power required and air mass flow rate. [5+5]

OR

11.a) Explain the working of an ideal vapour compression refrigeration cycle.

b) A refrigerator used R-12 as a working fluid and it operates on an ideal vapour compression cycle. The temperature of refrigerant in the evaporator is -20^0C and in the condenser is 40^0C. The refrigerant is circulated at the rate of 0.03 kg/s. Determine the coefficient of performance and capacity of refrigeration plant in the TR. [5+5]

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