R16

Code No: 135BP

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, July/August - 2023

THERMAL ENGINEERING – I

(Mechanical Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	Draw port timing diagram of a two stroke petrol engine.	[2]
b)	What do you understand by supercharging?	[3]
c)	List out different types of antiknock additives.	[2]
d)	Discuss about indirect injection combustion chambers.	[3]
e)	Define positive displacement compressor.	[2]
f)	How does frictional losses vary with speed in IC Engine?	[3]
g)	Differentiate between centrifugal compressor and axial flow compressor.	[2]
h)	Define polytropic efficiency in axial flow compressor.	[3]
i)	What do you understand by effective room sensible heat factor?	[2]
j)	What are the commonly used refrigerants in vapour compression system?	[3]

PART – B

(50 Marks)

2.a) Discuss the various important qualities of a good ignition system.
b) With a neat sketch, explain the battery ignition system. [5+5]

OR

3.a) Why the actual cycle efficiency is much lower than the air standard cycle efficiency? List the major losses in the actual engine.
b) Describe the evaporative cooling system with a neat sketch. [5+5]

4.a) With the help of graph, explain the factors which influence the flame speed in an S.I.engine.
b) Explain and discuss the phenomenon of diesel knock in CI engines and compare the same with detonation in SI engines. [5+5]

OR

5.a) Discuss the various methods for improving the anti-knock quality of an SI engine.
b) What is Physical delay? Discuss the factors that affect the delay period in a C.I. engine. [5+5]

6.a) Enumerate the various engine efficiencies. Explain.

b) A single acting two stage reciprocating air compressor compresses 4.6 kg of air per minute from 1.013 bar and 15^0 C through a pressure ratio of 9. The intercooling is perfect and the law of compression and expansion $PV^{1.3}$ = constant. Assuming the clearance volumes of both stages 5% of their swept volume and the speed of compressor 350 rpm, calculate the indicated power and the cylinder swept volume. [5+5]

OR

7.a) Explain Rope brake dynamometer to determine the brake power of an engine.

b) What are the instruments or equipment used for measuring the following parameters of an I.C. Engine i) Brake power ii) NO emissions iii) Air flow rate. [5+5]

8.a) What is degree of reaction? Derive the expression for degree of reaction for axial flow compressor.

b) A centrifugal air compressor having isentropic efficiency of 70% receives air at 16^0C. If the outer diameter of the blade tip is 1 m and the compressor runs at 5000 rpm find: (i) The temperature rise of the air and (ii) the static pressure ratio. [5+5]

OR

9.a) What is a centrifugal compressor? How does it differ from an axial flow compressor?

b) Explain the principle of operation of centrifugal compressor with neat sketch. [5+5]

10.a) Explain the working of Vapour compression refrigeration system with a neat diagram.

b) Explain about year –round air conditioning system with a neat labelled diagram. [5+5]

OR

11. A four rows coil with a face velocity of 150 m/min has a contact factor of 0.85. Calculate the contact factors for the following cases:
a) Face velocity 200 m/min and four rows
b) Face velocity 100 m/min and four rows
c) Face velocity 150 m/min and eight rows
d) Face velocity 150 m/min and two rows. [10]

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