Code No: 124DU

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech II Year II Semester Examinations, February - 2024

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)	Define: (i) stroke volume (ii) clearance volume.	[2]
b)	What are the advantages of liquid cooling system?	[3]
c)	Define abnormal combustion.	[2]
d)	Explain the stages of combustion in SI engines.	[3]
e)	What are the various methods for measurement of friction	[2]
f)	Write the effects of engine overheating and engine under cooling.	[3]
g)	Define slip and slip factor and pressure coefficient.	[2]
h)	What do you mean by positive displacement compressor?	[3]
i)	Explain the advantages of open cycle gas turbine.	[2]
j)	What is ozone depletion and global warming?	[3]

PART - B

(50 Marks)

2. Explain the actual valve timing diagram of a four stroke SI engine and compare with ideal valve timing diagram. [10]

OR

3. Describe the working of pressure feed lubrication system with a neat sketch. [10]

4. Explain and discuss the phenomenon of diesel knock in CI engines and compare the same with detonation in SI engines. [10]

OR

5.a) What is delay period and discuss the factors that affect the delay period.

b) What is the role of anti-knocking agents in internal combustion engine? Explain the anti-knocking agents used in CI and SI engines. [5+5]

6. Why Morse test is not suitable for single cylinder engine? Describe the method of finding friction power using Morse test. [10]

OR

7.a) An engine is used on a job requiring 110 kW B.P., the mechanical efficiency of the engine is 80 % and the engine used 50 kg fuel per hour under the conditions of operation. A design improvement is made which reduces the engine friction by 5 kW. Assuming the indicated thermal efficiency remains the same, how many kg of fuel per hour will be saved.

b) Explain the method of conducting retardation test in internal combustion engine and compare this method with Willian's line method. [5+5]

8.a) With the help of a neat sketches, explain the working of centrifugal air compressor clearly discussing how the pressure changes take place in impeller and diffuser.

b) Draw the schematic diagram vane compressor and explain working. [5+5]

OR

9.a) What is the function of impeller and diffuser in a centrifugal compressor?

b) Explain why now a days axial flow compressors are largely used for aviation gas turbines. [5+5]

10.a) What are the desirable properties of an ideal refrigerant? Explain.

b) A Bell-Coleman refrigerator works between 4 bar and 1 bar pressure limits. After compression, the cooling water reduces the air temperature to 17^0C. What is the lowest temperature produced by the ideal machine? Compare the coefficient of performance of this machine with that of the ideal Carnot cycle machine working between the same pressure limits, the temperature at the beginning of compression being -13^0 C. [5+5]

OR

11. A R-12 vapour compression system has saturated suction temperature of -5^0C and saturated discharge temperature of 40^0C. The refrigerant vapour is dry-saturated at the suction of compressor and becomes superheated after compression. For one ton of refrigeration capacity, Calculate a) Refrigerating effect b) mass flow rate c) Power and d) COP of the system. [10]

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