Code No: 155SD **RA**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, January/February - 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)	Write any two major differences between 'SI engine' and 'CI engine'.	[2]
b)	What is heat loss factor?	[3]
c)	What is abnormal combustion?	[2]
d)	What is mean by pre-ignition?	[3]
e)	Define volumetric efficiency.	[2]
f)	Define compressor efficiency.	[3]
g)	What is meant by positive displacement type compressor?	[2]
h)	What do you understand by stage compression?	[3]
i)	How are gas turbines classified?	[2]
j)	What are the different types of fuels used in gas turbines?	[3]

PART – B

(50 Marks)

2.a)	List various assumptions made in air - standard cycle analysis.	
b)	With the help of neat sketch, explain port timing diagram.	[5+5]
	OR	
3.a)	List three principal factors that influence engine performance.	
b)	Mention the various important qualities of a good ignition system.	[5+5]
4.a)	Briefly explain the stages of combustion in SI engines.	
b)	What is delay period and what are the factors that affect it.	[5+5]
	OR	
5.a)	Explain the phenomenon of knock in CI engines.	
b)	Explain the different types of combustion chambers used in CI engine.	[5+5]
6.a)	Briefly discuss the various efficiency terms associated with an engine.	
b)	Define mean effective pressure and distinguish between mean effective pressure and indicated mean effective pressure.	[5+5]
	OR	

7. A single cylinder reciprocating air compressor running at 150rpm delivers to a receiver 5m of free air per minute. Compressed to a pressure of 6 Kgf/cm^2. The suction is at 1 Kgf/cm^2 and 300 K. Compression and expansion. Curve follows the law pv1.3 =c. Clearance is 5% of the active stroke. Estimate.
   a) Temperature of air as admitted to receiver.
   b) Volumetric efficiency.
   c) Volumetric of air taken in per stroke.
   d) Dimension of the cylinder if stroke equals 1.25 times diameter.
   e) H.P. of compressor. [10]

8.a) What is a slip factor and a pressure co-efficient ?
   b) Describe briefly an axial-flow compressor. [5+5]

OR

9. If the compressor of example 21.1 is driven at 300 r.p.m. and is a single-acting, single-cylinder machine, calculate the cylinder bore required, assuming a stroke to bore ratio of 1.5 : 1. Calculate the power of the motor required to drive the compressor if the mechanical efficiency of the compressor is 85% and that of the motor transmission is 90%. [10]

10. Describe with neat diagram a closed cycle gas turbine. State also its merits and demerits. [10]

OR

11.a) Enumerate the various uses of gas turbines.
   b) Discuss briefly the methods employed for improvement of thermal efficiency of open cycle gas turbine plant. [5+5]

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