Question Paper

Exam Date & Time: 29-Apr-2019 (02:00 PM - 05:00 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

INTERNATIONAL CENTRE FOR APPLIED SCIENCES IV SEMESTER B.Sc. (Applied Sciences) - in Engg END SEMESTER THEORY EXAMINATION APRIL/MAY 2019 INTERNAL COMBUSTION ENGINES [IME 243]

Marks: 100

Α

Answer 5 out of 8 questions.

Answer ANY FIVE FULL questions. Any missing data if any, may be suitably assumed.

- What causes disintegration of product molecules? What are its effects? How ⁽⁶⁾ does it affect SI and CI engine combustion? Use sketches wherever
 - ^{A)} necessary.
 - ^{B)} Explain the following:
 - i) Air- fuel ratio,
 - ii) Mean effective pressure,
 - iii) Volumetric efficiency,
 - iv) Brake power

^{C)} With neat sketches explain dual cycle.

With neat sketches explain the functioning of pistons and piston rings. ⁽⁶⁾

A)

2)

- ^{B)} With neat sketches and individual process P- V diagrams explain the working of an I.C. engine which does not use blowers or compressors and yet has a power stroke for every rotation of the crank shaft.
- C) Give the classification of I.C. engines with examples. (6)
- With a neat sketch explain the analysis of combustion products by means of ⁽⁶⁾ ORSAT apparatus.
 - ^{B)} The products of combustion of a hydrocarbon fuel of unknown composition ⁽⁸⁾ have the following exhaust composition as measured by an ORSAT apparatus: CO_2 8%, CO- 0.9%, O_2 8.8%, N_2 82.3%. Calculate:
 - i) A/F ratio
 - ii) Composition of fuel on mass basis
 - iii) Percentage of theoretical air on mass basis
 - C) Elaborate on the following:
 - i) Enthalpy of Combustion,ii) Adiabatic flame temperature
- ⁴⁾ What are the variables affecting diesel knock? Explain.

(6)

Duration: 180 mins.

(8)

(6)

	A) B)	An unknown hydrocarbon fuel is burned with atmospheric air and by means of an ORSAT apparatus the following percentage composition of products of combustion are recorded: CO_2 - 10.1%, N ₂ - 87%, O ₂ - 1.9%, CO- 1%. Calculate the actual A/F ratio and percentage of deficit or excess air supplied.	(8)
	C)	A certain kind of engine uses fuel injection at the cylinder port for combustion. With a neat sketch explain the stages in its combustion.	(6)
5)	A)	With neat sketches explain: i) Compression swirl ii) Induction swirl	(6)
	В)	 Give reason: i) Increasing the inlet air density in SI engines raises the knocking effect and vice versa in CI engines. ii) Lower flame velocities in the combustion chamber can be caused due to improper air fuel mixture ratios. 	(8)
	C)	Briefly describe the factors to be considered for supercharging an IC engine.	(6)
6)	۵)	With neat sketches explain the stages of combustion generated from diffusion flames.	(6)
	B)	What are the effects of engines variables on ignition lag?	(8)
	C)	Explain types of combustion knock in SI engines.	(6)
7)	۵)	With neat sketches explain the working of L- head type combustion chambers. What are its advantages and disadvantages?	(6)
	B)	What are the primary considerations in the design of combustion chambers for CI engines?	(8)
	C)	With a neat sketch explain the working of pintle nozzle type fuel injector.	(6)
8)		Give a comparison between supercharger and turbocharger.	(6)
	A) B)	If a diesel engine is to run with petrol fuel, what modifications are to be done in the I.C. engine? Explain its working.	(8)
	C)	With appropriate sketches and equations explain dual stage catalytic convertor.	(6)

-----End-----