Question Paper

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 - S2]

Marks: 100   **Duration: 180 mins.**

A

Answer 5 out of 8 questions.

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

1)

A) Give a comparison of air standard cycles and actual cycles. (6)

B) With neat sketches and individual process P-V diagrams, explain the type of (8) engine which works on the principle of constant pressure process cycle and develops power for every two rotations of the crank shaft.

C) Give reason: (6)
i) Dissociation leads to lower brake power developed,
ii) Variation in specific heat leads to lower work output.

2)

A) With neat sketches explain the three major influences on actual cycles over (6) air standard cycles.

B) Explain the following: (8)
i)   Thermal efficiency,
ii) Brake specific fuel consumption,
iii) Compression ratio,
iv) Mean effective pressure

C) Three I.C. engines have same 1500cc volume. But they have different bore (6) and stroke length configurations. All three run on the same fuel and used for three different applications. Explain the engine characteristics with examples.

3)

A) With a neat sketch explain the method used to volumetrically analyze the (6) three components of exhaust gasses from an IC engine.

B) Two moles of Benzene are burnt completely with theoretical amount of air, (8) find:
i) A/F of reaction on volume basis
ii) Volumetric analysis of dry products

C) Elaborate on the following: (6)
i) Enthalpy of formation,
ii) Ignition limits.

4)	A)	A certain indirect injection type combustion chamber uses a pintle type nozzle to supply fuel to all chambers. Explain the working of the combustion chamber with a neat sketch.	(6)
	B)	A gas has the following composition by weight. H_2- 6%, S- 4%, C- 62%, O- 15%, N-1% and ash- 12% The fuel is burned with 40% excess air. Calculate: (i) Mass of air per kg of fuel, (ii) Mass of products per kg of fuel, (iii) Mass of H_2O in products per kg of fuel, (iv) Volumetric analysis of dry products.	(8)
	C)	Within a table mention eight variables that can cause knocking and its effect on the unburnt charge in an SI engine. Also, mention whether they can be controlled by the operator.	(6)
5)	A)	With neat sketches wherever possible, explain the effect of the following on air pollution: (i) Crevice volume, (ii) Valve overlap, (iii) Quenching.	(6)
	B)	With a neat sketch explain the working of a rotary engine. Can a rotary engine be used as a compressor? Give reasons.	(8)
	C)	What are the disadvantages of single point injection system over multi- port injection system? Draw neat sketches for both.	(6)
6)	A)	Give a comparison of SI and CI engine knock.	(6)
	B)	What are the effects of engines variables on delay period?	(8)
	C)	Explain abnormal combustion in SI engines.	(6)
7)	A)	With neat sketches explain the working of F- head type combustion chambers. What are its advantages and disadvantages?	(6)
	B)	What are the combustion chamber design principles for SI engines?	(8)
	C)	With a neat sketch explain the working of pintaux nozzle type fuel injector.	(6)
8)	A)	Give a comparison between two crankcase ventilation systems.	(6)
	B)	Explain the working of stratified engines with neat sketches. What are its advantages over conventional I.C. engines?	(8)
	C)	Give the classification of pollutants. Sketch any one method to control the emissions of regulated compounds simultaneously. Write the equations involved.	(6)

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