Question Paper

MANIPAL ACADEMY OF HIGHER EDUCATION

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

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

Answer 5 out of 8 questions.
Any missing data if any, may be suitably assumed.

1)

   A)   Compare air standard and actual cycle.   (6)

   B)   Explain the following: (8)
       i) Exhaust blow down,
       ii) Mean effective pressure,
       iii) Volumetric efficiency,
       iv) Brake power

   C)   With neat sketches explain otto cycle   (6)

2)

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

   B)   Explain the working of a single cylinder I.C. engine which produces power every alternate revolution of the crankshaft in the absence of fuel injector with neat sketches and individual P- V diagrams.   (8)

   C)   Give the classification of I.C. engines with examples.   (6)

3)

   A)   With a neat sketch explain the analysis of combustion products by means of ORSAT apparatus.   (6)

   B)   A hydrocarbon fuel contains 86% carbon and 13% hydrogen by mass and remaining is incombustible material. 25kg of air is supplied per kg of fuel. Find the percentage of excess air. If the exhaust gases are at one bar and 430^0C and room temperature is 30^0C, find the heat carried away by exhaust gases. Assume Cp(dry gases)= 1kJ/kg   (8)

   C)   Elaborate on the following: (6)
       i) Enthalpy of formation,
       ii) Adiabatic flame temperature.

4)

       What are the variables affecting diesel knock? Explain   (6)

A)

B) An unknown hydrocarbon fuel is burned with atmospheric air and by means (8)
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.

C) A certain kind of engine uses fuel injection at the cylinder port for (6)
combustion. With a neat sketch explain the stages in its combustion

5) With neat sketches explain: (6)
i) Air swirl in diesel engines,
A)
ii) Open and closed combustion chambers.

B) Give reason: (8)
i) 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.

C) Briefly describe the factors to be considered for multiport fuel injection over (6)
throttle body injection.

6) With neat sketches explain the stages of combustion generated from (6)
premixed flames.
A)
B) What are the effects of engines variables on after burning? (8)

C) Explain knocking through the factors by which they are affected for a CI (6)
engine.

7) With neat sketches explain the working of L- head type combustion (6)
chambers. What are its advantages and disadvantages?
A)
B) What are the primary considerations in the design of combustion chambers (8)
for CI engines?

C) With a neat sketch explain the working of pintaux nozzle injector. (6)

8) How does the stratified charge engine work? Explain with neat sketches. (6)

A)
B) If a diesel engine is to run with petrol fuel, what modifications are to be done (8)
in the I.C. engine? Explain its working.

C) Sketch the fuel evaporation control required for a petrol injection air- fuel (6)
mixture system

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