MARWADI UNIVERSITY

Faculty of Technology

AUTOMOBILE ENGINEERING

B. TECH **SEM:5** **WINTER-2019**

Subject: - Automobile Engine (01AE0503) **Date:- 14/10/2019**

Total Marks:-100 **Time: - 03:00 hours**

Instructions:

1. **All Questions are Compulsory.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Question: 1.

(a) Objective MCQ [10]

1. The working cycle in case of four stroke engine is completed in following number of revolutions of crankshaft
   a. 1/2
   b. 1
   c. 2
   d. 4
2. Scavenging air in diesel engine means
   a. air used for combustion sent under pressure
   b. forced air for cooling cylinder
   c. burnt air containing products of combustion
   d. air used for forcing burnt gases out of engine's cylinder during the exhaust period
3. Supercharging is the process of
   a. supplying the intake of an engine with air at a density greater than the density of the surrounding atmosphere
   b. providing reduced cooling air
   c. injecting excess fuel for raising more load
   d. supplying less air to remove combustion products fully
4. The ratio of brake power to the indicated power is called
   a. net efficiency
   b. efficiency ratio
   c. mechanical efficiency
   d. overall efficiency
5. Compression ratio of I.C. engines is
   a. the ratio of volumes of air in cylinder before compression stroke and after compression stroke
   b. volume displaced by piston per stroke and clearance volume in cylinder
   c. ratio of pressure after compression and before compression
   d. swept volume/cylinder volume
6. The air standard efficiency of an Otto cycle compared to diesel cycle for the given compression ratio is
   a. same
   b. less
   c. more
   d. more or less depending on power rating

7. For high power condition in automotive engines, the air-fuel mixture must be
    a. Lean
    b. Rich
    c. Chemically balanced
    d. None of the above
8. Combustion in compression ignition engines is
    a. homogeneous
    b. heterogeneous
    c. both (a) and (b)
    d. laminar
9. In a typical medium speed, 4-stroke cycle diesel engine
    a. fuel injection starts at 10° before top dead centre and ends at 20° after top dead centre
    b. fuel injection starts at top dead centre and ends at 20° after top dead centre
    c. fuel injection starts at just before top dead centre and ends just after top dead centre
    d. may start and end anywhere
10. A 75-cc engine has following parameter as 75 cc
    a. fuel tank capacity
    b. swept volume
    c. cylinder volume
    d. clearance volume.

(b) Short Que. [10]

1. Give the working principle of a carburettor.
2. Define volumetric efficiency of an I.C. engine.
3. What is the purpose of supercharging and turbocharging?
4. What do you mean by a stoichiometric air-fuel ratio?
5. Name the term by which ignition quality of petrol is expressed.
6. Name the term by which ignition quality of diesel is expressed.
7. Give the function of flywheel in engine.
8. Name the types of combustion chambers for C.I. engines.
9. What are the factors affecting the delay period?
10. Give the various types of lubrication and cooling system in I.C.engine.

Question: 2.

(a) What is internal combustion engine? Classify internal combustion engine [08]

(b) What do you understand by knock in S.I. Engine? Explain this phenomenon. How does the knock in S.I. Engines differ from the knock in C.I. Engines? [08]

OR

(b) Describe construction and working of fuel injector with the help of diagram [08]

Question: 3.

(a) Define Octane number, Cetane number, Compression ratio and Volumetric Efficiency. Discuss the factors affecting Carburetion. [08]

(b) Define Supercharging and Turbocharging with its advantages and disadvantages [04]

(c) Explain types of nozzle (in brief) used in CI engines [04]

OR

(a) What is the function of a Carburetor? Explain working of Simple Carburetor with the help of neat sketch. [08]

(b) Differentiate between (i) 2 Stroke & 4 Stroke engine [04]

(c) Explain (in brief) different combustion chamber used in SI engine. [04]

Question: 4.

(a) Explain stages of combustion (in brief) for CI engine with p-theta diagram. [08]

(b) Explain the phenomenon of diesel knock with neat sketch [04]

(c) List advantages and disadvantages of constant pressure turbocharging. [04]

OR

(a) Describe with suitable sketches the combustion phenomena in spark ignition engine the phases of combustion. [08]

(b) Explain factors affecting delay period on C.I. Engines. [04]

(c) Explain with the help of neat sketch, working and valve timing diagram of a 4-stroke Diesel engine [04]

Question: 5.

(a) Explain Morse test in detail with relevant equations. How far it is suitable with Engine performance analysis. [08]

(b) During trial on single cylinder four stroke diesel engine the following observations made:

Cylinder Bore = 200mm Piston Stroke = 400mm

Mean effective pressure = 6 bar Torque = 407 N-m

Speed of engine = 250 rpm and fuel consumption = 4 kg/hr.

C.V. of Fuel = 43,000 KJ/kg.

Calculate: (i) B.P. (ii) I.P. (iii) η mech (iv) η indicated thermal . [04]

(c) "Thermal efficiency of Diesel Engines is always higher than the Petrol Engines"-Justify the statement. [04]

OR

(a) Explain various methods of obtaining friction power and explain any one of them in detail. [08]

(b) Describe with the neat sketches the different methods of supercharging. [04]

(c) Define the terms: (i) Mechanical efficiency (ii) Thermal efficiency [04]

Question: 6.

(a) Enlist the function of lubrication system used in I.C. engines and explain any one type of lubrication system used in I.C. Engines. [08]

(b) "Generally, Spark Ignition engines are not employed with supercharger"- Justify the statement by relevant example. [04]

(c) Explain with neat sketch the pulse turbo charging (Buchi type) [04]

OR

(a) Draw a neat sketch of Multi Point Fuel Injection system used in automobiles engines and explain its working. [08]

(b) Explain with neat sketch the working of thermostat cooling system. [04]

(c) Describe with suitable sketches the following systems of carburetor: [04]
(i) Idling system, (ii) Acceleration Pump System

---Best of Luck---