WEST BENGAL UNIVERSITY OF TECHNOLOGY

AUE-601

AUTOMOTIVE PETROL & DIESEL ENGINE

Time Allotted: 3 Hours   Full Marks: 70

The questions are of equal value.
The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

GROUP A
(Multiple Choice Type Questions)

1. Answer *all* questions.   10×1 = 10

(i) In a diesel engine, the fuel is ignited by
  (A) spark
  (B) injected fuel
  (C) heat resulting from compressing air that is supplied for combustion
  (D) ignition
  (E) Combustion chamber

(ii) 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
  (E) Air fuel mixture

(iii) Combustion in compression ignition engines is
  (A) homogeneous   (B) heterogeneous
  (C) both (A) and (B)   (D) laminar
  (E) Turbulent

(iv) The rating of a diesel engine, with increase in air inlet temperature, will
  (A) increase linearly
  (B) decrease linearly
  (C) increase parabolic ally
  (D) decrease parabolic ally
  (E) First decrease linearly and then increase parabolic ally

(v) The cam shaft of a four stroke I.C. engine running at 1500 rmp will run at
  (A) 1500 rmp
  (B) 750 rmp
  (C) 3000 rmp
  (D) any value independent engine speed
  (E) none of these

(vi) The specific fuel consumption of a petrol engine compared to diesel engine of same H.P. is
  (A) same
  (B) more
  (C) less
  (D) less or more depending on operating conditions
  (E) Unpredictable

(vii) The operation of forcing additional air under pressure in the engine cylinder is known as
  (A) scavenging
  (B) turbulence
  (C) supercharging
  (D) pre ignition
  (E) Dissociation and carburetion of fuel

(viii) Flash point of fuel oil is

    (A) minimum temperature to which oil is heated in order to give off inflammable vapours in sufficient quantity to ignite momentarily when brought in contact with a flame

    (B) temperature at which it solidifies or congeals

    (C) temperature at which it catches fire without external aid

    (D) indicated by 90% distillation temperature, i.e. when 90% of sample oil has distilled off

    (E) none of these

(ix) Volumetric efficiency is affected by

    (A) exhaust gas in the clearance volume

    (B) value timing

    (C) design of intake and exhaust value

    (D) all of these

(x) The major loss in C.I. engine

    (A) cooling heat loss

    (B) rubbing and friction loss

    (C) pumping loss

    (D) loss due to incomplete combustion

GROUP B
(Short Answer Type Questions)

Answer any *three* questions.   3×5 = 15

2. What is ignition delay? Explain briefly about the different features affecting the delay period.

3. Develop valve timing diagram of four strokes SI and CI engine.

4. What are the factors which should reduce tendency of detonation of knocking?

5. Explain with a graph the three possible theoretical scavenging processes.

6. A single cylinder engine running at 1800 rpm develops a torque of 8 Nm. The indicated power of the engine is 1.8 KW. Find the loss due to friction power as percentage of brake power.

GROUP C
(Long Answer Type Questions)

Answer any *three* questions.   3×15 = 45

7. (a) In an air standard Diesel cycle, the compression ratio is 16, and at the beginning of isentropic compression, the temperature is 15 °C and the pressure is 0.1 Mpa. Heat is added until the temperature at the end of the constant pressure process is 1480 °C calculate the cut-off ratio, the Heat supplied per Kg of air, the cycle efficiency and the M.E.P.   9

   (b) Discuss the effect of engine variables on flame propagation.   6

8. With the help of neat schematic sketch derive the expression of A/F ratio as provided by a simple carburetor, taking into account the compressibility of air. Hence comment on the inherent limitations of such a carburetor in providing the requisite A/F ratio over the entire operating range of an SI engine.   15

9. (a) Explain the stages of combustion in a CI engine with P-θ diagram and show different important points in the diagram.   7

   (b) Discuss with the help of neat sketches, the operation of a battery ignition system of a typical SI engine. Explain how the magneto-ignition system compares with the battery ignition system.   8

10. (a) The air flow to a four cylinder, four stroke oil engine is measured by means of a 5cm diameter orifice having a co-efficient of discharge of 0.6. During a test on the engine of the following data were recorded bore= 10 cm, stroke= 12cm, speed= 1200rpm, brake torque= 120Nm, Fuel consumption = 5kg/h, calorific value of the fuel = 42 MJ/kg, pressure drop across orifice is 4.6 cm of water, ambient temperature and pressure are 17°C and 1 bar respectively. Calculate (i) the brake thermal efficiency (ii) the brake mean effective pressure and (iii) the volumetric efficiency based on free air condition.   12

   (b) What are the functions of a fuel feed pump?   3

11. (a) A four cylinder, four stroke engine running at 40rev/s. has a carburetor venturi with a 3cm throat. Assuming the bore to be 10cm, volumetric efficiency of 75%, the density of air to be 1.15 and co-efficient of air flow to be 0.75. Calculate the suction of the throat.   9

   (b) Explain Morse list method for determining mechanical efficiency of engine.   6