C.U.SHAH UNIVERSITY
Winter Examination-2015

Subject Name : Internal Combustion Engines

Subject Code : 4TE05ICE1   **Branch : B.Tech (Mechanical)**

Semester : 5   Date :04/12/2015   Time :2:30 To 5:30   Marks :70

Instructions:
  (1) Use of Programmable calculator & any other electronic instrument is prohibited.
  (2) Instructions written on main answer book are strictly to be obeyed.
  (3) Draw neat diagrams and figures (if necessary) at right places.
  (4) Assume suitable data if needed.

Q-1   Attempt the following questions: (14)

  1) The firing order in case of 4 – cylinder inline engine is
        (a) 1-2-4-3 (b) 1-3-4-2 (c) 1-4-3-2 (d) 1-2-3-4
  2) C.V. of petrol (approximately) is
        (a) 20MJ (b) 40 MJ (c) 50 MJ (d) 60MJ
  3) Cetane no. of diesel used in automobile lies between
        (a) 45-50 (b) 60-65 (c) 75-80 (d) 90-95
  4) Size of inlet valve in I.C. Engine
        (a) Smaller than exhaust valve   (b) Bigger than exhaust valve
        (b) Same as exhaust valve   (d) Depends upon the ambient temperature
  5) Radiator tubes are made of
        (a) Steel (b) Brass (c) Cast iron (d) None of above
  6) An engine has stroke volume $800 cm^3$ and clearance volume $100 cm^3$, the compression ratio of the engine is
        (a) 9:1 (b) 8:1 (c)10:1 (d) 7:1
  7) A single cylinder engine using diesel as a fuel develops power after every two revolutions, the cycle of operation is known as
        (a) Two stroke diesel cycle   (b) Four stroke diesel cycle
        (c) Four stroke otto cycle   (d) Two stroke otto cycle
  8) The pressure inside the I.C. engine is below atmospheric pressure during
        (a) Suction stroke   (b) Compression stroke
        (c) Expansion stroke   (d) Exhaust stroke
  9) The petrol flows from the float chamber to venture, because
        (a) of pressure difference   (b) of level difference
        (c) the air sucks the petrol   (d) All of the above
  10) The water circulation the radiator is caused by
        (a) Natural circulation   (b) Belt driven water pump
        (c) Gear driven water pump   (d) None of above

11) The power output of diesel engine is controlled by
        (a) Varying the compression stroke   (b) Regulating the quality of air induction
        (c) Varying the fuel pump timing   (d) None of the above

12) During the normal running, the required heat to ignite the fuel in diesel is obtained by using
        (a) Heat Plug   (b) High compression ratio
        (c) Manifold heater   (d) An cooled cylinder head

13) The part of the ignition system which increases the voltage from 12 V to 10000V is
        (a) Contact breaker (b) Capacitor   (c) Induction Coil (d) Distributor

14) The diesel knock in C.I. engine is caused by?
        (a) High cylinder temperature   (b) Poor fuel atomization
        (c) Too reach A:F mixture   (d) Too lean A:F mixture

Attempt any four questions from Q-2 to Q-8

Q-2	**Attempt all questions**	
(a)	Explain merits and demerits of hydrogen as engine fuels.	**(04)**
(b)	Explain in brief, why actual cycle deviates from theoretical cycle?	**(05)**
(c)	Explain Rotary Engine with neat Sketch.	**(05)**

Q-3	**Attempt all questions**	
(a)	With neat sketch, describe various types of nozzles. Also state their relative merits.	**(07)**
(b)	Prove that Air fuel Ratio for Simple Carburetor if air is assumed to be incompressible is equal to $\quad$ A.F. Ratio $= \dfrac{C_{da}\ A_a\ \sqrt{2}\rho_a.(\Delta p)}{C_{df}\ A_f\ \sqrt{2}\rho_f\ [(\Delta p) - h\ g\ \rho_f]}$	**(07)**

Q-4	**Attempt all questions**	
(a)	Define ignition lag and knocking.	**(04)**
(b)	With the help of neat sketch, explain the combustion stages in CI engine.	**(05)**
(c)	Explain with neat sketch working of MPFI system for I. C. engine.	**(05)**

Q-5	**Attempt all questions**	
(a)	Explain Wet and Dry sump lubricating system.	**(07)**
(b)	Explain with neat sketch force cooling for IC engines.	**(07)**

Q-6	**Attempt all questions**	
(a)	Explain the need of supercharging and with sketch describe any one type of supercharger.	**(07)**
(b)	What are the methods of improving the engine power output? Which method is most suitable for I.C. engines?	**(07)**

Q-7	**Attempt all questions**	
(a)	What are the essential components of battery and coil ignition system? Explain the working of such a system with the help of a neat sketch.	**(07)**
(b)	Explain in brief, Firing order for I.C. engines.	**(07)**

Q-8   **Attempt all questions**

(a)   Write a short note on SI engine emissions.   **(07)**

(b)   The following observations were made during the test on an oil engine: **(07)**
B.P. of the engine = 31.5 kW, Fuel used = 10.5 kg/hr., C.V. of fuel = 43000 kj/kg.,
jacket circulating water = 540 kg/hr., Rise in temperature of cooling water = $56^{o}C$.
Exhaust gases are passed through the exhaust gas calorimeter for finding the heat carried away by exhaust gases.
Water Circulated through exhaust gas calorimeter = 454 kg/hr.
Rise in temperature of water passing through exhaust gas calorimeter = $36^{o}C$
Temperature of exhaust gas leaving the exhaust gas calorimeter = $82^{o}C$
A:F ratio = 19:1, ambient temperature = $17\ ^{o}C$., C_p for exhaust gases = 1kJ/kg K.
Draw up the heat balance sheet on minute and percentage basis.