QP Code : 2089

(3 Hours) [Total Marks : 100

- Question No 1 is compulsory.
- Answer any four out of remaining six questions.
- Assumptions made should be clearly stated .
- Assume suitable data wherever required, but justify the same.

Q-1 Answer any **four** of the following : [20]

    (a) Distinguish between Two Stroke and Four Stroke engines.
    (b) Write a note on supercharging.
    (c) Define volumetric efficiency of an engine. Explain in brief the factors affecting it.
    (d) Write a note on SAE grading of Lubricants.
    (e) Define Mean effective pressure, Mechanical efficiency and brake thermal efficiency of an engine. How does bsfc vary with respect to the load on the engine?

Q-2 a) Explain with a circuit diagram the Battery Ignition System and elaborate on the [10] significance of individual components of the circuit.

    b) The venturi of a simple carburettor has a throat diameter of 20 mm and the [10] coefficient of air flow is 0.85. The fuel has orifice diameter of 1.25 mm and the coefficient of fuel flow is 0.62 . The petrol surface is 6 mm below the throat. Find
i) The air fuel ratio for a pressure drop of 0.07 bar when the nozzle lip is neglected,
ii) The air fuel ratio when nozzle lip is taken into account
iii) The minimum velocity of air required to start the fuel flow when nozzle lip is provided.

Q-3 a) Draw the actual Valve timing diagram for four stroke diesel engine and explain [10] the deviations with respect to the ideal diagram.

    b) Explain with a neat sketch the Common Rail System of fuel injection in a diesel [10] engine.

Q-4 a) What is the necessity of lubrication in IC engine. Explain with a sketch the [10] working of splash wet sump lubrication system.

    b) A four-stroke diesel engine has a compression ratio of 14 and works in ambient [10] condition of 1.013 bar and 27°C. A supercharger is added to the engine which raises the inlet pressure to 1.3 bar and inlet temperature to 60°C, other conditions remaining the same. What will be the percentage change in charging efficiency and indicated output of the engine?

TURN OVER]

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Q-5 a)   Distinguish between air and water cooling. Explain with a sketch the operation of   [10]
          thermosyphon cooling.

     b)   Following observations were made during a trial on single cylinder diesel engine.   [10]
          Fuel Consumption   = 10.2 kg/hr, Calorific value of fuel =   43890kJ/kg, Air
          consumption = 3.8 kg/min, Speed = 1900 RPM, Torque on the brake drum = 186 Nm,
          Quantity of water circulated = 15.5 kg/min, Temperature Rise = 36^0C, Exhaust Gas
          Temperature = 410 ^{0} C, Room Temperature = 20^0C, C_p of exhaust gases = 1.17 kJ/kg K.
          Calculate : (i) Brake Power (ii) Brake Specific Fuel Consumption. (iii) Brake
          Thermal efficiency. Draw Heat Balance Sheet on minute basis.

Q-6 a)   Explain the various stages of combustion in a diesel engine.   [8]

     b)   A four cylinder petrol engine has a bore of 60 mm and a stroke of 90 mm. Its   [12]
          rated speed is 2800 RPM and it is tested at this speed against a brake which has a
          torque arm of 0.37 m. The net brake load is 160 N and the fuel consumption is
          8.986litres per hour. The specific gravity of petrol used is 0.74 and it has a lower
          calorific value of 44100 kJ/kg. A Morse Test is carried out and the cylinders are
          cut out in order 1,2,3,4 with corresponding brake loads of 110,107,104 and 110 N
          respectively. Calculate for this speed : (i) Engine Torque   (ii) Brake Mean
          Effective Pressure (iii) Brake thermal efficiency (iv) The Brake specific fuel
          Consumption (v) Mechanical Efficiency (vi) Indicated Mean Effective Pressure.

Q-7   Write short notes on any **four** of the following :   [20]

          i.   Measurement of frictional power
          ii.   Wankel Engine
          iii. Control of Pollution from IC engines.
          iv.   Types of injectors
          v.   Effects of knocking in petrol engine.
          vi.   Effect of A/F ratio on output of diesel engine.