

Con. 6881-11.

(3 Hours)



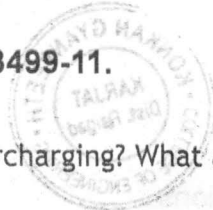
MP-3499

[Total Marks : 100]

- N.B. :** (1) Question No.1 is **compulsory**.
 (2) Attempt any **four** out the remaining questions.
 (3) Assume **suitable** data wherever **necessary**.
 (4) **Figures** to the **right** indicate **full** marks.

1. a) State whether following statements are TRUE or FALSE. Rectify the statements if FALSE (05)
- Relative efficiency is the ratio of Volumetric efficiency to air standard efficiency
 - Scavenging is the process of forcing air for engine cooling
 - Constant volume process in IC. Engines is the characteristic of S. I. Engine
 - The cam shaft of a 4-stroke I. C. engine rotates at twice the engine speed
 - In diesel engine, the mixing of fuel and air is carried out in injection pump
- b) Define the five important efficiencies of Internal Combustion Engines (05)
- c) Differentiate between two stroke and four stroke engines (05)
- d) What is 'Air-Box' in an engine test rig? Why is it used? How measurement of air flow is done in the engine test rigs? (05)
2. a) Explain in detail the Morse Test for finding the indicated power of an engine, stating any assumptions made. What are its advantages and limitations? (10)
- b) A single cylinder four stroke C.I. engine consumes 2.65kg/hr of fuel, running at 700rpm. Fuel injection occupies 32° of crank travel and takes place through a single nozzle orifice. Fuel is injected at a pressure of 135bar inside the combustion chamber where the pressure is 35 bar. Calculate the volume of fuel injected per cycle and the diameter of orifice. (10)
 Take density of fuel as 875kg/m^3 and coefficient of discharge for nozzle orifice as 0.8.
3. a) What is 'compensation' and why is it done in carburettor? (04)
- b) A load test is performed on a single cylinder four stroke diesel engine having compression ratio of 15. The speed of the engine is 2000rpm and the air and fuel consumption were found to be 3.6kg/min and 10 kg/hr respectively. The torque applied on the brake drum was 186N-m. Rate of cooling water circulation is 16kg/min and temperature rise was found to be 36°C . The exhaust gas temperature was found to be 415°C . (16)
- Calculate the Brake Power, BSFC and Brake Thermal Efficiency of this engine.
 Also draw Heat Balance Sheet on minute basis.
- Take: Calorific Value of fuel = 43000kJ/kg ; Ambient temperature = 30°C ; C_p for exhaust gases = 1.2kJ/kg .

[TURN OVER]



4. a) What is supercharging? What are the limits of supercharging? (08)
- b) In a single cylinder petrol engine a carburetor having a choke tube diameter of 26mm is employed. The engine consumes 8kg/hr of fuel having specific gravity of 0.75. If the tip of the fuel jet in the carburetor is 4.2mm above the level in float chamber, find diameter of fuel jet. Take ambient temperature of air = 27°C; air fuel ratio = 15; Cd for air = 0.8; Cd for fuel = 0.7; atmospheric pressure = 1.013bar. (12)
5. a) Describe in detail the various stages of combustion in SI engines (08)
- b) A diesel engine operating on four-stroke is to be designed to operate with following characteristics at sea level, where the mean conditions are 1.0132 bar and 10°C. (12)
 BP=260kW, Volumetric efficiency=78% (at sea level free air condition), Brake Specific fuel consumption=0.247kg/kWh, A/F ratio=17; speed=1500rpm.
- Calculate the required engine capacity and the anticipated brake mean effective pressure.
- The engine is fitted with a supercharger so that it may be operated at an altitude of 2700m, where the atmospheric pressure is 0.72bar. the power taken by a supercharger is 8% of the total power produced by the engine and the temperature of the air leaving the supercharger is 32°C. the air-fuel ratio and thermal efficiency remain the same for the supercharged engine as when running unsupercharged at sea level, as does the volumetric efficiency. Calculate the increase of air pressure required at the supercharger to maintain the same net output of 260kW. Take $R=0.287\text{kJ/kg}^{\circ}\text{K}$.
6. a) Describe any three types of injection systems used in C.I. engines (12)
- b) Draw the circuit diagram and explain in brief the working of various components of battery ignition system (08)
7. Write short notes on : (ANY FOUR) (20)
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| i) Wankel engines | ii) Mist Lubrication system |
| iii) Alternative fuels for I.C.Engines | iv) SAE Ratings of lubricants |
| v) Fuel Rating of I.C.Engines | vi) Stratified charge Engines |
| vii) Pollution control methods used in engines | |
