

Q7 A 3-cylinder, 4-stroke engine has a bore of 76 mm and a stroke of 125 mm. It develops 12 kW at the shaft when running at 1500 rpm. If the mechanical efficiency is 85% and it burns 3.2 kg of oil per hour of calorific value 42000 kJ/kg, find the indicated mean effective pressure, assuming all cylinders produce the same power, and the brake thermal efficiency.

Q8 A 4-cylinder, 4-stroke engine of 78 mm bore and 105 mm stroke develops an indicated power of 47.5 kW at 4400 rpm. The air/fuel ratio is 21 kg air/kg fuel, the fuel consumption is 13.6 kg/h and the calorific value of the fuel is 41.8 MJ/kg. Calculate for the engine:

- (a) the indicated mean effective pressure;
- (b) the indicated thermal efficiency;
- (c) the volumetric efficiency referred to inlet conditions of 1 bar, 15° C.

$$R = 287 \text{ J/kgK}$$

Q9 A 6-cylinder, 4-stroke diesel engine has a bore of 210 mm and a stroke of 315 mm. At 750 rpm, the brake mean effective pressure is 4.89 bar and the specific brake fuel consumption is 0.195 kg/kWh. The air to fuel mass flow ratio is 28 to 1 and the atmospheric conditions are 0.95 bar, 17° C. Calculate the volumetric efficiency.

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