

Vidyavardhini's College of Engineering and Technology, Vasai (W)

Department of Mechanical Engineering

IC Engines Mock University Exam (21-12-2020)

Part A – 40 marks (20 MCQs of 2 marks each)

1. The ratio of brake power to indicated power of an I. C. engine is called
 - a. Mechanical efficiency
 - b. Thermal efficiency
 - c. Volumetric efficiency
 - d. Relative efficiency
2. Stoichiometric air fuel ratio of petrol is roughly
 - a. 1:1
 - b. 50:1
 - c. 25:1
 - d. 15:1
3. The method of governing for SI engine is
 - a. Quality governing
 - b. Hit and miss governing
 - c. Quantity governing
 - d. None of the above
4. Compression ratio in CI engines is of the order of
 - a. 5 to 7
 - b. 10 to 12
 - c. 7 to 10
 - d. 14 to 20
5. Fuel injector is used in
 - a. SI engine
 - b. CI engine
 - c. Both SI and CI engine
 - d. None of the above
6. Increasing the compression ratio in SI engine _____ knocking tendency
 - a. Increase
 - b. Decrease

- c. Not affected
 - d. None of the above
7. Mist lubrication system is mainly used in
- a. 4-stroke CI engine
 - b. 2-stroke SI engine
 - c. 4-stroke SI engine
 - d. Wankel engine
8. The main purpose of the thermostat in an engine cooling system is to
- a. Prevent the coolant from boiling
 - b. Indicate coolant temperature to driver
 - c. Allow engine to warm-up quickly
 - d. Pressurize the system
9. Supercharging increases the power output of engine by
- a. Increasing the charge pressure
 - b. Increasing the charge temperature
 - c. Quantity of fuel admitted
 - d. Increasing the speed of engine
10. Blue smoke in CI engine indicates
- a. Unburnt fuel
 - b. NO_x
 - c. CO
 - d. HC
11. Gasohol is mixture of
- a. 50% ethanol + 50% gasoline
 - b. 40% ethanol + 60% gasoline
 - c. 10% ethanol + 90% gasoline
 - d. 90% ethanol + 10% gasoline
12. Major disadvantage of LPG as a fuel in automobile is
- a. Reduction in the life of engine
 - b. Reduction in life and less power
 - c. Less power compared to gasoline
 - d. Knocking tendency

13. Major constituent of natural gas is
- Ethane
 - Methane
 - Propane
 - Butane
14. The thermal efficiency of petrol engine as compared to diesel engine is
- lower
 - higher
 - same for same power output
 - same for same speed.
15. In S.I. engine, to develop high voltage for spark plug
- battery is installed
 - distributor is installed
 - carburettor is installed
 - ignition coil is installed.
16. The knocking tendency in C.I. engines increases with
- decrease of compression ratio
 - increase of compression ratio
 - increasing the temperature of inlet air
 - increasing cooling water temperature.
17. Morse test measures the indicated power of a
- SI engine
 - CI engine
 - Steam engine
 - Steam turbine.
18. Stoichiometric ratio is
- Chemically correct air-fuel ratio by weight
 - Chemically correct air-fuel ratio by volume
 - Actual air-fuel ratio for maximum efficiency
 - None of the above
19. The ratio of the indicated thermal efficiency to the air standard efficiency is known as
- Mechanical efficiency

- b. Overall efficiency
- c. Volumetric efficiency
- d. Relative efficiency

20. As a result of detonation in an I.C. engine, following parameter attains very high value

- a. Peak pressure
- b. Rate of rise of pressure
- c. Rate of rise of temperature
- d. Peak temperature

Part B – 40 marks (2 questions of 20 marks each)

21. Descriptive question no. 1 (attempt any 4 out of 6 sub-questions of 5 marks each)

21.a. With a neat sketch, explain the stages of combustion in S.I. Engine

21.b. Discuss advantages and disadvantages of petrol injection system with conventional carburettor system.

21.c. A 4-stroke petrol engine delivers 40 kW with the mechanical efficiency of 80%. The fuel consumption of the engine is 0.4 kg/kW-hr and air-fuel ratio is 14:1. The heating value of the fuel is 43000 kJ/kg. Find (a) Indicated Power, (b) Frictional Power, (c) Brake Thermal Efficiency, (d) Fuel consumption per hour and (e) Air Consumption per hour.

21.d. Write a short note on evaporative cooling system.

21.e. Calculate the diameter of fuel orifice of 4-stroke engine which develops 25 kW per cylinder at 2500 rpm. The specific fuel consumption is 0.3 kg/kWh and fuel is injected at a pressure of 150 bar over a crank travel of 25° . The pressure in the combustion chamber is 40 bar. Coefficient of velocity is 0.875 and specific gravity is 0.8762.

21.f. Define pour point and flash point and discuss its importance in selecting the lubricating oil for I.C. Engine.

22. Descriptive question no. 2 (attempt any 4 out of 6 sub-questions of 5 marks each)

- 22.a. State the reasons for efficiency of actual cycle is much lower than the air standard cycle efficiency. List the major losses and differences in actual engine cycle and air standard cycle.
- 22.b. What are the sources of HC formation in petrol engines? Explain the different factors which affect the HC formation.
- 22.c. List engine management sensors and state its importance.
- 22.d. In a trial of single cylinder diesel engine, the following observations were made: Calorific value of fuel – 43890 kJ/kg, Oil consumption – 10.2 kg/hr, Speed – 1900 rpm, Air consumption – 3.8 kg/min, Compression ratio – 15, Torque – 186 Nm, Quantity of cooling water used – 15.5 kg/min, Temperature rise - 36°C, Exhaust gas temperature - 410°C, Room temperature - 20°C, Cp of exhaust – 1.17 kJ/kgK. Prepare heat balance sheet on minute basis.
- 22.e. With a neat sketch, explain the stages of combustion in C.I. Engine.
- 22.f. A 6-cylinder, 4.8 litre supercharged engine operating at 3500 rpm has overall volumetric efficiency of 158%. The supercharger has an isentropic efficiency of 92% and mechanical efficiency of 87%. It is desired that air to be delivered to cylinder at 65°C and 180 kPa, while ambient conditions are 23°C and 98 kPa, adiabatic index is 1.4. Calculate i) Amount of air required to reduce temperature back to 65°C, ii) Engine power lost to run the supercharger.