

01093

**DIPLOMA IN MECHANICAL ENGINEERING
(DMEVI)****Term-End Examination****December, 2013****BIMEE-031 : I.C. ENGINES***Time : 3 hours**Maximum Marks : 70*

Note : Attempt *any seven* questions. All questions carry equal marks. Use of calculator is *permitted*.

1. (a) With a neat sketch, explain the working principle of two stroke, single cylinder SI engine. Also mark the important parts and explain them briefly. 5
- (b) In an air standard otto cycle engine, the temperature at the end of compression stroke is 377°C and the maximum temperature is 2127°C . If the engine delivers 700kJ/kg of net work, find the thermal efficiency and compression ratio of the engine. Take $C_v=0.718\text{ kJ/kg/K}$ 5
2. (a) With a neat sketch explain the working principle of a simple carburetor. 5
- (b) Draw the circuit diagram and describe the working of battery ignition system used for 4 cylinder petrol engine. 5

3. (a) Draw actual valve timing diagram for a four stroke petrol engine. Give reasons for early opening of exhaust valve and late closing of inlet valve. Give reasons for the valve overlap and mention any possible disadvantage of valve overlap. 5
- (b) What actions can be taken with regard to the following variables, in order to reduce the possibility of detonation in SI engine? Justify your answer suitably. 5
- (i) Compression ratio
 - (ii) Combustion chamber wall temperature
 - (iii) Turbulance
 - (iv) Distance of flame travel
 - (v) Engine speed
4. (a) Discuss important designs principles of combustion chambers for CI engines. 5
- (b) In an air standard diesel cycle with compression ratio 14, the conditions of air at the start of compression stroke are 1 bar and 300K. After addition of heat at constant pressure, the temperature rises to 2775K. Determine the thermal efficiency of the cycle and net work done per kg of air. 5
5. (a) What are the functions of a fuel injector in CI engines? With a neat sketch discuss the working of a fuel injector. 5
- (b) What is the purpose of governing? Discuss the working of hit and miss governing used in IC engines. 5

6. (a) What is the function of a radiator ? Discuss working principles of down flow type and cross flow type radiators. 5
- (b) Describe the methods commonly used in laboratory for measuring the air supplied to an IC engine. 5
7. Following observations were made during a test on a single cylinder, four stroke CI engine. 10
- Bore = 300mm, stroke = 450mm, speed = 300rpm, imep = 6 bar, net brake load = 1.5 kN, brake drum diameter = 1.8m, brake rope diameter = 2cm
- Calculate (i) indicated power (ii) brake power (iii) mechanical efficiency.
8. (a) Explain the mechanism of formation of CO and NO_x in petrol engines. 5
- (b) With a neat sketch describe the exhaust gas recirculation (EGR) for the control of oxide of nitrogen. 5
9. (a) What are the various methods of turbo charging ? Compare their relative merits. 5
- (b) What are the various sensors used in electronic gasoline injection system ? Briefly discuss one of them. 5

10. Write short notes on the following (*any two*) : 10
- (a) Spark plug
 - (b) Octane and cetane number
 - (c) Catalytic converters
 - (d) Prony brake
-