

**B.Tech. – VIEP – MECHANICAL ENGINEERING
(BTMEVI)**

Term-End Examination

June, 2018

00123

BIME-010 : THERMAL ENGINEERING – II

Time : 3 hours

Maximum Marks : 70

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

1. What are the advantages and disadvantages of a 2 stroke engine over a 4 stroke engine ? 10

2. Explain the phenomenon of knocking in SI engine. What are the different factors which influence the knocking ? Describe the methods used to suppress it. 10

3. Discuss in detail the requirements of a good sparking plug. Explain with the help of a neat sketch, the construction of a spark plug, describing in particular the materials used for its different parts. 10

4. A four-stroke, eight-cylinder engine of 9 cm bore and 8 cm stroke with a compression ratio 7 is tested at 4500 rpm on a dynamometer which has a 54 cm arm. During a 10 minutes test the dynamometer scale beam reading was 412.02 N and the engine consumed 4.4 kg of gasoline having a calorific value of 44000 kJ/kg. Air at 27°C and 1 bar was supplied to the carburettor at the rate of 6 kg/min.

Calculate :

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- (a) Brake power developed
 - (b) b.m.e.p.
 - (c) b.s.f.c.
 - (d) Brake specific air consumption
 - (e) Brake thermal efficiency
5. What is meant by volumetric efficiency of a reciprocating compressor ? How is it affected by
- (a) speed of compressor,
 - (b) delivery pressure, and
 - (c) throttling across the valves ?
- 10
6. Enumerate the applications of compressed air. State how air compressors are classified.
- 10
7. State the advantages and disadvantages of a battery ignition system.
- 10
8. Define the term "nozzle". Explain the various types of nozzles with the help of neat diagram.
- 10

9. A six-cylinder, four-stroke SI engine having a piston displacement of 700 cm^3 per cylinder developed 78 kW at 3200 rpm and consumed 27 kg of petrol per hour. The calorific value of petrol is 44 MJ/kg. Estimate :

- (a) the volumetric efficiency of the engine, if the air-fuel ratio is 12 and intake air is at 0.9 bar, 32°C ,
- (b) the brake thermal efficiency.

For air $R = 0.287 \text{ kJ}/(\text{kg}\cdot\text{K})$.

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10. What are the factors that limit the compression ratio that can be used in petrol engines ? What do you understand by octane number of 85 and cetane number of 75 ?

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