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Roll No.

337512(37)

B. E. (Fifth Semester) Examination, 2020

APR-MAY

(Old Scheme)

(Mech. Engg. Branch)

INTERNAL COMBUSTION ENGINES

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Attempt all questions. Part (a) from each question is compulsory. Attempt any two parts from parts (b), (c) and (d) of each question. Explain your answers by means of neat sketches. Assume suitable data if missing.

1. (a) What are the different parts of a two stroke engine? 2

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- (b) Draw the valve timing diagram of four stroke diesel engine. Why the valves are opened before dead centre and closed after dead centre? 7
- (c) What are the reasons for deviation of actual cycle from standard cycle? Explain the time losses due to timing losses and exhaust blow down loss. 7
- (d) With the help of neat sketch explain the working of rotary wankel engine. 7
2. (a) Define octane number. 2
- (b) Discuss the effect of molecular structure of hydrocarbons on knocking. What is cetane number? 7
- (c) Explain the combustion process in C.I. engine with the help of pressure-crank diagram. What is delay period? 7
- (d) What is stoichiometric ratio? One kg of octane, C_8H_{18} , is burned with 200% theoretical air. Assuming complete combustion determine air fuel ratio. 7
3. (a) What is Nozzle lip and why is it provided? 2

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- (b) Explain why a rich mixture is required for idling. Describe with suitable sketch idling system of a modern carburettor. 7
- (c) With a neat sketch explain the working principle of a simple carburettor. What are disadvantages of carburettor system when it is used for multicylinder engine? 7
- (d) Derive an expression for air fuel ratio taking compressibility into account. 7
4. (a) Draw a typical heat release diagram of diesel engine. 2
- (b) Write brief notes on : 7
- (i) Merits and demerits of a battery ignition system
- (ii) Governing of I.C. Engines
- (c) Explain wet sump lubrication system with the help of neat sketch. 7
- (d) Why engine cooling is necessary? Discuss merits and demerits of water cooling. 7

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5. (a) Define indicated thermal efficiency and relative efficiency. 2
- (b) Sketch a typical variable speed test performance curves (IHP Vs Speed, BHP Vs Speed, and specific fuel consumption Vs Speed) at full throttle of S.I. engine and comment on the nature of curves. 7
- (c) Discuss the emissions from S.I. engine. Describe in brief various engine modifications commonly used to reduce the emission in S.I. engine. 7
- (d) The following particulars were obtained in a trial on a 4-stroke gas engine : 7
- | | |
|-----------------------------------|----------------|
| Duration of trial | = 1 hour |
| Revolutions | = 14000 |
| Number of missed cycle | = 500 |
| Net brake load | = 1470 N |
| Mean effective pressure | = 7.5 bar |
| Gas consumption | = 20000 litres |
| L.C.V. of gas at supply condition | = 21 kJ/litre |

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Cylinder diameter	= 250 mm
Stroke	= 400 mm
Effective brake circumference	= 400 cm
Compression ratio	= 6.5

Calculate mechanical efficiency and relative efficiency.