

Code : 021722

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B.Tech 7th Semester Exam., 2017

INTERNAL COMBUSTION ENGINE AND
GAS TURBINE

Time : 3 hours

Full Marks : 70

Instructions :

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- (i) The marks are indicated in the right-hand margin.
- (ii) There are **NINE** questions in this paper.
- (iii) Attempt **FIVE** questions in all.
- (iv) Question No. 1 is compulsory.

1. Choose the correct answer of the following

(any seven) : akubihar.com 2×7=14

(a) In a four-stroke SI engine, during suction

- (i) only air is sucked
- (ii) only fuel is sucked
- (iii) fuel-air mixture is sucked
- (iv) None of the above

(2)

- (b) Engines used for ships are normally
 - (i) four-stroke SI engines of very high power akubihar.com
 - (ii) two-stroke CI engines of very high power
 - (iii) four-stroke CI engines of high speed
 - (iv) two-stroke SI engines of high power

(c) Indicated power is directly proportional to akubihar.com

- (i) torque
- (ii) air consumption
- (iii) cylinder peak pressure
- (iv) None of the above

(d) In CI engines, the delay period is affected by akubihar.com

- (i) compression ratio
- (ii) engine speed
- (iii) output
- (iv) All of the above

(e) The air-fuel ratio for idling speed of an automobile petrol engine is closer to

- (i) 10:1
- (ii) 15:1
- (iii) 17:1
- (iv) 21:1

- (f) A good CI engine fuel should have
- (i) high octane number
 - (ii) very high cetane number
 - (iii) a short ignition lag
 - (iv) None of the above
- (g) In ideal regenerative cycle, the temperature of steam entering the turbine is same as that of
- (i) water entering the turbine
 - (ii) water leaving the turbine
 - (iii) steam leaving the turbine
 - (iv) water at any section of the turbine
- (h) The choke in an automobile is meant for supplying
- (i) lean mixture
 - (ii) rich mixture
 - (iii) stoichiometric mixture
 - (iv) weak mixture
- (i) The relative jet exit velocity from a rocket is 1900 m/s and the forward flight velocity is 950 m/s. What is the propulsive efficiency of the unit?
- (i) 90%
 - (ii) 66.66%
 - (iii) 50%
 - (iv) 33.33%

- (j) What is the main objective of supercharging of the engine?
- (i) To reduce the mass of the engine per brake power
 - (ii) To reduce space occupied by engine
 - (iii) To increase the power output of engine
 - (iv) All of the above

2. (a) With neat sketches explain the working principle of four-stroke SI engine. 7
- (b) Define the following in brief : 7
- (i) Clearance volume
 - (ii) Swept volume
 - (iii) Stroke
 - (iv) Dead centre
 - (v) Indicated thermal efficiency
 - (vi) Mean effective pressure
 - (vii) Calorific value of the fuel

3. A four-stroke, four-cylinder gasoline engine has a bore of 60 mm and a stroke of 100 mm. On test it develops a torque of 66.5 N m when running at 3000 r.p.m. If the clearance volume in each cylinder is 60 cc, the relative

efficiency with respect to brake thermal efficiency is 0.5 and the calorific value of the fuel is 42 MJ/kg, determine the fuel consumption in kg/h and the brake mean effective pressure. akubihar.com 14

4. Explain the process of combustion in CI engines and also explain the various stages of combustion. 14

5. Explain the phenomenon of knock in SI engines and compare it with CI engine knock. What is delay period and what are the factors that affect it? 14

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6. (a) What is meant by supercharging? Explain how supercharging helps to improve the power output and write the limitations to supercharging. 10

(b) What is meant by abnormal combustion? 4

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7. (a) Derive an expression for air-fuel ratio of a simple carburettor. 10

(b) Describe the main metering system of carburettor. 4

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8. In a gas turbine plant, working on the Brayton cycle with a regeneration of 75% effectiveness, the air at the inlet to the compressor is at 0.1 MPa, 30°C, the pressure ratio is 6, and the maximum cycle temperature is 900°C. If the turbine and compressor have an efficiency of 80% each, then find the percentage increase in the cycle efficiency due to regeneration. 14

9. Write short notes on the following : 14

(a) Morse test

(b) Evaporative cooling

(c) Wet sump lubrication system

(d) Pulsejet engine

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