

IV B.Tech. II Semester Regular Examinations, April/May -2005

IC ENGINES

(Mechanical Engineering)

Time: 3 hours

Max Marks: 80

**Answer any FIVE Questions
All Questions carry equal marks**

1. (a) Explain the importance of scavenging in two-stroke cycle engines.
(b) What are the characteristic features of two-stroke cycle engines and their applications?
2. (a) What do you understand by ignition delay in S. I. engine combustion.
(b) Explain flame velocity and the effect of the speed of engine operation on it.
3. (a) Explain the principle of carburetion.
(b) Briefly discuss the air-fuel ratio requirements of a petrol engine from no load to full load.
4. Compare the open combustion chamber with divided combustion chamber giving merits and demerits of each.
5. (a) Discuss with sketches a hyperbar supercharged system.
(b) What are the limits of super charging of SI Engines.
6. (a) What is meant by specific energy consumption.
(b) A single cylinder diesel engine working on the 4- stroke cycle and delivers 40 kW at 600 rpm. The compression ratio of the engine is 14:1, fuel cut- off takes place at 5% of the stroke, ratio of the stroke to bore of the engine is 1.5 to 1. Index of compression and expansion curves are 1.4 and 1.3 respectively. Calculate the bore of the engine. Assume the pressure at the beginning of compression as 1 atm.
7. (a) What causes of NOx emission?
(b) What is smog?
(c) What is exhaust gas recirculation? What is the effect on emissions?
8. What are the emissions found out while alcohols as a fuel? What are necessity actions are taken to control the emission?

IV B.Tech. II Semester Regular Examinations, April/May -2005
IC ENGINES
(Mechanical Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) What are the methods of introduction of fuel and why are they required in internal combustion engines?
(b) How is it achieved in the principal engine types of the day, explaining any method with a neat schematic layout.
2. (a) How do engine operating variables affect detonation.
(b) Discuss the role of location of spark plug on S.I. engine combustion.
3. Name the various types of carburetors and explain any one with a neat sketch, bringing out its characteristic features.
4. (a) How do the injection timing and the fuel quantity effect the engine knock?
(b) Discuss the advantages and disadvantages of induction swirl.
5. What are the various methods of turbocharging? Compare their relative merits and demerits
6. In a test of a four –cylinder, four- stroke engine of 75 mm bore and 100 mm stroke, the following results were obtained at full throttle at a constant speed and with a fixed setting of the fuel supply of 0.082kg/min.

Brake horse power with all cylinders working – 15.24 kW

With first cylinder cut- off – 10.45 kW

With second cylinder cut- off – 10.38 kW

With third cylinder cut- off – 10.23 kW

With fourth cylinder cut- off – 10.45 kW

Estimate the indicated power of the engine under these conditions. If the calorific value of the fuel is 44000 J/kg. find the indicated thermal efficiency. Compare this with air standard efficiency, the clearance volume of the cylinder being 115 cc.

7. (a) What causes damage to the catalyst?
(b) What is a lean burn engine?
(c) What are the advantages of using lean mixtures in SI engines?
8. Can a diesel engine run on methyl alcohols? What are the undesirable effects, of operating a diesel engine on methyl alcohols?

IV B.Tech. II Semester Regular Examinations, April/May -2005
IC ENGINES
(Mechanical Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) What are the methods of introduction of fuel and why are they required in internal combustion engines?
(b) How is it achieved in the principal engine types of the day, explaining any method with a neat schematic layout.
2. (a) Explain what you understand by flame speed and what is it made up of.
(b) Why is flame speed important in combustion of s.i.engines.
3. (a) Explain the principle of carburetion.
(b) Briefly discuss the air-fuel ratio requirements of a petrol engine from no load to full load.
4. (a) Discuss the variables effecting the delay period.
(b) What are the main advantages and disadvantages of the CI engine compared to the SI engine?
5. (a) Describe the exhaust pipe arrangement for turbocharged engines having different number of cylinders.
(b) What are the merits and demerits of constant pressure turbo charging.
6. Calculate the air- fuel ratio of a four- stroke, single cylinder, air- cooled engine with fuel consumption time for 10 cc as 20 seconds and air consumption time for 0.1 m³ as 16.4 s. The load is 18 kg at the speed of 2800 rpm. Find also brake fuel consumption in g/k Wh and brake thermal efficiency. Assume the density of air as 1.175 kg/m³ and the specific gravity of fuel to be 0.72. the lower heating value of fuel is 42 MJ/kg and the dynamometer constant is 5000.
7. (a) What are the pollutants emitted by SI engines? Indicate their sources.
(b) Indicate the effect of mixture strength on the pollutants formed.
8. (a) What is boiling range of fuel?
(b) How is important in diesel engine operation?
(c) How the term 'Volatility' is important for fuels?

IV B.Tech. II Semester Regular Examinations, April/May -2005
IC ENGINES
(Mechanical Engineering)

Time: 3 hours**Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Give complete classification of i.c. engines.
(b) Explain methods of fuel introduction and their relative merits with two-stroke cycle engines.
2. (a) What is preignition and what causes it in S.I engines.
(b) Discuss the effects of preignition on engine performance.
3. (a) What are the function of venture, and float in a carburetor.
(b) What are the function of an economizer and an accelerating pump in a carburetor?
4. Compare the open combustion chamber with divided combustion chamber giving merits and demerits of each.
5. A four stroke diesel engine is pressure charged by using the energy of the exhaust gases to drive a turbo blower. The turbine and the blower have an adiabatic efficiency of 75%. Air from the atmosphere at 1 bar and 27°C is compressed in steady flow through the blower to 1.75 bar and after cooled to 30°C when the air enters the cylinder. The volumetric compression of the engine is 15, the peak pressure is limited to 100 bar and 1350 kJ of energy are liberated per kg cylinder air. Release occurs at bottom dead center at constant cylinder volume, the exhaust gas passing through the turbine to atmospheric while the piston is at the bottom dead center and remains throughout the exhaust stroke. The effects of clearance may be neglected. Assuming air cycle and neglecting heat, pressure and frictional losses in the engine, calculate the maximum system excess work available from the supercharger.
6. (a) What are the advantages of using lean mixtures in SI engines?
(b) Describe briefly the methods of charge stratification.
7. (a) What causes damage to the catalyst?
(b) What is a lean burn engine?
(c) What are the advantages of using lean mixtures in SI engines?
8. (a) Indicate briefly the principle of operation of bio-gas or natural gas in SI engines?
(b) What is the pour point? Why it is important?
