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**Second Semester M.Tech. Degree Examination, June 2012**  
**Theory of I.C Engines**

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions.**

- 1 a. Make a note on geometrical properties in reciprocating engines. (08 Marks)  
 b. Consider two engines with the following details:  
 Engine I: Four-stroke, Four cylinder, SI engine, indicated power is 40 kW, mean piston speed 10 m/s.  
 Engine II: Two-stroke, two cylinder, SI engine, indicated power is 10 kW.  
 Assume that mean effective pressure and both the engine to be same.  
 Ratio of bore of The engine I : II = 2 : 1 show that the mean piston speed of engine II is same as that and engine I. (08 Marks)  
 c. Distinguish between specific emission and emission index. (04 Marks)
- 2 a. Mention any three vegetable oils which can substitute diesel in future and discuss their relative merits and demerits with each other compared with diesel. (08 Marks)  
 b. Explain the use of CNG in IC engines. (06 Marks)  
 c. What modifications are required with the engine if LPG is used as a substitute fuel? (06 Marks)
- 3 a. Compare the actual and fuel-air cycles of a gasoline engine. (10 Marks)  
 b. Write a note on over expanded engine cycles. (10 Marks)
- 4 a. By means of a suitable graph explain the necessary carburettor performance to fulfill engine requirements. (08 Marks)  
 b. With a sketch explain the working of a multi point port injection system. (08 Marks)  
 c. Write a note on feed back systems in SI engine. (04 Marks)
- 5 a. What is meant by abnormal combustion? Explain the phenomena of knock in SI engines. (10 Marks)  
 b. What is delay period and what are the factors that affect the delay period? (10 Marks)
- 6 a. Explain the effect of the following factors on the performance of SI engine:  
 i) Spark timing  
 ii) Mixture composition  
 iii) Engine speed  
 iv) Load  
 v) Compression ratio. (10 Marks)  
 b. Discuss the general principle of SI engine combustion chamber design. (10 Marks)
- 7 a. Explain the following:  
 i) Pressure measurement in engines      ii) Recording pressure and crank angle diagram. (10 Marks)  
 b. Explain the internationally accepted methods of measuring the following emissions:  
 i) Oxides of nitrogen      ii) Carbon monoxide. (10 Marks)
- 8 a. What is meant by total emission control packages? Describe with sketches the two types of total emission control packages. (12 Marks)  
 b. Describe the exhaust gas recirculation device for the control of oxides of nitrogen. (08 Marks)