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Third Semester M.Tech. Degree Examination, December 2012
Engine Flow and Combustion

Time: 3 hrs.

Max. Marks:100

Note:1. *Answer any FIVE full questions.*
2. *Draw sketches wherever necessary.*
3. *Use of thermodynamic and HMT charts, tables allowed.*

1 a. Define volumetric efficiency of an IC engine and explain the various parameters that affect the same. **(10 Marks)**
  b. Discuss various methods of power boosting. **(10 Marks)**

2 a. With a simple illustrative sketch explain the phenomenon of intake jet flow. **(08 Marks)**
  b. What are the different scales of turbulence? Highlight the basic characteristics of turbulent flow. **(06 Marks)**
  c. Write brief notes on "Swirl" and "Squish". **(06 Marks)**

3 a. Explain with the help of a pressure crank angle diagram the essential features of combustion in an SI engine. Briefly explain fully mixed and unmixed models. **(12 Marks)**
  b. Discuss "Cycle to Cycle" variations and "Partial burning with misfire". **(08 Marks)**

4 a. What are the different zones of combustion in C-I engines? Explain briefly. **(08 Marks)**
  b. Explain delay period with respect to a C.I engine. **(04 Marks)**
  c. With a simple sketch explain the spray structure coming out of the injector in a C-I engine. **(08 Marks)**

5 a. Sketch the variation of NO_x, CO and unburnt hydrocarbons, with equivalence ratio in a conventional S-I engine and explain. **(10 Marks)**
  b. Explain any 2 methods of treatment of exhaust gas of an IC engine. **(10 Marks)**

6 a. Explain the heat transfer process taking place in the walls and intake and exhaust of an IC engine. **(10 Marks)**
  b. Highlight the effect of different engine parameters that influence the magnitude of heat flux to the different parts of an IC engine. **(10 Marks)**

7 a. What do you understand by "supercharging"? Explain the different methods of supercharging possible for an IC engine. **(10 Marks)**
  b. With a simple sketch, describe the exhaust turbocharging of a single cylinder engine. **(10 Marks)**

8 a. Define the following clearly:
     i) Brake thermal efficiency.
     ii) Mechanical efficiency.
     iii) Relative efficiency.
     iv) Scavenging efficiency.
     v) Charge efficiency. **(10 Marks)**
  b. A 6 cylinder 4 stroke gasoline engine having a bore of 90 mm and stroke of 100 mm has a compression ratio of 7. The relative efficiency is 55%, when the indicated specific fuel consumption is 300 gm/kwh. Estimate i) the calorific value of fuel and ii) the corresponding fuel consumption if the i.m.e.p is 8.5 bar and speed is 2500 rpm. **(10 Marks)**

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