University of Mansoura
Faculty of Engineering

Dept. of Mech. Power Eng.
4th Year Mech.

Second Term Examination
Fuel Systems and
Combustion - MPE4424-5
29 May 2013, Time: 3 hr
Full Mark: 60

ASSUME ANY MISSING DATA and ANSWER THE FOLLOWING QUESTIONS

QUESTION No. (1) [20 Marks]

A. Classify the fuel supply systems used in SI engines? [2 Marks]

B. What are the advantages of gasoline injection system over a carburetor system? [4 Marks]

C. State the function of each of the following sensors: Volume air flow, Coolant temperature, Oxygen, and crankshaft position sensors. [4 Marks]

D. Show with neat sketch the gasoline injection system component and explain briefly how does this system work? [6 Marks]

E. Explain briefly the combustion regions in SI engines. [4 Marks]

QUESTION No. (2) [20 Marks]

A. Define the following fuel parameters: Octane number, Cetane number, and ignition delay. Explain briefly how the Cetane number is experimentally determined. [6 Marks]

B. Show with neat sketch the main components of the diesel injection system. [5 Marks]

C. Show with neat sketches two types of fuel pumps used in Diesel injection system. [2 Marks]

D. Compare between direct and indirect injection methods in Diesel engine? [2 Marks]

E. State the advantages of duel fuel system and the different methods used for control the knocking phenomenon in this system? [5 Marks]

QUESTION No. (3) [20 Marks]

A. A fluidized bed displays characteristics similar to those of a liquid. What are these characteristics? [5 Marks]

B. What are the hydraulic regimes that match to the following locations in the circulating fluidized bed boilers: Furnace (below secondary air level), Furnace (above secondary air level), Cyclone, Return leg (standpipe), Loop seal/ External heat exchanger, Back-pass? [5 Marks]

C. Define the gasification process. What is the difference between the gasification and the combustion process? [6 Marks]

D. Explain with neat sketch the theory of operation of one type of gasifires and its advantages? [4 Marks]

GOOD LUCK

Dr. Hamdi Abdel- Salam