

	Kafr El-Sheikh UNIVERSITY FACULTY OF ENGINEERING DEPARTMENT OF MECHANICAL POWER ENGINEERING			
	EXAMINATION FOR FRESHMEN (2016 YEAR), STUDENTS OF 3 <sup>th</sup> GRADE MECHANICAL POWER			
COURSE TITLE:	Theory of combustion		COURSE CODE:	
DATE:	January 20, 2016	TERM: 1 <sup>nd</sup>	TOTAL ASSESSMENT MARKS: 75	TIME ALLOWED (HOURS): 3

Use of tables and charts of steam is allowed. مسموح باستخدام جداول الغاز.

Answer the following questions. Assume any necessary assumptions.

**Question (1) (10 Marks)**

**Give reasons for each of the following:**

- It is more difficult to burn coal than a natural gas.
- Viscosity is important property of liquid fuels.
- The ash fusion temperature is shall typically below the flame temperature.
- High excess air in combustion of fuels results in increased fuel consumption.
- Higher volatile matter in liquid fuels may pose a danger.

**Question (2) (20 Marks)**

- a) Explain the mechanism of thermal NO forming. What are the primary methods for the reduction thermal NO?
- b) Compare between premixed flames and diffusion flames.
- c) Discuss characteristic stability diagram of a premixed open burner flame.
- d) Discuss with equations and explain with diagrams (as far as possible) how Influence on the laminar burning velocity

1- Fuel air mixture ratio

2- Initial pressure of reactants

**Question (3) (15 Marks)**

- a) Discuss each of:
  - i) heat of reaction,
  - ii) types of elementary reactions.
  - iii) the relation between auto ignition temperature and each of octane number and cetane number.

