Menoufia University **Faculty of Engineering, Shebin El-Kom** **Mechanical Power Engineering Department.** **First Semester, Final Examination, 2013-2014** **Date of Exam: 16 / 1 / 2014**	**Subject: Information Systems** **Code : MPE 415 A** **Year : 2013 - 2014** **Time Allowed : 3 hours** **Total Marks : 60 marks**

Answer the following questions

Part I: Multiple Choice Questions (أكتب السؤال والإجابة الصحيحة فى ورقة الإجابة) **(20 marks)**

1 - (Problem 1) **(20 marks)**

1. The information systems are one of four types, the predictive information defined as, **(2 marks)**

A) What is wrong condition and what ought to be.
B) What is condition of a design and it describes the state of the work.
C) What would happen if and exceedingly valuable with desirable outcomes.
D) What should be done and evaluation of the outcomes for the basis of making decision.

2. The information systems are recorded into computer software, the user interface is, **(2 marks)**

A) Information related to financial transactions, production, marketing records, and weather data, it includes internal data generated by the business (financial transactions and production) and external data (market prices).
B) The component of the system has decision models that relate to operational, tactical and strategic decisions.
C) The management system is the bridge between database and modelbase components.
D) One of the more critical features of the system, and used to assist the decision maker in making more efficient and effective use of the system.

3. Classification of information systems of Sales and Marketing Systems is, **(2 marks)**

A) The systems deal with the planning, development, production and services with controlling the flow of production.
B) The systems that help the firm identify customers for the firm's products; develop products and services to meet customer's needs.
C) The systems keep track money owed the firm, design the firm's portfolio, prepare short-term budgets, and plan long-term profits.
D) The systems that maintain employee records, track employee skills, job performance, training, and support planning for employee compensation and career development.

4. Engineering systems is, **(2 marks)**

A) The art and science of developing an operable system capable of meeting requirements within often opposed constraints.
B) The scientific and mathematical analysis of manufacturing operations aimed at making them more efficient and more profitable.
C) The use of mathematics to describe real-world phenomena and test ideas to make predictions about the real world.
D) A program such as Finite Element Analysis (FEA) and Computational Fluid Dynamics (CFD) are important tools to solve the mathematical models for finding optimum solution.

5. Operations research involves the development and analysis, constructing model are, **(2 marks)**

A) Describe the system, assumptions with various variables, constraints and performance selection.
B) A fairly large data base is needed and avoids the possibility of data collection errors.
C) The problem must be translated from verbal, qualitative terms to logical, quantitative terms.
D) Representations of real objects based on key assumptions, estimates, or statistical analyses.

6. The quality of a product can be described and evaluated in several ways. **(2 marks)**

eliability is meaning

A) Will the product do the intended job?
B) How often does the product fail?
C) How long does the product last?
D) Serviceability (How easy is it to repair the product?)

7. **Quality means fitness, what is quality?** **(2 marks)**

A) The products and services must meet the requirements of those who use them.
B) All goods and services are produced in various grades or levels of quality.
C) May be several types of physical, sensory, and time orientation.
D) The important characteristics of a product decreases, the quality of the product increases.

8. Quality improvement is the, **(2 marks)**

A) Increasing of unwanted variability.
B) Reducing of variability.
C) Improving the service process of the wasted effort and expense.
D) Discover the errors to repair the mistake.

9. Quality engineering DMAIC is widely used in quality and process improvement. The improve step is, **(2 marks)**

A) To identify the project opportunity and to verify or validate.
B) To evaluate and understand the current state of the process.
C) To use the data to begin to understand the different sources of variability.
D) To use the data to collect, display, and creative thinking about the specific changes.
E) To complete all remaining work on the project and improve process to ensure that the gains from the project will be institutionalized.

10. **Quality control is concentrate on statistical and engineering technology. The Six Sigma is,** **(2 marks)**

A) A number of statistical and analytical tools are useful in analyzing quality problems and improving the performance of processes.
B) One of the primary techniques of statistical process control and the control limits are determined.
C) Reducing variability to the level at which failure or defects are extremely unlikely.
D) Maximizing desired variables and minimizing undesired ones.

Part II: Problems Solving

2 - (Problem 2) **(10 marks)**

For the following objective function and constraints, draw the graph of linear programming and find, (a) the feasible region, (b) the attractive corners, and (c) the maximum value of *Z*.

Objective: maximize: $Z = 13x + 37y$

Constraints: $x + y \le 5,\ 1.5x + 6y \le 12,\ x \le 2$

Non negativity conditions, $x, y \ge 0$

3 - (Problem 3) **(10 marks)**

For the following data, determine, (a) samples data average, $\bar{x}$, (b) sample standard deviation, σ , using table method, (c) construct a frequency distribution and histogram, and (d) construct a normal probability plot and six sigma class tables and percentage of data in each class.

$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} \exp \frac{-(x-\bar{x})^2}{2\sigma^2}$$

Data	Frequency	Data	Frequency	Data	Frequency	Data	Frequency
124	1	128	4	132	7	136	3
125	2	129	5	133	6	137	2
126	2	130	6	134	5	138	2
127	3	131	7	135	4	139	1

4 - (Problem 3) **(10 marks)**

The cost C of solar collector of dimensions x, and y is given by the expression of $C = x^2 y + \frac{3}{y} + \frac{5}{x}$. Calculate the dimensions of the collector and optimize the cost. Is it minimum, use the following, $S = \frac{\partial^2 C}{\partial x^2}\frac{\partial^2 C}{\partial y^2} - \left(\frac{\partial^2 C}{\partial x \partial y}\right)^2$

5 - (Problem 3) **(10 marks)**

Consider the convective heat transfer from a spherical reactor of diameter D and temperature T_S a fluid at temperature T_f, with a convective heat transfer coefficient h. Denoting that $\theta = (T_S - T_f)$, and $h = \frac{2}{\theta} + \frac{\theta}{D}$. Also, a constraint arises from strength considerations given by, $D\theta = 80$. Minimize the heat transfer, Q, from the surface area of spherical reactor. The ***Lagrange multipliers*** for this constrained optimization, as the followings,

$$\frac{\partial U}{\partial x_1} + \lambda_1 \frac{\partial G_1}{\partial x_1} + \lambda_2 \frac{\partial G_2}{\partial x_1} + \ldots\ldots + \lambda_m \frac{\partial G_m}{\partial x_1} = 0$$

$$\frac{\partial U}{\partial x_2} + \lambda_1 \frac{\partial G_1}{\partial x_2} + \lambda_2 \frac{\partial G_2}{\partial x_2} + \ldots\ldots + \lambda_m \frac{\partial G_m}{\partial x_2} = 0$$

$$\frac{\partial U}{\partial x_n} + \lambda_1 \frac{\partial G_1}{\partial x_n} + \lambda_2 \frac{\partial G_2}{\partial x_n} + \ldots\ldots + \lambda_m \frac{\partial G_m}{\partial x_n} = 0$$

With our best wishes.

This exam measures the following ILOs															
Question Number	Q1	Q2	Q3	Q4	Q5	Q1	Q2	Q3	Q4	Q5	Q1	Q2	Q3	Q4	Q5
Skills	a2-1, a2-3, a18-1, a18-2	a2-3, a2-4	a2-5, a8-2, a18-2	a2-6, a8-2, a18-2	a2-6, a8-2, a18-2	b1-1 b8-1	b1-2	b1-3 b8-2	b1-1 b8-1 b8-3	b1-1 b8-1 b8-3	c6-2 c16-1	c7-1	c7-2	c6-1, c16-1	c6-1, c16-1
	Knowledge &Understanding Skills					Intellectual Skills					Professional Skills				