

Menoufia University  
Faculty of Engineering, Shebin El-Kom  
Mechanical Power Engineering Department.  
First Semester, Final Exam  
Date of Exam: 15 / 1 / 2015



Subject: Information Systems  
Code : MPE 415 A  
Year : 2014 - 2015  
Time Allowed : 3 hours  
Total Marks : 60 marks

### Answer the following questions

#### Part I: Multiple Choice Questions

أكتب السؤال في ورقة الإجابة ثم أكتب الإجابة الصحيحة برمزها A أو B

#### Question (1)

(20 Marks)

1. The types of information systems are, the Diagnostic information is defined as, (2 marks)
  - A) What would happen if and exceedingly valuable with desirable outcomes.
  - B) What is condition of a design and it describes the state of the work.
  - C) What is wrong condition, where is measured as the disparity between what is and what ought to be.
  - D) What should be done and evaluation of the outcomes for the basis of making decision.
2. The information are recorded into computer, Model base related to, (2 marks)
  - A) Financial transactions, production, marketing records, the resource base, research and weather data.
  - B) The component of the system that relate to operational, tactical and strategic decisions.
  - C) The management system is the bridge between database and model base components.
  - D) The system that assist the decision maker in making more efficient and effective use.
3. Classification of information systems of Human Resources 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. The kinds of information systems supporting the managers at 4 levels, the Strategic level (2 marks)
  - A) Is served by senior managers.
  - B) Is served by middle managers.
  - C) Is served by knowledge and data workers.
  - D) Is served by operational managers.
5. Operations Research involves the development and analysis; Problem Formulation 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 or situation based on key assumptions, estimates, or statistical analyses.
6. The dimensions of quality can be described as; Durability is meaning (2 marks)
  - A) Will the product do the intended job?
  - B) How often does the product fail?
  - C) How long does the product last?
  - D) How easy is it to repair the product?

**7. Quality means fitness; the Quality of Design means****(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) Improving the service process and reduction of wasted, effort and expense.

**8. Quality Inversely Proportional to Variability, Quality Problems means****(2 marks)**

- A) Unwanted parameters, harmful and design differences.
- B) Reducing of variability.
- C) Fewer repairs and warranty claims means less rework and the reduction of wasted time, effort, and money.
- D) Discover the errors, mistake and the correction of which requires effort and expense.

**9. Quality engineering terminology, Sensory is****(2 marks)**

- A) The set of length, weight, voltage, and viscosity.
- B) The set of taste, appearance, and color.
- C) The set of reliability, durability, and serviceability.
- D) The set of operational, managerial, and engineering activities to ensure that the quality characteristics of a product are at the nominal levels.

**10. Statistical quality control; Control Chart 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) Simply the arithmetic mean of the data number observations.
- E) Maximizing desired variables and minimizing undesired ones.

**Part II: Problems Solving****Question (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 the objective function of Z at each corner, and (C) the best solution of Z.

Objective function:  $Z = 100x + 90y$

Constraints:  $0.4x + 0.3y \geq 4$ ,  $0.2x + 0.4y \leq 3$ ,  $0.2x + y \geq 4$

Non negativity conditions,  $x, y > 0$

**Question (3)****(10 Marks)**

For the following data of solar energy measurements  $W/m^2$ , determine, (a) samples data average,  $\bar{x}$ , (b) sample standard deviation,  $\sigma$ , using table method, (c) construct the data histogram, (d) six sigma class tables until  $\bar{x} \pm 2\sigma$  and percentage of data in each class, and (e) draw the control flow chart with the upper and lower control limits of  $\bar{x} \pm 1.5\sigma$ .

Data	Frequency	Data	Frequency	Data	Frequency	Data	Frequency
1004	5	996	6	1010	1	1000	8
990	3	1003	6	999	9	1009	1
1008	2	1006	2	1001	7	995	5
985	1	992	4	997	7	1011	1

**Question (4)****(10 Marks)**

An automobile manufacturer needs to allocate a maximum sum of  $\$2.5 \times 10^6$  between the development of two different car models. The profit expected from both the models is given by  $x_1^{1.5} x_2$ , where  $x_i$  denotes the money allocated to model  $i$  ( $i = 1, 2$ ). Determine the amounts to be allocated to the two models to maximize the profit expected, **using Lagrange Multipliers**. Also determine the maximum profit obtained.

The **Lagrange multipliers** for this constrained optimization, as the followings,

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

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

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

**Question (5)****(10 Marks)**

In a certain reservoir pump installation, the first cost of the pipe is given by  $(50D^2)$ , where  $D$  is the diameter of the pipe in centimeters. The cost of the reservoir decreases with an increase in the quantity of fluid handled and is given by  $(20/Q)$ , where  $Q$  is the rate at which the fluid is handled (cubic meters per second). The pumping cost is given by  $(300Q^2/D^5)$ . Find the optimal size of the pipe and the amount of fluid handled for minimum overall cost.

***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, a2-2, a18-1, a18-2	a2-3		a2-6		b1-1	b1-2	b1-3							C7.3
	Knowledge & Understanding Skills					Intellectual Skills					Professional Skills				