المستوى الثالث

علوم الحاسب

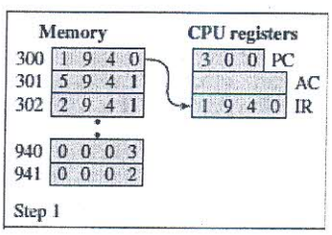
DEPARTMENT OF MATHEMATICS
TANTA UNIVE RSITY
FACULTY OF SCIENCE
(Computer Science Division)

EXAMINATION FOR PROSPECTIVE STUDENTS (3RD YEAR)

COURSE TITLE: COMPUTER ARCHITECTURE	DATE: 4/6/2017	COURSE CODE: CS 3206

Question 1: (50 Marks)

a. Using the following figure explain the Fetch-Decode cycle that adds the contents of the memory word at address 940 to the contents of the memory word at address 941 and stores the result in the latter location?



b. What are the solutions that were be taken to avoid the gap of performance (performance balance) between the processor and other computers components?

Question 2: (50 Marks)

a. Describe in details the different generations of computers. Support your explanation by examples of each generation?

b. Define interrupts? Draw Instructions cycle with interrupts? List and briefly define two approaches to dealing with multiple interrupts?

c. What are the differences among direct mapping, associative mapping, and set associative mapping? Support your answer by drawing?

Question 3: (50 Marks)

a. What is the benefit of using a multiple-bus architecture compared to a single-bus architecture? Describe bus types? What is the meaning of bus arbitration?

b. Describe in details the memory hierarchy? And explain the concept of principle of locality?

c. What is a stored program computer? What is the distinction between computer structure and computer function? List and briefly define the main structural components of a computer?

EXAMINERS	DR/ RASHA ELAGAMY	PPROF. ENTSAR ALKHOLY

With my best wishes

Tanta University, Faculty of Science | TIME DURATION: 2h

SUBJECT: **Systems Simulation** | **LEVEL 3 (Computer)**

CODE: CS3208 | SEMESTER 2, 2016-2017

Answer the following questions

QUESTION 1:

(i) The population of a certain species of fish living in a large lake at time t can be modeled using *Verhulst's equation*, otherwise known as the *logistic equation*,

$$\frac{dP}{dt} = P(\beta - \delta P),$$

Where $P(t)$ is the population of fish measured in tens of thousands, and β and δ are constants representing the birth and death rates of the fish living in the lake, respectively. Use the linear stability analysis as well as a graphical argument to classify the critical points of the equation. Suppose that $\beta = 0.1$, $\delta = 10^{-3}$, and the initial population is 50×10^4. Solve this initial value problem and interpret the results in physical terms.

(ii) Find the Hamiltonian and then make an approximate sketch for the following system:

$$\dot{x} = y, \quad \dot{y} = x + x^2.$$

QUESTION 2:

(i) Define trajectories, phase portrait and qualitatively equivalent systems. Find the manifolds, isoclines and the sign of $\frac{dy}{dx}$ in different regions of the plane for the following system, then sketch phase portraits for this system and its qualitatively equivalent one:

$$\dot{x} = -x - 3y, \quad \dot{y} = -3x - y.$$

(ii) By considering the flow across the rectangle with corners at $(-1,2)$, $(1,2)$, $(1,-2)$, and $(-1,-2)$, prove that the following system has at least one limit cycle:

$$\dot{x} = y - 8x^3, \quad \dot{y} = 2y - 4x - 2y^3.$$

QUESTION 3:

(i) Investigate the stability of the origin for the system $\dot{x} = x(x-\alpha)$, $\dot{y} = y(y-\beta)$ using the Lyapunov function $V(x,y) = (\frac{x}{\alpha})^2 + (\frac{y}{\beta})^2$.

(ii) Sketch a phase portrait for the system $\dot{x} = 0$, $\dot{y} = x + 2y$.

(iii) State with proof the Dulac's criteria.

(iv) In two different ways, prove that the following system has no limit cycles:

$$\dot{x} = y^2 - x, \quad \dot{y} = y + x^2 + yx^3.$$

With my best wishes