



# UNIVERSITY OF GHANA

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## B.SC INFORMATION TECHNOLOGY – FIRST SEMESTER

### EXAMINATION 2015/2016

#### CSIT307: DIGITAL AND LOGIC SYSTEMS DESIGN

##### INSTRUCTION:

*Answer ALL Question in Section A*

*Answer Any Two (2) Questions in Sections B.*

##### TIME ALLOWED:

*TWO AND A HALF (2½) HOURS*

#### SECTION A (60 MARKS)

#### ANSWER ALL QUESTIONS IN THIS SECTION

A1.

a) Briefly explain the following terms

- I. Microprocessor
- II. Microcontroller
- III. Hard real time
- IV. Soft real time
- V. Firm real time
- VI. Scheduling
- VII. Assembler Directives

14 marks

b) State the differences between microcontrollers and microprocessors?

4 marks

c) What is an assembly language and give one example?

2 marks

A1. Give the syntax of an assembly language instruction, explaining the purpose or role of each field in the instruction? 10 marks

A1. Construct the schedule according to the RM algorithm for the following set of periodic tasks:

	$C_i$	$T_i$
$\tau_1$	2	6
$\tau_2$	2	8
$\tau_3$	2	12

15 marks

A1. Construct the schedule according to the EDF algorithm for the task set:

	$C_i$	$D_i$	$T_i$
$\tau_1$	2	5	6
$\tau_2$	2	4	8
$\tau_3$	4	8	12

15 marks

### **SECTION B (40 MARKS)**

**ANSWER ANY TWO (2) QUESTIONS IN THIS SECTION**

B1.

a) State and explain any three (3) resource access protocols, giving the problems that they address? 12 marks

b) What is the criteria for choosing microcontrollers? 4 marks

c) What are the features of a Real Time Operating System? 4 marks

B1.

a) State the differences between Real Time Operating Systems (RTOS) and General Purpose Operating Systems (GPOS) and give two examples of each operating system? 8 marks

b) How do microcontroller and microprocessors relate to embedded systems? 5 marks

c) Briefly explain the features of embedded systems? 7 marks

B1.

a) State the characteristics of embedded systems? 10 marks

b) What is timing analysis in Real Time Operating Systems (RTOS)? 6 marks

c) What is a Real Time Operating System (RTOS) Kernel? Give an example? 4 marks

B1.

a) Briefly explain the following:

I. Polling Server 4 marks

II. Sporadic Server 4 marks

III. Deferrable Server 4 marks

b) Distinguish between a microprocessor and a microcontroller? 4 marks

c) State the characteristics of a microcontroller? 4 marks

