University of Asia Pacific

Department of Computer Science and Engineering

Semester Final Examination, Spring'2016

Program: B. Sc Engineering (3rd Year / 1st Semester)

Course Title: Electrical Drives and Instrumentation Course Code: ECE 301 Credit: 3.00

Time: 3.00 Hour Full Marks: 150

[There are **Eight** Questions. Answer any **Six**. Figures in the right margin indicate marks.]

1. (a) Write short notes on the following terms [10]
   i. Magnetic Field
   ii. Current
   iii. Lenz's Law
   iv. Wave Form
   v. Frequency

   (b) What do you mean by form factor? Derive the value of form factor for a half wave rectified sine wave. [15]

2. (a) Prove that in a balance Y-Y system line voltage V_L leads V_P by 30° and also V_L is equal to $\sqrt{3}$ times of V_P. [10]

   (b) Calculate the following phasors [10]
   i. $1+a^3+a^2+a^4+a^6$ 2
   ii. $1+2a+2a^3+5a^6+a^2$ 6.5 + j0.866

   (c) What do you mean by cycle? [05]

3. (a) What do you mean by transformer? Briefly explain its construction and working principle. [15]
   (b) Classify different types of losses in a machine. [05]
   (c) What is ideal transformer? Derive its power equation. [05]

4. (a) What do you mean by induction motor? Explain its working principle. [10]
   (b) What do you mean by slip ring rotor? [05]
   (c) For a three phase induction motor derive its equation of starting torque. [10]

5. (a) What do you mean by stepper motor? Briefly explain its working principle. [10]
   (b) Write down some advantages, disadvantages and applications of auto transformer. [8]
   (c) Briefly explain the construction details of stator for a three phase induction motor. [7]

6. (a) What is DC generator? Briefly explain its operation. [18]
   (b) What is unidirectional current? How it can be achieved from a generator. [07]

7. (a) What is DC motor? Derive the voltage equation and condition of maximum power for a DC motor. [20]
   (b) Draw the equivalent circuit of a motor. [05]

8. (a) For a Wheatstone bridge prove its balance equation. [10]
   (b) Explain about back emf considering the case of transformer. [07]
   (c) What do you mean by unipolar and bipolar stepper motor? [08]

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Department of Computer Science & Engineering
University of Asia Pacific (UAP)

Final Examination **Spring 2016** **3rd year 1st semester**

Course Code: CSE 321 **Course Title:** Database Systems **Credits: 3**

Full Marks: 150 **Duration: 3 Hours**

Instructions:

1. There are **Eight (8)** Questions. Answer any **Six (6)**. All questions are of equal value. Part marks are shown in the margins.
2. Non-programmable calculators are allowed.

Bonus

1. Answer Briefly:
   a. What is DBMS, RDBMS? Give some example of Database applications. 5
   b. What are the drawbacks of using file systems to store data? 5
   c. What are the advantages of using Database? 5
   d. What are the functionalities of a DBMS? 5
   e. What are the levels of abstraction? Draw the architecture for a database system 5

2. Draw a detailed ER diagram for Library Management System. Write the SQL to create the tables. 25

3. Answer Briefly:
   a. Give an Overview of Database Design. 5
   b. What are the basics of ER model? 5
   c. What is primary key and foreign key? Why we use it? Explain using example. 5
   d. What is ISA ('is a') Hierarchy? Give examples. 5
   e. What is data redundancy? Explain with examples 5

4. Database Table:

   Students(StudentID, Name, ClassYear, City, State, Zip, BirthDate, AdvisorID, Term)
   Faculty(FacultyID, FirstName, LastName, Phone, EMail)
   Majors(MajorID, MajorName, Department, ChairID)
   StudentInterest(StudentID, InterestID)
   Interests(InterestID, InterestName, Category, URL)

   Write the SQL query for following queries :
   a) Find all students name from Dhaka city. 5
   b) Find Student name and advisor last name. 5
   c) Find Student name, name of football team student is interested in. 5
   d) Find Student name whose advisor name is "Khan Md. Anwarus Salam". 5
   e) Find all Student information who have "Marketing" Major. 5

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-Foreign

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Write SQL queries for the following Database: 25

Track(cID, Num, Title, Time, aID) ; CD (cID, Title, Price); Artist(aID, Name);

a) Add $5 to the price of all CDs that cost more than $10.
b) Add a new column, "Type", to the CD table, should hold a string of up to 90 characters.
c) Find a list of all the CD titles.
d) Find a list of the titles of tracks that are more than 100 seconds long.
e) Find a list of the names of those artists who have a track on the CD with the title "Compilation".

Write SQL for the following Database: 25

Student (ID, First, Last, Year); Grade(ID , Code , Mark, YearTaken); Module(Code Title Credits)

a) Find, in a single query, the average mark for each student, and the average mark overall.
b) We want a list of students sorted by year then average mark (High to low) then last name, first name, and finally ID, in a single query.
c) Insert 5 of your friends info in Student table using SQL.
d) Alter table Student to add a new column "Email".
e) Delete Table Module.

We have following two tables: 25

EmployeeDetail

EmployeeID	FirstName	LastName	Salary	Joining Date	Department	Gender
1	Istiak	Ahmed	42000	2013-02-15	IT	Male
2	Rupa	Das	60000	2014-01-09	HR	Female
3	Anisul	Hoque	53000	2014-02-17	IT	Male
4	Siraj	Hossain	100000	2008-04-25	HR	Male
5	Humaira	Akter	50000	2013-02-19	Payroll	Female

ProjectDetail

ProjectDetailID	EmployeeDetailID	ProjectName
1	1	Task Track
2	1	CLP
3	1	Survey Management
4	2	HR Management
7	3	DDS
8	4	HR Management
9	6	GR Management

a) Get employee details (in descending order according to salary) whose Salary range is in between 45000 and 60000.
b) Select all employee detail who have First names either 'Rupa', 'Anisul' or 'Siraj'.
c) Write a query to get all employee detail from "EmployeeDetail" table.
d) Write a query to get all unique "Department".
e) Write a query to get the highest salary.

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Answer Briefly.

Table : sell_buy_info

Client_no	Client_name	City	Profit_percent	Sell_price	Balance_due
C01-001	Kamal	Mirpur	12	2800	800
C01-002	Joyoti	Dhanmondi	11	1500	500
C01-003	Dipa	Uttara	12	590	90
C01-004	Anisa	Dhanmondi	12	750	250
C01-005	Mostafa	Dhanmondi	11	960	360

a) Create a table whose structure is given by table sell_buy_info.

b) Retrieve the client_name and client_no from the table sell_buy_info where the clientss are in Dhanmondi city.

c) Retrieve the client_name and client_no and balance_due for those clients who has balance_due greater than 400.

d) Create a balance table from sell_buy_info table where client_name, client_no, city and balance_due are present.

e) Find out average balance from the sell_buy_info table.

Librarian, Students, Books, Borrow, ~~Ret~~ Due

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32+

89-32
8

University of Asia Pacific
Department of Basic Sciences & Humanities
Final Examination, Spring 2016
Program : B.Sc Engineering (Computer Science)
3rd Year/1st Semester

Course Title: Statistics and Probability
Time: 2 hrs

Course Code: MTH 301
Full Marks: 100

Answer any **FOUR** of the following questions

1. A retail athletic shoe store sold the following numbers of pairs of athletic shoes daily during seven weeks of six working days each **25**

35 45 63 60 76 75 69 49 60 55 75 85 65 67 38 65 71 93
43 51 59 61 78 65 89 70 73 55 64 58 75 62 75 40 72 87
83 75 85 65 97 89

(a) Group these daily sales figures into a distribution having the classes 30-39, 40-49, 50-59,..., and 90-99.
(b) Convert the distribution of part (a) into a percentage distribution
(c) Construct a histogram and Pie diagram of the above frequency distribution.

2. Given below is the frequency distribution of the marks obtained by 90 students. Compute the arithmetic mean, median and mode of the distribution: **25**

Marks	Number of students
20-29	2
30-39	12
40-49	15
50-59	20
60-69	18
70-79	10
80-89	9
90-99	4

mean ~~mode~~ 58.5
median 58
mode 57.143

3. What are the various measures of dispersion? Find the mean deviation and standard deviation of following frequency distribution: **25**

Marks	6	7	8	9	10	11	12
Frequency	3	6	9	13	8	5	4

MD = 1.25
SD 1.607.

4. (a) Define Karl Pearson's Coefficient of Correlation. Prove that $|r| \le 1$ or $-1 \le r \le +1$ **12**

(b) Ten students got the following percentage of marks in Mathematics and Statistics calculate the coefficient of correlation **13**

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Math.	78	36	98	25	75	82	90	62	65	39	$n=0$
Stat.	84	51	91	60	68	62	86	58	53	47	

5. (a) If the binomial distribution of the random variable X is $b(x;n,p)$, then show that **13**
(i) $E(X)=np$, (ii) $Var(X)=npq$

(b) The probability that a patient recover from a deliate heart operation is 0.10. If 15 people are known to have this operation, what is the probability that **12**
(i) at least 5 survive (ii) from 4 to 8 survive

6. (a) Define Normal distribution. What are the main properties of normal distribution. **10**

(b) As reported in Runner's World magazine, the times of the finishers in the New York City 10-km run are normally distributed with mean 61 minutes and standard deviation 9 minutes. **15**
(1) Determine the percentage of finishers with times between 50 and 70 minutes.
(2) Determine the percentage of finishers with times less than 75 minutes.

$$x = A + \frac{\Sigma fd}{n} \times i$$

$$\text{Median} = L + \frac{\frac{N}{2} - pcf}{f} \times i$$

$$\text{Mode} = L + \frac{f_1 + f_0}{2f_1 - f_0 - f_2} \times i$$

$$MD = \frac{\Sigma f_i |x_i - \bar{x}|}{\Sigma f_i}$$

$$S.D = \sqrt{\frac{\Sigma f x^2}{\Sigma f} - \left(\frac{\Sigma f x}{\Sigma f}\right)^2}$$

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Department of Computer Science & Engineering
University of Asia Pacific (UAP)

Final Examination **Spring 2016** **3rd Year 1st Semester**

Course Code: CSE 331 **Course Title: Computer Architecture** **Credits: 3**

Full Marks: 150 **Duration: 3 Hours**

Instructions:

1. There are **Eight (8)** Questions. Answer any **Six (6)**. All questions are of equal value. Part marks are shown in the margins.
2. Non-programmable calculators are allowed.

1. a) Draw the Von Neumann architecture of CPU. 05

b) What is clock speed of CPU? What does it mean if a processor speed is 3.6 GHz. 05

c) Write down the difference between Ram and Register. 05

d) Suppose we have two implementation of same instruction set architecture. Computer A has a clock cycle time of 350 ps and a CPI of 1.6 for some program, and computer B has a clock cycle time of 400 ps and a CPI of 1.2 for the same program. Which computer is faster and how much? 10

2. Two floating points are given in decimal: -.3 and .275

a) Convert these two numbers into binary. 05

b) Represent the converted binary values in 32-bit register using single precision. 05

c) Complete the hardware diagram for the floating point addition of the given values. The diagram is given at Appendix 02. Attach this page (Appendix 02) with your answer script. 15

3. a) What is leaf and non-leaf procedures in MIPS? 05

b) Given a MIPS code. Now, Simulate the following MIPS code and write down its function in comments (#) form. Some answers are already given in *italic* to enhance the clarity. A reference is given at the Appendix 01, that will help you to understand the function of the Syscall ($V0). 15

```
        .data
fout:   .asciiz "testout2.txt"     # filename for output
buffer: .asciiz "The quick brown fox jumps over the lazy dog."
        .text
```

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```
##################################################################
# Open (for writing) a file that does not exist
li  $v0, 13          # ----------------------------
la  $a0, fout        # ----------------------------
li  $a1, 1           # Open for writing (flags are 0: read, 1: write)
li  $a2, 0           # mode is ignored
syscall              # ----------------------------
move $s6, $v0        # save the file descriptor

##################################################################
# Write to file just opened
li  $v0, 15          # ----------------------------
move $a0, $s6        # file descriptor
la  $a1, buffer      # ----------------------------
li  $a2, 44          # ----------------------------
syscall              # ----------------------------

##################################################################
li  $v0, 16          #----------------------------
move $a0, $s6        # ----------------------------
syscall              # ----------------------------

##################################################################
```

c) What is the abbreviation of MIPS? What does it mean 32-bit processor? 05

a) Write down the meaning of the following MIPS instructions. 05

Jal
LWC1
LWC2
ADD.S
SLL

b) Given a loop statement in C Programming Language. Translate it to MIPS code. 10

```
int result = 0;
for (int  j = 0; j < 5; ++j)
   result = result* 2 + 5
```

10

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c) Given a conditional statement in C Programming Language. Translate it to MIPS code.

```
if (i == j)
f = (g + h)*2;
else
f = (g – h)*2.5;
```

5. a) What is the difference between *J* and *Jal* in MIPS? 03

b) Why we need to shift two digits in I-Format instructions in MIPS? Give an example with 16 bits immediate value. 07

c) Given a branch instruction in MIPS: 15

```
bne $t0, $t1, label
label: sub $t2, $t0, $t1
```

Now, complete the datapath for the above branch instruction. Datapath should contains all the possible components of hardware (Ex: P.C., RegFile, ALU, Controller)

6. a) What is the function of Controller in MIPS datapath? 3

b) What is the function of "sign extension" in MIPS datapath? Given two 16 bits binary values, convert it to 32 bits using sign extension. 7

- 00001111 11111111
- 11110000 11111100

c) Draw the MIPS datapath for the combination of R-Format and I-Format instructions. Hints: For LW operations. 15

7. a) What is pipelining in computer architecture? Write down the 5 stages of instruction cycles in pipelining. 07

b) What is a data hazards in pipelining? Explain the unavoidable situation of a data hazards. Given a MIPS code: 10

```
LW   $s0, 100($t0)
ADD  $t2, $s0, $t3
```

Explain why there will be an unavoidable hazard in these instructions. Also state a way of solving this hazard.

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c) Total time for each instruction calculated from the time for each component is given in the table. To complete all the instructions, it need 2600ps. Now show how pipelining can reduce the total time requirement. Hints: draw table for separate instruction and pipeline. 08

Instruction class	Instruction fetch	Register read	ALU operation	Data access	Register write	Total time
Load word (lw)	200 ps	100 ps	200 ps	200 ps	100 ps	800 ps
Store word (sw)	200 ps	100 ps	200 ps	200 ps		700 ps
R-format (add, sub, and, or, slt)	200 ps	100 ps	200 ps		100 ps	600 ps
Branch (beq)	200 ps	100 ps	200 ps			500 ps

8. a) What are the meaning of the following instructions? 05

lw $t1, ($t0)

lw $t1, 5 ($t0)

b) Given a portion of MIPS code: 10

```
lw $t1, 5 ($t0)
lw $t2, 6 ($t0)
add $t3, $t1, $t2
sw $t3, 10 ($t0)
lw $t4, 5 ($t0)
add $t5, $t3, $t4
sw $t5, 10 ($t0)
```

Perform code scheduling to possibly reduce cycle required to complete the given instructions. Compare the number of total cycles required before and after code scheduling of the code segment.

0.625 × 2 = 0.05

0.05 × 2 = 0.1

0.1 × 2 = 0.2

0.2 × 2 = 0.4

0.4 × 2 = 0.8

0.8 × 2 = 1.6

0.6 × 2 = 1.2

0.2 × 2 = 0.4

0.625

$(1.0000011)_{10}$

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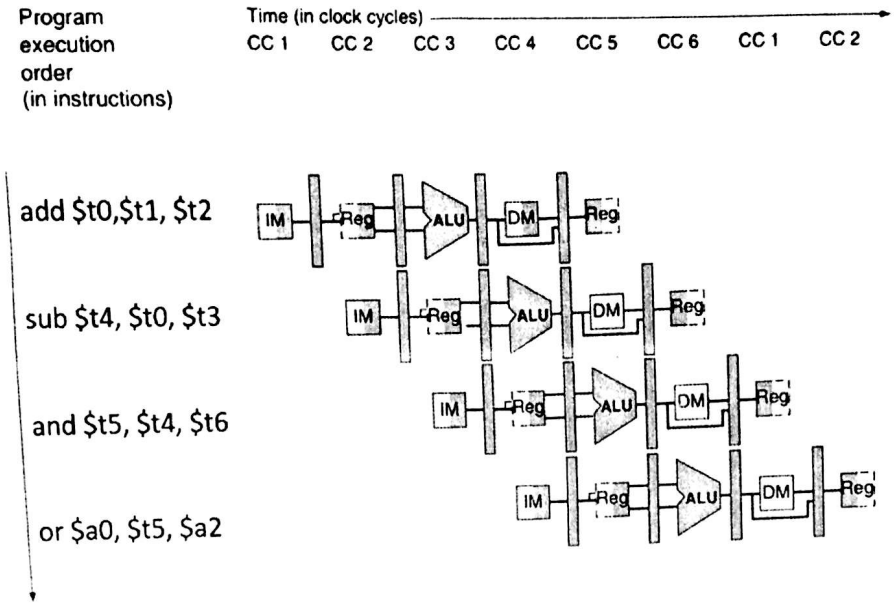
c) In pipeling there might occur data hazards during operation. Bypassing/forwarding is an effecting way to reduce the hazards. For the given instructions, show how bypassing can minimize the hazards. 10



0.00100
0.00011
0.00001

0.00001×2^{-2}

$0.025 \times 2 = 0.05$

$0.05 \times 2 = 0.1$

$0.1 \times 2 = 0.2$

$0.2 \times 2 = 0.4$

$0.4 \times 2 = 0.8$

$0.8 \times 2 = 1.6$

$0.6 \times 2 = 1.2$

$0.2 \times 2 = 0.4$

$-(0.025)_{10} = -(0.0000011)_2 = 1.1 \times 2^{-6}$

1.1

$E = 127 - 6 = (121)_{10} = (01111001)_2$

1.00100
1.00011
0.00001

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Appendix 01: Reference Instructions Results

Service	Code in $v0	Arguments	Result
print integer	1	$a0 = integer to print	
print float	2	$f12 = float to print	
print double	3	$f12 = double to print	
print string	4	$a0 = address of null-terminated string to print	
read integer	5		$v0 contains integer read
read float	6		$f0 contains float read
read double	7		$f0 contains double read
read string	8	$a0 = address of input buffer $a1 = maximum number of characters to read	*See note below table*
sbrk (allocate heap memory)	9	$a0 = number of bytes to allocate	$v0 contains address of allocated memory
exit (terminate execution)	10		
print character	11	$a0 = character to print	*See note below table*
read character	12		$v0 contains character read
open file	13	$a0 = address of null-terminated string containing filename $a1 = flags $a2 = mode	$v0 contains file descriptor (negative if error). *See note below table*
read from file	14	$a0 = file descriptor $a1 = address of input buffer $a2 = maximum number of characters to read	$v0 contains number of characters read (0 if end-of-file, negative if error). *See note below table*
write to file	15	$a0 = file descriptor $a1 = address of output buffer $a2 = number of characters to write	$v0 contains number of characters written (negative if error). *See note below table*
close file	16	$a0 = file descriptor	
exit2 (terminate with value)	17	$a0 = termination result	*See note below table*

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University of Asia Pacific
Department of Computer Science and Engineering
Semester Final Examination, Spring-2016
Program: B. Sc. Engineering (3rd Year / 1st Semester)

Course Title: Digital Electronics and Pulse Techniques Course No: ECE 303 Credits: 3.00

Time: 3.00 Hours. Full Marks: 150

[There are **Eight** Questions. Answer any **Six**. Figures in the right margin indicate marks.]

1. (a) Explain how a pen drive memory cell functions (read, write and erase) [13]
   (b) What is cache memory? Explain with diagrams. [12]

2. (a) Describe how 555 astable circuit operates. To get 50% duty cycle what should be done? [12]
   (b) Design and explain how smoke detector circuit works using a 555 timer. [13]

3. (a) Explain how Binary weighted digital to analog converter works. What is the limitation of it? [11]
   (b) Explain Dual slop analog to digital converter. [14]

4. (a) Expand 65,536 X4 RAM to form a 65,536 X 32 RAM [12]
   (b) Reconstruct the following analog signal from 4 bit quantization taking 10 samples [13]

5. (a) Show that for a Buck-Boost converter $I_o = I_{in}$ **(1-D/D)** with necessary diagrams, where symbols indicate their usual meaning. [13]
   (b) Draw the wave shapes of the output voltage V_O for the following two figures with sinusoidal input, V_i. [12]

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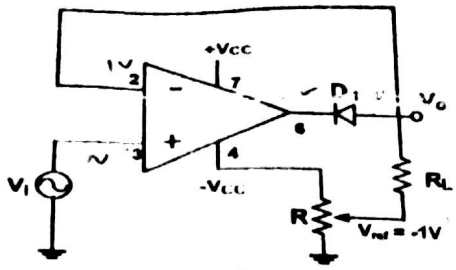


Figure 1

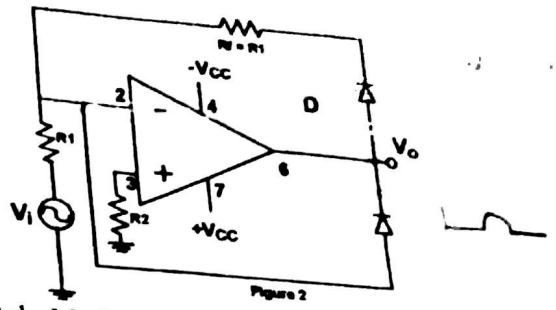


Figure 2

6. (a) Draw the block diagram of a Switch Mode Power Supply (SMPS) and Standard power supply, What are the differences between them and write the advantages of SMPS. [18]

(b) Draw the DC to AC converter circuit using SCR and draw its input output wave forms. [07]

7. (a) Draw the circuit diagram of a single phase full wave controlled rectifier and deduce the V_{avg} & V_{rms} at $\alpha = 40^0$ and draw its input-output waveform. [15]

(b) Draw the circuit diagram of a Three Transistor Dynamic RAM Cell & describe its operation. [10]

$V_{avg} = 0.562 V_m$

$V_{rms} = 0.6836 V_m$

8. (a) Implement the following logic functions using both NMOS & CMOS [11]

$$F = (A + B\bar{C}D) + E$$

(b) Draw the DTL & TTL circuit diagram of a 2 input XOR gate. [14]

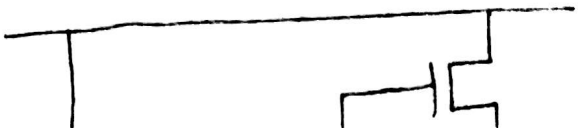
$A \oplus B = \bar{A}B + A\bar{B}$

$\overline{\overline{\bar{A}B} \quad \overline{A\bar{B}}}$

$\overline{\overline{\bar{A}B}} + \overline{\overline{A\bar{B}}}$

$\bar{A}B + A\bar{B} = A \oplus B$

Buse



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