

MID TERM EXAMINATIONS - 2014
B.Sc PART – I COMPUTER SCIENCE – HONOURS
BANGABASI COLLEGE

Time : 2 Hrs

Full Marks : 50

Instructions:

Figures in the margins indicate full marks.
Answer Question 1 and any five from the rest.

Question 1: Answer any five questions:

2 × 5 = 10

- a. What do you understand by data and information?
- b. What are the functions of Long term scheduler and Short term scheduler?
- c. Show that dual of X-OR is equal to its complement. Prove or disprove whether the same is true for X-NOR.
- d. Convert $(5544)_8$ to its equivalent binary number.
- e. Implement the function with only AND & NOT gates:

$$F = xy + x'y' + y'z$$
- f. Prove the Distributive Law of Boolean Algebra using truth tables.
- g. State the purpose of any four symbols in a flowchart.
- h. What is a variable? Give examples.
- i. What are arrays? Illustrate with an example.
- j. What is a PCB?

Question 2:

4 + 4 = 8

- a. Assume that the following jobs are to be executed on a single processor system:

Job-Id	CPU-BurstTime
p	4
q	1
r	8
s	1
t	2

 The jobs are assumed to have arrived at time 0 and in the order p, q, r, s, t. Calculate the waiting time for job p if scheduling is Round Robin (RR) with time slice 1.

- b. A majority gate is a digital circuit whose output is equal to 1 if the majority of the inputs are 1's. The output is 0 otherwise. By means of a truth table, find the Boolean function implemented by a 3-input majority gate. Simplify the function.

Question 3:

$$(2 + 2) + 4 = 8$$

- What is an algorithm? What are the properties that a good algorithm should have?
- Consider the following set of processes, with the arrival times and the CPU burst times given in milliseconds.

Process	Arrival-Time	Burst-Time
P1	0	5
P2	1	3
P3	2	3
P4	4	1

What is the average turnaround time for these processes with the pre-emptive shortest job first (SJF) algorithm?

Question 4:

$$4 + (1 + 1 + 1 + 1) = 8$$

- Design a combinational circuit with three inputs and one output. The output is 1 when the binary value of the inputs is less than 3. Otherwise the output is 0.
- Given that $x = 15$, $y = 20$ and $z = 25$. What does the following expressions evaluate to (True or False) ?
 - $(x > 0) \text{ AND } (y < 20)$
 - $(x = 15) \text{ OR } (y = 15)$
 - $\text{NOT } (z < 100)$
 - $(z - y) \neq (z - x)$

Question 5:

$$3 + 5 = 8$$

- Draw a flowchart to test whether a number is odd or even.
- Write an algorithm to find the H.C.F. of two numbers given as input.

Question 6:

$$2 + (2 + 2) + 2 = 8$$

- Reduce the Boolean Expression to the 4 Numbers of literals
 $(A+C+D)(A+C+D')(A+C'+D)(A+B')$
- Express the function in a sum of minterms and product of maxterms
 $F(x,y,z) = (xy+z)(y+xz)$
- Implement the Boolean Function with Ex-OR and AND Gates
 $F = AB'CD' + A'BCD' + AB'C'D + A'BC'D$

Question 7:

$$2 + 2 + 4 = 8$$

- Implement the function with only AND & NOT gates:
 $F = xy + x'y' + y'z$

- b. Prove that $x(y+z)=xy+yz$.
- c. Design a combinational circuit with four input lines that represent a decimal digit in 2421 code and four output lines that generates the 9's complement of the input digit.

Question 8:

$$2 + 2 + (2 + 2) = 8$$

- a. $(234.369)_{10} = (?)_2$
- b. State De- Morgan's Theorem.
- c. What do you understand by universal gates? Show that NAND Gate is a Universal Gate.

Question 9:

$$(2 + 2) + 4 = 8$$

- a. Simplify:

$$F = W'(X'Y + X'Y' + XYZ) + X'Z'(Y + W)$$

$$D = W'X(Y'Z + YZ') + WYZ$$
- b. Explain the differences between entry controlled loops and exit controlled loops with the aid of diagrams and examples.