MID TERM EXAMINATIONS - 2016
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: $2 \times 5 = 10$

   a. What is Operating System?
   b. What is Context switching?
   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 $(5234)_8$ to its equivalent hexadecimal value
   e. If $A \oplus B = C$, then justify which of this is true:
      i) $B \oplus C$ ii) $C.A = B$ iii) $CA'B' = B$ iv) None of i, ii or iii
   f. Implement the function with only AND & NOT gates: $F = xy + x'y' + y'z$
   g. Prove that $x(y+z)=xy+yz$.
   h. What do you understand by complexity of an algorithm?
   i. What is a variable? Give examples.
   j. What is deadlock in Operating system?
   k. What are the differences between RAM and ROM ?
   l. How many types of RAM are used?
   m. Write down the function of a Cache memory.

Question 2: $4 + 4 = 8$
   a. Assume that the following jobs are to be executed on a single processor system:

Process	Arrival-Time	Burst-Time
A	0	5
B	1	4
C	2	3
D	3	4
E	4	5

   The jobs have arrived in the order A,B,C,D,E. Calculate the waiting time for job C if scheduling is Round Robin (RR) with time slice 2.

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

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

Process	Arrival-Time	Burst-Time
P1	2	5
P2	1	6
P3	0	3
P4	3	2

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

Question 4: $\qquad$ $4 + (1 + 1 + 1 + 1) = 8$

a. 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.

b. Given that x = 15, y = 20 and z = 25. What does the following expressions evaluate to (T/F) ?
   i) $(x > 0)$ AND $(y < 20)$ ii) $(x = 15)$ OR $(y = 15)$
   iii) NOT $(z < 100)$ iv) $(z - y) != (z - x)$

Question 5: $\qquad$ $4 + 4 = 8$

a. Write an algorithm to find the roots of an quadratic equation.
b. Write an algorithm to find the H.C.F. of two numbers given as input.

Question 6: $\qquad$ $2 + (2 + 2) + 2 = 8$

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

Question 7: $\qquad$ $2 + 2 + 4 = 8$

a. Implement the function with only NAND 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: $\qquad$ $2 + 2 + (2 + 2) = 8$

a. $(234.369)_{10} = (\ ?\ )_2$
b. State De- Morgan's Theorem.
c. What do you understand by universal gates? Show that NOR Gate is a Universal Gate.

Question 9: $\qquad$ $(2 + 2) + 4 = 8$

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.

Question 10:

a. What are the main function of an assembler? How it differs from a Compiler?
b. What do you mean by memory hierarchy? Explain.   4+4=8