Session
2014-2015

MID TERM EXAMINATIONS - 2015

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 is Operating System?
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 (5234)8 to its equivalent hexadecimal value
e. If $A \oplus B = C$ then justify which of this true:
   i) $B \oplus C$
   ii) C.A B
   iii) CA'B' = B
   iv) None of the above
f. Implement the function with only AND & NOT gates:
   F = xy + x'y' + y'z
g. Prove that x(y+z)=xy+yz
h. State the purpose of any four symbols in a flowchart.
i. What is a variable? Give examples.
j. What are relational operators?

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

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	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

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 (True or False) ?
   i. (x > 0) AND (y < 20)
   ii. (x = 15) OR (y = 15)
   iii. NOT (z < 100)
   iv. (z - y) != (z - x)

Question 5: 3 + 5 = 8

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

Question 6: 2 + (2 + 2) + 2 8

a. Reduce the Boolean Expression to the 4 Numbers of literals
   (A+C'+D)(A+C'+D')(A+C'+D)(A+B')
b. Express the function in a sum of minterms and product of maxterms
   F(x,y,z)=(xy+z)(y+xz)
c. 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

a. 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.