

## FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester M.Sc Computer Science Degree Examination, November 2019

## MCS1C05 – Computer Organization and Architecture

(2019 Admission onwards)

Time: 3 hours

Max. Weightage : 30

**PART A****Questions 1 to 7. Answer any four. Each question carries two weightage.**

1. Draw and explain JK flip flop.
2. Differentiate MUX and DMUX.
3. Write a note on branch instruction.
4. What is hardwired control?
5. Depict IEEE 754 representation for single precision FP number. Why do we use biased notation?
6. How DMA operations are performed?(Specify signals involved)
7. Explain SP and AX registers in 8086.

**(4 x 2 = 8 weightage)****PART B****Questions 8 to 14. Answer any four. Each question carries three weightage**

8. Explain full adder with diagram.
9. Explain parallel-in serial-out shifter.
10. Explain a memory read cycle in single cycle organization.
11. Differentiate indexed and based addressing mode in 8086 microprocessor.
12. Explain restoring and non-restoring division algorithms.
13. What is vectored interrupt? Mention a few significant interrupts.
14. Draw the software architecture of 8086.

**(4 x 3 = 12 weightage)****PART C****Questions 15 to 18. Answer any two. Each question carries five weightage**

15. Explain universal shifter.
16. Explain micro programmed control unit in detail.
17. Prove that Booth's algorithm performs 2's complement multiplication.
18. Explain instruction set in 8085 microprocessor.

**(2 x 5 = 10 weightage)**

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester M.Sc Computer Science Degree Examination, November 2019

MCS1C04 – The Arts of Programming Methodology

(2019 Admission onwards)

Time: 3 hours

Max. Weightage : 30

**Section A**

**Answer any 4 questions. Each question carries 2 weightage**

1. What are the trigraph character? How are they useful?
2. What is a translator? Differentiate interpreter and compiler.
3. Briefly explain program development cycle
4. Describe general structure of C program.
5. Define an algorithm, list the characteristics of a good algorithm.
6. Differentiate continue and break statement in C with program code.
7. What you mean by type casting.

**(4 x 2 = 8 weightage)**

**Section B**

**Answer any 4 questions. Each question carries 3 weightage**

8. Compare entry control loop and exit control loop with suitable program
9. What you mean by recursive function. How it help programmers. Illustrate with suitable example
10. Differentiate between function definition and function prototype
11. Distinguish between actual parameter and formal parameter.
12. Explain switch statement with suitable program code.
13. Draw flow chart to reserve a number and find sum of the digit.
14. Write a note on different storage classes available in C

**(4 x 3 = 12 weightage)**

**Section C**

**Answer any 2 questions. Each question carries 5 weightage**

15. Using function write c program for matrix multiplication.
16. Explain scope and life time of variable with suitable program statement.
17. Write any five string manipulation commands in C and explain
18. Explain for loop statement and additional features of for loop statement with suitable program code.

**(2 x 5 = 10 weightage)**

## FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester M.Sc Computer Science Degree Examination, November 2019

## MCS1C03 – Theory of Computation

(2019 Admission onwards)

Time: 3 hours.

Max. Weightage : 30

**PART A (Answer any four. Each question carries Two weightage.)**

1. What is inductive proof?
2. Define Alphabet, string and Languages.
3. Give applications of Finite Automata with examples.
4. Distinguish between DFA and NFA with the help of examples.
5. Explain regular expression with examples.
6. Whether the languages accepted by a DPDA and NPDA are same? Justify your answer.
7. What do you mean by 'closure property of a language'?

**( 4 x 2 = 8 weightage)****PART B (Answer any four. Each question carries Three weightage.)**

8. Give DFA for the language.  $L = \{\text{all strings with not more than three 'b' s; } \Sigma = \{a, b\} \}$ .
9. State and prove the equivalence of DFA and NFA.
10. Explain the pumping lemma for context free language.
11. What is an ambiguous grammar? Give an example.
12. Describe CNF and the steps involved to convert a grammar to CNF using suitable example.
13. Briefly explain the PCP problem.
14. Explain multi head Turing machines.

**( 4 x 3 = 12 weightage)****PART C (Answer any two. Each question carries Five weightage)**

15. What is a regular expression? Draw the NFA with epsilon moves for the regular expression  $ab^*(a+ab)^*$ .
16. Construct a PDA for the language  $L = \{0^n 1^n \mid n \geq 1\}$ .
17. Explain Turing machine. Design a TM to accept the language  $L = \{a^n b^n c^n \mid n \geq 1\}$ .
18. Explain the Halting problem. Show that it is undecidable.

**(2 x 5 = 10 weightage)**

## FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

First Semester M.Sc Computer Science Degree Examination, November 2019

## MCS1C02 – Advanced Data Structures

(2019 Admission onwards)

Time: 3 hours

Max. Weightage : 30

**PART A (Answer any four. Each question carries *Two* weightage.)**

1. Explain what is meant by time complexity of an algorithm.
2. What do you mean by frequency count in the context of an algorithm? What is its relevance?
3. Define stack. Give two applications of stack.
4. Differentiate circular queue and linear queue.
5. Compare and contrast array and linked list.
6. Explain Binomial Tree.
7. Distinguish linear search and binary search? Compare their complexities.

**( 4 x 2 = 8 weightage)****PART B(Answer any four. Each question carries *Three* weightage.)**

8. Write a note on bubble sort.
9. What is meant by Binary Search Tree? Give an example.
10. What is Threaded Binary Tree?
11. What do you understand by sparse matrix? Show that product of two sparse matrix need not necessarily be sparse.
12. Explain representation of Graphs.
13. What is hashing? How it is useful in indexing?
14. Explain Fibonacci Search.

**( 4 x 3 = 12 weightage)****PART C(Answer any two. Each question carries *Five* weightage)**

15. Perform heap sort on the given data and show each step 5, 80, 20, 60, 10, 77, 19, 11, 70.  
Discuss its complexity.
16. Define an AVL tree. Why it is called so? Explain insertion and deletion operations in AVL tree with suitable examples.
17. What is RB Tree? What are its properties? Explain various cases of balancing in RB Tree.
18. Explain Hashing and various methods for hashing. Also explain how collisions can be handled?

**(2 x 5 = 10 weightage)**



10. Let A be the set of factors of a particular positive integer m and let  $\leq$  be the relation divides, i.e.,  
 $\leq = \{(x,y) \text{ such that } x \in A \wedge y \in A \wedge (x \text{ divides } y)\}$   
 Draw Hasse diagrams for a) m=2; b) m=6; c) m=30 d) m=120 e) m=12 f) m=45
11. Discuss on Lagrange's theorem
12. Discuss on Lattices, Distributive lattices, Complemented Lattices
13. Discuss the steps of Dijkstra's shortest path algorithm.
14. Show that Every chain is a distributive lattice.

(4 x 3 = 12 weightage)

### PART C

Questions 15 to 18. Answer any *two*. Each question carries *five* weightage

15. Derive the principal disjunctive normal form of

$$P \rightarrow ( (P \rightarrow Q) \wedge ( (Q \vee \neg P) ) )$$

16. What is minimum spanning tree? Explain Prim's algorithm with an example.

17. Show that the following Boolean expressions are equivalent to one another .

a)  $(x \oplus y) * (x' \oplus z) * (y \oplus z)$

b)  $(x * z) \oplus (x' * y) \oplus (y * z)$

c)  $(x \oplus y) * (x' \oplus z)$

d)  $(x * z) \oplus (x' * y)$

18. Prove that if G is a finite group of order n with H a subgroup of order m, then m divides n

(2 x 5 = 10 weightage)