IS 1.1

I Semester MSc. Information Science (Open Book Examination)
January/February 2021
Essential Mathematics

Time: 3 Hours **Max. Marks: 80**

Instruction: Answer the following questions

PART A
Note: Answer any of four of the following (4×5 = 20)

1. Explain the process of inference and conclusion.
2. Let A={1,2,3,4,5,6} and $p_1=\begin{pmatrix}1&2&3&4&5&6\\3&4&1&2&6&5\end{pmatrix}$, $p_2=\begin{pmatrix}1&2&3&4&5&6\\2&3&1&5&4&6\end{pmatrix}$,
   $p_3=\begin{pmatrix}1&2&3&4&5&6\\6&3&2&5&4&1\end{pmatrix}$, find p_1 o (p_3 o p_2^{-1}).
3. How many different sets of 8 cards with 5 red cards and 3 black cards can be formed from a deck of 52 cards?
4. Let e: $B^2 \rightarrow B^5$ defined by e(00)=00000, e(10)=00111, e(01)=01110, e(11)=11111. How many errors will e detect?
5. Let Z be the set of integers and 2Z be the set of even integers. Show that the semigroups (Z, +) and ($2Z$, +) are isomorphic.
6. Define complete graph, simple graph, and regular graph. Illustrate each one of these.

PART B
Note: Answer any of three of the following (3×10= 30)

7. *Find the Disjunctive and Conjunctive Normal Forms of* ~(p→ r)∨ (q↔ p)
8. Find the domain, range, relational matrix and the digraph of the relation R for the set A={a, b, c, d}, b={1, 2, 3, 4} where R={(a,1), (a,2), (b,1), (c,2), (d,1), (d,4), (c,4)}
9. State the problem of travelling salesman. How is this similar to Hamiltonian circuit?
10. Let R = {(1,1), (1, 2), (2,1), (4,3)} be a relation on A={1, 2, 3, 4}. Find the transitive closure of R by Warshall's algorithm.
11. Let Z be set of all integers with the binary operation * defined by $a*b = a + b + 1$ for a, $b \in Z$. Then show that (Z, *) is an abelian group.

PART C

Note: Answer any two of the following (2×15 = 30)

12. Describe the method of mathematical induction. Hence prove that n^3-n is divisible by 3 for all non-negative integers n.
13. Discuss the two methods of searching graphs in detail.
14. Let R={(a, b): a – b is divisible by 3} be a relation on A={1, 2, 3, …, 7}. Verify whether R is an equivalence relation. If so, find the partition of A generated by R. Draw the graph of R.
15. Suppose that *e* is an encoding function and *d* is a maximum likelihood decoding function associated with *e*. Then prove that (*e*, *d*) can correct *k* or fewer errors if and only if the minimum distance of *e* is at least 2*k*+1

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IS 1.2

I Semester M.Sc Information Science (Open Book Examination)
January/February 2021
PROGRAMMING CONCEPTS AND C

Time: 3 Hours **Max. Marks: 80**

PART – A

Answer any fourquestions. Each question carries 5 marks: 4x5=20

1. Discuss the steps involved in execution of a C program.
2. Describe the basic structure of C program.
3. Write the difference between implicit and explicit type conversion with an example.
4. Discuss formatted input and output file with an example.
5. Briefly explain various data types available in C.
6. Explain the use of if-else with example.

PART – B

Answer any three questions. Each question carries10 marks 3x10=30

7. Briefly explain different types of Loops available in C.
8. What is an array? Explain its types with example.
9. Explain automatic, static and register storage classes with example.
10. Write a C program to maintain a record of "n" student details using an array of structures with five fields (Roll number, Name, Age, Marks, and Grade). Print the marks of the student given student name as input.
11. Write a C program to perform addition of two matrices.

PART – C

Answer any two questions. Each question carries 15 marks: 2x15=30

12. Discuss different types of Operators available in C with example.
13. A) Explain malloc() and calloc() functions with example. (8 marks)

    b) Write a C program to display Fibonacci series using recursion. (7 marks)
14. A) Explain calling function and called function with example.(5 marks)

    b) Discuss any five string handling functions with suitable example. (10 marks)
15. a) Briefly explain any two jumping statements available in C. (5 marks)

    b) Define sorting. Write a C program to perform insertion sort. (10 marks)

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IS 1.3

I Semester M.Sc. Information Science (Open Book Examination)
January/February 2021
Operating System

Time: 3 Hours **Max. Marks: 80**

PART – A

Answer any four questions. Each question carries 5 marks: 4x5=20

1. Brief out on services provided by operating system.
2. Elucidate about virtual machines.
3. Give an account on Process Control Block.
4. Explain swapping with a neat diagram.
5. Describe single level and two level directory structure.
6. Write a note on cryptography.

PART – B

Answer any three questions. Each question carries 5 marks: 3x10=30

7. Discuss about different evolution of operating system.
8. Explain Round Robin Scheduling algorithm in detail.
9. Explain semaphores with example.
10. Brief out on deadlock characterization.
11. Explain working of paging.

PART – C

Answer any two questions. Each question carries 15 marks 2x15=30

12. Explain various system components of operating system in detail.
13. Discuss LRU Page Replacement algorithms with suitable illustrations.
14. Describe protection and security in detail.
15. Explain working of Linux kernel.

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IS 1.4

I Semester M.Sc. Information Science (Open Book Examination)
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DATA STRUCTURE AND ALGORITHMS

Time: 3 Hours **Max. Marks: 80**

PART – A

Answer any four questions. Each question carries 5 marks: 4x5=20

1. Define algorithm. Explain the properties of an algorithm.
2. Explain amortized analysis with example.
3. What are linked lists? Explain with an example.
4. Define a thirsty baby problem and obtain an optimal solution for this problem.
5. Write the difference between Full Binary tree and a Complete Binary tree.
6. What is forest? Explain with an example.

PART – B

Answer any three questions. Each question carries 10 marks:3x10=30

7. Define stack. Write an algorithm to perform any three operations on Stack.
8. Explain min-max problem and divide-and-conquer method of solving it.
9. Discuss the Prim's algorithm to solve minimum cost spanning tree problem.
10. Describe insertion and searching operations on Binary Search Trees.
11. Explain two different ways of sequential representation of a graph with example.

PART – C

Answer any two questions. Each question carries 15 marks: 2x15=30

12. Write an algorithm to perform insertion sort and hand simulate insertion sort technique for the following numbers in the set

    A = { 19, 27, 51, 06, 71, 9, 47, 99, 12, 63, 91}

13. Describe the three greedy strategies used to solve Knapsack problem.
14. a) Briefly explain array implementation of a queue. (10 marks)
    b) Explain the problem of optimal storage on tapes with an example. (5 marks)
15. a) Write a short note on arithmetic expression tree and decision tree. (5 marks)
    b) Explain Binary search technique with an example. (10 marks)