Q33) Which one of the following is a correct option which provides an optimal solution for 4-queens problem
a)(3.1.4.2) b)(2.3.1.4) c)(4.3.2.1) d)(4.2.3.1) L3CO5

Q34) _____ among the following are undecidable theories?
A. The first order theory of boolean algebra
B. The first order theory of Euclidean geometry
C. The first order theory of hyperbolic geometry
D. The first order theory of the natural number with addition, multiplication, and equality L3CO5

Q35) The problem of finding a subset of positive integers whose sum is equal to a given positive integer is called
a)n- queen problem b)subset sum problem
c)knapsack problem d)hamiltonian circuit problem L3CO5

Q36) What is the time complexity of the brute force algorithm used to solve the Knapsack problem?
a)O(n) b)O(n!) c)$O(2^n)$ d)$O(n^3)$ L3CO5

Q37) _____problem can be solved using dynamic programming.
a)Heapsort b)Binary search
c)Longest common subsequence d)Radix sort L3CO5

Q38) In a traveling salesman problem, the elements of diagonal from left-top to right-bottom are
a)Zeros b)All negative elements c)All ones d)All infinity L3CO5

Q39) The assignment problem will have alternate solutions
A. when total opportunity cost matrix has at least one zero in each row and column
B. when total opportunity cost matrix has at least two zero in each row and column
C. when there is a tie between zero opportunity cost cells
D. if two diagonal elements are zeros L3CO5

Q40) Which of the following is true about the time complexity of the recursive solution of the subset sum problem?
a)It has an exponential time complexity b)It has a linear time complexity
c)It has a logarithmic time complexity d)it has a time complexity of O(n2) L3CO5

Q41) Which of the following problems were reduced to Knapsack
a)Exact Cover b)Max Cut c)0-1 Integer Programming d)None of above L3CO5

Q42) The problem of placing n queens in a chessboard such that no two queens attack each other is called
a)1-queen problem b)eight queens puzzle c)four queens puzzle d)n-queen problem L3CO5

Q43) _____ is an essential requirement for an algorithm to be classified as an approximation scheme for TSP
A. It must produce an exact solution for small instances of the problem.
B. It must provide a solution within a constant factor of the optimal.
C. It must scale its performance based on the size of the problem instance.
D. It must guarantee polynomial-time complexity for any input size. L3CO5

Q44) In analysis of algorithm, approximate relationship between the size of the job and the amount of work required to do is expressed by using _____
a)Central tendency b)Differential equation c)Order of execution d)Order of magnitude L3CO5

Q45) What is a subset sum problem?
a)finding a subset of a set that has sum of elements equal to a given number
b)checking for the presence of a subset that has sum of elements equal to a given number and printing true or false based on the result
c)finding the sum of elements present in a set
d)finding the sum of all the subsets of a set L3CO5

Q46) A problem is called _____ if its has an efficient algorithm for itself.
a)tractable b)intractable c)computational d)none of the mentioned L3CO5

Q47)What is the number of elements in this set {{a, b}, c}?
A. 1 B. 3 C. 4 D. 0 L3CO5

Q15)Given an array where numbers are in range from 1 to n6, which sorting algorithm can be used to sort these number in linear time?
a)Not possible to sort in linear time
b)Radix Sort
c)Counting Sort
d)Quick Sort
L4CO3

Q16)Identify the approach followed in Floyd Warshall's algorithm?
a)Linear programming
b)Dynamic Programming
c)Greedy Technique
d)Backtracking
L5CO4

Q17)Consider the brute force implementation in which we find all the possible ways of multiplying the given set of n matrices. What is the time complexity of this implementation?
a)O(n!)
b)O(n^3)
c)O(n^2)
d)Exponential
L5CO4

Q18)The Knapsack problem where the objective function is to minimize the profit is _____
a)Greedy
b)Dynamic 0/1
c)Back tracking
d)Branch & Bound 0/1
L5CO4

Q19)What does "brute force" mean in the context of problem-solving?
a)Using the most complex approach to solve a problem
b)Trying all possible solutions without optimization
c)Solving problems without a plan
d)Applying advanced mathematics to solve a problem
L5CO4

Q20) Dijkastra's Algorithm cannot be applied on
a)Directed and weighted graph
b)Unweighted graphs
c)Graphs having negative weight function
d)Undirected and unweighted graphs
L5CO4

Q21) Which of the following statements is TRUE?
A. The algorithm uses dynamic programming paradigm
B. The algorithm has a linear complexity and uses branch and bound paradigm
C. The algorithm has a non-linear polynomial complexity and uses branch and bound paradigm
D. The algorithm uses divide and conquer paradigm
L5CO4

Q22) What is the time complexity of Bellman-Ford single-source shortest path algorithm on a complete graph of n vertices?
a)$\theta(n^2)$
b)$\theta(n^2 \log n)$
c)$\theta(n^3)$
d)$\theta(n^3 \log n)$
L5CO4

Q23) Suppose the letters a, b, c, d, e, f have probabilities 1/2, 1/4, 1/8, 1/16, 1/32, 1/32 respectively. What is the average length of Huffman codes?
a) 3
b) 2.1875
c) 2.25
d) 1.9375
L5CO4

Q24) What does Maximum flow problem involve?
a)finding a flow between source and sink that is maximum
b)finding a flow between source and sink that is minimum
c)finding the shortest path between source and sink
d)computing a minimum spanning tree
L5CO4

Q25)_____will be the value of m in the division method (p=prime number)?
A. Any prime number
B. Any even number
C. $2^p - 1$
D. 2^p
L5CO4

Q26) You are given a knapsack that can carry a maximum weight of 60. There are 4 items with weights {20, 30, 40, 70} and values {70, 80, 90, 200}. What is the maximum value of the items you can carry using the knapsack?
A. 200
B. 160
C. 170
D. 90
L5CO4

Q27) The problems which can be solved using greedy approach can be solved using dynamic programming?
a)True
b)False
c)Undecidable
d)None of the above
L5CO4

Q28) Hamiltonian path problem is _____ problem
a)NP
b)P class
c)NP-complete
d)N class
L5CO4

Q29) What is the advantage of the recursive approach than an iterative approach
a)Consumes less memory
b)Less code and easy to implement
c)Consumes more memory
d)More code has to be written
L5CO4

Q30) What is the worst case time complexity for search, insert and delete operations in a general Binary Search Tree for a skewed tree?
a)O(n) for all
b)O(Logn) for all
c)O(Logn) for search and insert, and O(n) for delete
d)O(Logn) for search, and O(n) for insert and delete
L5CO4

Q31) Which of the following is not a backtracking algorithm?
a)Knight tour problem
b)N queen problem
c)Tower of Hanoi
d)M coloring problem
L3CO5

Q47) Which one of the following statement is TRUE?
a)Set of all matrices forms a group under multiplication
b)Set of all rational negative numbers forms a group under multiplication
c)Set of all non-singular matrices forms a group under multiplication
d)Both (b) and (c)

Q48) For a positive integer n, by using Chinese Remainder Theorem, the number of solutions of the congruence $x^2 \equiv 1 \pmod{n}$, when e ≥ 3 is
a)$2^e + 1$ b)2^{e+1} c)2^{e-1} d)2^e

Q49) The HCF of 480 and 540 is
a)30 b)24 c)20 d)16

Q50) The price P of a certain computer system decreases immediately after its introduction and then increases. If the price P is estimated by the formula $P = 17t^2 - 170t + 6400$, where t is the time in months from its introduction, find the time until the minimum price is reached.
a)8 months b)10 months c)20 months d)8.5 months

Q51) The cost of a computer system increases with increased processor speeds. The cost C of a system as a function of processor speed is estimated as $C = 5S^2 - 4S + 1000$, where S is the processor speed in MHz. Find the processor speed for which cost is at a minimum.
a)0.2 MHz b)0.4 MHz c)3.2 MHz d)8 MHz

Q52) What does NP stands for in complexity classes theory?
a)Non polynomial b)Non-deterministic polynomial
c)All of the mentioned d)None of the mentioned

Q53) Which of the following is incorrect for the given phrase
Phrase :'solvable by non deterministic algorithms in polynomial time'
a)NP Problems
b)During control flow, non deterministic algorithm may have more than one choice
c)If the choices that non deterministic algorithm makes are correct, the amount of time it takes is bounded by polynomial time.
d)None of the mentioned

Q54) Let S be an NP-complete problem and Q and R be two other problems not known to be in NP. Q is polynomial time reducible to S and S is polynomial-time reducible to R. Which one of the following statements is true?
a)R is NP-complete b)R is NP-hard c)Q is NP-complete d)Q is NP-hard

Q55) Which of the following can be used to define NP complexity class
a)Verifier b)Polynomial time c)Both (a) and (B) d)None of above

Q56) A problem X belongs to P complexity class if there exist _____ algorithm to solve that problem, such that the number of steps of the algorithms bounded by a polynomial in n, where n is the length of the input.
a)1 b)2 c)3 d)All of the mentioned

Q57) The structural optimization problem is generally expressed as
a) Maximize Z = F(x) b)Minimize Z =F (x) c)Z = F(x) d)Z = F (t)

Q58) What is the first approach in optimization methods?
a)Theory of layout b)Theory of bending c)Theory of stress d)Theory of elongation

Q59) Halting problem is an example of _____
a)Decidable problem b)Undecidable problem c)Complete problem d)Tractable problem

Q60) If $x^2 - 7x + a$ has a remainder 1 when divided by $x + 1$, then a is
a) 7 b) 7 c) 0 d) 1

--End of Question paper--

4. Do not write or mark anything on the question paper except your registration no. on the designated space.
5. Submit the question paper and the rough sheet(s) along with the OMR sheet to the invigilator before leaving the examination hall.

Q1)Recurrence relations can be solved by
a) Recurrence functions b) Total functions c) Generating functions d) Partial functions L2CO1

Q2)If h is the height of BST, the maximum no. of nodes possible are
A. $2^{h+1}-1$ B. $2^{h+1}-1$ C. 2^h+1 D. $2^{h-1}+1$ L2CO1

Q3)Which of the following is not $O(n^3)$
a) $(15)*n^2$ b) $n^{1.5}$ c) $n^3/(\text{sqrt}(n))$ d) $(20)*n$ L2CO1

Q4)_____ is the theoretical analysis of an algorithm.
A. Posterior Analysis B. Priori Analysis C. Simple Analysis D. Priori Analysis L2CO1

Q5)In the sequence, 11 4 20 45 32 60 98 70, which element seems to be the pivot
a) 70 b)20 c) 98 d) 4 L2CO1

Q6)How does KMP improve the brute-force-method
A. By comparing the characters right to left instead of left to right.
B. By searching for text in pattern instead of pattern in string
C. By not doing redundant comparisons and using the information gained from previous comparisons
D. All of the mentioned L2CO1

Q7)Which of the following areas do closest pair problem arise
a) computational geometry b) graph colouring problems
c) numerical problems d) string matching L3CO2

Q8)Backtracking may lead to a solution that is
a) Optimal b) Suboptimal c) Efficient d) Deterministic L3CO2

Q9)If the expected number of valid shifts is small and modulus is larger than the length of pattern what is the matching time of Rabin Karp Algorithm
a) Theta(m) b) Big-Oh(n+m) c) Theta(n-m) d) Big-Oh(n) L3CO2

Q10)What is the best case for linear search?
a)O(nlogn) b)O(logn) c)O(n) d)O(1) L3CO2

Q11)Which of the following is an unstable sorting algorithm in its typical implementation.
a)Insertion Sort b)Merge Sort c)Quick Sort d)Bubble Sort L3CO

Q12) Breadth First Search is equivalent to which of the traversal in the Binary Trees?
a)Pre-order Traversal b)Post-order Traversal c)Level-order Traversal d)In-order Traversal L4CO

Q13)Which of the following is not an application of Depth First Search?
a) For generating topological sort of a graph
b) For generating Strongly Connected Components of a directed graph
c) Detecting cycles in the graph
d) Peer to Peer Networks L4CO

Q14)Topological sort can be applied on the _____ graph
a)Directed Acyclic Graphs b)Undirected Acyclic Graphs
c)Directed Cyclic Graphs d)Undirected Cyclic Graphs L4C