PS – 390

II Semester M.C.A. Examination, November/December 2022
(CBCS) (2020 – 21 and Onwards)
COMPUTER SCIENCE
2MCA5 : Design and Analysis of Algorithms

Time : 3 Hours Max. Marks : 70

Instructions : *1) Section – **A** : Answer **any five** questions.*
*2) Section – **B** : Answer **any four** questions.*

SECTION – A

Answer **any five** questions. **Each** question carries **six** marks. **(5×6=30)**

1. Give an account of basic efficiency classes.
2. Present Brute-force based algorithm to perform pattern matching and investigate its efficiency.
3. Develop an algorithm to find whether a list containing integers is sorted or not. Comment on its efficiency.
4. Write an algorithm to evaluate the polynomial.
   $p(x) = a_n x^n + a_{n-1} x^{n-1} + \ldots + a_2 x^2 + a_1 x + a_0$ at a given value of x, using straight forward approach.
5. Write dynamic programming based algorithm to compute binomial coefficients. Trace it to compute ${}^7C_3$.
6. Given a digraph, how do you arrive at its transitive closure for the graph ? Write the procedure for the task.
7. Give an account of transform and conquer technique and its variations.
8. Present an algorithm to search for a string in a list of strings using brute force based approach.

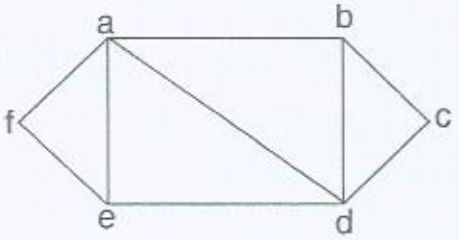
SECTION – B

9. a) Give an account of theoretical analysis of algorithms. **(4×10=40)**
   b) Sort the following list of numbers
   13, 25, 9, 72, 5, 24, 7 using selection sort.

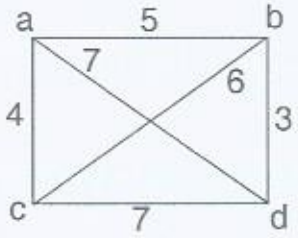
P.T.O.

10. a) Give an account of decrease and conquer technique with an illustrative example for each variation of the technique.

    b) Produce depth-first-search algorithm and comment on its efficiency. Trace it for the following graph.



11. a) Give an account of the underlying principle behind Prim's algorithm. Also produce Prim's algorithm. Trace it for the following graph.



    b) Write transform and conquer based algorithm to evaluate a polynomial. How does it differ from Brute-force based algorithm ?

12. a) Trading space for time is viable in some situations. Justify.

    b) Write Horspool's algorithm to perform pattern matching. How does it differ from Brute-force based pattern matching algorithm ? Comment.

13. a) Write the principle of Backtracking technique. How does it help in solving 4-queens problem ? Explain.

    b) How do you solve sum of subsets problem using backtracking ? Solve the following instance

    $S = \{3, 7, 10, 5\}$, $d = 10$.

14. Write short notes on : **(4+3+3)**

    i) Merge sort.

    ii) Problem reduction.

    iii) P and NP problems.