

14. How can you represent a sparse matrix using 2D array. Illustrate with an example.
15. How to implement queue as a linked list ?
16. What is a weighted graph ?
17. What is depth first search ?
18. What are parallel arrays ?

(8 × 2 = 16 marks)

### Part C

*Write short essay on any **six** questions.*

*Each question carries 4 marks.*

19. Explain the space complexity of an algorithm.
20. Write down the algorithm for deleting an element at the beginning of a singly linked list.
21. Explain some applications of linked list.
22. Explain how recursion can be implemented using a stack.
23. Explain the algorithm for deleting an element from a queue.
24. Explain different types of priority queue.
25. Write a C program to implement POSTORDER traversal in a binary tree.
26. Explain the steps for searching in a binary search tree.
27. Write a C program for exchange sort.

(6 × 4 = 24 marks)

### Part D

*Write essays on any **three** questions.*

*Each question carries 10 marks.*

28. Explain push and pop operations on stack.
29. Explain the insertion and deletion operation in a singly linked list.
30. Explain selection sort with illustration.
31. Explain linear search algorithm with an example.
32. Explain with an example, the adjacency matrix representation of a) Directed graph ; b) Undirected graph ; and c) Multigraph.

(3 × 10 = 30 marks)

**THIRD SEMESTER (CUCBCSS—UG) DEGREE EXAMINATION  
NOVEMBER 2020**

B.C.A.

BCA 3C 06—THEORY OF COMPUTATION

(2017 Admissions)

Time : Three Hours

Maximum : 80 Marks

**Section A**

*Answer all the questions.*

*Each question carries 1 mark.*

1. What is a transition system ?
2. What is a mealy machine ?
3. Explain relations. What are its properties ?
4. Define one-to-one function with example.
5. Define grammar.
6. What is yield ?
7. Define digraph.
8. What is derivation tree ?
9. Find the regular expression for the set of all strings containing exactly 2a's if alphabet set is {a, b}.
10. What are the properties of a relation ?

(10 × 1 = 10 marks)

**Section B**

*Answer all the questions.*

*Each question carries 2 marks.*

11. Define five postulates on binary operations.
12. Find the sets represented by the regular expression  $(a + b)^*(aa + ab + bb + ba)^*$ .
13. Explain tree and its properties.
14. Define PDA.

**Turn over**

15. What are the properties of transition functions ?
16. Find the derivation tree for the string 00110101 if grammar  
G is  $S \rightarrow 0B|1A$ ,  $A \rightarrow 0|0S|1AA$ ,  $A \rightarrow 1|1S|0BB$ .
17. Define Turing Machine.
18. Explain various ways of describing a Set.

(8 × 2 = 16 marks)

### Section C

*Answer any six questions.*

*Each question carries 4 marks.*

19. Explain Chomsky classification of languages.
20. Write the steps for construction of top down parser.
21. Show that the grammar G is ambiguous if  $S \rightarrow SbS|a$ .
22. Find  $L(G)$ , if G is  $S \rightarrow aS|bS|a|b$ .
23. Prove that the theorem : A tree with  $n$  vertices has  $(n - 1)$  edges.
24. Explain about Non Deterministic Finite State Automaton.
25. What are the identities for regular expression ?
26. Explain bottom up parsing with suitable example.
27. Explain ambiguous grammars with example.

(6 × 4 = 24 marks)

### Section D

*Answer any three questions.*

*Each question carries 10 marks.*

28. Construct a grammar in Greibach Normal Form equivalent to the grammar  $S \rightarrow AA|a$ ,  $A \rightarrow SS|b$ .
29. Prove that, If L is the set accepted by N DFA , then there exists a DFA which also accepts L.
30. Explain Arden's theorem.
31. Write steps for minimization of automata with suitable example.
32. Construct a DFA if the regular expression is  $10 + (0 + 11)0^*1$ .

(3 × 10 = 30 marks)

**THIRD SEMESTER (CUCBCSS—UG) DEGREE EXAMINATION  
NOVEMBER 2020**

B.C.A.

BCA 3C 06—OPERATIONS RESEARCH

(2014 Admissions)

Time : Three Hours

Maximum : 80 Marks

*Calculator is permitted.*

**Part A**

**Answer all questions in one word.**

*Each question carries 1 mark.*

1. A basic feasible solution to a LPP correspond to an \_\_\_\_\_ of the set of all feasible solutions.
2. Models in which all parameters and functional relationships are known with certainty when a decision is to be made are called \_\_\_\_\_.
3. The dual of the dual of LPP is a \_\_\_\_\_ problem.
4. In assignment problem with n rows and n columns, the number of occupied cell will be \_\_\_\_\_.
5. The sequence in which given machines are required for completing the job is known as \_\_\_\_\_.
6. A replacement policy where an item is replaced immediately after its failure is called \_\_\_\_\_.
7. The portion of total float within which an activity can be manipulated without affecting the float of subsequent activities is known as \_\_\_\_\_.
8. Revenue due to disposal of left over items at the termination of the inventory period is termed as \_\_\_\_\_.
9. The set of all feasible solutions to linear programming problem forms a \_\_\_\_\_.
10. Activity in a network is non critical if the total float of the activity is \_\_\_\_\_.

(10 × 1 = 10 marks)

**Turn over**

**Part B (Short Answer Questions)***Answer all questions.**Each question carries 2 marks.*

11. Define general LPP.
12. What are balanced and unbalanced transportation problems?
13. Define inventory policy.
14. What is no passing rule in a sequencing problem ?
15. What are the basic components of a network ?

(5 × 2 = 10 marks)

**Part C (Short Essay Questions)***Answer any five questions.**Each question carries 4 marks.*

16. Explain the Big M method of solving linear programming problems.
17. Show that the following system of linear equations has a degenerate solution :  
 $2x + y - z = 2$ , and  $3x + 2y + z = 3$ .
18. Explain transportation problem. Give its mathematical formulation.
19. Solve the following transportation problem by north west corner rule :

Factory	Distribution					Supply
	V	W	X	Y	Z	
A	4	3	1	2	6	80
B	5	2	3	4	5	60
C	3	5	6	3	2	40
D	2	4	4	5	3	20
Demand	60	60	30	40	10	200

20. Explain the rules of network construction.
21. A stockist purchases an item at the rate of \$40 per piece from a manufacturer. 2000 units of the item are required per year. What should be the order quantity per order if the cost per order is \$15 and the inventory charges per year are \$0.20 ?

22. Describe the time estimates made for each activity and expected activity duration in PERT.
23. Explain the replacement model of items that deteriorates with time for a constant money value.

(5 × 4 = 20 marks)

**Part D (Essay Questions)**

*Answer any five questions.  
Each question carries 8 marks.*

24. Use two phase simplex method to :

$$\text{Maximize } Z = x_1 + 2x_2 + 3x_3$$

subject to the constraints

$$x_1 - x_2 + x_3 \geq 4, x_1 + x_2 + 2x_3 \leq 8, x_1 - x_3 \geq 2 \text{ and } x_1 \geq 0, x_2 \geq 0 \text{ and } x_3 \geq 0.$$

25. Explain the dual simplex method of solving LPP.
26. Derive EOQ formula for an inventory model with finite production rate and shortages are permitted
27. Solve the following assignment problem for minimum cost :

	I	II	III	IV	V	VI
A	12	10	15	22	18	8
B	10	18	25	15	16	12
C	11	10	3	8	5	9
D	6	14	10	13	13	12
E	8	12	11	7	13	10

28. (i) Explain briefly the costs/ revenues associated with the inventory control.
- (ii) Define the following terms in inventory: Demand, Lead time and Safety stock.
29. A project schedule has the following characteristics :

Activity	Time
0-1	2
1-2	8
1-3	10
2-4	6

**Turn over**

Activity	Time
2-5	3
3-4	3
3-6	7
4-7	5
5-7	2
6-7	8

Construct network and find the critical path. What is the project duration ?

30. The maintenance cost and resale value per year of a machine whose purchase price is 7000 rupees, is given below :

Year	1	2	3	4	5	6	7	8
Maintenance cost in rupees	900	1200	1600	2100	2800	3700	4700	5900
Resale value in rupees	4000	2000	1200	600	500	400	400	400

When should the machine be replaced ?

31. There are 7 job , each of which has to go through the machines A and B in the order AB. Processing times in hours are given below :

Job	1	2	3	4	5	6	7
Machine A	3	12	15	6	10	11	9
Machine B	8	10	10	6	12	1	3

Determine a sequence of jobs the will minimize the total elapsed time. What is the minimum elapsed time ? What are the idle times for machines A and B ?

(5 × 8 = 40 marks)

**THIRD SEMESTER (CUCBCSS—UG) DEGREE EXAMINATION  
NOVEMBER 2020**

B.C.A.

BCA 3C 05—FINANCIAL AND MANAGEMENT ACCOUNTING

(2014 Admissions)

Time : Three Hours

Maximum : 80 Marks

**Part A**

*Answer all questions.*

*Each question carries 1 mark.*

A. Choose the correct answer from the choices given :

1 Standard costs are :

- |                   |                                 |
|-------------------|---------------------------------|
| a) Ideal Costs.   | b) Normal Costs.                |
| c) Average Costs. | d) Reasonably Attainable Costs. |

2 Average stock is Rs. 12,000 and Closing stock is Rs.3,000 more than opening stock. If so, what will be the closing stock ?

- |                |                |
|----------------|----------------|
| a) Rs. 12,000. | b) Rs. 14,000. |
| c) Rs. 14,500. | d) Rs. 13,500. |

3 Decrease in the amount of creditors result in :

- |                           |                           |
|---------------------------|---------------------------|
| a) Increase in cash.      | b) Decrease in cash.      |
| c) Increase in liability. | d) Decrease in liability. |

4 Fictitious assets are also known as :

- |                     |                           |
|---------------------|---------------------------|
| a) Current assets.  | b) Closing assets.        |
| c) Floating assets. | d) Deferred expenditures. |

5 The budget prepared for more than one level of activity is :

- |                   |                     |
|-------------------|---------------------|
| a) Fixed budget.  | b) Flexible budget. |
| c) Master budget. | d) Cash budget.     |

B. Fill in the blanks :

6 Closing stock + \_\_\_\_\_ – Purchases = Opening stock.

7 Building sold on credit is \_\_\_\_\_ of fund.

**Turn over**



- 8 *The Imprest system* is used in relation to \_\_\_\_\_.
- 9 Comparison of financial variables of a firm over a period of time is known as \_\_\_\_\_.
- 10 In marginal costing, finished goods are valued at \_\_\_\_\_.

(10 × 1 = 10 marks)

### Part B (Short Answer Questions)

Answer **all** questions.

Each question carries 2 marks.

11. What is an account ?
12. What is P/E Ratio ?
13. What is cost break even point ?
14. Define ledger.
15. Write any two limitations of management accounting.

(5 × 2 = 10 marks)

### Part C (Short Essay Questions)

Answer any **five** questions.

Each question carries 4 marks.

16. Bring out the dissimilarities of balance sheet with profit & loss account.
17. Mention the limitations of financial statements.
18. Explain the forms of cash flows with suitable examples.
19. Explain the managerial uses of variance analysis.
20. Calculate fund from operation from the following data :
  - a) Net profit as on 31<sup>st</sup> July 2017 ₹ 6,50,000
  - b) Gain on sale of building ₹ 35,500
  - c) Good will appears in the books at ₹ 1,80,000 out of that 10% has been written off during the year.
  - d) Old machinery worth ₹ 8,000 has been sold for ₹ 6,500 during the year.
  - e) ₹ 1,25,000 have been transferred to the general reserve fund.
  - f) Depreciation has been provided during the year on machinery and furniture @20% whose total cost is ₹ 6,50,000.

Using the following information, prepare a comparative balance sheet of Karuna Ltd :

Particulars	As on 31 <sup>st</sup> Dec. 2017 (₹)	As on 31 <sup>st</sup> Dec. 2016 (₹)
Equity share capital	50,00,000	50,00,000
Fixed assets	72,00,000	60,00,000
Reserve & surplus	12,00,000	10,00,000
Investments	10,00,000	10,00,000
Long term loans	30,00,000	30,00,000
Current assets	21,00,000	30,00,000
Current liabilities	11,00,000	10,00,000

Prepare a production budget for Nanma Ltd. from the details furnished below :

Type of Product	Estimated stock on 1 <sup>st</sup> Jan.2012 (Units)	Estimated Sales during Jan-March 2012 (Units)	Desired Closing stock on 31 <sup>st</sup> March 2012 (Units)
A	2,000	10,000	3,000
B	3,000	15,000	5,000
C	4,000	13,000	3,000
D	3,000	12,000	2,000

Mr. X furnishes the following details :

	Rs.
Sales	6,00,000
Fixed cost	3,00,000
Variable cost	1,80,000

Calculate Break even point at :

The budgeted data.

Assuming 20% increase in variable cost.

Assuming 20% increase in fixed cost.

(5 × 4 = 20 marks)

### Part D (Long Essay Questions)

Answer any **five** questions.

Each question carries 8 marks.

1. Explain the process of accounting in detail.

2. Explain CVP analysis? State its applications in detail.

Turn over

26. Discuss the preliminaries involved in the installation of a budgetary control system.
27. What is a fund flow statement ? State its uses and the causes of changes in working capital.
28. Current ratio 2.5, Liquid ratio 1.5, working capital Rs. 60,000. Find out :
- (i) Current assets. (ii) Current liabilities.
- (iii) Liquid assets. (iv) Stock.
29. Following are the summarized balance sheets of Excel Ltd. as on 31st March, 2016 and 2017. You are required to prepare a statement of sources and application of cash :

Liabilities	2016 Rs.	2017 Rs.	Assets	2016 Rs.	2017 Rs.
Eq. Share capital	3,00,000	4,00,000	Goodwill	1,15,000	90,000
8% Red.Pref. Share capital	1,50,000	1,00,000	Land & Building	2,00,000	1,70,000
General reserve	40,000	70,000	Plant	80,000	2,00,000
P& L A/c	30,000	48,000	Stock	77,000	1,09,000
Proposed dividend	42,000	50,000	Sundry Debtors	1,60,000	2,00,000
Sundry Creditors	55,000	83,000	Bills receivable	20,000	30,000
Bills Payable	20,000	16,000	Cash in Hand	15,000	10,000
Provision for taxation	40,000	50,000	Cash at Bank	10,000	8,000
	6,77,000	8,17,000		6,77,000	8,17,000

Additional informations :

- (i) An interim dividend of Rs. 20,000 was paid in 2017
- (ii) Income tax paid during the year was Rs. 35,000
- (iii) Depreciation of Rs. 10,000 and Rs. 20,000 have been charged on plant and buildings respectively in 2017
30. From the following informations regarding a standard product, calculate labour variances :

Labour rate	50 paise per hour
Hours per unit	10 hour
Units produced	500
Hours worked	6,000
Actual labour cost	2,400

31. The following are the information of Green Ltd. Find out :

- a) Fixed expense.
- b) Break even units.
- c) Number of units to earn a profit of Rs. 40,000.

The selling price per unit can be assumed at Rs. 100. The company sold 7,000 units in 2012 and has incurred a loss of Rs. 10,000. In 2013 sold 9,000 units and earned a profit of Rs. 10,000.

(5 × 8 = 40 marks)

**THIRD SEMESTER (CUCBCSS—UG) DEGREE EXAMINATION  
NOVEMBER 2020**

B.C.A.

BCA 3C 05—COMPUTER ORIENTED NUMERICAL AND STATISTICAL METHODS

(2017 Admissions)

Time : Three Hours

Maximum : 80 Marks

**Part A**

*Answer all questions.*

*Each question carries 1 mark.*

1. What is the accuracy of the number 95.763 ?
2. What do you mean by Round-off errors ?
3. Give the form of an algebraic equation.
4. What is the empirical relationship between Mean, Median and Mode ?
5. When mode is said to be ill-defined ?
6. Define standard deviation ?
7. Give the formula for finding Karl Pearson's co-efficient of correlation ?
8. What do you mean by a random experiment ?
9. Define discrete and continuous random variables.
10. What are the properties of a distribution function ?

(10 × 1 = 10 marks)

**Part B**

*Answer all questions.*

*Each question carries 2 marks.*

11. What do you mean by the method of false position ?
12. Give the Trapezoidal rule.

**Turn over**

13. Calculate Arithmetic mean for the following data :  
10, 90, 85, 103, 11, 29, 84, 15, 35, 80
14. Explain Lorenz curve with its procedures of drawing ?
15. Define Harmonic mean with its formula.
16. What do you mean by Q.D ?
17. What you mean by Principle of least squares ?
18. Give the relationship between correlation co-efficient and regression co-efficients.

(8 × 2 = 16 marks,)

**Part C**

*Answer any six questions.  
Each question carries 4 marks.*

19. Find a root of the equation  $x^2 - 4x - 10 = 0$  using bisection method ?
20. Compute the integral  $\int_{-1}^1 e^x dx$  using composite trapezoidal rule for (a)  $n = 2$  and (b)  $n = 4$ .

21. Given the data :

X	1.2	1.3	1.4	1.5
$f(x)$	1.063	1.091	1.119	1.145

Calculate  $f(1.35)$  using Newton's Interpolation polynomial of order 1 through 3.

22. Calculate Median for the following data :

Size	0-5	5-10	10-15	15-20	20-25	25-30
Frequency	20	24	32	28	20	26

23. Find the Geometric mean of 1.05, 1.08, 2.01, 3.05, 4.01.
24. Find Spearman's Rank Correlation Co-efficient between Poverty and Overcrowding :

Poverty	17	13	15	16	6	11	14	9	7	12
Overcrowding	36	46	35	24	12	18	27	22	2	8

25. In the study of regression equations, following values were obtained. (a) Regression co-efficient of  $y$  on  $x = 0.25$ ,  $r = 0.42$ ,  $\sigma_y = 4$ , find S.D. of  $x$ . (b) Out of the two lines of regression given by  $x + 2y - 5 = 0$  and  $2x + 3y - 8 = 0$ , which one is the regression line of  $x$  on  $y$  ?
26. Define the probability density function and distribution function of a discrete random variable with examples of each.
27. Represent the Union, Intersection and complement of two events A and B by using Venn diagrams.

(6 × 4 = 24 marks)

**Part D**

*Answer any three questions.  
Each question carries 10 marks.*

28. Find roots of the equation  $f(x) = x^2 - 2x - 1$  by using Newton-Raphson method.
29. Find Mode for the following data :
- | Marks     | 0–10 | 10–20 | 20–30 | 30–40 | 40–50 | 50–60 |
|-----------|------|-------|-------|-------|-------|-------|
| Frequency | 5    | 15    | 0     | 40    | 32    | 2     |
30. Derive false-position formula and use the same repeatedly to find the roots of the equation  $\sin(x) - x + 2 = 0$ .
31. From the following data, form the two regression equations and find the value of  $y$  when  $x = 16$  :

$x$	36	23	27	28	28	29	30	31	33	35
$y$	29	18	20	22	27	21	29	27	29	28

32. Find Karl Pearson's co-efficient of correlation for the following data :

Price	100	90	85	92	90	84	88	90
Sales	600	610	700	630	670	800	800	750

(3 × 10 = 30 marks)

**THIRD SEMESTER (CUCBCSS—UG) DEGREE EXAMINATION  
NOVEMBER 2020**

B.C.A.

BCA 3B 04—DATA STRUCTURES USING C++

(2014 Admissions)

Time : Three Hours

Maximum : 80 Marks

**Part A**

*Answer all the questions.*

*Each question carries 1 mark.*

1. \_\_\_\_\_ is a set of rules for carrying out calculations either by hand or on a machine.
2. \_\_\_\_\_ is an example of primitive data structures.
3. The efficiency of the algorithm is measured by evaluating the space complexity and \_\_\_\_\_.
4. An array name holds the address of \_\_\_\_\_.
5. A matrix with high ratio of zeroes is called \_\_\_\_\_ matrix.
6. \_\_\_\_\_ data structure is used for subprogram execution control.
7. In \_\_\_\_\_ linked list the last node holds the address of the first node.
8. Process queue is an example of \_\_\_\_\_ type of queue.
9. The degree of a terminal node of a tree is \_\_\_\_\_.
10. The term address collision is in connection with \_\_\_\_\_.

(10 × 1 = 10 marks)

**Part B**

*Answer all questions.*

*Each question carries 2 marks.*

11. What is ADT ?
12. What are the features of a sparse matrix ?
13. What is the postfix form of the expression  $(A + B) * C / (D + E)$  ?
14. Define left skewed binary tree with example.
15. What are the advantages of binary search procedure ?

(5 × 2 = 10 marks)

**Turn over**

**Part C**

*Answer any five questions.  
Each question carries 4 marks.*

16. Explain the bottom-up approach in algorithmic design.
17. What are the various design strategies of an algorithm ?
18. How to represent a one dimensional array in memory ? Discuss its limitations.
19. Develop the data structures to represent a polynomial in memory using linked list and discuss its manipulation.
20. What is doubly linked list ? Explain.
21. What is linked queue ? Explain.
22. Explain one of the tree traversal methods with suitable example.
23. Discuss various hash functions with example.

(5 × 4 = 20 marks)

**Part D**

*Answer any five questions.  
Each question carries 8 marks.*

24. What are data structures ? Explain the classification of data structures with suitable example.
25. Explain the row major and column major representation of two dimensional arrays.
26. Develop the algorithms for implementing the following operations in circular doubly linked list.
  1. Insert a new node as a first node.
  2. Delete the node from a specified position.
27. What is dynamic memory allocation ? Discuss the dynamic memory management strategies in detail.
28. What are the advantages of a circular queue ? Develop the algorithms to implement a circular queue in memory.
29. What is graph data structure ? Discuss the basic graph terminology with proper diagrams.
30. What is hash collision ? Discuss various collision resolving methods.
31. Explain the heap sort procedure. Also, illustrate with example.

(5 × 8 = 40 marks)



**THIRD SEMESTER (CUCBCSS—UG) DEGREE EXAMINATION  
NOVEMBER 2020**

B.C.A.

BCA 3B 03—DATABASE DESIGN AND RDBMS

(2014 Admissions)

Time : Three Hours

Maximum : 80 Marks

**Part A**

*Answer all questions.*

*Each question carries 1 mark.*

1. The overall design of the database is called the database \_\_\_\_\_.
2. A row in a database can also be called \_\_\_\_\_.
3. A domain is \_\_\_\_\_ if elements of the domain are considered to be indivisible units.
4. A \_\_\_\_\_ is a unit of program execution that accesses and possibly updates various data items.
5. The transaction has been rolled back and the database has been restored to its state prior to the start of the transaction is called \_\_\_\_\_.
6. Expand RDBMS.
7. The \_\_\_\_\_ clause corresponds to the selection predicate of the relational algebra.
8. Expand DDL.
9. Which is the command used for destroying tables ?
10. \_\_\_\_\_ key is a field in the table that is primary key in another table

(10 × 1 = 10 marks)

**Part B**

*Answer all questions.*

*Each question carries 2 marks.*

11. What is database system ?
12. What is query language ?

**Turn over**

13. State Byce-Codd Normal form.
14. What is the use of primary key ?
15. What is Cursor ?

(5 × 2 = 10 marks)

### Part C

*Answer any five questions.  
Each question carries 4 marks.*

16. Briefly explain the characterization of attribute types.
17. Discuss about the type of database system users.
18. Distinguish between weak entity and strong entity.
19. What do you mean by the durability property of transaction ? How can you ensure the durability of transaction ?
20. Explain the schema definition in SQL.
21. Discuss the usage of HAVING clause in grouping data from tables in SQL.
22. Discuss the granting privileges in SQL.
23. Explain the implicit cursor attributes used in SQL.

(5 × 4 = 20 marks)

### Part D

*Answer any five questions.  
Each question carries 8 marks.*

24. Explain the database architecture.
25. What are mapping cardinalities ? Discuss the different cardinalities used in a relationship set with diagram.
26. Discuss 1NF, 2NF and 3NF.
27. Discuss the concurrent executions of transactions.
28. Explain the data types used in SQL.
29. Explain the between and like operators used in SQL with example.
30. Discuss the error handling in SQL.
31. What are locks ? Discuss the types and levels of locks.

(5 × 8 = 40 marks)

**THIRD SEMESTER (CBCSS-UG) DEGREE EXAMINATION, NOVEMBER 2020**

B.C.A.

BCA 3C 05—COMPUTER ORIENTED NUMERICAL AND STATISTICAL METHODS

Time : Two Hours

Maximum : 60 Marks

**Section A***Answer at least **eight** questions.**Each question carries 3 marks.**All questions can be attended.**Overall Ceiling 24.*

1. Define Median.
2. Explain Random Variable with example.
3. Why Arithmetic Mean is considered to be the best measure of central tendency ?
4. Define Correlation.
5. Two numbers are given as 2.5 and 48.289, both of which being correct to the significant figures given. Find their product.
6. Explain the term Random Experiment in probability.
7. Write the formula for finding Karl Pearson's Coefficient of Correlation.
8. What are the uses of Mean Deviation ?
9. Calculate Standard deviation 41, 43, 44, 45, 47, 49, 50, 55, 56, 60.
10. Define Conditional Probability.
11. The marks obtained by seven students are 5,10,15,20,25,30,45. Find the Harmonic Mean.
12. Explain Probability density function of a discrete random variable.

(8 × 3 = 24 marks)

**Section B***Answer at least **five** questions.**Each question carries 5 marks.**All questions can be attended.**Overall Ceiling 25.*

13. Explain Lorenz Curve.
14. Explain Method of False Position.

**Turn over**

15. Find Geometric Mean from the following data :

Size	5	8	10	12
Freq.	2	3	4	1

16. Find a real root of the equation  $x = e^x$ , using the Newton-Raphson method.

17. Obtain the quartile measure of dispersion and its coefficient for the data given below :

Age	0–10	10–20	20–30	30–40	40–50	50–60	60–70	70–80
No. of Persons	15	30	53	75	100	110	115	125

18. Using Simpson's (1/3)<sup>rd</sup> Rule. Evaluate  $\int_1^5 dx/x$  given  $h = 1$ .

19. A card is drawn from a pack of cards. What is the probability that it is ?

- |                   |                         |
|-------------------|-------------------------|
| (i) Black card.   | (ii) A king.            |
| (iii) A queen.    | (iv) A spade.           |
| (v) A spade king. | (vi) A king or a queen. |

(5 × 5 = 25 marks)

### Section C (Essay Questions)

*Answer any one question.  
The question carries 11 marks.*

20. Obtain the rank correlation coefficient for the following data :

X	68	64	75	50	64	80	75	40	55	64
Y	62	58	68	45	81	60	68	48	50	70

21. Find the approximate value of  $\int_0^1 dx/(1+x)$  using (i) Trapezoidal Rule ; (ii) Simpson's (1/3)<sup>rd</sup> Rule.

(1 × 11 = 11 marks)

**THIRD SEMESTER (CBCSS—UG) DEGREE EXAMINATION  
NOVEMBER 2020**

BCA

BCA 3B 04—DATA STRUCTURES USING C

Time : Two Hours

Maximum : 60 Marks

**Section A (Short Answer Type Questions)**

*Answer at least **eight** questions.*

*Each question carries 3 marks.*

*All questions can be attended.*

*Overall Ceiling 24.*

1. What are the different applications of data structures ?
2. Briefly describe the notation of the space-time trade off of algorithm.
3. What is row major order ?
4. Define linked list.
5. Write formula to calculate address of elements in two-dimensional array. Explain with example.
6. What will happen in a C program when you assign a value to an array element whose subscripts exceed the size of array ? Explain with example.
7. Write an algorithm to perform pop operation
8. List the different applications of tree.
9. Write the following prefix notation to expression tree in step by step.  
+, \*, 2, 6, /, 3, 8.
10. Define binary search.
11. What is undirected graph ? Explain.
12. Explain Folding Method in hashing.

(8 × 3 = 24 marks)

**Section B (Short Essay Type Questions)**

*Answer at least **five** questions.*

*Each question carries 5 marks.*

*All questions can be attended.*

*Overall Ceiling 25.*

13. Write a menu driven program to concatenate two strings with and without using string functions.
14. Differentiate between linear and non-linear data structure.

**Turn over**

15. Write menu driven a program to implement singly linked list without using recursive function.
16. What is a Stack? Write a program to insert more than one element into a stack. Check all validations and use user defined functions and pass parameters.
17. Write a menu driven program to implementation (operations) of queue using linked list.
18. Define Hashing. Explain the different hash functions.
19. Write a program to sort a list of numbers in descending order using Bubble. Explain.

(5 × 5 = 25 marks)

**Section C (Essay Type Questions)**

*Answer any one question.  
The question carries 11 marks.*

20. Write a note on :
    - (i) Data structure operations.
    - (ii) Big-O notation.
    - (iii) Parallel arrays and Applications of linked lists.
    - (iv) Sequential searching.
  21. (a) Write a program to sort a list of number using Exchange sort, use user defined functions and pass parameters.

(6 marks)
  - (b) Explain depth-first and breadth with example.

(5 marks)
- [1 × 11 = 11 marks]

**THIRD SEMESTER (CBCSS—UG) DEGREE EXAMINATION  
NOVEMBER 2020**

BCA

BCA 3C 06—THEORY OF COMPUTATION

Time : Two Hours

Maximum : 60 Marks

**Section A (Short Essay Type Questions)***Answer at least **eight** questions.**Each question carries 3 marks.**All questions can be attended.**Overall Ceiling 24.*

1. Define Top Down Parsing.
2. Explain algebraic laws for regular expression.
3. Differentiate between Mealy machine & Moore machine.
4. What are the characteristics of automaton ?
5. What are the operations on sets ?
6. Define onto function with example.
7. What is yield ?
8. Explain representation of a digraph.
9. Explain Turing Machine Model.
10. Define Parse Tree with example.
11. Prove the following theorem by Induction :  $1 + 2 + 3 + \dots + n = n(n + 1)/2$ .
12. Explain Strings & their properties.

(8 × 3 = 24 marks)

**Turn over**

### Section B (Short Essay Type Questions)

Answer at least **five** questions.

Each question carries 5 marks.

All questions can be attended.

Overall Ceiling 25.

13. Explain the steps for construction of minimum automaton.
14. Write different methods for representing Turing Machines.
15. Prove that the number of leaves in a binary tree  $T$  is  $(n + 1)/2$ , where ' $n$ ' is the number of vertices.
16. Find  $L(G)$ , if  $G = (\{S\}, \{0, 1\}, \{S \rightarrow 0S1, S \rightarrow \wedge\})$ .
17. Construct a regular expression corresponding to the given transition table.

State	0	1
$\rightarrow q^1$	$q^1$	$q^2$
$q^2$	$q^3$	$q^2$
$q^3$	$q^1$	$q^2$

18. Prove the Pigeonhole principle by induction.
19. Explain algebraic laws for regular expression.

(5 × 5 = 25 marks)

### Section C

Answer any **one** question.

The question carries 11 marks.

20. Explain Kleene's Theorem.
21. Explain Chomsky classification of languages with example.

(1 × 11 = 11 marks)