

**FIRST SEMESTER (CBCSS—UG) DEGREE EXAMINATION
NOVEMBER 2021**

B.C.A.

BCA 1C 02—DISCRETE MATHEMATICS

(2019—2020 Admissions)

Time : Two Hours

Maximum : 60 Marks

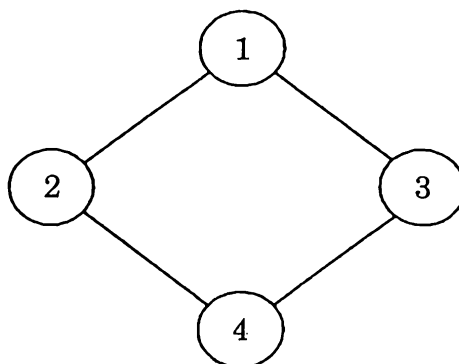
Section A (Short Answer Type Questions)

Answer all questions.

Each question carries 2 marks.

Ceiling 20 marks.

1. Construct the truth table for $\sim(pq)$.
2. Express in the symbolic form of 'Everyone who is healthy can do all kinds of work'.
3. Give an example of a relationship that is both symmetric and antisymmetric.
4. Define the greatest lower bound in Poset.
5. Show that in any graph, the number of vertices of odd degrees is even.
6. Define a Hamiltonian Graph.
7. Briefly explain the spanning tree.
8. Define binary tree. Give example.
9. What is a regular graph ? Give an example.
10. Write the matrix representation of the following graph.



11. Define chromatic graph. Give an example.
12. Explain logical equivalent and logical sequences of a proposition.

Section B (Short Essay Type Questions)

Answer all questions.

Each question carries 5 marks.

Ceiling 30 marks.

13. Prove that for any *three* propositions P, Q, R the compound proposition $(P \rightarrow (Q \rightarrow R)) \rightarrow ((P \rightarrow Q) \rightarrow (P \rightarrow R))$ is a tautology i) With truth table ; ii) With laws of logic.
14. Define partially ordered set and Hasse diagram. Let $S = \{a, b, c\}$ then the power set $P(S) = \{\emptyset, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{b, c\}, \{a, b, c\}\}$ is a Poset with respect to the relation inclusion \subseteq . Draw the Hasse diagram.
15. What is Isomorphism ? Explain with an example.
16. Write Kruskal's algorithm.
17. How do you represent a graph ? Explain with an example
18. Prove that the maximum number of edges in a simple graph with n vertices is.
19. Define Adjacency matrix and incidence matrix of a graph. Give example.

Section C (Essay Type Questions)

Answer any one question.

The question carries 10 marks.

20. Prove that connected graph G with at least two vertices contains at least two vertices that are not cut vertices.
21. Explain the searching algorithms of the graph with an example.

(1 × 10 = 10 marks)

FIRST SEMESTER (CBCSS-UG) DEGREE EXAMINATION, NOVEMBER 2021

B.C.A.

BCA 1C 01—MATHEMATICAL FOUNDATION FOR COMPUTER APPLICATIONS

(2019--2020 Admissions)

Time : Two Hours

Maximum : 60 Marks

Section A (Short Answer Type Questions)

*Answer all questions.**Each question carries 2 marks.**Ceiling 20 marks.*

1. Define skew symmetric matrices.
2. If $A = \begin{bmatrix} 2 & 1 \\ 1 & 7 \end{bmatrix}$ and $B = \begin{bmatrix} -2 & 5 \\ 0 & 8 \end{bmatrix}$. Find $4A - 8B$.
3. Find the value of λ such that the vectors $\vec{a} = 2\vec{i} + 3\vec{j} + 4\vec{k}$ and $\vec{b} = 3\vec{i} + 2\vec{j} + \lambda\vec{k}$.
4. Show that the matrix $\begin{bmatrix} 2 & -1 \\ 1 & 3 \end{bmatrix}$ is non-singular.
5. Find the derivative of $x^2 \tan x$.
6. Find $\frac{dy}{dx}$, if $y = (1 + x^2) \cos x$.
7. Find $\int_0^2 \cos 2x \, dx$.
8. Evaluate $\int \cot x \, dx$.
9. Define an odd function. What is an even function?

10. Evaluate $\int_0^{\pi/4} e^x (1 + \tan x + \tan^2 x) dx$.

11. Find the determinant of the matrix $A = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 2 \\ 0 & 0 & 4 \end{bmatrix}$.

12. Find the rank of the matrix $A = [5 \ 2]$.

Section B (Short Essay Type Questions)

Answer all questions.

Each question carries 5 marks.

Ceiling 30 marks.

13. If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \end{bmatrix}$. Verify that $A^2 - 4A - 5I = 0$.

14. Find the rank of the matrix $A = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 3 & -2 & 1 \\ 2 & 0 & -3 & 2 \end{bmatrix}$.

15. Find the derivative of e^x using the first principal.

16. Evaluate $\int \frac{x-5}{x^2-10x+11} dx$.

17. Evaluate $\int \frac{1}{1+\sin x} dx$.

18. Solve the linear system :

$$-x_1 + x_2 + 2x_3 = 2$$

$$3x_1 - x_2 + x_3 = 6$$

$$-x_1 + 3x_2 + 4x_3 = 4.$$

19. Find the angle between the vectors $a = [2, -1, 1]$ and $b = [-1, 3, 5]$.

Section C (Essay Type Questions)

Answer any one question.

The question carries 10 marks.

20. a) If $A = \begin{bmatrix} 1 & -1 & 0 \\ 2 & 1 & 3 \\ 4 & 1 & 8 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 1 & 0 \\ 2 & -3 & 1 \\ 1 & 1 & -1 \end{bmatrix}$ then verify that $(AB)' = B'A'$.

b) Compute the inverse of a matrix $\begin{bmatrix} 1 & 0 & 2 \\ 2 & 1 & 0 \\ 3 & 2 & 1 \end{bmatrix}$.

21. a) Evaluate $\int \frac{x-1}{(x+1)(x-2)} dx$.

b) Evaluate $\int x \log x dx$.

(1 × 10 = 10 marks)

**FIRST SEMESTER (CBCSS—UG) DEGREE EXAMINATION
NOVEMBER 2021**

B.C.A.

BCA 1B 01—COMPUTER FUNDAMENTALS AND HTML

(2019—2020 Admissions)

Time : Two Hours

Maximum : 60 Marks

Section A (Short Answer Type Questions)

*Answer all questions.
Each question carries 2 marks.
Ceiling 20 marks.*

1. What are the different components of CPU ?
2. Define the purpose of mother board.
3. What are the different types of computer language ? Give examples for each.
4. What is Excess-3 code ?
5. Define Maxterm.
6. How do you convert 1s complement to 2s complement ?
7. What are the symbols used in flowchart ?
8. Write the algorithm to find the average of n numbers.
9. Define W3C.
10. What are Web browsers ? Give two examples.
11. What are input types in HTML ?
12. Define CSS Class.

Section B (Short Essay Type Questions)

*Answer all questions.
Each question carries 5 marks.
Ceiling 30 marks.*

13. Briefly discuss different types of RAM.
14. Differentiate primary storage and secondary storage devices with examples.

15. What is the difference between Octal and Hexadecimal number system ? Give example.
16. Minimize the following Boolean expression using K-map -
$$F(A, B, C) = A'BC + A'BC' + AB'C' + AB'C$$
17. How do you find roots of quadratic equation ? Briefly explain with an example.
18. Discuss briefly HTML media tags with example.
19. Briefly discuss the types of CSS with examples.

Section C (Essay Type Questions)

*Answer any **one** question.*

Each question carries 10 marks.

20. Discuss Von Neumann Model with diagram.
21. Design algorithm and flowchart for the following :
 - a) Solutions to the Quadratic Equation.
 - b) Finding Smallest number among N numbers.

(1 × 10 = 10)

FIRST SEMESTER (CBCSS—UG) DEGREE EXAMINATION, NOVEMBER 2021

B.C.A.

BCA 1C 02—DISCRETE MATHEMATICS

(2021 Admissions)

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. Define contradiction.
2. Define dual of proposition. Write the dual of $(P \wedge Q) \vee T$
3. Show that $\neg P \wedge P$ is a tautology.
4. Explain universal quantifier.
5. Define transitive relation. Show whether the relation $R = \{<1, 2>, <2, 3>, <1, 3>, <2, 1>\}$ is transitive.
6. Define Boolean algebra.
7. Define minterm.
8. Define partially ordered set.
9. Define subgraph of a graph with an example.
10. Define Euler Graph.
11. Define isolated vertex of a graph. Give an example.
12. Define an m-ary tree.

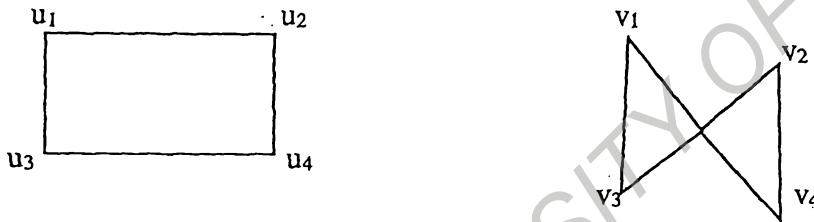
(8 × 3 = 24 marks)

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

13. Prove distributive law in logic using truth table.
14. Show that $P \rightarrow (Q \rightarrow R) \leftrightarrow (P \wedge Q) \rightarrow R$ using laws of logic.

Turn over

15. Let $X = \{1, 2, 3, 4\}$ If $R = \{ \langle x, y \rangle / x > y, x \& y \in X \}$.
- Write the elements of R and its matrix.
 - Draw the digraph represents the relation.
16. Define equivalence class. Also write the equivalence classes modulo 3 generated by the elements of \mathbb{Z} .
17. Show that the $\langle P(X), \subseteq \rangle$ is a partially ordered set, where X is any set and $P(X)$ is the power set of A .
18. Define isomorphism between two graphs. Show that the following graphs are isomorphic.



19. Show that in a complete binary tree the total number of edges is given by $2(n_i - 1)$. Where n_i is the number of terminal nodes.

(5 × 5 = 25 marks)

Section C (Essay Type Questions)

Answer any **one** question.

The question carries 11 marks.

20. Explain relation on a set. Also explain different types of relation on a set. Give examples for each relation.
21. (a) Explain Travelling Salesman Problem.
- (b) Explain Breadth-first search algorithm for spanning tree.

(1 × 11 = 11 marks)

**FIRST SEMESTER (CBCSS-UG) DEGREE EXAMINATION
NOVEMBER 2021**

B.C.A.

BCA 1C 01—MATHEMATICAL FOUNDATION FOR COMPUTER APPLICATIONS
(2021 Admissions)

Time : Two Hours

Maximum : 60 Marks

Section A

*Answer atleast **eight** questions.*

Each question carries 3 marks.

All questions can be attended.

Overall ceiling 24.

1. Define singular and non-singular matrix
2. Define principal diagonal of matrix.
3. If $A = \begin{bmatrix} x - y & 2x + z \\ 2x - y & 3z + w \end{bmatrix} = \begin{bmatrix} -2 & 5 \\ 0 & 8 \end{bmatrix}$. Then find x, y, z and w .
4. State the definition of Eigen value.
5. Evaluate the determinant $\begin{vmatrix} \cos n\theta & \sin n\theta \\ -\sin n\theta & \cos n\theta \end{vmatrix}$.
6. Define derivative of a function at a point.
7. State function of function rule.
8. Find $\frac{dy}{dx}$ if $y = \sqrt{\sin x}$.
9. Find the derivative of $(x - 1)(x - 2)$.
10. Evaluate $\int_1^2 x^2 dx$.

Turn over

11. Define an even function. What is the value of $\int_{-a}^a \cos x \, dx$?
12. Write any two properties of definite integral.

(8 × 3 = 24 marks)

Section B

Answer atleast **five** questions.

Each question carries 5 marks.

All questions can be attended.

Overall ceiling 25.

13. If $A = \begin{bmatrix} a & b & c \\ c & a & b \\ b & c & a \end{bmatrix}$, then prove that $|A| = a^3 + b^3 + c^3 - 3abc$.
14. If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ where $ad - bc \neq 0$ then find the inverse of A.
15. Find the vector perpendicular to the vectors $2i - j + k$ and $3i + 4j - k$.
16. Find the derivative of $\cos x$ using the first principal.
17. Differentiate $e^x \log(\sin 2x)$.
18. Evaluate $\int \frac{3x + 2}{x^2 + 3x + 2}$.
19. Integrate $\frac{\cos^3 x + 1}{\cos^2 x}$.

(5 × 5 = 25 marks)

Section C

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

20. (a) Solve the system of linear equations :

$$x_1 - x_2 + x_3 = 4$$

$$2x_1 + x_2 - 3x_3 = 0$$

$$x_1 + x_2 + x_3 = 2.$$

(b) Find the eigen values the matrix :

$$\begin{bmatrix} 2 & 1 & 0 \\ 0 & 2 & 1 \\ 0 & 0 & 2 \end{bmatrix}.$$

21. (a) Find if $\frac{dy}{dx}$, if $y = e^x \log(1 + x^2)$.

(b) Integrate $\frac{1}{x^2 + 2x + 7}$.

(1 × 11 = 11 marks)

**FIRST SEMESTER (CBCSS-UG) DEGREE EXAMINATION
NOVEMBER 2021**

B.C.A.

BCA 1B 01—COMPUTER FUNDAMENTALS AND HTML

(2021 Admissions)

Time : Two Hours

Maximum : 60 Marks

Section A (Short Answers)

*Answer atleast **eight** questions.*

Each question carries 3 marks.

All questions can be attended.

Overall ceiling 24.

1. Explain language translators.
2. What are the functions of an output unit ? Explain.
3. What is input interface ? Explain with example.
4. Explain OR gate. Draw OR gate. If A,B and C has a 1 output if any of the input is one
_____ 81.
5. What is Postulates ? Write all postulates.
6. What is a Gray code ?
7. What is flowchart ? Draw flowchart for find smallest number from a list of numbers.
8. What are the different CSS fonts Properties ? Explain.
9. Define URL.
10. What is the use of Formatting Tags in HTML ? Explain any two.
11. What is a Web Pages ?
12. What is class selector in CSS ? Explain.

(8 × 3 = 24 marks)

Turn over

Section B (Short Answers)

Answer atleast five questions.

Each question carries 5 marks.

All questions can be attended.

Overall ceiling 25.

13. What are registers ? List the six registers in CPU and describe the function of each.
14. List the different optical disks. Explain each with its operations.
15. What do you mean by 1's and 2's Complements ? Explain complement subtractions.
16. What is Product of Sums ? Covert $F = \prod (1, 2, 3)$ to Product of Sums.
17. What is top-down design ? Explain different characteristic of an algorithm. Write an algorithm to find quadratic equation.
18. Explain how to create text, password, button and checkbox.
19. Explain how to control fonts in CSS.

(5 × 5 = 25 marks)

Section C (Essays)

Answer any one question.

The question carries 11 marks.

20. (a) List out the different digital codes. Explain each in detail.
(b) Explain different Unicode encoding forms.
21. (a) Minimize four variables Boolean equation using K-map method. Explain.
(b) Explain De Morgan's Theorem.

(1 × 11 = 11 marks)

**FIRST SEMESTER (CUCBCSS-UG) DEGREE EXAMINATION
NOVEMBER 2021**

B.C.A.

BCA 1C 02—DISCRETE MATHEMATICS

(2016—2018 Admissions)

Time : Three Hours

Maximum : 80 Marks

Part A (Objective Type)

Answer all ten questions.

1. Write an example for a proposition.
2. Which of the following is a tautology?
 - (i) $1 + 1 = 2$.
 - (ii) The equation $x^2 + x + 1 = 0$ has no solution.
 - (iii) $x + 3 = 5$.
 - (iv) Mysore is in Tamilnadu.
3. Give an example of a relation which is antisymmetric.
4. State De Morgan's laws in Boolean algebra.
5. Write the complement of the Boolean expression $(a + b')c$.
6. Draw a graph having five vertices of degree 0, 1, 2, 2, 3.
7. Define a regular graph.
8. A tree with 11 vertices 11 edges doesn't exist. Why ?
9. Draw a rooted tree with 5 vertices.
10. Which graph is called Kratowski's second graph ?

(10 × 1 = 10 marks)

Turn over

Part B (Short Answer Type)*Answer all five questions.*

11. Give an example for a partial order relation.
12. Draw the symbol for NOT gate and its truth table.
13. Write the dual of the Boolean expressions:
 - (i) $(x + 0) + (1 \cdot x') = 1$; and (ii) $x \cdot (x' + y) = x \cdot y$.
14. Draw a graph with 4 vertices of degree 1, 1, 3 and 3. Is the graph simple ?
15. If there is one and only one path between every pair of vertices in a graph, prove that the graph is a tree.

 $(5 \times 2 = 10 \text{ marks})$ **Part C (Short Essay Type)***Answer any five questions.*

16. With the help of truth table, obtain that the statement $p \vee \bar{p}$ is tautology.
17. Symbolize the following expressions :
 - (i) Some animals are vegetarians.
 - (ii) Every student is tall.
18. In Boolean algebra, prove that $(a + b)' = a' \cdot b'$.
19. Define : (i) Loop ; (ii) Parallel edge ; (iii) Walk ; and (iv) Path.
20. Define : (i) Cut vertex ; and (ii) Cut edge. Give examples.
21. Prove that every connected simple graph has a spanning tree.
22. Either draw a graph with the given specifications or explain why no such graph exists :
 - (i) Rooted tree having 4 vertices.
 - (ii) Connected graph with 6 vertices and 5 edges having a non-trivial circuit.
23. With the help of an example, define dual of a plane graph.

 $(5 \times 4 = 20 \text{ marks})$

Part D (Essay Type)

Answer any **five** questions.

24. Verify whether the statements are true/false :
- (i) $(\forall n \in \mathbb{N}) (n + 4 > 5)$.
 - (ii) $(\forall n \in \mathbb{N}) (n + 1 > 5)$.
 - (iii) $(\exists n \in \mathbb{N}) (n + 9 < 8)$.
 - (iv) $(\exists n \in \mathbb{N}) (n + 5 < 7)$.
25. Which of the of the following relations are equivalence relations ?
- (i) $x R y$ if and only if $x - y$ is a multiple of 10 on the set of positive integers.
 - (ii) $x R y$ if and only if $x < y$ on the set of integers.
 - (iii) $x R y$ if and only if x is perpendicular to y on the set of all straight lines in the plane.
26. Explain the concept of a Boolean algebra with the help of an example.
27. (a) Prove that every u, v -walk contains a u, v -path.
- (b) Prove that if a graph possesses an Eulerian path, then it is connected and has either zero or two vertices of odd degree.
28. (a) Define a planar graph.
- (b) Let G be a connected simple planar graph with n (≥ 3) vertices and e edges. Prove that if G has no circuits of length 3, then $e \leq 2n - 4$.
- (c) Is $K_{3,3}$ planar ? Justify your answer.
29. Prove that the number of edges in a tree with n vertices is $n - 1$.
30. Discuss how graphs can be used to formulate and solve network-flow problems.

31. (a) Draw undirected graph corresponding to the adjacency matrix $\begin{bmatrix} 1 & 2 & 0 & 0 \\ 2 & 0 & 1 & 1 \\ 0 & 1 & 2 & 2 \\ 0 & 1 & 2 & 0 \end{bmatrix}$.

(b) Draw the digraph corresponding to the adjacency matrix $\begin{bmatrix} 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 0 \\ 1 & 1 & 0 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}$.

(5 × 8 = 40 marks)

CHMK LIBRARY UNIVERSITY OF CALICUT

**FIRST SEMESTER (CUCBCSS—UG) DEGREE EXAMINATION
NOVEMBER 2021**

B.C.A.

BCA 1C 01—MATHEMATICAL FOUNDATION OF COMPUTER APPLICATIONS

(2017—2018 Admissions)

Time : Three Hours

Maximum : 80 Marks

Part A

*Answer all questions.
Each question carries 1 mark.*

1. Define transpose of a matrix.
2. Find $A + B$ where $A = \begin{bmatrix} 1 & 2 \\ 4 & 5 \end{bmatrix}$, $B = \begin{bmatrix} 9 & 4 \\ 2 & 8 \end{bmatrix}$.
3. Define eigen values.
4. State Cayley-Hamilton Theorem.
5. Define limits of a function.
6. Find $\frac{dy}{dx}$ if $y = \sin x + \cos x$.
7. Evaluate $\int x \log x \, dx$.
8. What is the value of $\int_{-a}^a f(x) \, dx$ if $f(x)$ is an odd function. Define odd function.
9. Evaluate $\int \frac{2x}{1+x^2} \, dx$.
10. Evaluate $\int \tan x \, dx$.

(10 × 1 = 10 marks)

Turn over

Part B*Answer all questions.**Each question carries 2 marks.*

11. Check whether the given matrix is symmetric or skew symmetric $A = \begin{bmatrix} 1 & 0 & 4 \\ 0 & 2 & 5 \\ 4 & 5 & 3 \end{bmatrix}$.

12. Explain triangular matrices.

13. Find all Eigen values of the matrix $A = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$.

14. Find $\frac{dy}{dx}$ if $y = (x^3 + x)^3$.

15. Find $\frac{dy}{dx}$ if $y = 4x^2 + 2x + 1$.

16. Evaluate $\int \cos 2x \, dx$.

17. Evaluate $\int 5e^{3x} \, dx$.

18. Find $\int_0^1 \frac{1}{x^2 + 2x + x} \, dx$.

 $(8 \times 2 = 16 \text{ marks})$ **Part C***Answer any six questions.**Each question carries 4 marks.*

19. Explain different types of matrices.

20. Find the inverse of the matrix $\begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$.

21. Find the rank of the matrix $\begin{bmatrix} 1 & 2 & 3 & 2 \\ 2 & 3 & 5 & 1 \\ 1 & 3 & 4 & 5 \end{bmatrix}$.

22. Find the derivative of $\sin x$ using first principle.

23. Find $\frac{dy}{dx}$ if $y = \frac{6x^2}{2-x}$.

24. Evaluate $\int \frac{1}{3 + \cos x} dx$.

25. Find $\int_0^\pi \frac{x}{1 + \sin x} dx$.

26. Evaluate $\int_0^\pi \log(1 + \cos x) dx$.

27. Prove that $\int_0^{\pi/4} \sin 2x dx = \frac{1}{2}$.

(6 × 4 = 24 marks)

Part D

Answer any **three** questions.

Each question carries 10 marks.

28. a) If $A = \begin{bmatrix} 1 & 2 & 3 \\ 1 & 3 & 4 \\ -1 & 1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 & 2 \\ 2 & 1 & 0 \\ 3 & 2 & 1 \end{bmatrix}$. Find the product AB and BA . Show that $AB \neq BA$.

b) Find the determinant of the matrix $A = \begin{bmatrix} 9 & 1 & 2 \\ 4 & 3 & 7 \\ 5 & 1 & 0 \end{bmatrix}$.

29. a) Find the Eigen values of the matrix $\begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$.

b) Solve the system of equation using Gauss Jordan Method :

$$2x - y + 2z = 8$$

$$3x + 2y - 2z = -1$$

$$5x + 3y - 3z = 3.$$

30. a) Find $\frac{dy}{dx}$, if $y = \frac{4 \sin x}{2x + \cos x}$.

b) State and prove increment theorem.

31. a) Find $\frac{dy}{dx}$ if $y = \log [x + \sqrt{x^2 + 1}]$.

b) Evaluate $\int x^3 \sqrt{3 + 5x^4} dx$.

32. a) Evaluate $\int_0^6 (2 + 5x) e^{\frac{1}{3}x} dx$.

b) Evaluate $\int_0^{\pi} x^2 \cos 4x dx$.

(3 × 10 = 30 marks)

**FIRST SEMESTER (CUCBCSS—UG) DEGREE EXAMINATION
NOVEMBER 2021**

B.C.A.

BCA 1C 01—MATHEMATICAL FOUNDATION OF COMPUTER APPLICATIONS

(2016 Admissions)

Time : Three Hours

Maximum : 80 Marks

Part A (Objective Type Questions)

Answer all questions (1–10).

Each question carries 1 mark.

1. What is the rank of the matrix $\begin{bmatrix} 1 & 0 & 6 \\ 3 & 0 & 2 \end{bmatrix}$?
2. $\hat{k} \times \hat{j} =$ _____.
3. Define *idempotent matrix*.
4. What is the derivative of a^x ?
5. What is the integral of $\tan x$?
6. If f is an even function, then $\int_{-a}^a f(x) dx =$ _____.
7. Find the order and degree of the differential equation $(y'')^2 + (y')^3 + 4y = 2$.
8. What is the general solution of the differential equation $dy + \cos x dx = 0$.
9. Find the complementary function of the differential equation $y'' - 2y' + y = e^x$.
10. Write the general form of **quasi-linear first order partial differential equation**.

(10 × 1 = 10 marks)

Turn over

Part B (Short Answer Type)*Answer all questions (11–15).**Each question carries 2 marks.*

11. Find a, b, c and d , where, $\begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix} \cdot \begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$.
12. Evaluate $\bar{a} \times \bar{b}$, where $\bar{a} = 2\hat{i} - \hat{j}$ and $\bar{b} = \hat{i} + \hat{j} + \hat{k}$.
13. Integrate $x(x+1)(x+2)$.
14. Assume that a spherical rain drop evaporates at a rate proportional to its surface area. Form a differential equation involving the rate of change of the radius of the rain drop.
15. Solve : $(D^2 + D) y = 0$, where $D = \frac{d}{dx}$.

 $(5 \times 2 = 10 \text{ marks})$ **Part C (Short Essay Type)***Answer any five questions (16–23).**Each question carries 4 marks.*

16. Find the eigen values of the matrix $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$.

17. Find the inverse of the matrix $\begin{bmatrix} 1 & 2 & 5 \\ 2 & 3 & 1 \\ -1 & 1 & 1 \end{bmatrix}$.

18. Using the first principle find the derivative of \sqrt{x} .

19. Find the derivative of $y = (x \sin x)^3$.

20. Integrate $\cos 5x \cos 2x$.

21. Evaluate $\int e^{\tan x} \sec^2 x \, dx$.

22. Solve the differential equation : $\frac{dy}{dx} = x \log x$.

23. Solve : $y'' + 2y' + y = \cos x$.

(5 × 4 = 20 marks)

Part D (Essay Questions)

Answer any five questions (24–31).

Each question carries 8 marks.

24. Find the rank of the matrix $\begin{bmatrix} 1 & -1 & 0 & 2 & 1 \\ 3 & 1 & 1 & -1 & 2 \\ 4 & 0 & 1 & 0 & 3 \\ 9 & -1 & 2 & 3 & 7 \end{bmatrix}$ by reducing it to the row-echelon form.

25. Test for consistency and if consistent, solve completely :

$$5x + 3y + 3z = 48; 2x + 6y - 3z = 18; 8x - 3y + 2z = 21.$$

26. Differentiate : (a) $y = \sqrt{\frac{1 - \cos x}{1 + \cos x}}$; and (b) $y = \sin^{-1} \left(\frac{2x}{1 + x^2} \right)$.

27. Evaluate : $\int_0^{\frac{\pi}{2}} \frac{\sin 2\theta \, d\theta}{\sin^4 \theta + \cos^4 \theta}$.

28. Solve : $y' - y - x = 0$.

29. Solve : $x^2 y' = y^2 + xy + x^2$.

30. Solve : $y'' + 4y' + 5y = e^{2x} + \cos 4x$.

31. Form the partial differential equation by eliminating the arbitrary function f , where $z = f(x^2 + y^2)$.

(5 × 8 = 40 marks)

CHMK LIBRARY UNIVERSITY OF CALCUTTA

**FIRST SEMESTER (CUCBCSS—UG) DEGREE EXAMINATION
NOVEMBER 2021**

BCA

BCA 1B 01—COMPUTER FUNDAMENTALS AND HTML

(2017—2018 Admissions)

Time : Three Hours

Maximum : 80 Marks

Section A

*Answer all questions.
Each question carries 1 mark.*

1. Write the use of language translator.
2. What is the function of a port ?
3. What is postulates ?
4. What is SOP ?
5. What is computer programming ?
6. Give two examples for high level programming language.
7. What is URL ? Give example.
8. Why we use search engines ?
9. Which tag is used to write subscripts ?
10. What is a List ?

(10 × 1 = 10 marks)

Section B

*Answer all questions.
Each question carries 2 marks.*

11. What is RAM and ROM ?
12. What is Unicode ?
13. What is K-map ?
14. Represent the decimal number 147 in 2's complement form.
15. List the symbols used in flowchart.

Turn over

16. What is the 2's complement of 0011010110011100.
17. What are the advantages of CSS ?
18. Explain how CPU and memory works.

(8 × 2 = 16 marks)

Section C

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

19. With the help of a neat diagram, explain memory hierarchy.
20. Explain decimal and hexa-decimal number systems.
21. Explain how to find 1's complement and 2's complement.
22. Explain basic logic gates with truth tables.
23. Differentiate between ordered and unordered list in HTML with suitable examples.
24. Draw a flowchart to check whether a number is odd or even.
25. Explain media tags in HTML with examples.
26. How to include CSS in a web page ?
27. Explain navigation using anchor tag.

(6 × 4 = 24 marks)

Section D

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

28. Explain classification of computer languages with proper examples.
29. Explain laws and rules of Boolean algebra.
30. Write an algorithm and draw a flowchart to find the sum and average of 'N' natural numbers.
31. Write short notes on :
 - (a) HTML.
 - (b) XHTML.
 - (c) DHTML.
 - (d) HTTP.
32. Design a form which accepts roll number, name, department, address, phone number, e-mail id, gender and hobbies of a student.

(3 × 10 = 30 marks)