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Roll No.....

A 601

BCA/BCA-CTIS/BCA-DS/BCA-AIML I Semester Examinations (June 2026)

Foundations of Computer Science (BCA-101A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1	Marks
(a) What is Flash memory?	
(b) What is Firmware?	
(c) Define control panel.	
(d) What is URL?	
(e) What is Spyware?.	2x6=12
(f) What is Search Engine?	

UNIT-I

Q.2(a)	Discuss Classification of computers.	6
Q.2(b)	Explain working of Magnetic tape in brief.	6
Q.3	Make a Block Diagram of computer and explain working of its all components.	12

UNIT-II

Q.4	Explain any four Input and Output devices in detail.	12
Q.5(a)	What is Window explorer? Explain its use in brief.	6
Q.5(b)	Explain Device drivers in brief.	6

UNIT-III

Q.6	What is E-mail? Explain different components of email in detail.	12
Q.7(a)	What is Web Browser? Explain with example.	6
Q.7(b)	Differentiate between Internet and Extranet.	6

UNIT-IV

Q.8	What is Security mechanism? Explain different type of Security mechanism in detail.	12
Q.9(a)	Discuss about different type of Viruses.	6
Q.9(b)	What are the Backup and Recovery methods in computers?	6

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A-602

BCA/BCA-DS/BCA-CTIS I Semester Examinations (June 2026)

Digital Logic Design (BCA-103A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1	Marks
(a) Convert $(110011)_2$ into octal.	2
(b) What is meant by present state and next state?	2
(c) Convert into SOP form: $(A+B)(A+C)$	2
(d) Show that: $(A+B')'+AB=A'B+AB$	2
(e) Mention any two uses of PISO register.	2
(f) What is edge triggering and level triggering?	2

UNIT-I

Q.2(a)	Explain Gray code and discuss its advantages in digital electronics.	6
Q.2(b)	Explain CRC (Cyclic Redundancy Check) method for error detection.	6
Q.3	Explain BCD codes, weighted codes, self-complementing codes, and Excess-3 with suitable examples.	12

UNIT-II

Q.4	Simplify the following Boolean function using K-Map with don't care conditions: $F(W,X,Y,Z)=\Sigma(1,3,7,11,15)$ $d(W,X,Y,Z)=\Sigma(0,2,5)$ Implement the simplified function using logic gates.	12
Q.5(a)	Simplify the following Boolean function using 3-variable K-Map: $F(A,B,C)=\Sigma(0,2,3,5,7)$	6
Q.5(b)	Implement AND gate and OR gate using only NAND gates.	6

UNIT-III

Q.6	Explain Master Slave JK Flip Flop with neat diagram. Discuss race around condition and its elimination.	12
Q.7(a)	Explain Full Subtractor with truth table and logic circuit.	6
Q.7(b)	Draw and explain the logic diagram of D Flip Flop using SR Flip Flop.	6

UNIT-IV

Q.8	Explain the operation of bidirectional shift register and universal shift register with neat diagrams.	12
Q.9(a)	Explain direct, indirect, and indexed addressing modes.	6
Q.9(b)	Explain Serial In Serial Out (SISO) shift register with neat diagram and timing sequence.	6

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A-603

BCA/BCA-CTIS/BCA-DS I Semester Examinations (June 2026)
Basic of Mathematics I (ASH-MAT-115A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1	Marks
(a) Define proper subset of a set with example.	2
(b) Define Universal set with example.	2
(c) Give one example of a relation that is reflexive, symmetric but not transitive.	2
(d) Define Bijective function with example	2
(e) Find the determinant of $A = \begin{bmatrix} 0 & 3 \\ -3 & 0 \end{bmatrix}$.	2
(f) Write the formula of sum of n terms of AP and find S_5 .	2

UNIT-I

Q.2(a)	Draw the Venn Diagrams of $A \cup B$, $A \cap B$, $A - B$, A^c , B^c .	6
Q.2(b)	Let $U = \{1,2,3,4,5,6,7,8,9\}$ and $A = \{1,2,3,4,5\}$. $B = \{4,5,6,7\}$ and $C = \{1,6,8,9\}$ Find $A - (B \cup C)$, $A - (B - C)$ and $A \cup (B \cap C)$.	6
Q.3(a)	Define Power set and Empty set and write down the power set of $\{a, b, c\}$.	6
Q.3 (b)	In a Society of 150 people, 75 like Instagram, 55 like Facebook and 40 like Both. find no. of people neither like Instagram nor like Facebook using De-Morgan's Law	6

UNIT-II

Q.4 (a)	Determine whether the relation $S = \{(a, b): a + b \text{ is even}\}$ on the set of +ve integers is an equivalence relation.	6
Q. 4(b)	$A = \{a, b\}$ and $B = \{e, f, g\}$ determine all functions from A to B	6
Q.5 (a)	Let $A = \{a, b, c, d\}$ Define functions $f: A$ to A such that (i) f is one-one and onto (ii) f is neither one-one nor onto	6
Q.5(b)	If f and g are the functions on integers defined by $f(x) = x^2$ and $g(x) = x+1$. Find fog and gof.	6

UNIT-III

Q.6	Solve the system of linear equations $x + y + z = 6$, $2x + 3y + z = 11$, $x - y + 2z = 5$	12
Q.7(a)	If $A = \begin{bmatrix} 1 & -2 & 3 \\ -4 & 2 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 3 \\ 4 & 5 \\ 2 & 1 \end{bmatrix}$ show $AB \neq BA$	6
Q.7(b)	If $A = \begin{bmatrix} -1 & 2 & 2 \\ 2 & -1 & 2 \\ 2 & 2 & -1 \end{bmatrix}$, then compute $A^2 - 9A - 7I$	6

UNIT-IV

- Q.8 (a) Solve for x, $\log x = \log 3 + 2\log 2 - \frac{3}{4} \log 16$ 6
- Q.8(b) The p^{th} term of an AP is q and q^{th} term is p. Prove that $(p+q)^{\text{th}}$ term is zero. 6
- Q.9(a) Find the sum of all integers between 50 and 500 which are divisible by 7. 6
- Q.9(b) The sum of three numbers in G.P. is $13/12$ and their product is -1. Find the numbers. 6

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A-604

BCA /BCA-CTIS/BCA-DS/BCA-AIML I Semester Examinations (June 2026)

Problem Solving through C (BCA-105A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all, selecting one question from each unit and Question 1 is compulsory. Each Question carries 12 marks.

Q.1	Marks
(a) Write the difference between variable and constant.	2
(b) Define keyword with two examples.	2
(c) What is a break statement? Where is it used?	2
(d) Define a string. How do you declare a string in C?	2
(e) What is a structure?	2
(f) Define pointer and write its declaration syntax	2

UNIT-I

Q.2(a)	Discuss the history and importance of C language.	6
Q.2(b)	Explain symbolic constants with suitable examples.	6
Q.3(a)	Explain any four input/output functions in C.	6
Q.3(b)	Describe the character set and identifiers in C.	6

UNIT-II

Q.4(a)	Explain operator hierarchy with an example.	6
Q.4(b)	Write a C program to find the largest among three numbers using <i>if-else</i> .	6
Q.5(a)	Explain switch-case statement with syntax and example.	6
Q.5(b)	Write a C program to print Fibonacci series using a while loop.	6

UNIT-III

Q.6(a)	Explain memory representation of 1-D and 2-D arrays.	6
Q.6(b)	Write a program to input 10 numbers in an array and display the maximum number.	6
Q.7(a)	What are string manipulation functions? Explain any four.	6
Q.7(b)	Write a function to add two numbers using call by reference.	6

UNIT-IV

Q.8(a)	What is an array of structures? Demonstrate with a simple example.	6
Q.8(b)	Explain the difference between structure and union with examples.	6
Q.9(a)	Explain pointer arithmetic with examples.	6
Q.9(b)	Write short notes on: (i) Static storage class (ii) Extern storage class	6

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A-605

BCA/BCA-CTIS/BCA-DS/BCA-AIML I Semester Examinations (June 2026)

English Language & Communication I (ASH-HUM-117A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1	Marks
(a) What is meant by feedback in communication?	2
(b) Who is called the receiver in communication?	2
(c) Name any two elements of face-to-face communication.	2
(d) A student nods while listening to a lecture. Identify the type of communication involved.	2
(e) What is the role of concentration in listening?	2
(f) Why is group discussion important?	2

UNIT-I

Q.2(a)	Compare language barriers and gender barriers with suitable examples.	6
Q.2(b)	Describe the role of <i>encoding</i> and <i>decoding</i> in the communication process with examples.	6
Q.3	"Effective communication is essential for success." Elaborate with reference to communication skills.	12

UNIT-II

Q.4(a)	Explain the role of physical communication in daily life.	6
Q.4(b)	Discuss the importance of visual perception in communication.	6
Q.5	"Non-verbal communication is more powerful than verbal communication." Discuss.	12

UNIT-III

Q.6	You are listening to a friend who is upset. Describe how becoming an active listener can help in this emotional context.	12
Q.7(a)	Define written communication and explain its importance.	5
Q.7(b)	Discuss strategies for listening effectively in difficult situations	7

UNIT-IV

Q.8	Explain the Do's and Don'ts of group discussion in detail.	12
Q.9(a)	Imagine a GD on "Social Media and Youth." How can tone of voice and body language influence the effectiveness of communication?	6
Q.9(b)	Discuss the communication skills required for effective group discussion.	6

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A-606

BCA/BCA-CTIS/BCA-DS/BCA-AIML I Semester Examinations (June2026)

Digital Marketing (BBA-215A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

	Marks
Q.1	
(a) List any two advantages of digital marketing.	2
(b) What is PPC advertising?	2
(c) Define keyword targeting.	2
(d) What do you mean by social media metrics?	2
(e) What is email automation?	2
(f) Define digital ethics in marketing.	2
UNIT-I	
Q.2(a) Describe the key milestones in the development of digital marketing.	6
Q.2(b) Explain the concept of Search Engine Optimization (SEO) and its techniques.	6
Q.3 Discuss the structure of a Search Engine Marketing (SEM) campaign and analyze factors affecting its success.	12
UNIT-II	
Q.4 Explain how businesses can use social media platforms to engage customers and promote their products.	12
Q.5(a) Discuss the process of building and managing an email list.	6
Q.5(b) Evaluate the effectiveness of segmentation in improving email campaign performance.	6
UNIT-III	
Q.6 Discuss the importance of data in digital marketing and explain how it supports strategic decision-making.	12
Q.7(a) Explain the planning and execution of social media advertising campaigns.	6
Q.7(b) Evaluate the role of analytics tools in measuring campaign success.	6
UNIT-IV	
Q.8 Discuss the concept of digital detox and its importance in maintaining mental wellbeing.	12
Q.9(a) Explain the ethical responsibilities of digital marketers.	6
Q.9(b) Evaluate the impact of privacy issues on consumer trust in digital marketing.	6

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A 641

BCA/BCA-DS/ BCA-CTIS/BCA-AIIML/BBA/BBA(DM)/BBA(BA)

I/II Semester Examinations (June 2026)

Environmental Studies (BT-CE-104A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory. Each Question carries 12 marks.

Q.1	Marks
(a) Define natural resources with one example.	2
(b) What is deforestation? State one major cause.	2
(c) Define biodiversity.	2
(d) What is air pollution? Mention one source.	2
(e) What is sustainable development?	2
(f) Define carbon footprint.	2

UNIT-I

Q.2(a)	Discuss the multidisciplinary nature, scope, and importance of environmental studies.	6
Q.2(b)	Explain renewable and non-renewable sources of energy with Indian examples.	6

OR

Q.3(a)	What is forest resource over-exploitation? Explain its impacts.	6
Q.3(b)	Describe land degradation, soil erosion, and desertification with case studies.	6

UNIT-II

Q.4(a)	Define ecosystem and explain its structure and functions.	6
Q.4(b)	Describe energy flow in an ecosystem with food chain and food web examples.	6

OR

Q.5(a)	Explain hotspots of biodiversity and list major Indian hotspots.	6
Q.5(b)	Discuss in-situ and ex-situ biodiversity conservation methods.	6

UNIT-III

Q.6(a)	Explain the causes, effects, and control measures of air pollution.	6
Q.6(b)	Describe different types of urban and industrial solid waste and their management.	6

OR

Q.7(a)	Explain natural disasters: earthquakes, floods, and cyclones.	6
Q.7(b)	Describe man-made disasters and disaster preparedness plans.	6

UNIT-IV

- Q.8(a)** Explain the major environmental issues arising from unsustainable development. 6
- Q.8(b)** Write short notes on: 6
- (i) Water conservation
 - (ii) Rainwater harvesting

OR

- Q.9(a)** Explain the concepts of green buildings and carbon footprinting. 6
- Q.9(b)** Discuss the key provisions of the Environment Protection Act (1986). 6

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B 661

BCA-AIML II Semester Examinations (June 2026)
Artificial Intelligence & Applications (BCA-126A)

Time- 3hrs
Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1	Marks
(a) State and discuss any two real world applications of AI.	2
(b) Differentiate between General AI and Super AI.	2
(c) What are the two quantifiers in predicate Calculus? Explain with example.	2
(d) Explain relevance of heuristic search in AI, and mention one example of a heuristic.	2
(e) List four different ways of knowledge representation.	2
(f) Differentiate between rule based and model based expert system	2

UNIT-I

Q.2(a)	State Turing Test. What is its relevance in Artificial Intelligence? How is Turing test different from Revised Turing Test?	8
Q.2(b)	Discuss different issues in the design of a search problem.	4
Q.3(a)	What is the use of production system in AI? Discuss in detail about its components and types.	8
Q.3(b)	Describe any two AI problems and demonstrate their state space.	4

UNIT-II

Q.4(a)	Transform the following into CNF and PNF: (i) $P \vee (\sim P \ \& \ Q \ \& \ R)$ (ii) $(\sim P \ \& \ Q) \vee (P \ \& \ \sim Q) \ \& \ S$	8
Q.4(b)	Describe any two inference rules used in predicate logic. Give the description, interpretation and symbolic representation.	4
Q.5(a)	Explain the process of finding MGU. How does it help in resolution in the predicate logic? Explain using example.	8
Q.5(b)	Write a script for knowledge representation for buying an item from a shopping mall.	4

UNIT-III

Q.6(a)	Compare Breadth First Search and Depth First Search. Are these search algorithms informed or uninformed. Give an algorithm for hill climbing search. List two advantages of informed search over uninformed search.	8
Q.6(b)	Exemplify any two heuristics used with 8-puzzle and compare their effect on goal-search.	4
Q.7(a)	Explain the working of the A* algorithm and discuss its properties of admissibility and monotonicity.	8
Q.7(b)	State different components of game playing in AI.	4

UNIT-IV

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|---------------|---|----------|
| Q.8(a) | Explain the architecture and components of an Expert System with the help of a diagram. What are the advantages and disadvantages of Expert System? | 8 |
| Q.8(b) | What is a real time expert system? How is it different from other types of expert system. | 4 |
| Q.9(a) | Explain the Rule based architecture of Expert System. Compare and contrast it with Model based architecture. | 8 |
| Q.9(b) | State any two application areas of Expert System. | 4 |

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A-662

BCA-AIML I Semester Examinations (June 2026)

Mathematics For Computing I (ASH-MAT-121A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1	Marks
(a) Explain the following with suitable examples: (i) Finite sets and Disjoint sets.	2
(b) Let $f: A \rightarrow B$ and $g: B \rightarrow C$ be two functions. Define composite function $(g \circ f)$ and find $(g \circ f)(x)$ if: $f(x) = 2x + 1$ and $g(x) = x^2 - 3$	2
(c) Integrate $\int (5x^4 + 3x^2 - 2x + 7) dx$	2
(d) Differentiate $y = \tan 2x$.	2
(e) Write down all subsets for a set with elements $\{a, b, c\}$.	2
(f) Define domain and range. Find the domain and range of the function $f(x) = (x^2 - 4)/(x - 2)$.	2

UNIT-I

Q.2(a)	In a group of 65 people, 40 like cricket, 10 like both cricket and tennis. (i) How many like tennis? (ii) How many like tennis only but not cricket?	6
Q.2(b)	Let $U = \{2, 4, 6, 8, 10, 12, 14, 16, 18, 20\}$, $A = \{2, 4, 6, 8, 10\}$, $B = \{4, 6, 8\}$ and $C = \{14, 16, 18, 10\}$. Find: (i) $(A \cap C)^c$ (ii) $(A \cup B)^c$	6
Q.3(a)	If A and B are two sets such that $n(A) = 16$, $n(B) = 23$ and $n(A \cup B) = 38$, find: (i) $n(A \cap B)$ (ii) $n(B - A)$	6
Q.3(b)	Prove De-Morgan's First Law: $(A \cup B)^c = A^c \cap B^c$.	6

UNIT-II

Q.4(a)	For the function $f: \mathbb{Z} \rightarrow \mathbb{Z}$ defined by $f(x) = x^2 - 4$, determine whether f is: (i) Injective (ii) Surjective (iii) Bijective	6
Q.4(b)	Define equivalence relation. Check whether the relation $R = \{(a,b) \mid a \equiv b \pmod{3}\}$ on $\mathbb{Z}$ is an equivalence relation	6
Q.5(a)	Let $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ be the universal set. If $A = \{2, 4, 6, 8, 10\}$ and $B = \{1, 3, 5, 7, 9\}$, find: (i) $A \cap B$ (ii) $A \cup B$ (iii) A^c and B^c (iv) $(A \cap B)^c$ and $A^c \cup B^c$	6
Q.5(b)	Show that $f: \mathbb{R}^* \rightarrow \mathbb{R}^*$ defined by $f(x) = 1/x$ is one-one and onto, where $\mathbb{R}^*$ is the set of non-zero real numbers.	6

UNIT-III

- Q.6(a)** Find the derivatives of the following functions using the definition of derivative: 6
(i) $f(x) = x^2 + 3x$ (ii) $f(x) = \sqrt{x}$
- Q.6(b)** Using the quotient rule, find the derivative of $y = (x^2 + 1)/(x - 1)$. 6
- Q.7(a)** Differentiate the following with respect to x : 6
(i) $y = \sin(2x) + \cos(3x)$ (ii) $y = e^x \cdot \log(x)$
- Q.7(b)** Using the chain rule, differentiate the following: 6
(i) $y = (3x^2 + 2x + 1)^5$ (ii) $y = \sin(x^3 + 2x)$

UNIT-IV

- Q.8** Evaluate $\int (3x + 2)/(x^2 + 2x + 1) dx$ using partial fractions method. 12
- Q.9(a)** Evaluate $\int 3x^2 \sin(x^3) dx$ using substitution method. 6
- Q.9(b)** Evaluate the following indefinite integrals: 6
(i) $\int x e^x dx$ (ii) $\int (\sin x + \cos x) dx$ (iii) $\int (e^x + 1/x) dx$

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B-662

BCA-AIML II Semester Examinations (June 2026)

Database Systems (BCA-128A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1	Marks
(a) Why do we need a DBMS?	
(b) What is schema and instance?	
(c) What is referential integrity?	
(d) What is the purpose of Having clause in SQL?	
(e) What is denormalization?	
(f) What is transaction?	6*2=12

UNIT-I

Q.2(a)	How does a DBMS overcome the limitations of the traditional file system?	6
Q.2(b)	Explain the Three-Schema Architecture of DBMS with suitable diagram.	6
Q. 3	What is ER model? Explain entity set, attributes, and relationship types with examples. Draw the ER model of an university system.	12

UNIT-II

Q.4(a)	Write SQL queries for the following: i. Create an student table with attributes Rollno (Primary key), Name, DOB, Class and Contact_no with suitable data type. ii. Insert three records into the table iii. Update the Contact_no of a student whose Rollno=2.	6
Q.4(b)	Write a PL/SQL code block for inverting a number 5639 to 9365.	6
Q.5(a)	Write SQL queries to demonstrate: i. MODIFY command ii. DUAL table iii. ORDER BY clause	6
Q.5(b)	Explain relational algebra operations including selection, rename, and join with suitable examples.	6

UNIT-III

Q.6	What is normalization? Explain 1NF, 2NF, 3NF, and BCNF with suitable examples.	12
Q.7(a)	How to find the Minimal cover of a given set of functional dependencies? Explain with an example.	6
Q.7(b)	Explain Join dependency and Fifth Normal Form (5NF) with examples.	6

UNIT-IV

Q.8(a)	What are ACID properties and concurrent execution of transactions?	6
Q.8(b)	Discuss Two-Phase Locking (2PL) technique.	6
Q.9(a)	Write a short note on Time Stamp based protocol.	6
Q.9(b)	Explain the various phase of Data Mining with suitable diagram.	6

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Roll No.....

B-663

BCA-AIML II Semester Examinations (June 2026)

Computer System Architecture (BCA-130A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1	Marks
(a) List any two Boolean laws.	2
(b) Define addressing mode.	2
(c) Define a multiplexer.	2
(d) State De Morgan's theorems.	2
(e) Define instruction cycle.	2
(f) What is a Master-Slave Flip Flop?	2

UNIT-I

Q.2(a)	Convert the following: i) $(7A)_{16}$ to binary ii) $(110011.11001)_2$ into decimal	6
Q.2(b)	Simplify the following Boolean function using Boolean algebra and verify the result using a truth table: $F = AB + \bar{A}B + AB\bar{C}$	6
Q.3	Simplify the following Boolean function using K-Map and implement the minimized expression: $F(A,B,C,D) = \Sigma(0,2,5,7,8,10,13,15)$. a) Construct the 4-variable K-Map and plot the given minterms b) Group the cells and obtain the simplified Boolean expression. c) Implement the simplified function using logic gates	12

UNIT-II

Q.4	Design a full adder using two 4×1 multiplexers by taking A and B as select lines and C_{in} as the input variable. Derive the expressions for Sum and Carry outputs and draw the logic circuit.	12
Q.5(a)	Explain the working of EX-OR and EX-NOR gates with suitable truth tables and logic expressions. Mention one practical application of each gate.	6
Q.5(b)	Using only NAND gates or only NOR gates, design the basic logic gates (AND, OR, and NOT). Draw the logic diagrams and explain their working with suitable Boolean expressions and truth tables.	6

UNIT-III

Q.6	Design a 4-bit Serial-In Serial-Out (SISO) shift register using D flip-flops. Draw the logic diagram and explain its working with timing sequence.	12
Q.7(a)	Explain stack organization in computer architecture with neat diagram and suitable example. Discuss PUSH and POP operations.	6
Q.7(b)	Differentiate between immediate, direct, indirect, and register addressing modes with examples.	6

UNIT-IV

Q.8	Explain memory hierarchy in detail with neat diagram. Discuss the role of cache memory, main memory, and secondary memory.	12
Q.9(a)	Explain the basic architecture and applications of GPU.	6
Q.9(b)	Explain the characteristics of CISC architecture.	6

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B 664

BCA-AIML II Semester Examinations (June 2026)
Mathematics for Computing (ASH-MAT-122A)

Time- 3hrs
Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory. Each Question carries 12 marks.

- | Q.1 | Marks |
|--|-------|
| (a) If $A = \begin{bmatrix} 1 & 3 & 4 \\ 5 & -2 & 7 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & -5 & 6 \\ 1 & 4 & -3 \end{bmatrix}$, Find $3A + 4B$. | (1.5) |
| (b) If $\begin{vmatrix} x+1 & x-1 \\ x-3 & x+2 \end{vmatrix} = \begin{vmatrix} 4 & -1 \\ 1 & 3 \end{vmatrix}$; find the value of x . | (1.5) |
| (c) Define a rank of a matrix with example. | (1.5) |
| (d) Find the product of eigen values of the matrix: $A = \begin{bmatrix} 2 & 0 & 0 \\ 7 & 1 & 0 \\ 2 & -2 & 3 \end{bmatrix}$. | (1.5) |
| (e) Are the vectors $(2, 3)$ and $(4, 6)$ linearly independent? | (1.5) |
| (f) Define Basis and dimension. | (1.5) |
| (g) Find the cross product of the vectors:
$a = 2\hat{i} - \hat{j} + \hat{k}$, $b = 3\hat{i} + 4\hat{j} - \hat{k}$. | (1.5) |
| (h) Define a vector point function with example. | (1.5) |

UNIT-I

- | | | |
|--------|---|-----|
| Q.2(a) | If $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$, show that $A^3 - 6A^2 + 7A + 2I_3 = O$ | (6) |
| Q.2(b) | If $A = \begin{bmatrix} 4 & 3 & 7 \\ 6 & 5 & -8 \\ 1 & 2 & 6 \end{bmatrix}$, Express A as the sum of a symmetric and skew-symmetric matrix. | (6) |
| Q.3(a) | If $A = \begin{bmatrix} 2 & 1 & 3 \\ 3 & 1 & 2 \\ 1 & 2 & 3 \end{bmatrix}$; Verify that $A \cdot (\text{adj. } A) = (\text{adj. } A) \cdot A = A I_3$. | (6) |
| Q.3(b) | Solve the following system of equations: | (6) |

$$2x + 8y + 5z = 5; x + y + z = -2; x + 2y - z = 2.$$

UNIT-II

Q.4(a) Reduce the following matrix into normal form and hence, find rank:

$$\begin{bmatrix} 2 & 1 & -3 & -6 \\ 3 & -3 & 1 & 2 \\ 1 & 1 & 1 & 2 \end{bmatrix}. \quad (6)$$

Q.4(b) Find the eigen values and the corresponding eigen vectors of the following matrix:

$$\begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 0 \\ 0 & 0 & 5 \end{bmatrix}.$$

Q.5(a) Apply Gauss elimination method to solve the equations:

$$x + y + z = 9; 2x - 3y + 4z = 13; 3x + 4y + 5z = 40. \quad (6)$$

Q.5(b) Verify Cayley Hamilton Theorem for the matrix and also find the A^{-1} :

$$\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix} \quad (6)$$

UNIT-III

Q.6(a) Prove that the set of all diagonal matrices over $\mathbb{R}$ is a vectors space with respect to matrix addition and scalar multiplication. (6)

Q.6(b) If V is the vector space of all 3-square matrices over $\mathbb{R}$, which of the following sets of matrices are subspace of V ? (6)

- (i) All scalar matrices
- (ii) All singular matrices.

Q.7(a) Show that the set $\{(2, 1, 4), (1, -1, 2), (3, 1, -2)\}$ forms a basis of $\mathbb{R}^3(\mathbb{R})$. (6)

Q.7(b) Express the vector $u = (2, -5, 4)$ as a linear combination of the vectors: $v = (1, -3, 2)$; $w = (2, -1, 1)$ in the vector $\mathbb{R}^3(\mathbb{R})$. (6)

UNIT-IV

Q.8(a) Show that the vectors $2\hat{i} - \hat{j} + \hat{k}$, $\hat{i} - 3\hat{j} - 5\hat{k}$ and $3\hat{i} - 4\hat{j} - 4\hat{k}$ form the sides of a right- angled triangle. Also, find the remaining angles of the triangle. (6)

Q.8(b) If $\mathbf{a} = 3\hat{i} - \hat{j} + 2\hat{k}$, $\mathbf{b} = 2\hat{i} + \hat{j} - \hat{k}$, $\mathbf{c} = \hat{i} - 2\hat{j} + 2\hat{k}$, find $(\mathbf{a} \times \mathbf{b}) \times \mathbf{c}$ and $\mathbf{a} \times (\mathbf{b} \times \mathbf{c})$ and hence show that $(\mathbf{a} \times \mathbf{b}) \times \mathbf{c} \neq \mathbf{a} \times (\mathbf{b} \times \mathbf{c})$. (6)

Q.9(a) Define gradient of a scalar and also find the *grad* ϕ , when ϕ is given by $\phi(x, y, z) = x^3 + y^3 + 3xyz$ at the point $(1, 1, 1)$. (6)

Q.9(b) Find the divergence and curl of the vector:
 $\vec{V} = (xyz)\hat{i} + (3x^2y)\hat{j} + (xz^2 - y^2z)\hat{k}$ at the point $(2, -1, 1)$. (6)

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Roll No.....

B 601

BCA/BCA-CTIS/BCA -DS II Semester Examinations (June 2026)

Operating System (BCA-102A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Marks

Q.1

- (a) Define operating system. Also write its main purpose in a computer system. (2)
- (b) What are system calls? Give one example of a system call. (2)
- (c) What is the role of a scheduler in an operating system? (2)
- (d) Differentiate between preemptive and non-preemptive scheduling. (2)
- (e) Differentiate between internal fragmentation and external fragmentation. (2)
- (f) Write any two functions of a file system. (2)

UNIT-I

- Q.2(a) Describe the main characteristics of an Operating System. (6)
- Q.2(b) Define multiprogramming. How multiprogramming ensures effective utilization of main memory and CPU? (6)
- Q.3 What is Process Control Block? Explain the important information stored in a PCB and its role in process management. (12)

UNIT-II

- Q.4(a) Define process scheduling. Explain the need and importance of process scheduling in an Operating System. (6)
- Q.4(b) Consider the following processes. Solve using non-pre-emptive SJF scheduling. Calculate completion time, turnaround time, waiting time, average turnaround time, and average waiting time. Also, draw the Gantt chart. (6)

Process	Arrival Time	Burst Time
P1	0	8
P2	1	4
P3	2	9
P4	3	5

- Q.5** What is deadlock in an Operating System? Describe Banker's Algorithm and explain how it is used to avoid deadlock with the help of an example. (12)

UNIT-III

- Q.6** Explain the concept of virtual memory in Operating System. Discuss various page replacement policies such as FIFO, LRU, and Optimal page replacement algorithms in detail with suitable examples. (12)
- Q.7(a)** Consider the following page reference string: (6)
7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2
Number of frames = 3.
Calculate the number of page faults using FIFO page replacement algorithm.
Also, show the frame table.
- Q.7(b)** What is paging? Discuss page number, frame number, page table, and address translation in paging. (6)

UNIT-IV

- Q.8** Explain the concept of file management in Operating System. Discuss various file access methods and file protection mechanisms in detail with suitable examples. (12)
- Q.9(a)** Explain directory allocation methods used in Operating Systems. (6)
- Q.9(b)** Consider a disk queue with requests: 98, 183, 37, 122, 14, 124, 65, 67. The initial head position is 53. Calculate the total head movement using FCFS disk scheduling. (6)

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B-602

BCA II Semester Examinations (June 2026)
Object Oriented Programming using C++ (BCA-104A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1	Marks
(a) What is abstraction?	2
(b) Define reference variable.	2
(c) What is destructor?	2
(d) What is operator overloading?	2
(e) What is hybrid inheritance?	2
(f) What is pure virtual function?	2
UNIT-I	
Q.2(a) Explain principles of Object-Oriented Programming. Compare procedural programming and object-oriented programming.	6
Q.2(b) What are reference variables and pointers in C++?	6
Q.3 Discuss the differences between C and C++. Explain tokens, keywords, identifiers, constants and variables with examples.	12
UNIT-II	
Q.4 What is a constructor in C++? Explain the default constructor, parameterized constructor and copy constructor with suitable examples. Also discuss their importance in object initialization.	12
Q.5(a) Explain the concept of destructors in detail.	6
Q.5(b) Explain friend function, static data members and static member functions.	6
UNIT-III	
Q.6 Define polymorphism in C++. Explain compile-time polymorphism using function overloading and operator overloading with suitable examples.	12
Q.7(a) Discuss rules for overloading unary and binary operators.	6
Q.7(b) What is inheritance? Explain single, multiple and hierarchical inheritance with diagrams.	6
UNIT-IV	
Q.8 Explain exception handling in C++. Discuss try, throw and catch blocks with examples. How are uncaught exceptions handled in C++?	12
Q.9(a) What is pure virtual function? Explain abstract class with suitable examples.	6
Q.9(b) Explain runtime polymorphism using virtual functions with examples.	6

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B 603

BCA/BCA-CTIS/BCA -DS II Semester Examinations (June 2026)

Basics of Mathematics II (ASH-MAT-116A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1	Marks
(a) Define continuous function	2
(b) Differentiate: $y = \log x + e^x$	2
(c) Find the derivative of $x \sin x$	2
(d) Find $\int \sin x \, dx$	2
(e) Find $\int \frac{1}{x} \, dx$	2
(f) Find the magnitude of vector $A = 3\hat{i} + 4\hat{j}$	2

UNIT-I

Q.2(a) Discuss continuity of $f(x)=x^3$ at $x=1$	6
Q.2(b) Evaluate $\lim_{x \rightarrow 2} \frac{x^2-4}{x-2}$	6
Q.3(a) Evaluate $\lim_{x \rightarrow 0} \frac{\sin 2x}{x}$	6
Q.3(b) State the properties of continuous functions.	6

UNIT-II

Q.4 Differentiate: (i) $y = \tan x + \sec x$ (ii) $y = x^2 e^x$ (iii) $y = \log(\sin x)$	12
Q.5(a) Find the derivative of $y = (x^2+1)/(x-1)$	6
Q.5(b) Differentiate $y=x^2 \sec x$.	6

UNIT-III

Q.6(a) Evaluate using integration by parts $\int x \sin x \, dx$	6
Q.6(b) Evaluate $\int \tan x \, dx$	6
Q.7(a) Evaluate using substitution: $\int x (x^2+4)^3 \, dx$	6
Q.7(b) Evaluate: $\int \frac{dx}{\sqrt{1-x^2}}$	6

UNIT-IV

Q.8 Find divergence and curl of $F = 2x\hat{i} + 3y\hat{j} + 4z\hat{k}$	12
Q.9(a) Find $\nabla\phi$ if $\phi = xy + yz + zx$.	6
Q.9(b) Find dot and cross product of $A = \hat{i} + \hat{j} + \hat{k}$ and $B = 2\hat{i} + 3\hat{j} - \hat{k}$	6

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Roll No.....

B 604

BCA/BCA-CTIS/BCA -DS II Semester Examinations (June 2026)

Introduction to Web Technology (BCA-106A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1	Marks
(a) What are HTTP request methods? List any two.	2
(b) What do you mean by Relative URLs? Give an example.	2
(c) List and describe the CSS Border Style Properties in detail with illustration.	2
(d) How will you create a password field in a HTML form?	2
(e) What is the need for cascading style sheets.	2
(f) Name any two javascript objects and mention their use.	2

UNIT-I

Q.2(a)	Differentiate the following (giving examples)	8
	(i) Static vs dynamic websites	
	(ii) Web client vs web server	
	(iii) HTTP vs HTTPS	
	(iv) Webpage vs website	
Q.2(b)	Explain in detail the functions of a web server.	4
Q.3(a)	Explain all the steps involved from planning to development of a website.	8
Q.3(b)	How search engines enhance web browsing? Name three popular search engines and three web browsers.	4

UNIT-II

Q.4(a)	Define List tag usage with an example. Compare ordered and unordered list with their specific use cases. Write HTML code to generate	8
	(i) an unordered list of five colour names and	
	(ii) an ordered list of number names <i>one to five</i> .	
Q.4(b)	How HTML frames can be used to create two horizontal rows on a webpage?	4
Q.5(a)	Using HTML form controls create a web page for user registration that includes the following details:	8
	user name, date of birth, address, gender, email id, and mobile number.	
Q.5(b)	How anchor and img tags are used in a web document? Explain using sample code for each.	4

UNIT-III

Q.6(a)	Write the CSS code to generate a web page with the following requirements:	8
	(i) Add a background image.	
	(ii) Set a color to the span elements (different color for two classes)	
Q.6(b)	What are the different ways to include CSS in a web page?	4

- Q.7(a)** Discuss CSS box model, positioning and display properties in detail. 8
Q.7(b) Explain different CSS selectors with examples. 4

UNIT-IV

- Q.8(a)** State and explain different types of control statements in JavaScript with suitable coding examples. 8
Q.8(b) Write HTML code to find the area of a circle by taking radius 'r' as input using a dialog box. 4
Q.9(a) Describe the Document Object Model (DOM) and its manipulation techniques in detail. 8
Q.9(b) Define Event. How events are handled in JavaScript? 4

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B-605

BCA/BCA-DS/BCA-CTIS/BCA-AIML II Semester Examinations (June 2026)

English Language & Communication II (ASH-HUM-118A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all, selecting one question from each unit and Question 1 is compulsory. Each Question carries 12 marks.

Q.1	Marks
(a) Identify the parts of speech of the underlined words and explain their function in the sentence. Example: She <u>runs</u> fast but is a <u>runner</u> at heart.	2
(b) Explain the difference in meaning between "He is a teacher" and "He is the teacher."	2
(c) How does skimming help in understanding the main idea of a passage quickly?	2
(d) Why are organisation and coherence important in essay writing?	2
(e) Why is body language important during an interview?	2
(f) What is the main purpose of a Statement of Purpose (SOP)?	2

UNIT-I

Q.2(a)	Describe the basic rules of subject-verb agreement and illustrate how these rules apply to sentences with compound subjects	6
Q.2(b)	Fill in the blanks with suitable articles. i. He is ___ university student. ii. She aspires to become ___ authority in the field of astrophysics. iii. ___ Himalayas are known for their breathtaking beauty. iv. He was appointed ___ ambassador to France. v. The professor gave ___ lecture on ethics in artificial intelligence. vi. She found ___ coin on ___ road.	6
Q.3(a)	How does shifting a story from the past tense to the present tense alter the reader's sense of urgency and intimacy? Briefly explain using an example of your own	6
Q.3(b)	Fill in the words with the correct form of verbs (tenses): i. By the time the conference begins, the researchers ___ (compile) all the data. ii. She said she ___ (never / experience) such a challenging experiment before. iii. I wish I ___ (know) about the deadline earlier. iv. If it ___ (rain), we will cancel the picnic. v. They ___ (build) a new bridge over the river next year. vi. Had the data been accurate, the hypothesis ___ (prove) correct.	6

UNIT-II

- | | | |
|---------------|--|-----------|
| Q.4 | Explain the process of skimming and scanning. How do these techniques help a reader improve comprehension and save time? | 12 |
| Q.5(a) | Why is speed alone not sufficient for effective reading? | 6 |
| Q.5(b) | What do you understand by identifying relevant information in a text? Illustrate with an example | 6 |

UNIT-III

- | | | |
|---------------|--|-----------|
| Q.6(a) | Discuss the structure and objective of a Request for Information under the RTI Act | 6 |
| Q.6(b) | Differentiate between an expository essay and a persuasive essay with examples | 6 |
| Q.7 | Write a letter to the Editor, The Hindu, expressing concern about increasing air pollution in urban areas. | 12 |

UNIT-IV

- | | | |
|---------------|---|-----------|
| Q.8 | Illustrate your answer with examples of appropriate and inappropriate interview behaviour. | 12 |
| Q.9(a) | Describe the common fears associated with public speaking and explain methods to overcome them effectively. | 6 |
| Q.9(b) | Discuss and differentiate between the main methods of presentation. | 6 |

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B-606

BCA/BCA-CTIS/BCA -DS/BCA-AIML II Semester Examinations (June 2026)

Indian Knowledge System (ASH-HUM-119A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1		Marks
(a)	Define Indigenous Knowledge and mention any two of its features.	3
(b)	What is the objective of the Forest Rights Act, 2006?	3
(c)	What do you mean by Intellectual Property Rights (IPR) in the context of Traditional Knowledge?	3
(d)	Write any two roles of Traditional Knowledge in healthcare or food security.	3
UNIT-I		
Q.2	Define Traditional Knowledge and explain its characteristics and significance in modern society.	12
Q.3	Discuss the need for protection of Traditional Knowledge. Explain its importance with suitable examples.	12
UNIT-II		
Q.4	Explain the provisions and significance of the Protection of Traditional Knowledge Bill.	12
Q.5	Discuss the role of legal frameworks in safeguarding Traditional Knowledge with reference to relevant Acts.	12
UNIT-III		
Q.6	Explain systems of Traditional Knowledge Protection. How can these systems be strengthened?	12
Q.7	Discuss various strategies to enhance the protection of Traditional Knowledge at national and international levels.	12
UNIT-IV		
Q.8	Explain the role of Traditional Knowledge in engineering and traditional medicine systems.	12
Q.9	Discuss the importance of Traditional Knowledge in agriculture and healthcare systems of traditional societies.	12

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B-621

BCA/BCA -DS/BCA-AIML II/IV Semester Examinations (June 2026)

Programming with Python (BCA-122A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1	Marks
(a) Define Python and mention any two applications of Python.	2
(b) Differentiate between keywords and identifiers.	2
(c) What is the purpose of type() function in Python?	2
(d) Differentiate between break and continue statements.	2
(e) What is the difference between list and tuple?	2
(f) Define recursive function.	2

UNIT-I

Q.2(a)	Explain variables, identifiers, comments, and keywords in Python with suitable examples.	6
Q.2(b)	Write a Python program to input radius of a circle and calculate its area using package.	6
Q.3(a)	Explain standard data types in Python with suitable examples.	6
Q.3(b)	Explain the use of math package, round() function, and id() function in Python with suitable examples.	6

UNIT-II

Q.4(a)	Explain different types of operators in Python with suitable examples.	6
Q.4(b)	Write a Python program to check whether a number is positive, negative, or zero using if-elif-else.	6
Q.5(a)	What is control statement? Explain for loop and while loop with suitable examples.	6
Q.5(b)	Write a Python program to: i. Print multiplication table of a number ii. Find factorial of a number using loops.	6

UNIT-III

Q.6(a)	Explain string operations in Python including indexing, concatenation, and traversal with examples.	6
Q.6(b)	Write a Python program to: i. Create a list of numbers ii. Display maximum, minimum, and sum of list elements.	6
Q.7(a)	Differentiate between list and tuple. Explain tuple operations with examples.	6

- Q.7(b)** Write a Python program to: **6**
- i. Perform indexing and slicing operations
 - ii. Check whether an element exists in the list using in operator.

UNIT-IV

- Q.8(a)** Explain set operations and built-in functions in Python with examples. **6**
- Q.8(b)** Write a Python program to create a dictionary of student details and display its keys, values, and items. **6**
- Q.9(a)** Explain different types of arguments in Python functions with examples. **6**
- Q.9(b)** Write a Python program using: **6**
1. Lambda function
 2. map() function to calculate square of numbers in a list.

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B-622

BCA -DS II Semester Examinations (June 2026)

Office & Spreadsheet Tools (BCA-124A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1		Marks
(a)	List the names of text-alignment in MS-Office.	02
(b)	Classify system software and application software with examples	02
(c)	How is Recycle bin different from other folders?	02
(d)	Define sorting and filtering in Excel.	02
(e)	What is the short-cut key for new slide in MS-PowerPoint?	02
(f)	Define slide sorter view of MS PowerPoint.	02

UNIT-I

Q.2(a)	Describe different types of Operating Systems with examples.	6
Q.2(b)	How the spell check tool is used to identify and correct errors	6
Q.3	Explain how to explore files and folders in a computer. List steps create, rename, and delete files and folders.	12

UNIT-II

Q.4	Illustrate how to use the Find and Replace function to modify text content. List the steps of creating and saving a document.	12
Q.5(a)	Explain various methods to create a table in MSWord document. How can cells be merged and format the text in table?	6
Q.5(b)	What is mail merge? Discuss mail merge giving a suitable example.	6

UNIT-III

Q.6	Explain the steps to create charts in a spreadsheet. Describe different types of charts such as bar, pie, and line charts with their uses and diagrams.	12
Q.7(a)	Describe the rules for writing a formula in MS-Excel?	6
Q.7(b)	Explain the use of format cell dialog box to improve the structure.	6

UNIT-IV

Q.8	What do you understand by presentation? Write steps to create a presentation and add a table in a Powerpoint presentation.	12
Q.9(a)	Explain briefly different views used in Power-point presentations.	6
Q.9(b)	Discuss steps to link a Excel worksheet to a slide.	6

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B-641

BCA-CTIS/BCA-DS II/III Semester Examinations (June 2026)

Data Structures using C++ (BCA-112A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1		Marks
(a)	Define-Data Hiding and encapsulation.	03
(b)	Write a program in C++ to concatenate two strings.	03
(c)	List the real life applications of stack.	03
(d)	Compare linear search and binary search?	03

UNIT-I

Q.2	What is a scope resolution operator and its significance? How the members of a class are accessed?	12
Q.3(a)	Define the Class. How it is different from the Structure?	06
Q.3(b)	Write and explain the features of object-oriented programming.	06

UNIT-II

Q.4	Define an algorithm. Write the characteristics of an algorithm. Explain asymptotic notations	12
Q.5	Write a program in C++ to find the multiplication of two matrices.	12

UNIT-III

Q.6 (a)	Explain the sequential representation of stack in memory.	06
Q.6(b)	Write a program in C++ to find the factorial of a number using recursion.	06
Q.7	Write a program in C++ to insert an element in a Queue. Explain queue as an Abstract Data Type	12

UNIT-IV

Q.8	Explain the various types of operations applicable on link list.	12
Q.9	Write the algorithm of the Merge Sort. Sort the following sequence of numbers using Merge sort: 23, 11, 37, 56, 18, 85, 117, 32	12

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B-642
BCA-CTIS II Semester Examinations (June 2026)
Introduction to Cloud Computing (BCA-114A)

Time- 3hrs
Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q. 1	Answer the following questions in brief:	Marks
	a) What is cloud computing architecture?	2
	b) Define scalability.	2
	c) What is PaaS?	2
	d) What is VM provisioning?	2
	e) Define SLA.	2
	f) Name any two cloud computing tools.	2

UNIT-I

Q. 2	a) Explain characteristics of cloud computing.	6
	b) Discuss advantages and limitations of cloud computing.	6
Q. 3	Describe the history and evolution of cloud computing. Also explain its major components.	12

UNIT-II

Q. 4	Explain deployment models of cloud computing with suitable diagrams.	12
Q. 5	a) Explain different types of SLA.	6
	b) Describe lifecycle of SLA.	6

UNIT-III

Q. 6	Explain virtualization. Discuss its advantages.	12
Q. 7	a) Explain the process of virtual machine provisioning.	6
	b) Describe service migration in cloud environments.	6

UNIT-IV

Q. 8	Explain the following:	12
	a) Federated Clouds	
	b) Hybrid Clouds	
	c) Mobile Clouds	
Q. 9	a) Discuss security challenges in cloud computing.	6
	b) Explain commonly used cloud platforms/tools (AWS, Azure, Google Cloud).	6

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C-601

BCA/BCA-CTIS II Semester Examinations (June 2026)
Software Engineering (BCA-201A)

Time- 3hrs
Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1	Marks
(a) What is software crisis? Mention two causes.	2
(b) Write two advantages of the Spiral Model.	2
(c) If a requirement says "The system should load within 2 seconds", what type of requirement is it?	2
(d) Which SDLC model works like "building a house floor by floor"?	2
(e) List different types of cohesion.	2
(f) Alpha vs Beta testing.	2

UNIT-I

Q.2	Explain Software Engineering. Discuss its importance and need in Developing reliable and efficient software systems. If a program is correct but still fails in real usage, which software characteristic was ignored? Justify your answer.	12
Q.3(a)	Explain software myths in detail. Discuss how these myths affect the software development process.	6
Q.3(b)	Describe software evolution and discuss the different types of changes that occur in software over time.	6

UNIT-II

Q.4(a)	Define the following terms: i) Define SRS. ii) Requirement Elicitation iii) Brainstorming	6
Q.4(b)	Draw a Level-0 and Level-1 DFD for an Online Shopping System and explain the data flow.	6
Q.5(a)	Compare Iterative Enhancement Model with Evolutionary Development Model.	6
Q.5(b)	Differentiate between functional and non-functional requirements.	6

UNIT-III

Q.6(a)	Demonstrate how cohesion and coupling concepts can be used to improve the design of a simple system?	8
Q.6(b)	Write differences between conceptual and technical design.	4

- Q.7** Compare function-oriented design and object-oriented design in terms of flexibility, scalability, and reusability. Analyse the trade-off between modularity and software cost. Give appropriate examples. **12**

UNIT-IV

- Q.8(a)** Compare alpha, beta, and acceptance testing in terms of user involvement and testing environment. **6**
- Q.8(b)** Describe the difference between bug, fault, and failure with examples. **6**
- Q.9(a)** Define the following terms: **6**
- i) Bug
 - ii) Token count.
 - iii) Software metrics.
- Q.9(b)** What are data structure metrics? Explain each type. **6**

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C-603

BCA/BCA-DS/BCA-CTIS III Semester Examinations (June 2026)

Database Management System (BCA-203A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1	Marks
(a) What do you mean by degree of relationship?	2
(b) What is the purpose of the Rename operation?	2
(c) Define aggregation in the EER model.	2
(d) What is Theta Join?	2
(e) Define Trivial Functional Dependency.	2
(f) What is Concurrent Execution?	2

UNIT-I

Q.2(a)	Who are database users? Classify different types of DBMS users and explain their roles.	6
Q.2(b)	Differentiate between Schema and Instance. Explain with suitable examples and highlight their significance.	6
Q.3	Explain the concepts of Entity, Entity Set, Attributes, and Keys in the ER model. Illustrate your answer with a suitable ER diagram.	12

UNIT-II

Q.4	Describe different types of SQL commands. Explain DDL, DML, DCL, and TCL commands with syntax and examples.	12
Q.5(a)	Explain the Division operation in Relational Algebra. Illustrate with a suitable example.	6
Q.5(b)	Consider the following relations: EMPLOYEE (EmpID, Name, DeptID, Salary) DEPARTMENT (DeptID, DeptName) Write Relational Algebra expressions for the following queries: 1. Retrieve the names of employees working in the 'IT' department. 2. Find the names of employees having salary greater than 50,000. 3. Display the names of employees along with their department names.	6

UNIT-III

Q.6	Explain the need for normalization. Discuss insertion, deletion, and update anomalies with suitable examples. Explain how normalization removes these anomalies.	12
Q.7(a)	What is a Minimal Set of Functional Dependencies? Explain the steps to find a canonical cover with an example.	6
Q.7(b)	What are Join Dependencies and Fifth Normal Form (5NF)? Explain with suitable examples.	6

UNIT-IV

- | | | |
|---------------|---|-----------|
| Q.8 | Explain Transaction Processing Concepts in detail. Discuss transactions, schedules, and ACID properties with examples. | 12 |
| Q.9(a) | Describe the Two-Phase Locking (2PL) protocol. Explain its phases, working mechanism, and how it ensures serializability. | 6 |
| Q.9(b) | Compare and contrast Operational Databases and Data warehouse with respect to their purpose, characteristics, and usage. | 6 |

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Roll No.....

C-605

BCA/BCA-DS/BCA-CTIS III Semester Examinations (June 2026)

Personality Development (BBA-217A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1	Write Short Notes on the following:	Marks
(a)	Situational conversations	2
(b)	Teamwork and collaboration	2
(c)	Internal and external motives	2
(d)	Psychometric analysis	2
(e)	Group discussion	2
(f)	Work ethics	2

UNIT-I

Q.2(a)	How confidence-building techniques help in personality development?	6
Q.2(b)	Explain the importance of interpersonal skills in effective communication and personality development.	6
Q.3	Compare and contrast formal and informal presentation of self with examples. How can an individual identify and improve their strengths and weaknesses?	12

UNIT-II

Q.4	Explain how attitudes are formed and changed over time? Differentiate between personalities having positive and negative attitude.	12
Q.5(a)	Analyze the relationship between attitude and behavior. How does attitude influence decision-making?	6
Q.5(b)	Explain the importance of self-motivation. How can SMART goals improve performance of an individual?	6

UNIT-III

Q.6	Discuss the different stages of a personal interview (HR & Technical) process. Discuss the various types of interviews in detail.	12
Q.7(a)	How psychometric analysis and mock interview sessions help in recruitment in an organization?	6
Q.7(b)	Describe the role of personality tests and aptitude tests in the selection process.	6

UNIT-IV

Q.8	Discuss the key qualities of a good leader and their significance. Discuss various leadership styles and evaluate their effectiveness in different situations.	12
Q.9(a)	Explain the importance of etiquettes and good manners in personal and professional life.	6
Q.9(b)	Discuss various techniques of time management and their advantages.	6

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Roll No.....

C-621

BCA/BCA-DS III/IV Semester Examinations (June 2026)

Probability & Statistics (ASH-MAT-215A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

- Q.1** **Marks**
- (a) Explain briefly qualitative and quantitative data with one example of each. **3**
- (b) Explain linear regression. **3**
- (c) Differentiate between discrete and continuous random variable along with one example of each **3**
- (d) Discuss the concept of population and sample. **3**

UNIT-I

- Q.2(a)** Explain briefly the diagrammatic representation of data. **4**
- Q.2(b)** The following distribution gives the pattern of overtime work done by 100 employees of a company. Calculate the average overtime work done per employee: **8**

Overtime hours	10-15	15-20	20-25	25-30	30-35	35-40
Number of Employee	11	20	35	20	8	6

- Q.3(a)** Find the harmonic mean of the following distribution of data: **6**

Dividend yield (per-cent)	2 - 6	6 - 10	10 - 14
Number of companies	10	12	18

- Q.3(b)** A study of 100 engineering companies gives the following information: Calculate the standard deviation of the profit earned. **6**

Profit (Rs. in crore)	0-10	10-20	20-30	30-40	40-50	50-60
Number of companies	8	12	20	30	20	10

UNIT-II

Q.4(a) Given the following data:

Student	1	2	3	4	5	6	7	8	9	10
Management aptitude score	400	675	475	350	425	600	550	325	675	450
Grade point average	1.8	3.8	2.8	1.7	2.8	3.1	2.6	1.9	3.2	2.3

(i) Draw this data on a graph paper.

6

(ii) Is there any correlation between per capita national income and per capita consumer expenditure? If yes, what is your opinion.

Q.4(b) The following table gives indices of industrial production and number of registered unemployed people (in lakh). Calculate the value of the correlation coefficient.

6

Year	1991	1992	1993	1994	1995	1996	1997	1998
Index of Production	100	102	104	107	105	112	103	99
Number Unemployed	15	12	13	11	12	12	19	26

Q.5(a) Ten competitors in a beauty contest are ranked by three judges in the following order:

6

Judge1:	1	6	5	10	3	2	4	9	7
Judge2:	3	5	8	4	7	10	2	1	6
Judge3:	6	4	9	8	1	2	3	10	5

Use the rank correlation coefficient to determine which pair of judges has the nearest approach to common tastes in beauty.

- Q.5(b)** Use least squares regression line to estimate the increase in sales revenue expected from an increase of 7.5 per cent in advertising expenditure. 6

Firm	Annual Percentage Increase in Advertising Expenditure	Annual Percentage Increase in Sales Revenue
A	1	1
B	3	2
C	4	2
D	6	4
E	8	6
F	9	8
G	11	8
H	14	9

UNIT-III

- Q.6(a)** Tickets are numbered from 1 to 100. They are well shuffled and a ticket is drawn at random. What is the probability that the drawn ticket has 6
- (i) an even number?
 - (ii) the number 5 or a multiple of 5?
 - (iii) a number which is greater than 75?
 - (iv) a number which is a square?
- Q.6(b)** What is the probability that a randomly chosen card from a deck of cards will be either a king or a heart. 6
- Q.7(a)** From a bag containing 3 red balls and 2 white balls, a man is to draw two balls at random without replacement. He gains Rs. 20 for each red ball and Rs. 10 for each white one. What is the expectation of his draw. 6
- Q.7(b)** A brokerage survey reports that 30 per cent of individual investors have used a discount broker, that is, one which does not charge the full commission. In a random sample of 9 individuals, what is the probability that 6
- (i) exactly two of the sampled individuals have used a discount broker,
 - (ii) not more than three have used a discount broker,
 - (iii) at least three of them have used a discount broker.

UNIT-IV

- Q.8(a)** The mean length of life of a certain cutting tool is 41.5 hours with a standard deviation of 2.5 hours. What is the probability that a simple 6

random sample of size 50 drawn from this population will have a mean between 40.5 hours and 42 hours?

Q.8(b) Explain estimation and hypothesis test. 6

Q.9(a) An auditor claims that 10 per cent of customers' ledger accounts are carrying mistakes of posting and balancing. A random sample of 600 was taken to test the accuracy of posting and balancing and 45 mistakes were found. Are these sample results consistent with the claim of the auditor? Use 5 per cent level of significance. 6

Q.9(b) A company is interested in determining whether an association exists between the commuting time of their employees and the level of stress-related problems observed on the job. A study of 116 assembly-line workers reveals the following: 6

Commuting Time	High	Moderate	Low	Total
Under 20min	9	5	18	32
20-50 min	17	8	28	53
over 50 min	18	6	7	31
Total	44	19	53	116

At $\alpha = 0.01$ level of significance, is there any evidence of a significant relationship between commuting time and stress?

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Roll No.....

C-641

BCA-CTIS III Semester Examinations (June 2026)

Linux & Shell Programming (BCA-211A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1		Marks
(a)	List any five features of Linux.	2
(b)	What does the uname command do?	2
(c)	What is a zombie process?	2
(d)	Explain script debugging briefly.	2
(e)	Differentiate between chmod and umask	2
(f)	What is the role of the boot block?	2

UNIT-I

Q.2	Compare file-oriented commands vs. directory-oriented commands with real-time usage cases. Describe file-oriented commands with examples: cat, head, tail, diff, cmp.	12
Q.3	Explain the Linux architecture in detail. Describe each layer with roles and examples. Is the vi editor? Explain its modes and commonly used commands.	12

UNIT-II

Q.4(a)	Compare zombie and orphan processes. How are they created?	6
Q.4(b)	Describe process states with transitions using a neat state diagram.	6
Q.5(a)	Discuss disk-related commands: du, df, dd, fdisk, compress, uncompress.	6
Q.5(b)	Explain process scheduling using cron, crontab, at, batch.	6

UNIT-III

Q.6(a)	Write a shell script to: i. read a filename ii. check if it exists iii. display number of lines, words, and characters	6
Q.6(b)	Discuss control structures in shell scripting: if, case, for, while, until.	6
Q.7	Explain the concept and working of pipes in Linux. Why are pipes important for command chaining? Describe how multiple commands can be connected together using pipes.	12

UNIT-IV

Q.8	Explain the structure of the Linux file system: boot block, superblock, inode block, data block. Discuss steps to create, mount, and unmount a file system.	12
Q.9	Discuss user account management: creating, modifying, and deleting users and groups. Analyze the importance of proper user and group management in maintaining system security.	12

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Roll No.....

C-642

BCA – CTIS III Semester Examinations (June 2026)

Introduction to Information Security (BCA-213A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1	Marks
(a) What is multi-factor authentication?	2
(b) What is a security attack?	2
(c) Explain Ransomware	2
(d) What is cryptanalysis?	2
(e) What is IDS?	2
(f) What is Malware?	2

UNIT-I

Q.2(a)	Explain the differences between threats, attacks, and vulnerabilities.	6
Q.2(b)	Explain Denial of Service (DoS) attack and Man-in-the-Middle attack. How do they affect the CIA triad?	6
Q.3	Describe security attacks and explain their classification. Explain how attacks affect Confidentiality, Integrity, and Availability with suitable examples.	12

UNIT-II

Q.4	Explain the concepts of authentication, authorization, and encryption. Describe how these are implemented in a social media platform with an example.	12
Q.5(a)	Explain the differences between symmetric and asymmetric cryptography.	6
Q.5(b)	Describe situations where each type of cryptography is preferred with suitable examples.	6

UNIT-III

Q.6	Explain common web application vulnerabilities, including SQL Injection and Cross-Site Scripting (XSS), with suitable examples.	12
Q.7(a)	Explain the concept of firewalls in network security.	6
Q.7(b)	Describe different types of firewalls along with their key features.	6

UNIT-IV

Q.8	Explain the concept of web security and discuss its importance. Describe common web security threats with suitable examples.	12
Q.9(a)	Explain the concept of patch management and its role in maintaining system security.	6
Q.9(b)	Explain common operating system vulnerabilities with suitable examples.	6

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Roll No.....

C 643

BCA/BCA-DS/BCA-CTIS III/IV Semester Examinations (June 2026)

Full Stack Development I (MERN) (BCA-215A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

	Marks
Q1:	
a. What is Node.js? Mention one feature of it.	2
b. Write the difference between props and state in React.js?	2
c. What are core modules in Node.js? Give one example.	2
d. Explain the Event Loop in Node.js?	2
e. Explain the difference between client-side and server-side JavaScript?	2
f. What is JSX in React.js?	2

UNIT-I

Q2:	
a. Explain the features of Node.js and its role in MERN stack development.	6
b. Write short notes on JavaScript fundamentals: variables, functions, loops, and arrays.	6
Q3: Describe how the event-driven architecture and non-blocking I/O model work in Node.js with a suitable diagram or example. Also explain why Node.js is suitable for Full Stack (MERN) development.	12

UNIT-II

Q4: Explain React.js and its core concepts. Also compare functional and class components and describe how data is managed in React applications.	12
Q5:	
a. Explain React Hooks and their uses in React applications.	6
b. What is React Router? Explain navigation and dynamic routing with route parameters.	6

UNIT-III

Q6: Explain the role of Node.js and Express.js in backend development. Describe how middleware, routing, and request handling work together in an Express application.	12
Q7:	
a. Explain core, global, and user-defined modules in Node.js.	6
b. What is middleware in Express.js? Explain different types of middleware and their role in request processing with a simple example.	6

UNIT-IV

Q8: Explain asynchronous programming in Node.js using callbacks, promises, and async/await.

12

Q9:

a. What is JWT? Explain how it is used for authentication in web applications.

6

b. What is Mongoose? Explain schema and model creation in MongoDB using Mongoose.

6

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Roll No.....

D 601

BCA/BCA-DS/BCA-CTIS IV Semester Examinations (June 2026)

Quantitative Aptitude (BCA-202A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1

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|-----|---|---|
| (a) | Check whether equation $x + \frac{3}{x} = x^2$ is quadratic equation? | 2 |
| (b) | Prove that $(1 + \tan^2 \theta) \cos^2 \theta = 1$. | 2 |
| (c) | What would be the annual interest accrued on a deposit of Rs. 10,000 in a bank that pays a 4 % per annum rate of simple interest? | 2 |
| (d) | How many words can be formed by using 3 letters from the word "DELHI"? | 2 |
| (e) | The following are the marks of 9 students in a class. Find the median
34,32,48,38,24,30,27,21,35. | 2 |
| (f) | What is the difference between bar graph and pie chart? | 2 |

UNIT-I

- | | | |
|--------|---|----|
| Q.2(a) | Solve: $2x + 3y = 17$, $3x - 2y = 6$ | 6 |
| Q.2(b) | The sum of the squares of two consecutive natural numbers is 313. Find the numbers | 6 |
| Q.3 | Five years hence, father's age will be 3 times the age of his son. 5 years ago, father was 7 times as old as his son. Find their present age. | 12 |

UNIT-II

- | | | |
|--------|--|----|
| Q.4 | Two taps can fill a cistern in 4 and 26 hours respectively. A third tap can empty it in 26 hours. How long will it take to fill one-fourth of the empty cistern, if all of them are opened all together? | 12 |
| Q.5(a) | A man can do a work in 20 days and a woman in 15 days. If they work on it together for 5 days, find the fraction of the work which is left? | 6 |
| Q.5(b) | A train is moving with a speed of 132 Km/hr. If the length of the train is 110 meter, how long will it take to cross a railway platform 165 meters long? | 6 |

UNIT-III

- | | | |
|--------|---|----|
| Q.6 | A circus artist is climbing from the ground along a rope stretched from the top of a vertical pole and tied at the ground. The height of the pole is 12 meter and the angle made by the rope with the ground level is 30 degree. Calculate the distance covered by the artist in climbing to the top of the pole. | 12 |
| Q.7(a) | A class has 60 students. 35 students play football, 40 play cricket, and 15 play both. How many students play only one sport? | 6 |
| Q.7(b) | The difference between simple and compound interests compounded annually on a certain sum of money for 2 years at 4% per annum is Re. 1. Find The sum (in Rs.) . | 6 |

UNIT-IV

- Q.8 The marks scored by 750 students in an examination are given in the form of a frequency distribution table. Represent this data in the form of a histogram and construct a frequency polygon. 12

Marks	600-640	640-680	680-720	720-760	760-800	800-840	840-880
No. of Students	16	45	156	284	172	59	18

- Q.9(a) Suman recorded her grades received throughout the year in the table shown below. Draw a pie chart to display Suman's result. 6

Grade	A	B	C	D
Frequency	6	5	10	3

- Q.9(b) In how many ways can a group of 5 members be formed by selecting 3 boys out of 6 boys and 2 girls out of 5 girls? 6

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Roll No.....

D 621

BCA-DS IV Semester Examinations (June 2026)
Statistical Foundation for Data Science (BCA-222A)

Time- 3hrs
Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1	Marks
(a) A teacher calculates the average marks of her class and represents them using a table. Which type of statistics is used? And why?	(2)
(b) The standard deviation of a symmetric distribution is 3. What must be the value of the 4 th moment about the mean in order that the distribution be mesokurtic?	(2)
(c) Given that $P(A) = \frac{3}{8}$, $P(B) = \frac{5}{8}$ and $P(A \cup B) = \frac{3}{4}$. Find $P(A/B)$ and show whether A and B are independent.	(2)
(d) If 10 coins are tossed 100 times, how many times would you expect 7 coins to fall head upward.	(2)
(e) A sample of size 25 has mean 50 and population standard deviation 10. Using $z = 1.96$, find the 95% confidence interval for the population mean.	(2)
(f) For a sample of observations, the probable error of the correlation coefficient is 0.08. Find the minimum value of the correlation coefficient required for it to be statistically significant.	(2)

UNIT-I

Q.2(a)	What do you understand by skewness and kurtosis? Point out their role in analyzing a frequency distribution.	(3)
Q.2(b)	The marks obtained by 10 students in an examination were as follows: 70,65,68,70,75,73,80,70,83,86 Find the mode, median, and mean deviation about the mean	(6)
Q.2(c)	The mean of five items of an observation is 4 and the variance is 5.2. if three Of the items are 1, 2 and 6, then find the other two.	(3)
Q.3	The following data represents marks obtained by 30 students: 11,14,17,19,21,24,27,29,31,34, 12,15,18,20,22,25,28,30,32,35, 13,16,23,26,33,36,37,39,41,44 (a) Construct a frequency distribution table using suitable class intervals and draw a histogram. (b) Construct a box plot for the given data and identify the median, quartiles, and any outliers.	(12)

UNIT-II

Q.4	Show that Poisson distribution is the limiting case of Binomial distribution.	(12)
Q.5(a)	A continuous random variable X has the probability density function	(6)

$$f(x) = \begin{cases} ax^2, & 0 < x < 1 \\ 0, & \text{otherwise} \end{cases}$$

Find the value of a , Mean and variance of X .

- Q.5(b) If $Y = 2X + 1$, find $E(Y)$ and $Var(Y)$. (6)

UNIT-III

- Q.6 Two random samples are drawn from 2 normal populations are as follows: (12)

A	28	30	32	33	31	29	34
B	29	30	30	24	27	28	

Test whether the samples are drawn from the same normal population.

- Q.7(a) A certain cubical die was thrown 9000 times and 5 or 6 was obtained 3240 times. On the assumption of certain throwing, do the data indicate an unbiased die? (6)

- Q.7(b) Before an increase in excise duty on tea, 800 people out of a sample of 1000 persons were found to be tea drinkers. After an increase in the duty, 800 persons were known to be tea drinkers in a sample of 1200 people. Do you think that there has been a significant decrease in the consumption of tea after the increase in the excise duty. (6)

UNIT-IV

- Q.8 Calculate the co-efficient of correlation and obtain the least square regression line of y on x for the following data: (12)

x	1	2	3	4	5	6	7	8	9
y	9	8	10	12	11	13	14	16	15

Also obtain an estimate of y which should correspond on the average to $x=6.2$

- Q.9(a) Explain the Pearson correlation coefficient and Spearman rank correlation coefficient. Discuss their assumptions and limitations. Why is Spearman's method called a non-parametric measure? (6)

- Q.9(b) In experiment on pea breeding, the following frequencies of seeds were obtained: (6)

Round and Yellow	Wrinkled and Yellow	Round and Green	Wrinkled and Green	Total
315	101	108	32	556

Theory predicts that the frequencies should be in proportions 9:3:3:1. Examine the correspondence between theory and experiment.

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Roll No.....

D-622

BCA-DS IV Semester Examinations (June 2026)
Data Mining & Warehousing (BCA-224A)

Time- 3hrs
Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1	Marks
(a) What is a Data Cube?	2
(b) Explain the concept of data integration in a Data Warehouse.	2
(c) What is Knowledge Discovery in Databases (KDD)?	2
(d) Explain different types of attributes used in Data Mining.	2
(e) Define clustering in Data Mining.	2
(f) Define Decision Tree.	2

UNIT-I

Q.2(a)	Discuss the importance of Data Warehouse in decision support systems.	6
Q.2(b)	Analyze the differences between Star Schema and Snowflake Schema.	6
Q.3	Explain the architecture of a Data Warehouse with neat diagram.	12

UNIT-II

Q.4	Describe the Knowledge Discovery Process in detail.	12
Q.5(a)	Discuss the methods used for data cleaning.	6
Q.5(b)	Compare different Data Mining functionalities.	6

UNIT-III

Q.6	Explain different clustering methods in Data Mining.	12
Q.7(a)	Demonstrate hierarchical clustering using a sample dataset.	6
Q.7(b)	Discuss the concept of nearest neighborhood in Data Mining.	6

UNIT-IV

Q.8	Describe Association Rule Mining and its importance.	12
Q.9(a)	Describe the role of entropy and information gain in attribute selection.	6
Q.9(b)	Compare Decision Tree classification and Neural Network classification.	6

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Roll No.....

D-623

BCA-DS IV Semester Examinations (June 2026)

Data Visualization using Python (BCA-226A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1	Marks
(a) State the difference between = and ==.	1.5
(b) State one advantage of using packages in Python.	1.5
(c) What is array slicing in NumPy?	1.5
(d) What is boolean indexing in NumPy?	1.5
(e) What is represented by a scatter plot?	1.5
(f) How can annotations help in understanding trends in graphs?	1.5
(g) What is meant by integration of Seaborn with Pandas?	1.5
(h) Why are correlation heatmaps important in machine learning and statistics?	1.5

UNIT-I

Q.2(a)	Describe different data types available in Python with suitable examples.	6
Q.2(b)	Explain the steps involved in creating and using a user-defined module in Python using suitable examples.	6
Q.3	Evaluate the significance of encapsulation and polymorphism in developing secure and reusable Python applications with suitable examples.	12

UNIT-II

Q.4	Analyze the importance of data filtering, sorting, and grouping operations in decision-making systems with appropriate examples from real-world applications.	12
Q.5(a)	Evaluate the importance of handling missing data in Pandas DataFrames. Explain suitable methods with examples.	6
Q.5(b)	Explain the importance of NumPy in data manipulation. Discuss array creation and arithmetic operations with examples.	6

UNIT-III

Q.6	Develop a Python application using Matplotlib to visualize sales data through multiple plot types. Analyze the advantages of each plot in data interpretation.	12
Q.7(a)	Analyze the role of Matplotlib in business analytics and scientific research applications.	6

Q.7(b) Explain the role of Matplotlib in data visualization. Discuss its major features and applications. **6**

UNIT-IV

Q.8 Explain distribution plots in Seaborn. Discuss histogram, box plot, and violin plot with suitable programs and applications. **12**

Q.9(a) Explain the role of styles and themes in Seaborn visualization. **6**

Q.9(b) Explain the features of Seaborn and compare it with Matplotlib. **6**

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Roll No.....

D-625

BCA-DS IV Semester Examinations (June 2026)

Artificial Intelligence (BCA-260A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1	Marks
(a) Define Artificial Intelligence.	2
(b) Differentiate declarative and procedural knowledge representation.	2
(c) State three applications of Expert system.	2
(d) Explain the relevance of Turing Test.	2
(e) Define unification in Predicate logic.	2
(f) Demonstrate A* search algorithm.	2

UNIT-I

Q.2(a)	Explain what a production system is and discuss its characteristics.	6
Q.2(b)	Elucidate the historical development of artificial intelligence (AI) and its associated domains.	6
Q.3	Describe the concepts of state-space representation and analyze challenges encountered in designing search problems; demonstrate with an example.	12

UNIT-II

Q.4	Discuss various knowledge representation approaches, including logical representations, semantic networks, frames and scripts along with example for each.	12
Q.5(a)	Describe First Order Predicate Logic and its components.	6
Q.5(b)	Explain resolution and most general unifier with example.	6

UNIT-III

Q.6	Compare BFS, DFS, IDDFS, Hill Climbing and AO* search algorithms with respect to completeness, optimality and complexity.	12
Q.7(a)	Explain Alpha-Beta pruning with an example.	6
Q.7(b)	Illustrate the Min-Max strategy in game playing.	6

UNIT-IV

Q.8	Explain Architecture and components of an Expert System with neat diagram.	12
Q.9(a)	Apply the Alpha-Beta pruning to the given game tree and identify the nodes that are pruned. Show all the process. Terminal values: First subtree: 2,4 Second subtree: 6,8 Third subtree: 1,7	8
Q.9(b)	Describe the fundamental problems in NLP and method to overcome them.	4

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D 641

BCA-CTIS IV Semester Examinations (June 2026)
Data Communication & Computer Network (BCA-212A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1	Marks
(a) Differentiate between connection-oriented and connectionless services with suitable examples.	2
(b) State the role and working principle of a router in a computer network.	2
(c) Explain the working mechanism of CSMA/CD and mention its area of application.	2
(d) Describe the purpose and importance of a firewall in ensuring network security.	2
(e) Explain the concept of framing in data link control.	2
(f) Compare LAN, MAN, and WAN based on coverage area and usage.	2

UNIT-I

Q.2(a)	Explain the components of data communication system and describe the role of each component in network communication.	6
Q.2(b)	Describe different types of transmission media and analyze their suitability for different communication environments.	6
Q.3	Explain the OSI model, describing the functions of each layer and their role in data communication. A data communication system transmits 8 bits per signal element over a channel with a data rate of 64 kbps. Calculate the baud rate of the system.	12

UNIT-II

Q.4	Explain the working principles of circuit switching and packet switching and compare their performance in data communication. A communication channel has a bandwidth of 3 kHz and uses binary signaling. Calculate the maximum data rate using the Nyquist formula. Also determine the data rate if the number of signal levels increases to 4.	12
Q.5(a)	Examine the functions and differences of hubs, switches, and routers, highlighting their roles in network communication.	6
Q.5(b)	Analyze analog and digital communication techniques, focusing on modulation methods and their significance in data transmission.	6

UNIT-III

- Q.6** Explain the concept of sliding window protocol and describe its basic working. A sender uses Stop-and-Wait ARQ over a link of 1 Mbps bandwidth. The frame size is 1000 bits and propagation delay is negligible. Calculate the utilization of the link. **12**
- Q.7(a)** Explain the concept of error detection and error correction in data link control. Describe any two error detection techniques. **6**
- Q.7(b)** A slotted ALOHA network has a channel capacity of 1 Mbps. If each frame size is 500 bits, calculate the maximum throughput of the system. **6**

UNIT-IV

- Q.8** Explain the Distance Vector Routing algorithm with its working principle. Also, mention how routing tables are updated and its limitations. **12**
- Q.9(a)** A token bucket has a capacity of 12 tokens and generates tokens at a rate of 3 tokens/sec. Packets requiring 5, 6, 4, and 7 tokens arrive at 1-second intervals. Determine which packets are transmitted and which are delayed or dropped. Also, show the token status after each second. **6**
- Q.9(b)** Explain the flooding routing technique in computer networks. Discuss its working, advantages, disadvantages, and where it is used. **6**

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D 642

BCA-CTIS IV Semester Examinations (June 2026)

Cyber Laws & Ethics (BCA-214A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1	Marks
(a) What is meant by "Cyber Jurisdiction"? Name the two types of jurisdictions applicable in cyberspace.	2
(b) Differentiate between Copyright and Patent protection for software.	2
(c) Explain the concept of a Certifying Authority under the IT Act, 2000.	2
(d) List the ethical considerations associated with Blockchain technology.	2
(e) What is Online Dispute Resolution? State any two advantages of ODR over traditional dispute resolution.	2
(f) Define Cyber Ethics. Why is it considered important in the information society?	2

UNIT-I

Q.2(a)	Explain the evolution of computer technology and the emergence of cyberspace. How did the growth of the internet create the need for a dedicated cyber legal framework?	6
Q.2(b)	Discuss the various forms of cyber-crimes with suitable examples. How does Cyber Jurisprudence attempt to address these crimes within the existing legal framework?	6
Q.3	Explain the legal and technological significance of Domain Names. Discuss the importance of a Web Development Agreement and the legal issues that may arise in web space.	12

UNIT-II

Q.4(a)	Give an overview of the IT Act, 2000. Discuss its key amendments and identify the major limitations that still exist in the Act.	6
Q.4(b)	Explain the concept of Electronic Governance under the IT Act, 2000. Discuss the legal recognition accorded to Electronic Records and Digital Signatures under the Act.	6
Q.5(a)	Discuss the liability of Network Service Providers under the IT Act, 2000. Under what circumstances can a Network Service Provider claim exemption from liability?	6
Q.5(b)	Describe the structure and functions of the Cyber Regulations Appellate Tribunal. Explain the provisions relating to Penalties and Adjudication under the IT Act, 2000.	6

UNIT-III

- Q.6(a)** Discuss the protection available to Electronic Databases under Indian law. How do the provisions of the Indian Evidence Act apply to electronic records and digital evidence? 6
- Q.6(b)** Explain the relevance of the Indian Penal Code and the Bankers Book Evidence Act in the context of cyber-crimes and digital transactions. 6
- Q.7(a)** Discuss the legal framework governing Trademark and Copyright in the context of Domain Name disputes. How are such disputes resolved under Indian law? 6
- Q.7(b)** Write a note on Alternative Dispute Resolution as applicable to cyber disputes. 6

UNIT-IV

- Q.8(a)** Discuss the ethical and privacy issues that arise in cyber law enforcement. How does the concept of Cyber Ethics seek to regulate individual behaviour in the digital environment? 6
- Q.8(b)** Explain the need for Cyber Regulations and Ethics in the information society. What role do ethical frameworks play in shaping responsible digital citizenship? 6
- Q.9** What are the core ethical principles governing Artificial Intelligence? Discuss any three ethical issues that arise from the deployment of AI systems in society. 12

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D-643

BCA-CTIS IV Semester Examinations (June 2026)
Fundamental of Storage & Data Centres (BCA-216A)

Time- 3hrs
Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1		Marks
(a)	What is data center infrastructure? List its key components.	2
(b)	What is the role of RAID in data protection?	2
(c)	Name any two components of an intelligent storage system.	2
(d)	Define the n-Tier architecture model. How does it differ from the traditional Client/Server model?	2
(e)	Why should a data center be safe from natural and man-made hazards?	2
(f)	What is HVAC in a data center environment?	2

UNIT-I

Q.2	Describe the data center infrastructure in detail. Explain the role of each element of the storage system environment and how they collectively support enterprise data management needs. Discuss the evolution of storage technology with focus on current trends.	12
Q.3	What are the fundamental laws governing disk performance? Explain disk drive performance metrics including seek time, rotational latency, and data transfer rate with suitable examples. Also, discuss application requirements and their impact on disk performance.	12

UNIT-II

Q.4	Describe RAID levels in detail. Compare their advantages, limitations, and suitability for different storage requirements.	12
Q.5(a)	Explain the concepts of EMC CLARIION and EMC Symmetrix storage systems.	6
Q.5(b)	Discuss the impact of RAID on disk performance. Explain how different RAID levels affect read/write performance and reliability	6

UNIT-III

Q.6	Explain the Client/Server model and its evolution. Describe the n-Tier model and Multitier Architecture Application Environment with the help of diagrams. How does this relate to Data Center Architecture?	12
Q.7(a)	Describe the various Application Architecture Models used in data centers. Explain how these models have evolved with changing business needs?	6
Q.7(b)	Explain data center architecture with reference to scalability, availability, and manageability.	6

UNIT-IV

- Q.8** Prepare a requirement analysis for establishing a data center. Include power, cooling, physical space, network bandwidth, and budget constraints. **12**
- Q.9** Discuss the physical requirements of a data center in detail. Explain the required power, cooling (HVAC), network bandwidth, and weight constraints. Also, describe how budget constraints influence data center planning? **12**

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D-644

BCA-CTIS IV Semester Examinations (June 2026)

Full Stack Development II (MERN) (BCA-218A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all by selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

Q.1		Marks
(a)	Write short note on Node_Js run time environment.	03
(b)	Elaborate the applications of AngularJS.	03
(c)	What do you mean by Rootscope?	03
(d)	Explain using Postman for API testing.	03

UNIT-I

Q.2	Write the steps of installation of Node.Js.	12
Q.3	What is a scripting language? Explain various types of loops used in JavaScript?	12

UNIT-II

Q.4	What is role of built in filters? How filters can be used in controller?	12
Q.5	Explain the following directives: a) ng-app, b) ng-model c) ng-repeat d) ng-bind	12

UNIT-III

Q.6	Introduce the concept of Angular JS Modules. Explain updating models with a twist	12
Q.7	Write short note on a) Dependency injection b) Factory service	12

UNIT-IV

Q.8	Explain the features of the MongoDB. How CRUD operations are performed with Mongoose.	12
Q.9	Explain the followings: a) Middleware b) Error handling	12

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D-645

BCA-CTIS 4th Semester Examinations (June 2026)
Essentials of Python (BCA-256A)

Time: 3 Hrs

Max. Marks: 60

Attempt 5 questions in all, selecting one question from each unit. Question 1 is compulsory and each Question carries 12 marks.

	Marks
Q.1	
(a) What is the use of id() and type() methods in Python?	2
(b) What is keyword? List few important keywords in Python.	2
(c) Describe reference operators (is / is not).	2
(d) What is 'elif' control statement?	2
(e) Define 'list' data type in Python and write code to convert a 'string' to 'list'.	2
(f) Define 'lambda' function in Python.	2

UNIT-I

Q.2(a)	Discuss various explicit data type conversion methods in Python	8
Q.2(b)	What is 'math' module in Python? Write the output of the following code: import math print(math.sqrt(16)) print(math.pow(2,3)) print(math.ceil(1.6)) print(math.floor(1.6))	4
Q.3(a)	Discuss the use of the following functions in Python with examples. i) bin() ii) oct() iii) hex()	6
Q.3(b)	Write Python code to check the data type of following variables. a=10.5, b="11.5", c=True, d=-5, e='Y', f=3+4j	6

UNIT-II

Q.4(a)	Describe relational operators. Write a Python program to make use of relational operators.	6
Q.4(b)	Write a Python program to display the following pattern for the given number of lines using nested loop. 1 12 123 1234	6
Q.5(a)	Describe logical operators. Write a Python program to make use of logical operators.	6

- Q.5(b)** Write a Python program to find Area and Circumference of the circle with the radius entered as real number input. Use pi value from math module and round off the output to 3 decimal places. **6**

UNIT-III

- Q.6(a)** Discuss the use of following string handling methods: **6**
i) strip() ii) split() iii) join()
- Q.6(b)** Write the output of the following statement for a given list: **6**
lst = ['A', 'B', 'C', 'D', 'E', 'F', 'G', 'H', 'I', 'J', 'K', 'L']
print(lst[1:5])
print(lst[-4 :])
print(lst[-6 : -2])
print(lst[-6 : -2 : 2])
print(lst[-2 : -6 : -1])
print(lst[4 : 0 : -1])
- Q.7(a)** Discuss the use of following string handling methods: **4**
i) lower() ii) swapcase()
- Q.7(b)** Define 'tuple' data type in Python. How it is different from 'list'. Apply concatenation (+) and repetition (*) operator with tuple in Python. **8**

UNIT-IV

- Q.8(a)** What is a 'set'? Discuss Roaster and Rule based form of set. Write a Python program to perform union and intersection operation on the following two sets. **6**
A = {0, 1, 2, 3, 4, 5}
B = {0, 3, 6, 9, 12, 15}
- Q.8(b)** What is a Dictionary in Python? Discuss keys(), values() and items() methods of the Dictionary. **6**
- Q.9(a)** Explain default arguments and variable length arguments with respect to function in Python. **6**
- Q.9(b)** Describe a Recursive function. Write a Python program to find the factorial of given input integer number using a recursive function. **6**
