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END SEMESTER EXAMINATION, DECEMBER - 2024
BCA/B. Sc. (Hons.) in Data Science Semester – I

Course Name: Fundamentals of Accounting and Finance**Course Code: BMD112/MD111T****Time allotted: 03 Hours****Max. Marks: 100****Note: Read all the instructions carefully.****Q.1 VERY SHORT ANSWER QUESTIONS – Attempt All.****(2x10 = 20 Marks)**

- a. Define accounting?
- b. Explain the terms debtors and creditors.
- c. Explain the concept of materiality.
- d. State the meaning of real account?
- e. Write the formula of current ratio.
- f. Journal entries: Commence business with cash 20000.
- g. Journal entries : Purchased goods on credit from Ajay ` 10,000
- h. Journal entries: Cash sales 7000.
- i. Journal entries: Rent paid 800.
- j. Journal entries: Commission received 800.

Q.2 SHORT ANSWER QUESTIONS – Attempt any Five.**(4x5 = 20 Marks)**

- a. What are the golden rules of debit and credit?
- b. What are the major classification of ratios? Explain
- c. Which accounts are to be drawn in final accounts draw the format of trading a/c ?
- d. Define margin of safety.
- e. What are the objectives of financial management?
- f. What are the errors which are not disclosed by trial balance?
- g. Draw the format of balance sheet.

Q.3 STRUCTURED QUESTIONS – Attempt any Three.**(3x10 = 30 Marks)**

- a. Explain the functions of the finance manager.
- b. Who are the various users of accounting information? Explain.
- c. Explain the application of CVP analysis in decision making.
- d. Differentiate between book keeping and accounting.

Q.4 Case Analysis/ Situation Based QUESTIONS – Attempt any Two.**(2x15 = 30 Marks)**

- a. Explain all concepts and conventions of accounting.
- b. What do you understand by CVP analysis? Explain its disadvantages.
- c. What do you understand by the term ratio analysis? explain its advantages and disadvantages

END SEMESTER EXAMINATION, DECEMBER - 2024

BCA/B. Sc. (Hons.) in Data Science Semester – I

Course Name: Fundamentals in Information Technology

Course Code: BCT111/BD112T

Time allotted: 03 Hours

Max. Marks: 100

Note: Read all the instructions carefully.

Q. 1. Attempt all questions. All carry equal marks.

(2 x 10 = 20)

QN	Questions	CO	PO
a.	What is a Network Topology? Name two types.	3	1
b.	Name two Input devices and their functions.	1	1
c.	What does ALU and CU stand for?	1	1
d.	What technology was used in the fourth generation of computers?	1	1
e.	Define high-level language.	1	1
f.	Define computer.	1	1
g.	What does MAN stand for?	3	1
h.	What is MS Word used for?	4	1,3
i.	Define ROM.	1	1
j.	Name two storage devices. Explain them.	2	1

Q. 2. Attempt any 5 questions. All carry equal marks

(5 x 4 = 20)

QN	Questions	CO	PO
a.	Compare primary memory and secondary memory.	1	1
b.	Discuss the concept of Big Data. Explain its advantages and how it helps in data analysis.	5	1
c.	Discuss the Command Line Interface (CLI). Explain its features & advantages.	3	1
d.	Explain the concept of the Peer-to-Peer model.	3	1
e.	Explain the applications of MS WORD.	4	1,3
f.	List five MS-DOS commands with a brief description of what each command does.	3	1
g.	Differentiate between Data & Information.	2	1

Q. 3. Attempt any 3 questions. All carry equal marks.

(10 x 3 = 30)

QN	Questions	CO	PO
a.	Compare input and output devices. Elaborate on their types and provide relevant examples.	1	1
b.	Convert the following numbers decimal into binary: (i) 17 (ii) 160 (iii) 200 (iv) 127 (v) 1024	2	1
c.	What are different Network Topologies? Explain.	3	1
d.	What are the various types of computer networks? Explain each with examples and discuss their advantages and limitations.	3	1

Q. 4. Attempt any 2 questions. All carry equal marks.

(15 x 2 = 30)

QN	Questions	CO	PO
a.	(i) Explain different types of Networking Devices. (ii) What is MODEM? Discuss its working.	3	1
b.	Classify computers based on their size. Explain the different categories with examples and their respective characteristics.	1	1
c.	Explain the concept of Cloud Computing and its service models.	5	1

END SEMESTER EXAMINATION, DECEMBER - 2024
BCA/B. Sc. (Hons.) in Data Science Semester – I

Course Name: English Language Skill/English Communication

Course Code: BCT115/BD115T

Time allotted: 03 Hours

Max. Marks: 100

Note: Read all the instructions carefully.

Q.1 VERY SHORT ANSWER QUESTIONS – Attempt All.

(2x10 = 20 Marks)

Do as directed type questions.

- Change the sentence from present simple to future continuous tense:
"He reads a book every weekend." CO2
- Write the antonyms of given words: CO1
1. Offensive 2. Pertinent
- Break and count syllable in below given words: CO2
1. Apple 2. Synchronic
- Convert the given sentence into the passive voice: CO2
"She will teach the class tomorrow."
- Write the synonyms of given words: CO2
1. Prominent 2. Stubborn
- Convert the sentence from present perfect to future perfect: CO1
"We have completed the project."
- What is Rise-fall intonation? CO1
- Choose appropriate preposition. CO2
The movie starts _____ 7:30 PM. (by/at)
- Define intonation process? CO1
- Recall language learning and language acquisition. CO1

Q.2 SHORT ANSWER QUESTIONS – Attempt any Five.

(4x5 = 20 Marks)

- Identify one barrier to effective listening and suggest a solution for overcoming it. CO3
- How can reflective response contribute to better understanding in communication? CO3
- Analyze the process of listening, breaking down its stages and explaining the significance of each stage. CO3
- What do you understand by information overload? Explain with an example. CO3
- Define the importance of reading and its role in education. CO4
- List two strategies for developing skimming skills. CO4
- Evaluate the different types of reading and their respective applications in various contexts. CO4

Q.3 STRUCTURED QUESTIONS – Attempt any Three.

(3x10 = 30 Marks)

- Analyze the strategies for improving reading skills, considering both short-term and long-term benefits. CO4
- Evaluate the impact of reflective responses in resolving misunderstandings during communication. CO4
- Briefly define intonation and its role in spoken language. CO5
- Analyze the effectiveness of evaluation in listening comprehension. CO5

Q.4 Case Analysis/ Situation Based QUESTIONS – Attempt any Two.

(2x15 = 30 Marks)

- Formulate a detailed guide on formal letter writing. Include essential elements, formatting rules, and the appropriate language to be used in different formal correspondence situations. CO5
- Create a narrative paragraph telling a short story or recounting a personal experience. CO6
- Imagine you recently purchased a product or service that did not meet your expectations. Write a formal letter to the company or service provider expressing your dissatisfaction, outlining the issues you encountered, and suggesting possible solutions. CO6

END SEMESTER EXAMINATION, DECEMBER - 2024

BCA Semester – I

Course Name: English

Course Code: HS111T

Time allotted: 03 Hours

Max. Marks: 100

Note: Read all the instructions carefully.

Q.1 VERY SHORT ANSWER QUESTIONS – Attempt All.

(2x10 = 20 Marks)

- | | |
|--|-----|
| a. Define extensive reading. | CO1 |
| b. Describe reflective response. | CO1 |
| c. What is inferring? | CO1 |
| d. What is Stress in spoken English? | CO1 |
| e. Delineate word-stress. | CO1 |
| f. Write antonym of given words. (a). Adversity (b). Brutal | CO2 |
| g. Write synonyms of given words. (a). Blunder (b). Combat | CO2 |
| h. Use appropriate article with given words. (a). Umbrella (b). University | CO2 |
| i. Convert to Past indefinite tense:
He has never understood them. | CO2 |
| j. Use appropriate preposition:
1. She is allergic ____ cat. (with/ to)
2. He is afraid ____ heights. (to/ of) | CO2 |

Q.2 SHORT ANSWER QUESTIONS – Attempt any Five.

(4x5 = 20 Marks)

- | | |
|---|-----|
| a. Define the importance of good listening skills in academic and professional sphere. | CO3 |
| b. Define the term “reading comprehension” in the context of language learning. Provide a brief explanation of its importance in effective language learning. | CO3 |
| c. What do you understand by specific information? | CO3 |
| d. Delineate intonation. | CO3 |
| e. Suggest three practical methods for improving one’s writing skills. Explain how each method can contribute to becoming a more effective in writing. | CO3 |
| f. Relate the connection between active listening and reflective response. | CO4 |
| g. What is Evaluation in listening process? Explain. | CO4 |

Q.3 STRUCTURED QUESTIONS – Attempt any Three.

(3x10 = 30 Marks)

- | | |
|---|-----|
| a. Examine the importance of different types of intonation and analyze how each type contributes to overall speaking skills. | CO4 |
| b. Examine the significance of discussion and discourse in improving speaking skills and analyze how these contribute to a better thought orientation and critical thinking. Provide examples to support your analysis. | CO4 |
| c. Evaluate the importance of the various speaking skills in effective communication. | CO5 |
| d. Evaluate how the knowledge of phonetics contributes to become a good speaker. | CO5 |

Q.4 Case Analysis/ Situation Based QUESTIONS – Attempt any Two.

(2x15 = 30 Marks)

- | | |
|---|-----|
| a. Write a paragraph describing an event, ensuring a logical progression of details. | CO5 |
| b. Write a descriptive paragraph about your favorite place, utilizing vivid imagery and sensory details. | CO6 |
| c. Write the body of a formal letter expressing gratitude for a scholarship, focusing on clarity and conciseness. | CO6 |

END SEMESTER EXAMINATION, DECEMBER - 2024
BCA Semester – I

Course Name: Computer Fundamentals in Information Technology **Course Code: BC111T**

Time allotted: 03 Hours

Max. Marks: 100

Note: Read all the instructions carefully.

Q. 1. Attempt all questions. All carry equal marks.

(2 x 10 = 20)

		CO	PO
a	What is the role of DNS in internet communication?	1	1
b	Explain the concept of IP addresses and their formats.	1	2
c	Define the communication process and its components.	2	1
d	EEPROM stands for i) Electrically Erasable Programmable Read Only Memory ii) Easily Erasable Programmable Read Only Memory iii) Electronic Erasable Programmable Read Only Memory iv)None of the above	2	2
e	 translates and executes program at run time line by line i)Compiler ii)Interpreter iii)Linker iv)Loader	2	1
f	The device used to carry digital data on analogue lines is called as i)Modem ii)Multiplexer iii)Modulator iv)Demodulator	1	1
g	BIOS stands for i)Basic Input Output system ii)Binary Input output system iii)Basic Input Off system. iv)all the above	1	2
h	 is the science that attempts to produce machines that display the same type of intelligence that humans do i)Nanoscience ii)Nanotechnology iii)Simulation iv)Artificial intelligence (AI)	2	2
i	Which one of the following is NOT a computer language? i)MS-Excel ii)BASIC iii)COBOL iv)C++	1	2
j	A fault in a computer program which prevents it from working correctly is known as i)Boot ii)Bug iii)Biff iv)Strap	2	1

P.T.O./-

Q. 2. Attempt any 5 questions. All carry equal marks

(5 x 4 = 20)

	CO	PO
a Explain the principles of confidentiality, integrity, and availability (CIA) in security.	3	2
b Define and explain the role of firewalls in internet security.	3	2
c What are the major components of a computer's block diagram?	2	1
d What are the different types of internet services?	1	2
e Define URL, URI, and URN in the context of internet navigation.	2	1
f Explain the client-server model in the context of computer networks.	3	2
g Name various data transmission media and their characteristics.	3	2

Q. 3. Attempt any 3 questions. All carry equal marks.

(10 x 3 = 30)

	CO	PO
a Convert the following: i) $(9874)_{10} = (?)_{16}$ ii) $(2CE)_{16} = (?)_{10}$ iii) $(63)_8 = (?)_{10}$	4	2
b (i) Write the key feature of MS PowerPoint in detail (ii) Write down the short note on: Router, gateway and hub (iii) Explain the client-server model in the context of computer networks	4	3
c Draw the broad classification diagram of popular secondary storage device used in today's computer system. Explain each secondary storage devices in brief	4	3
d Discuss the algorithm and flow chart with example.	3	2

Q. 4. Attempt any 2 questions. All carry equal marks.

(15 x 2 = 30)

	CO	PO
a (i) Explain the following: Assembler, compiler, Interpreter (ii) Explain system and application software with example.	5	3
b OSI stands for Open System Interconnection; it is a reference framework that explains the process of transmitting data between computers. This framework is divided into seven layers that work together to carry out specialized network functions. Explain these seven layers with the help of a diagram.	5	2
c Explain the following topics. (i) Hard disks, (ii) Optical disks, (iii) CDROM.	5	3

Enrol. No. **S R H U**Regn. No. **D D****END SEMESTER EXAMINATION, DECEMBER - 2024****B. C. A. Semester - I****Course Name: Fundamentals of Accounting & Finance****Course Code: BC114T****Time allotted: 03 Hours****Max. Marks: 100****Note: Read all the instructions carefully.**

Q.1	VERY SHORT ANSWER QUESTIONS – Attempt All.	(2x10 = 20 Marks)	
a.	Define accounting?		CO-1
b.	What is drawings?		
c.	What do you mean by variable cost?		
d.	What is a real account?		
e.	State the meaning of nominal account?		
f.	Write the formula of quick ratio.		CO-2
g.	Define financial management.		
h.	What are the sources of short term finance?		
i.	Explain the going concern concept.		
j.	What are intangible assets?		
Q.2	SHORT ANSWER QUESTIONS – Attempt any Five.	(4x5 = 20 Marks)	
a.	What are the golden rules of debit and credit?		CO-2
b.	What are the major classification of ratios? Explain		
c.	Explain accounting equation with example.		
d.	Define margin of safety.		
e.	What are the objectives of financial management?		CO-3
f.	Meaning and definition of accounting.		
g.	Draw the format of balance sheet.		
Q.3	STRUCTURED QUESTIONS – Attempt any Three.	(3x10 = 30 Marks)	
a.	Explain the functions of the finance manager.		CO-3
b.	Who are the various users of accounting information? Explain.		
c.	Explain the application of Break Even Point analysis in decision making.		
d.	Define current and quick ratio.		CO-4
Q.4	Case Analysis/ Situation Based QUESTIONS – Attempt any Two.	(2x15 = 30 Marks)	
a.	Classify the following account into Capital, Liabilities, Assets, Income, and Expenses: - Land and building - Interest received - Salary paid - Wages paid - Debtors - Creditors - Bank loan - Overdraft - Copyrights - Discount received - Repair and maintenance - Computer - Electricity bill - Sales		CO-4
b.	What do you understand by CVP analysis? Explain its disadvantages.		
c.	Explain the forms of business enterprises with examples.		

END SEMESTER EXAMINATION, DECEMBER - 2024

BCA Semester – I

Course Name: Programming Concepts using C Language **Course Code: BCA107/BC112T**
Time allotted: 03 Hours **Max. Marks: 100**

Note: Read all the instructions carefully.

Q. 1. Attempt all questions. All carry equal marks. (2 x 10 = 20)

QN	Questions	CO	PO
a.	How do we declare single dimensional array.	2	1
b.	In how many ways you can initialize a variable?	3	2
c.	How do you declare a pointer variable?	3	2
d.	What is the role of 'continue' statement?	2	1
e.	Write the syntax of switch case statement.	3	2
f.	What is header file?	3	2
g.	Write the size of int, float and char.	2	1
h.	Who was the inventor of C?	3	2
i.	Differentiate actual parameters and formal parameters.	3	2
j.	Explain the role of keywords in C.	2	1

Q. 2. Attempt any 5 questions. All carry equal marks (5 x 4 = 20)

QN	Questions	CO	PO
a.	Write a program to insert and display records in a structure 'student' having members: id, name and address.	3	2
b.	What is function prototype or declaration? Explain with proper syntax and example.	2	1
c.	Write a program to find out whether a given number is even or odd.	3	2
d.	What is algorithm? Write an algorithm to find out the average of five numbers.	3	2
e.	Draw a flow chart to find out whether a given number is palindrome number or not.	2	1
f.	What is structure? How do you define and declare a structure?	3	2
g.	Explain any five string handling functions.	2	1

Q. 3. Attempt any 3 questions. All carry equal marks. (10 x 3 = 30)

QN	Questions	CO	PO
a.	Explain following terms: i. Pointers ii. Data Types in 'C' Expression	3	2
b.	i. Write the definition of flow chart? Explain all the notations of flow chart. ii. Write characteristics and limitations of flow chart.	2	1
c.	i. Write characteristics and limitations of algorithm. ii. What is union? Compare it with structure with a suitable example.	3	2
d.	The following keywords used in C: i. enum ii. const iii. return iv. static extern	2	1

Q. 4. Attempt any 2 questions. All carry equal marks. (15 x 2 = 30)

QN	Questions	CO	PO
a.	i. What is the difference between structure and union? Also explain array with in structure with suitable example. ii. What is data type? Explain fundamental data type and user defined data type in C.	4	2
b.	i. Explain all the memory management functions with suitable example ii. Differentiate while loop and do-while loop with suitable example.	2	1
c.	i. Differentiate call by value and call by reference with suitable example. ii. Write a program to print the table of a given number.	3	2

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END SEMESTER EXAMINATION, DECEMBER - 2024
BCA Semester – I

Course Name: Environmental Studies**Course Code: HS112T****Time allotted: 03 Hours****Max. Marks: 100****Note: Read all the instructions carefully.****Q.1. Attempt all.****(10×2=20)**

QN	Questions	CO	PO
a.	Define lapse rate in atmosphere.	2	7
b.	Give an example of edaphic factor of an ecosystem.	2	7
c.	Flow of energy in an ecosystem is cyclic. (True/False)	2	7
d.	The advancement of an ecological community with time is called ecological succession. (True/False)	1	7
e.	Geothermal energy is an example of renewable source of energy. (True/False)	3	7
f.	Decibel (dB) is used to measure _____.	2	7
g.	Give two examples of secondary air pollutant.	2	7
h.	Define rehabilitation.	1	7
i.	Acid rain causes corrosion of material. (True/False)	2	12
j.	Air Pollution control act was enacted in 1986. (True/False)	2	12

Q.2. Attempt any five out of Seven.**(5×4=20)**

QN	Questions	CO	PO
a.	Explain the vertical structure of atmosphere.	2	7
b.	Write any four characteristics of aquatic ecosystem.	1	7
c.	What are different types of forest?	1	7
d.	Brief the anthropogenic causes of biodiversity loss.	2	12
e.	Write a short note on nuclear hazards.	4	7
f.	Brief the consequences of ozone layer depletion.	4	12
g.	What are the causes of overpopulation?	2	12

Q.3. Attempt any three out of four.**(3×10=30)**

QN	Questions	CO	PO
a.	Discuss the significance of sustainable development.	4	10
b.	Describe the process of ecological succession in detail.	1	7
c.	Explain the process of rain water harvesting.	2	12
d.	Brief values and services of biodiversity.	1	12

Q.4. Attempt any two out of three.**(2×15=30)**

QN	Questions	CO	PO
a.	Explain the concept of carbon footprint. How it can be minimized at individual level?	3	3
b.	Discuss the causes and effects of climate change. How it can be minimized?	2	7
c.	Explain your experience with reference to environmental field visit.	3	12

END SEMESTER EXAMINATION, DECEMBER - 2024

BCA Semester – I

Course Name: Introduction to AI

Course Code: BCT113

Time allotted: 03 Hours

Max. Marks: 100

Note: Read all the instructions carefully.

Q. 1. Attempt all questions. All carry equal marks.

(2 x 10 = 20)

QN	Questions	CO	PO
a.	Define Artificial Intelligence (AI).	1	1,2
b.	Explain agent environments.	1	1,2
c.	What is supervised learning?	3	2
d.	Define Perceptron in Neural Networks.	4	2
e.	Define Ontology.	3	2
f.	What is the importance of Knowledge Representation?	3	2
g.	What is Forward Chaining?	3	2
h.	Define the term NLP.	5	2
i.	What is multilayer perceptron?	4	2
j.	What is the use of semantic networks?	3	2

Q. 2. Attempt any 5 questions. All carry equal marks

(5 x 4 = 20)

QN	Questions	CO	PO
a.	Discuss propositional and predicate logic with examples.	3	2
b.	List and describe various applications of AI in real-world scenarios.	1	1,2
c.	What are expert systems? Discuss their components and applications.	2	2
d.	What are inference mechanisms? Compare forward and backward chaining.	3	2
e.	Discuss the importance of CNNs and RNNs in Deep Learning.	4	1,2
f.	List and explain real-world applications of Machine Learning.	4	2
g.	List and explain real-world applications of NLP.	5	1,2,4

Q. 3. Attempt any 3 questions. All carry equal marks.

(10 x 3 = 30)

QN	Questions	CO	PO
a.	What are robotics and autonomous systems? Provide examples.	5	2
b.	Explain the concept of Knowledge-Based Systems and Rule-Based Systems with real-world examples.	3	4
c.	I. Explain the history and scope of Artificial Intelligence. II. Differentiate between declarative and procedural knowledge.	1	2
d.	Explain Deep Learning with example.	4	3,4

Q. 4. Attempt any 2 questions. All carry equal marks.

(15 x 2 = 30)

QN	Questions	CO	PO
a.	Define intelligent agents and describe their structure and types.	2	1,2
b.	What is computer vision? Discuss image recognition techniques.	5	2,4
c.	Describe the types of Machine Learning techniques with examples.	4	1,4

END SEMESTER EXAMINATION, DECEMBER - 2024

BCA Semester - I

Course Name: Foundation Course in Mathematics-I

Course Code: BCA105

Time allotted: 03 Hours

Max. Marks: 100

Note: Read all the instructions carefully. Attempt all Sections & Questions.

Section (A)

Q. 1. Attempt all questions.

(2 x 10 = 20)

- a. Find $\lim_{x \rightarrow 4} \frac{x^2 - 16}{x - 4}$.
- b. Find the nth derivative of $y = \cos(ax + b)$.
- c. Define a singular matrix.
- d. What is the condition for a non-homogenous system of linear equations to have a unique solutions?
- e. When a double point will be a node?
- f. State Lagrange's mean-value Theorem.
- g. If $A = i + 2j + 3k$ and $B = i + 2j - k$ find $A \times B$.
- h. Solve the integral $\int x \sin x^2 dx$.
- i. Find the cofactor of the element a_{12} in the following determinant

$$\begin{vmatrix} 1 & 3 & -2 \\ 4 & -5 & 6 \\ 3 & 5 & 2 \end{vmatrix}$$
- j. If $A = i + 5j + 2k$ and $B = -i + 6j - k$ find the dot product of A and B.

Section (B)

Q. 2. Attempt any 5 questions.

(7 x 5 = 35)

- a. Find the following limit $\lim_{x \rightarrow 0} \frac{10 - 10 \cos x}{x^3}$.
- b. Verify Rolle's theorem for the following function in the interval $[1, 3]$

$$f(x) = x^3 - 6x^2 + 11x - 6.$$

- c. Find the maxima and minima of the following function

$$f(x) = (x - 1)^2 (x - 2).$$

- d. Find the integral $\int \frac{xe^x}{(x+1)^2} dx$
- e. Find the volume of parallelepiped if $A = -3i + 5j + 7k$, $B = -i + 6j - 4k$, $C = 3i - 5j - 2k$ are three edges of the parallelepiped.
- f. Show that the four points whose position vectors are $3i - 2j + 4k$, $6i + 3j + k$, $5i + 7j + 3k$ and $2i + 2j + 6k$ are coplanar.
- g. Find the rank of the matrix $A \begin{bmatrix} 3 & -1 & 2 \\ -6 & 2 & 4 \\ -3 & 1 & 2 \end{bmatrix}$.

Section (C)

Attempt any 3 questions.

(15 x 3 =

Q.3. a. Solve the following system of equations by Cramer rule

$$5x - 7y + z = 11$$

$$6x - 8y - z = 15$$

$$3x + 2y - 6z = 7$$

(8)

b. Prove that
$$\begin{vmatrix} a^2 & a & bc \\ b^2 & b & ca \\ c^2 & c & ab \end{vmatrix} = - \begin{vmatrix} 1 & 1 & 1 \\ a^2 & b^2 & c^2 \\ a^3 & b^3 & c^3 \end{vmatrix}$$

(7)

Q.4. a. Determine the values of a and b such as the following system

(8)

$$x + y + z = 6$$

$$x + 2y + 3z = 10$$

$$x + 2y + az = b.$$

has (i) no solution; (ii) a unique solution; (iii) infinite solutions.

b. Find the inverse of the matrix A by elementary row operation: $A = \begin{bmatrix} 2 & -1 & 3 \\ 1 & 1 & 1 \\ 1 & -1 & 1 \end{bmatrix}$

(7)

Q.5. a. Trace the curve $x(x^2 + y^2) = a(x^2 - y^2)$.

(10)

b. Using Taylor's series expand $f(x) = x^3$ in powers of $(x-1)$

(5)

Q.6. a. If $y = \sin^{-1} x$ then prove that

(8)

$$(1-x^2)y_{n+2} - (2n+1)x y_{n+1} - n^2 y_n = 0.$$

b. Solve $\int \frac{x dx}{(x^2+4)(x-1)}.$

(7)

Q.7. a. Show that the function

(9)

$$f(x) = \begin{cases} x-1 & \text{when } x > 1 \\ 0 & \text{when } x = 1 \\ 1-x & \text{when } x < 1 \end{cases} \text{ is continuous at } x = 1 \text{ but not differentiable at } x = 1.$$

b. Find the n^{th} derivative of $y = \frac{1}{1-5x+6x^2}.$

(6)

END SEMESTER EXAMINATION, DECEMBER - 2024

BCA Semester - I

Course Name: Foundation Course in Mathematics - I Course Code: BCT114/ BC113T

Time allotted: 03 Hours

Max. Marks: 100

Note: Read all the instructions carefully.

Q.1. Attempt all.

(10×2=20)

QN	Questions	CO	PO
a.	Find $\lim_{x \rightarrow 3} \frac{x^2 - 5}{x - 5}$.	2	2
b.	Find the nth derivative of $y = \cos(ax + b)$.	2	8
c.	Define a row matrix.	1	1
d.	Write example of identity matrix of 3×3 order.	1	2
e.	The value of $\frac{d5e^x}{dx}$.	2	2
f.	State Lagrange's mean-value Theorem.	3	1
g.	If $A = i + 2j + 3k$ and $B = i + 2j - k$ find $A \times B$.	4	2
h.	State Rolle's Theorem.	3	1
i.	Find the cofactor of the element a_{12} in the following determinant $\begin{vmatrix} 1 & 3 & -2 \\ 4 & -5 & 6 \\ 3 & 5 & 2 \end{vmatrix}$	1	1
j.	If $A = i + 5j + 2k$ and $B = -i + 6j - k$ find the dot product of A and B.	4	1

Q.2. Attempt any five out of Seven.

(5×4=20)

QN	Questions	CO	PO
a.	Solve $x + y + z = 3$ $x + 2y + 3z = 4$ $x + 4y + 9z = 6$	1	1
b.	To check the function $f(x) = x^3 - 3x - 1$ is maxima / minima.	3	2
c.	If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ then prove that $A^2 - 4A - 5I = 0$, where I is identity matrix.	1	2
d.	If for two vectors $\vec{A}$ and $\vec{B}$ is $ \vec{A} + \vec{B} = \vec{A} - \vec{B} $ find the angle between $\vec{A}$ and $\vec{B}$.	4	2
e.	Prove that $\begin{vmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{vmatrix} = (b - c)(c - a)(a - b)$	1	1
f.	Find the inverse of matrix by using ERO method $A = \begin{bmatrix} 1 & 2 & 5 \\ 2 & 3 & 1 \\ -1 & 1 & 1 \end{bmatrix}$	1	8
g.	Evaluate $\frac{dy}{dx}$ if $y = \frac{1 - \cos x}{1 + \cos x}$.	2	2

Q.3. Attempt any three out of four.

(3×10=30)

QN	Questions	CO	PO
a.	Solve the matrix by inverse method $x + 2y + 3z = 2$ $2x + 4y + z = 9$ $x + 4y + 9z = 2$	1	1
b.	Expand $\cos x$ in ascending power of x as far as the term containing x^4 by Maclaurin's series.	3	8
c.	To find the maxima or minima value of function $x^3 - 6x^2 + 9x + 2$.	3	1
d.	Find the rank of matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 7 \\ 3 & 6 & 10 \end{bmatrix}$	1	2

Q.4. Attempt any two out of three.

(2×15=30)

QN	Questions	CO	PO
a.	If $y = \sin(\sin x)$, then prove that $y_2 - \tan x y_1 + y \cos^2 x = 0$	2	8
b.	(i) Solve $\frac{(\cos 3\theta + i \sin 3\theta)^2 (\cos 4\theta - i \sin 4\theta)^4}{(\cos 4\theta + i \sin 4\theta)^5 (\cos 5\theta - i \sin 5\theta)^3}$ (ii) To find the square root of $-8 - 6i$.	5	2
c.	(i) If $2 \cos \theta = x + \frac{1}{x}$ and If $2 \cos \phi = y + \frac{1}{y}$, then prove that $x^m y^n \frac{1}{x^m y^n} = 2 \cos(m\theta + n\phi)$. (ii) To convert into $A + iB$ form of $\frac{(1+i)^2}{3-i}$.	5	1
