Model Question Paper-I with effect from 2025

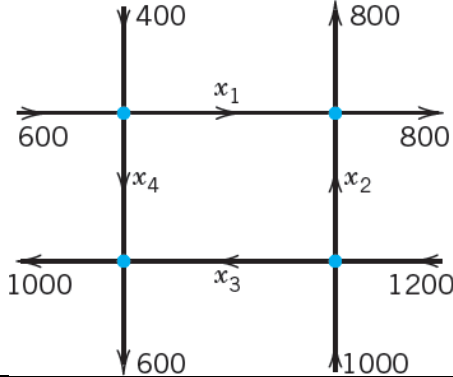USN ☐☐☐☐☐☐☐☐☐☐   **1BMATS101**

First Semester B.E./B.Tech. Degree Examination
Calculus & Linear Algebra

TIME: 03Hours   **Max.Marks:100**

Note: 1. *Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE***
      2. *VTU Formula Hand Book is Permitted*
      3. *M: Marks, L: Bloom's level, C: Course outcomes*

		Module-1	M	L	C
Q 1.	**a**	Show that $u_x + u_y = u$, if $u = \dfrac{e^{x+y}}{e^x + e^y}$.	6	L2	1
	b	If $u = x + 3y^2 - z^3, v = 4x^2 yz, w = 2z^2 - xy$, find $\dfrac{\partial(u,v,w)}{\partial(x,y,z)}$ at (1, -1,0).	7	L2	1
	c	Find the extreme values of the function $f(x,y) = xy + \dfrac{a^3}{x} + \dfrac{a^3}{y}$.	7	L3	1
		OR			
Q 2.	**a**	If $V = f(r,s,t)$ and $r = \dfrac{x}{y}, s = \dfrac{y}{z}, t = \dfrac{z}{x}$ show that $x\dfrac{\partial V}{\partial x} + y\dfrac{\partial V}{\partial y} + z\dfrac{\partial V}{\partial z} = 0$.	6	L2	1
	B	If $u = \dfrac{2yz}{x}, v = \dfrac{3zx}{y}, w = \dfrac{4xy}{z}$ then find $\dfrac{\partial(u,v,w)}{\partial(x,y,z)}$.	7	L2	1
	C	Apply Maclaurin's series, to expand $\cos x \cos y$ in powers of x and y up to second-degree terms.	7	L3	1
		Module-2			
Q 3.	**a**	If $f = x^2 yz$ and $g = xy - 3z^2$, calculate $\nabla(\nabla f \cdot \nabla g)$.	6	L2	1
	b	A vector field is given by $F = (6xy + z^3)\hat{i} + (3x^2 - z)j + (3xz^2 - y)k$. Show that the field is irrotational and hence find its scalar potential.	7	L2	1
	c	Express the vector $\vec{F} = x\hat{i} + 2y\hat{j} + yz\hat{k}$ in spherical polar coordinates.	7	L3	1
		OR			
Q 4.	**a**	Find the directional derivative of $f(x,y,z) = 4e^{2x-y+z}$ at the point $(1,1,-1)$ in the direction towards the point $(-3, 5, 6)$.	6	L2	1
	b	Find $div\,\vec{F}$ and $curl\,\vec{F}$, where $F = grad(x^3 + y^3 + z^3 - 3xyz)$.	7	L2	1
	c	Express the vector $\vec{F} = 2x\hat{i} + 3y\hat{j} - z\hat{k}$ in cylindrical polar coordinates.	7	L3	1
		Module-3			

Q 5.	A	Find the constant b if the rank of $\begin{bmatrix} 1 & 1 & -1 & 0 \\ 4 & 4 & -3 & 1 \\ b & 2 & 2 & 2 \\ 9 & 9 & b & 3 \end{bmatrix}$ is 3.	6	L2	2
	b	Find model matrix of $\begin{bmatrix} 4 & 1 \\ 2 & 3 \end{bmatrix}$ and verify its diagonalization.	7	L2	2
	c	Write the system of linear equations of the traffic flow in the net of one-way street directions as shown in the figure and find its solution.	7	L3	2

<div align="center">OR</div>

Q 6.	a	Investigate the values of λ and μ so that the equations $\begin{aligned} 2x+3y+5z &= 9 \\ 7x+3y-2z &= 8 \\ 2x+3y+\lambda z &= \mu \end{aligned}$ have (i) no solution (ii) unique solution (iii) infinite number of solutions.	6	L2	2
	b	Apply Gauss Jordan method to approximate the solutions of the system $83x+11y-4z=95$ $7x+52y+13z=104$ by choosing initial solution $(0,0,0)$. Perform four $3x+8y+29z=71$ iterations.	7	L2	2
	C	Determine the eigenvalues and corresponding eigenvectors for the matrix $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$.	7	L3	2

<div align="center">**Module-4**</div>

Q 7.	a	Verify whether $v=(1,-2,5)$ in $\mathbb{R}^3$ is a linear combination of the vectors $u_1=(1,1,1)$, $u_2=(1,2,3)$ and $u_3=(2,-1,1)$.	6	L2	3
	b	Determine whether $W=\{(a,b,c)/a+b+c=0\}$ is a subspace of R^3 or not?	7	L2	3
	c	Find the basis and dimension of the row space, column space and null space of the matrix $\begin{bmatrix} 1 & -1 & 1 & 3 & 2 \\ 2 & -1 & 1 & 5 & 1 \\ 0 & 1 & -1 & -1 & -3 \end{bmatrix}$	7	L2	3

		OR			
Q 8.	a	Find the basis and dimension of the subspace W spanned by $(1,2,3),(2,4,6),(0,1,1)$.	6	L2	3
	b	Find the inner products $\langle v_1,v_2 \rangle,\langle v_1,v_3 \rangle$ and $\langle v_2,v_3 \rangle$ where $v_1 =(1,1,1,1)$, $v_2 =(1,2,4,5)$ $v_3 =(1,-3,-4,-2)$.	7	L2	3
	c	Find the coordinates of the vector $v=(1,-3,\ 2)$ with respect to the basis $S=\{(1,\ 1,\ 1),(1,\ 1,\ 0),(1,\ 0,\ 0)\}$.	7	L2	3
		Module-5			
Q 9.	a	Verify whether the transformation $T:R^2 \to R^2$ which is defined by $T(x,\ y)=(3x+4y,10x-4y+3)$ is linear or not?	6	L2	3
	b	Prove that the transformation $F:R^2 \to R^2$ is singular and find its Kernal if the transformation $F(a,\ b)=(2a-4b,\ 3a-6b)$.	7	L2	3
	c	Find the rank and nullity of the transformation $T:R^3 \to R^3$ defined by $T(x,\ y,\ z)=(x+y,\ x-y,\ 2x+z)$.	7	L2	3
		OR			
Q 10.	A	Check whether the transformation $T:V_1(R) \to V_3(R)$ defined by $T(x)=(x,\ x^2,\ x^3)$ is linear or not.	6	L2	3
	b	Consider the matrix $A=\begin{bmatrix} 2 & 4 \\ 5 & 6 \end{bmatrix}$ which defines a linear operator on $\mathbb{R}^2$. Find the matrix of the linear transformation relative to the basis $S=\{u_1,u_2\}=\left\{ \begin{bmatrix} 1 \\ -2 \end{bmatrix}, \begin{bmatrix} 3 \\ -7 \end{bmatrix} \right\}$.	7	L2	3
		Let F be the linear transformation defined on a vector space R^2 through $F(x,\ y)=(2x+y,\ 3x+2y)$, show that F is invertible and hence find F^{-1}.	7	L2	3

Model Question Paper

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Course Code: 1BCHES102/202

First Semester B.E. Degree Examination, January 2025

Applied Chemistry for Smart Systems (CSE Stream)

TIME:3 hrs.   Max.Marks:100

Note: 1. Answer any FIVE full questions, choosing ONE question from each MODULE
   2. VTU Formula Hand Books Permitted
   3. M: Marks, L: Bloom's level,C: Course outcomes.

		Module-1	**M**	**L**	**C**
Q.1	a	What are organic semiconductors? Explain the types of organic semiconductors used in memory devices.	6	L1	CO1
	b	Write a note on Pentacene semiconductor chip.	7	L2	CO1
	c	Illustrate the construction and working of Quantum Light Emitting Diodes (QLEDs) and discuss their applications in modern display technology.	7	L2	CO1
		OR			
Q.2	a	What are liquid crystals (LCs)? Discuss their classifications.	6	L1	CO1
	b	Explain the synthesis of TiO$_2$-RAM nanomaterial by the sol–gel method and describe its properties and applications.	7	L2	CO1
	c	Illustrate the construction and working principle of Organic Light Emitting Diodes (OLEDs) and discuss their applications in modern electronic displays.	7	L2	CO1
		Module–2			
Q.3	a	Describe the wet chemical synthesis of Cd–Se quantum dots and list their important applications.	6	L2	CO2
	b	What is Nylon-6,6? Describe its synthesis, properties, and advantages in 3D printing applications.	7	L1	CO2
	c	Discuss construction, working principle and applications of quantum dot sensitized solar cells (QDSSCs).	7	L2	CO2
		OR			
Q.4	a	Explain the structure-property relationship in polymers.	6	L2	CO2
	b	Explain synthesis, properties and applications of polymethyl methacrylate (PMMA)	7	L2	CO2
	c	In a sample of a polymer, 150 molecules have the molecular mass 100 g/mol, 200 molecules have the molecular mass 1000 g/mol, 350 molecules have the molecular mass 10,000 g/mol. Calculate the number average and weight average molecular mass of a polymer and also, find the Polymer dispersity index.	7	L3	CO1

		Module–3			
Q.5	**a**	What are fuel cells? Explain construction and working of solid oxide fuel cell (SOFC).	6	L1	CO3
	b	A copper concentration cell is obtained by combining two copper electrodes of concentrations 0.1M and 0.5 M immersed in copper sulphate solution at 25 ˚C. Write the cell reactions and calculate EMF of the cell.	7	L3	CO3
	c	Explain the construction and working of a Li-ion battery.	7	L2	CO3
		OR			
Q.6	**a**	Explain the construction and working of a Lithium-ion battery.	6	L2	CO3
	b	Illustrate the construction, working and applications of solar photovoltaic cell (PV cell).	7	L2	CO3
	c	Discuss the production of green hydrogen using the TiO_2 photocatalytic method.	7	L2	CO3
		Module–4			
Q.7	**a**	Define the following terms (i) Transducer (ii) Actuators (iii) Sensors	6	L1	CO4
	b	Explain i). Water line corrosion ii). Pitting corrosion.	7	L2	CO4
	c	Apply the concept of galvanization to prevent corrosion in steel structures exposed to marine environments. Justify your choice with appropriate chemical reasoning.	7	L3	CO4
		OR			
Q.8	**a**	What is corrosion? Explain electrochemical theory of corrosion by taking iron as an example.	6	L1	CO4
	b	Explain the applications of Electrochemical gas sensors in sensing SO_X and NOx	7	L2	CO4
	c	What is CPR? A thick sheet of area 93 $inch^2$ is exposed to air near the ocean. After a 6 months it was found to experience a weight loss of 360 g due to corrosion, if the density of the steel is 7.9 g/cm^3. Calculate the corrosion penetration rate in mpy and mmpy (Given K = 534 in mpy and 87.6 mm/y).	7	L3	CO4
		Module–5			
Q.9	**a**	Describe the role of artificial intelligence in e-waste management.	6	L1	CO4
	b	Apply the concept of green synthesis for the production of ZnO nanoparticles.	7	L3	CO4
	c	Discuss the synthesis and properties of alginate hydrogel with reference to its applications in brain–computer interfaces (BCIs).	7	L2	CO4
		OR			
Q.10	**a**	Describe the sources and composition of e-waste.	6	L1	CO4
	b	Discuss the process of gold extraction from e-waste using the bioleaching method.	7	L2	CO4
	c	Explain the synthesis and properties of polylactic Acid (PLA) in touch screen applications.	7	L2	CO4

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Model question Paper-I

CBCS SCHEME

First/ Second Semester B.E Degree Examination, 2025-26

Introduction to AI and Applications (1BAIA103/203)

TIME: 03 Hours   **Max.Marks:100**

Notes:

1. *Answer any FIVE full questions, choosing at least ONE question from each MODULE*
2. *M: Marks, L: Bloom's level, C: Course outcomes.*

		Module -1	M	L	C
Q.01	a	What is Artificial Intelligence. Explain how does AI work? List out three advantages and disadvantages of Artificial Intelligence.	8	L2	CO1
	b	Compare weak AI and strong AI.	6	L2	CO1
	c	What is Machine Learning. Relate AI and Machine Learning?	6	L2	CO1
		OR			
Q.02	a	Explain five components of Intelligence with example. Compare Inductive reasoning with deductive reasoning.	8	L2	CO1
	b	What is AI Agent? Classify the agents in an AI system.	6	L2	CO1
	c	Is Depth First Search (DFS) an informed search or uninformed search? Justify your answer	6	L2	CO1
		Module-2			
Q. 03	a	Apply ethical prompt construction to minimize bias in AI-generated content.	8	L3	CO4
	b	Develop a use-case scenario where prompt engineering improves communication clarity in cross-cultural conversations.	6	L3	CO4
	c	Design a Few-Shot Prompt that trains ChatGPT to classify customer feedback as positive, neutral, or negative.	6	L3	CO4
		OR			
Q.04	a	Apply creative prompts to generate innovative ideas for a sustainable startup project.	8	L3	CO4
	b	Develop imaginative prompts to enhance product design creativity in engineering students.	6	L3	CO4
	c	Apply LLM-based writing prompts to produce creative content for digital marketing campaigns.	6	L3	CO4
		Module-3			
Q. 05	a	Write Basic neural network model explaining the function of each layer.	8	L2	CO2
	b	"ML Model is a combination of Task, Performance and Experience", Explain with suitable an example.	6	L2	CO2
	c	Is Labelled data supervised or unsupervised machine learning? Extend your answer explaining different types of machine learning.	6	L2	CO2
		OR			
Q. 06	a	Outline K-Means Algorithm with merits and demerits.	8	L2	CO2
	b	A company decides to carry out its business operations on a rented space. If the cost of the rental space is Rs 20000 plus Rs 500 per employee per day, then compute monthly rental for space given that the company is open 5 days a week. Show a linear equation for this scenario with explanation.	6	L2	CO2
	c	Explain the four steps to create Decision Trees with suitable example for each step.	6	L2	CO2
		Module-4			

Q. 07	a	List and explain any four Trusted AI principles.	8	L2	CO5
	b	What is expert system? Explain three components of expert system.	6	L2	CO5
	c	Relate the role of ethics in AI.	6	L2	CO5
		OR			
Q. 08	a	Explain the working of an expert system taking any example.	8	L2	CO5
	b	AI could be programmed to do something beneficial, but the method used to achieve its goal can be highly destructive, Explain why?	6	L2	CO5
	c	What is Artificial Intelligence of Things (AIoT). Explain how Does AIoT Work?	6	L2	CO5
Module-5					
Q. 09	a	List different types of Robots. Identify and explain industry application of Robots.	8	L3	CO3
	b	What is No-Code AI. Explain why No-Code AI Must be Used?	6	L2	CO3
	c	Explain the role of AI in early disease prevention.	6	L2	CO3
		OR			
Q. 10	a	What is the role of AI in Medical Diagnosis? Identify three applications of AI in Medical Diagnosis.	8	L3	CO3
	b	Relate the role of AI in Biology and Environmental Sciences.	6	L2	CO3
	c	What is Low Code AI. Compare Traditional tools with Low Code AI.	6	L2	CO3

Model Question Paper – II with effect from 2025-26 (CBCS Scheme)

USN

First/Second Semester B.E. Degree Examination

Subject Title: Introduction to AI and Applications

TIME: 03 Hours

Max. Marks: 100

Note:
1. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.
2. Provide block diagrams wherever necessary.
3. Missing data may be suitably assumed.

		Module -1	**M**	**L**	**C**
Q.01	a	Define Artificial Intelligence (AI). Explain how do AI systems work and give advantages and disadvantages of this technology.	8	L2	CO1
	b	Differentiate between the following: (i) Inductive and deductive reasoning (ii) Human and machine intelligence (iii) Episodic and non – episodic environment	6	L2	CO1
	c	What are knowledge – based agents? Explain their role and architecture of agent based system.	6	L2	CO1
		OR			
Q.02	a	Outline the merits and demerits of the following search algorithms. (i) Breadth First Search (BFS) (ii) Uniform Cost Search (UCS) (iii) Depth – First Search (DFS)	8	L2	CO1
	b	Compare traditional programming with machine learning.	6	L2	CO1
	c	Summarize the major phases in AI evolution.	6	L2	CO1
		Module-2			
Q. 03	a	A user repeatedly gets ambiguous answers from an AI tool. Apply prompt - engineering strategies to redesign the prompt to improve clarity and intent.	8	L3	CO4
	b	Build a zero-shot prompt to classify comments as positive or negative. Explain why it qualifies as zero-shot.	6	L3	CO4
	c	Develop a writing prompt that helps a student begin an essay on "The Impact of Social Media on Teenagers." Explain how the prompt stimulates the writing process.	6	L3	CO4
		OR			
Q.04	a	You are building a customer – support assistant using a Large Language Model (LLM). Develop a prompt that ensures the model responds politely and provides step-by-step troubleshooting guidance. Explain how your prompt uses principles of prompt engineering.	8	L3	CO4
	b	Develop a one-shot example to help an LLM convert active voice to passive voice. Illustrate with the example and the instruction.	6	L3	CO4
	c	Build a creative prompt that encourages ChatGPT to propose futuristic transportation ideas. Explain how this promotes imaginative thinking.	6	L3	CO4
		Module-3			
Q. 05	a	Explain how Linear Regression, Logistic Regression, and Polynomial Regression can be applied to analyze and predict real-world data in Artificial Intelligence and Machine Learning.	8	L2	CO2
	b	Define conditional probability and the Bayes rule with examples.	6	L2	CO2
	c	Differentiate between the following: (i) Supervised and Unsupervised Machine Learning (ii) Forward and Backward Propagation	6	L2	CO2

		(iii) Classification and Regression			
		OR			
Q. 06	a	Explain how Machine Learning, Deep Learning, and Natural Language Processing techniques can be applied to solve real-world problems in Artificial Intelligence.	8	L2	CO2
	b	Summarize the features of: (i) Reinforcement Learning (ii) Support Vector Machines (SVM)	6	L2	CO2
	c	How does computer vision work with deep learning? Explain the tasks involved in computer vision.	6	L2	CO2
Module-4					
Q. 07	a	What is Neuromorphic Computing? Explain its architecture, features resembling the human brain, and how it contributes toward achieving Artificial General Intelligence (AGI).	8	L2	CO5
	b	Describe the concept of AI as a Service (AIaaS). Outline two advantages and two challenges of using AIaaS in organizations.	6	L2	CO5
	c	List and explain the risks associated with Artificial Intelligence and their societal impact.	6	L2	CO5
		OR			
Q. 08	a	Explain AI Bias. Describe the sources of bias, real-world examples, and methods to mitigate bias in AI systems.	8	L2	CO5
	b	Explain the major components of an Expert System with their functions.	6	L2	CO5
	c	Differentiate between the following: (i) AI Programs and Robots (ii) Human–controlled and fully – autonomous bots	6	L2	CO5
Module-5					
Q. 09	a	Identify the application of AI in education, specifically in personalized learning experiences. Explain with examples, how adaptive learning platforms and intelligent tutoring systems use AI to tailor educational content and provide customized support for students.	10	L3	CO3
	b	Explain how AI contributes to environmental science by breaking down its role in climate modelling, air and water quality monitoring, waste management, and resource conservation. Describe the specific data, techniques, and decision-making processes involved in each area.	10	L2	CO3
		OR			
Q. 10	a	Identify the role of AI in scientific experimentation by examining how it supports different disciplines and breaking down the specific experimental activities such as data collection, pattern identification, simulation, and hypothesis testing that AI enhances.	10	L3	CO3
	b	Compare AI – enabled precision farming with traditional farming. Outline the key differences in data usage, cost, and productivity.	10	L2	CO3

*Revised Bloom's Taxonomy Level: Indicate as L1, L2, L3, L4, etc. It is also desirable to indicate the COs and POs to be attained by every bit of questions.

Model Question Paper- I

CBCS SCHEME

First/ Second Semester B.E Degree Examination

Introduction to Mechanical Engineering (1BESC104D)

TIME: 03 Hours   **Max. Marks: 100**

Notes:

 1. Answer any FIVE full questions, choosing at least ONE question from each MODULE
 2. M: Marks, L: Bloom's level, C: Course outcomes.

		Module - 1	M	L	C
Q. 1	a	With a neat sketch, explain the working principle of Pelton Turbine.	6	2	1
	b	Discuss the need for a Power steering in an automobile and describe the same.	6	2	1
	c	With a neat sketch, explain the working principle of an Air-conditioning system.	8	2	1
		OR			
Q. 2	a	With a neat sketch, explain the brake system of an automobile.	6	2	1
	b	Summarize the parts involved in making of a Drone and highlight the functions of the parts.	6	2	1
	c	With a neat sketch, explain the working principle of a refrigeration system.	8	2	1
		Module – 2			
Q. 3	a	With the help of neat diagrams, explain the working of a 4-stroke petrol engine.	10	2	2
	b	What do you mean by the term Gear train? With the help of a neat sketch, explain the working of a compound gear train.	10	2	2
		OR			
Q. 4	a	List the advantages and limitations of Electric vehicles and Hybrid vehicles.	10	2	2
	b	What do you mean by the term Automatic transmission in automobiles. Explain the working of the same.	10	2	2
		Module – 3			
Q. 5	a	Explain the classification of engineering materials. Discuss the properties and applications of ferrous and non-ferrous metals.	10	2	3
	b	Explain the working principles and applications of piezoelectric materials and magnetorheological (MR) fluids.	10	2	3
		OR			
Q. 6	a	Define composite materials. Explain their classification based on the type of matrix material, and discuss their applications.	10	2	3
	b	What are smart materials? Explain the different types of smart materials and discuss their advantages and disadvantages.	10	2	3
		Module – 4			
Q. 7	a	Describe the classification of manufacturing processes. Explain the factors that influence the selection of a suitable manufacturing process.	6	2	4
	b	Explain the following operations with neat sketches: (i) Drilling (ii) Reaming	8	2	4
	c	What is CNC? Explain the main components of a CNC machine.	6	2	4
		OR			
Q. 8	a	Define the soldering, brazing, and welding processes	6	2	4
	b	With neat sketches, explain any two operations performed on Milling machine.	8	2	4
	c	Explain the basic principle of 3D printing.	6	2	4

Model Question Paper- I

		Module – 5			
Q. 9	a	Define automation and explain the different types of automation.	6	2	5
	b	With a neat diagram, explain the working principle and applications of a capacitive sensor.	8	2	5
	c	Explain the need for integration of technologies in modern engineering systems.	6	2	5
		OR			
Q. 10	a	Define mechatronics and explain the main elements of a mechatronic system.	6	2	5
	b	What is an optical encoder? Explain its working principle and industrial uses.	8	2	5
	c	Describe Advanced Driver Assistance Systems (ADAS) and explain its important features.	6	2	5

Model Question Paper- I

CBCS SCHEME

First/ Second Semester B.E Degree Examination, 2025-26

PYTHON PROGRAMMING (1BPLC105B/205B)

TIME: 03 Hours　　　　　　　　　　　　　　　　　　　　**Max. Marks:100**

Notes:

1. *Answer any FIVE full questions, choosing at least ONE question from each MODULE*
2. *M: Marks, L: Bloom's level, C: Course outcomes.*
3.

		Module - 1	M	L	C
Q.1	a	Explain the concept of type conversion in Python. Differentiate between implicit and explicit conversion with examples.	08	L2	CO1
	b	Develop a Python program with a while loop to display the Fibonacci sequence up to n terms entered by the user.	08	L3	CO1
	c	Differentiate between a syntax error and a runtime error with examples.	04	L2	CO1
		OR			
Q.2	a	Describe the Collatz 3n + 1 sequence and explain how iteration and conditional statements are used in its implementation.	08	L2	CO1
	b	Develop a program that prints all numbers from 1 to 100 that are divisible by 3 or 5 but not both. Use continue or break statements wherever suitable.	08	L3	CO1
	c	What is meant by function composition? Illustrate with an example.	04	L2	CO1
		Module – 2			
Q.3	a	Explain the string operations in Python for slicing, concatenation, repetition, and comparison with suitable examples.	8	L2	CO2
	b	Define a list. How is it different from an array? Develop a Python statement to access the third element of a list: nums = [3, 6, 9, 12].	6	L3	CO2
	c	Develop a program to count the number of words in a given line of text.	6	L3	CO2
		OR			
Q.4	a	Explain mutability in lists. Illustrate the difference between modifying a list and creating a clone of it using examples.	8	L2	CO2
	b	Develop a Python program to check if a string is a palindrome using slicing.	6	L3	CO2
	c	Develop a program that takes a list of numbers and returns a new list containing only the even numbers.	6	L3	CO2
		Module – 3			
Q5	a	Develop a Python program that counts the frequency of words in a paragraph using a dictionary and displays the top three most frequent words.	8	L3	CO2
	b	What is masking in NumPy? Develop a program to illustrate masking to filter array elements.	6	L3	CO3
	c	Explain the use of the 'with' statement in file handling with a program.	6	L2	CO4
		OR			
	a	Explain the key features and operations of Python dictionaries. How are they different from lists? Develop suitable program to illustrate insertion, deletion, and lookup.	8	L3	CO2
	b	Develop a NumPy program to: Create a 3×3 matrix of random integers. Display its shape, transpose, and mean of all elements.	6	L3	CO3

	c	Explain how binary files differ from text files in terms of content and operations. Illustrate with suitable program segments.	6	L2	CO4
Module – 4					
Q.7	a	Explain the use of random and time modules in Python. Develop a program that simulates a simple stopwatch that records random time intervals and calculates the average elapsed time.	8	L3	CO3
	b	Explain the concept of namespaces in Python. Develop program to illustrate how variable lookup follows the LEGB (Local, Enclosing, Global, Built-in) rule.	8	L3	CO3
	c	Differentiate between class attribute and instance attribute with suitable program segments.	4	L2	CO5
OR					
Q.8	a	Develop python script to create a module utilities.py with functions for square, cube, and factorial of a number. Import it in another file using all three import variants. Demonstrates the usage of each of the imported function.	8	L3	CO3
	b	Develop a custom module having function which calculates factorial of a number. Import this custom module to a program to calculate binomial coefficient.	8	L3	CO3
	c	Explain the difference between 'is' and '==' operators using immutable objects.	4	L2	CO5
Module – 5					
Q.9	a	Create a Python class Point with attributes x and y. Demonstrate sameness using 'is' operator, and show the effect of mutability when modifying one reference.	8	L3	CO5
	b	Explain the need for exception handling in Python. Develop a program to illustrate: try, except, else, and finally blocks.	8	L3	CO5
	c	What is operator overloading? Illustrate with example using __add__().	4	L2	CO5
OR					
Q.10	a	Develop a program to illustrate polymorphism by defining a common interface method in two different classes.	8	L3	CO5
	b	Outline the difference between pure functions and modifiers. Develop a program code illustrating both using a class BankAccount.	8	L3	CO5
	c	Explain the role of finally clause with an example.	4	L2	CO5