

Roll No.

Total No. of Pages: 2

Total No. of Questions: 09

B.Tech (CSE/ IT/ ME/ ECE/ IOT/ CS/ RAI/ AIML/ AIDS/ CSE DS), Semester: 1st

Subject Code: 25C1EMU-101

M.Code:

Date of Examination: 12-12-2025

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

Q. No.	Question	Course Outcome	Bloom's Level
SECTION-A			
1.	Answer briefly:		
a.	Define D'Alembert's Ratio Test.	CO-1	L1
b.	Interpret whether the sequence $\{a_n\}$, where $a_n = \frac{2n-1}{(n+1)^2}$ is convergent or divergent.	CO-1	L2
c.	Explain Maclaurin's Theorem in one variable.	CO-1	L2
d.	Define Beta and Gamma function with their examples.	CO-2	L1
e.	Show that: $\int_0^{\infty} e^{-x^2} dx = \frac{\sqrt{\pi}}{2}$	CO-2	L2
f.	Show that: $\beta(m, n) = \beta(m, n+1) + \beta(m+1, n)$.	CO-2	L2
g.	Find stationary points of the function: $f(x, y) = x^2 + y^2 + 6x + 12$	CO-3	L1
h.	Explain the conditions for maxima and minima of a function of two variables.	CO-3	L2
i.	Find the value of: $\int_0^3 \int_0^1 (x^2 + 3y^2) dy dx$	CO-4	L1
j.	Infer the value of the integral: $\int_0^2 \int_1^2 \int_0^{yz} xyz dx dy dz$	CO-4	L2
SECTION-B			
2.	Examine the convergence/divergence of the series:	CO-1	L4

	$a_n = \sum \sqrt{\frac{n}{n^2+1}}$		
3.	Solve for the length of an arc of the cycloid: $x = a(\theta - \sin \theta)$ and $y = a(1 - \cos \theta)$	CO-2	L3
4.	If $u = x^y$, Prove that: $\frac{\partial^3 u}{\partial x^2 \partial y} = \frac{\partial^3 u}{\partial x \partial y \partial x}$	CO-3	L5
5.	Solve $\iint_A y \, dx \, dy$ where A is the region bounded by the parabolas $y^2 = 4x$ and $x^2 = 4y$	CO-4	L3
6.	If $z = \log(u^2 + 3v)$, $u = e^{5x^2+y^2}$, $v = e^{2x^2+7y}$, Determine $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$	CO-3	L5
SECTION-C			
7.	(a) Analyse the length of the curve: $x = t^3, y = 2t^2$ on $[0, 1]$. (b) Simplify the integral: $\int_0^1 x^5 (1 - x^3)^3 \, dx$	CO-2	L4
8.	Solve $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2}$, where $u = \tan^{-1}\left(\frac{y^2}{x}\right)$	CO-3	L3
9.	Evaluate $\iiint \frac{dx \, dy \, dz}{\sqrt{1-x^2-y^2-z^2}}$ over the positive octant of the sphere $x^2 + y^2 + z^2 = 1$	CO-4	L5

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i.	Define absolute convergence with the help of an example.	CO1	L1
j.	Show that Beta function is symmetric.	CO2	L1
SECTION-B			
2.	Analyse the convergence or divergence of the series $\sum (\sqrt[3]{n^3 + 1} - n)$.	CO1	L4
3.	Solve the cardioid $r = a(1 - \cos \theta)$ for finding the perimeter	CO2	L3
4.	If $u = \sin^{-1} \left(\frac{x^2 + y^2}{x + y} \right)$, prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \tan u$.	CO3	L5
5.	Solve $\iint_A y \, dx \, dy$ where A is the region bounded by the parabolas $y^2 = 4x$ and $x^2 = 4y$.	CO4	L3
SECTION-C			
6.	Examine the convergence of the series $\sum \frac{(-1)^{n-1} n}{5n+1}$.	CO1	L4
7.	Prove the relation between Beta and Gamma functions.	CO2	L5
8.	If $u = f \left(\frac{y-x}{xy}, \frac{z-x}{xz} \right)$, then solve $x^2 \frac{\partial u}{\partial x} + y^2 \frac{\partial u}{\partial y} + z^2 \frac{\partial u}{\partial z}$	CO3	L3
9.	Simplify $\iiint (x + y + z) \, dx \, dy \, dz$ over the tetrahedron bounded by the planes $x = 0, y = 0, z = 0, x + y + z = 1$.	CO4	L4

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Roll No.

Total No. of Pages: 02

Total No. of Questions: 09

B.Tech (All Branches), (Sem. -1, 2)

CHEMISTRY-I

Subject Code: BTCH101-23

M.Code: 93800

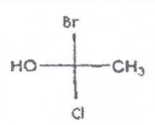
Date of Examination: 02-12-2025

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

- SECTION-A is COMPULSORY consisting of TEN questions carrying two marks each.
- SECTION-B & C have FOUR questions each.
- Each question of SECTION B & C consists of eight marks.
- Attempt any FIVE questions from SECTION B & C, taking at least two questions from each section.

Q. No.	Question	Course Outcome	Bloom's Level
SECTION-A			
1.	Answer briefly:		
a.	Why is TMS used as an internal standard in NMR spectroscopy.	CO3	L1
b.	Outline dry corrosion of metals.	CO2	L2
c.	Recall effective nuclear charge term.	CO4	L1
d.	Why halogens have highest electron affinity in the periodic table?	CO4	L1
e.	How atomic radii varies along the period in the periodic table?	CO1	L1
f.	Outline position isomerism with an example.	CO6	L1
g.	Infer about electrophiles through examples.	CO5	L2
h.	Label R and S configuration to the following: 	CO6	L1
i.	Illustrate the terms: Bathochromic shift and Hypsochromic shift.	CO3	L2
j.	Demonstrate free radical substitution reaction in alkanes.	CO5	L2
SECTION-B			
2.	Construct the molecular orbital diagram for N ₂ molecule and by making use of MOT compare (a) stability (b) Bond order (c) bond length (d) magnetic behavior of N ² , N ²⁺ and N ²⁻ species.	CO1	L5

3.	(a) The e.m.f of a cell reaction $3\text{Sn}^{4+} + 2\text{Cr} \rightarrow 2\text{Cr}^{3+} + 3\text{Sn}^{2+}$ is 0.89. Determine the standard Free energy for this reaction. (b) Model working of lime-soda process for water softening.	CO2	L3
4.	(a) Explain the mechanism of Electrochemical wet theory of corrosion along with appropriate reactions. (b) Describe the methods of prevention of corrosion.	CO2	L2
5.	(a) Analyze the number of signals for the following compounds: (i) CH ₃ -CH ₂ -O-CH ₃ (ii) CH ₃ -CH ₂ -CH ₂ -OH (b) Examine different types of molecular vibrations in IR spectroscopy.	CO3	L4
SECTION-C			
6.	(a) Deduce different conformations possible for propane molecule and also discuss their stability. (b) Explain meso compounds? Give atleast one example.	CO6	L5
7.	Solve Schrodinger wave equation upto laplacian operator. Also discuss the physical significance of ψ and ψ^2 .	CO1	L3
8.	Analyze the (a) geometry (b) shape (c) bond angle (d) number of bond pairs and (e) lone pairs of these following molecules: H ₂ O, SF ₆ , CH ₄ and NH ₃ by applying VSEPR theory.	CO4	L4
9.	Construct the pathway for the synthesis of Aspirin from salicylic acid. Also, give applications of aspirin drug molecule.	CO5	L3

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Roll No.

Total No. of Pages: 02

Total No. of Questions: 09

B.Tech (All Branches), (Sem.-1, 2)
BASIC ELECTRICAL ENGINEERING
 Subject Code: BTEE101-18
 M.Code: 93797/75339
 Date of Examination: 26-11-2025

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

- SECTION-A is COMPULSORY consisting of TEN questions carrying two marks each.
- SECTION-B & C have FOUR questions each.
- Each question of SECTION B & C consists of eight marks.
- Attempt any FIVE questions from SECTION B & C, taking at least two questions from each section.

Q. No.	Question	Course Outcome	Bloom's Level
SECTION-A			
1.	Answer briefly:		
a.	Compare active and passive elements.	CO1	L2
b.	Explain superposition's theorem.	CO1	L2
c.	What is the effect of frequency on inductive reactance?	CO2	L1
d.	Compare DC and AC.	CO2	L2
e.	Define magnetic materials and provide examples.	CO3	L1
f.	Illustrate the significance of torque-slip characteristics in case of an electrical machine.	CO3	L2
g.	What is the difference between wire & cable?	CO4	L1
h.	List the properties of ideal fuse wire.	CO4	L1
i.	What is the importance of power factor?	CO2	L1
j.	Define voltage regulation for a transformer.	CO3	L1
SECTION-B			
2.	Examine the transient analysis of first order RL series circuit. Also sketch the graphical representation of RL series circuit.	CO1	L4
3.	Solve for current through $10\ \Omega$ using Norton's theorem.	CO1	L3

4.	Explain the series resonance and its effects in RLC series circuit with suitable diagrams.	CO2	L5
5.	A resistance of $12\ \Omega$ and inductance of 0.1H are connected in series across a 220V , 100Hz supply. Solve for a) Impedance of the circuit. b) Current flowing through the circuit. c) Power factor. d) Power consumed in the circuit.	CO2	L3
SECTION-C			
6.	The iron loss and full load copper losses of 25KVA , $2000/200\text{V}$, single phase transformer are 200 watts and 400 watts respectively. Solve (a) the efficiency at full load and half load at 0.8 power factor lag. (b) maximum efficiency and corresponding load at same power factor.	CO3	L3
7.	Explain the construction and working principle of 3-phase induction motor with the help of neat diagram.	CO3	L5
8.	Analyze the important characteristics of batteries in electrical installation. Using suitable diagrams, explain the different types of batteries.	CO4	L4
9.	Examine the function of a miniature circuit breaker with the help of neat schematic diagram.	CO4	L4

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Total No. of Pages:02

Total No. of Questions: 09

B.Tech (IT/AIML/AIDS/ECE/CSE-DS/CSE-CS/RAI), Semester-1st

Chemistry-I

Subject Code: 25C1CHU-101

M.Code:

Date of Examination: 19-12-2025

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

Q. No.	Question	Course Outcome	Bloom's Level
SECTION-A			
1.	Answer briefly:		
a.	What is physical significance of ψ and ψ^2 ?	CO-1	L1
b.	Summarize Huckel's rule of aromaticity with an example.	CO-1	L2
c.	How hard water differs from soft water?	CO-2	L1
d.	Compare the terms oxidation and reduction?	CO-2	L2
e.	Why is TMS used as an internal standard in NMR spectroscopy?	CO-3	L1
f.	Show stretching vibrations with suitable examples.	CO-3	L2
g.	Outline the shape of XeF ₄ on the basis of VSEPR theory.	CO-4	L2
h.	Show an example of aliphatic electrophilic substitution reaction.	CO-5	L2
i.	Explain the concept of structural isomerism.	CO-6	L2
j.	Recall one example of each: Position isomerism and Functional isomerism.	CO-6	L1
SECTION-B			
2.	Doping Germanium with Phosphorous give rise to n-type semiconductor whereas, it's doping with Boron gives p-type semiconductor. Justify your answer by applying band theory.	CO-1	L3
3.	Simplify the term corrosion and examine the factors which promote electrochemical corrosion? Also, List different methods that can be used to prevent corrosion.	CO-2	L4
4.	Determine the number of distinct ¹ H NMR signals and splitting pattern (high resolution NMR) for the following: (a) 1,2-dichloroethane (b) 1,1-dichloroethane	CO-3	L5

5.	Solve how VSEPR theory can be applied to predict the geometry of molecules with up to 6 electron pairs through some examples.	CO-4	L3
6.	Identify the chirality and optical activity terms. Also how chirality can be applied to find optical activity in the compounds.	CO-6	L4
SECTION-C			
7.	Evaluate the crystal field splitting of d-orbitals in octahedral complexes and justify the formation of high-spin and low-spin complexes	CO-1	L5
8.	(a) What is electron affinity? Apply your knowledge of atomic size and electronic repulsion to explain why chlorine has a higher electron affinity than fluorine. (b) Identify the isoelectronic from the following species and arrange them in increasing ionic radii by applying effect of increasing nuclear charge on their size : O^{2-} , F^- , Na^+ , Mg^{2+}	CO-4	L3
9.	Analyze the mechanism of nucleophilic addition to carbonyl compounds and explain why aldehydes are generally more reactive than ketones.	CO-5	L4

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Total No. of Pages: 2

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B.Tech (All Branches), (Sem. -1, 2)
ENGINEERING PHYSICS
Subject Code: BTPPH101-23
M.Code: 93794
Date of Examination: 18-11-2025

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying two marks each.
2. SECTION-B & C have FOUR questions each.
3. Each question of SECTION B & C consists of eight marks.
4. Attempt any FIVE questions from SECTION B & C, taking at least two questions from each section.

SECTION-C

6.	Solve the Schrodinger wave equation for particle in 1-D box and show that energy of particle in a box is quantized.	CO5	L3
7.	Distinguish between step index and graded index optical fiber.	CO6	L4
8.	a) Classify the four Maxwell equation in their differential and integral form. Also give the physical significance of each equation. b) Dissect the concepts of dielectric polarization and displacement current.	CO4	L4
9.	Explain the construction and working of Photodiode. Give its disadvantages.	CO2	L5

Q. No.	Question	Course Outcome	Bloom's Level
SECTION-A			
1.	Answer briefly:		
a.	Define a Unit Cell.	CO1	L1
b.	What do you mean by extrinsic semiconductor?	CO2	L1
c.	List two unusual properties of nanomaterials.	CO3	L1
d.	Find the gradient of $1/r^2$ where $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$.	CO4	L1
e.	Explain the physical significance of a wave function.	CO5	L2
f.	What is Holography?	CO6	L1
g.	Illustrate the properties of X-rays.	CO1	L2
h.	Explain Magnetic anisotropy.	CO3	L2
i.	Compare the condition for the vector F to be solenoidal and vector F to be irrotational.	CO4	L2
j.	What is Uncertainty Principle?	CO5	L1
SECTION-B			
2.	Identify the wavelength of X-ray using Bragg's Spectrometer. Also find the minimum wavelength of continuous X-ray emitted from an X-Ray tube with operating voltage of 24kV.	CO1	L3
3.	Examine the function of Zener diode as a voltage regulator.	CO2	L4
4.	Utilize the principles of superconductivity to compare the behavior of Type-I and Type-II superconductors and explain their soft and hard nature.	CO3	L3
5.	Explain the construction and working of Ruby laser with the help of energy level diagram. Also explain spiking in ruby laser.	CO6	L5

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Roll No.

Total No. of Questions: 09

Total No. of Pages:04

B.Tech (AI&ML/AI&DS/ECE/IT/RAI/CSE-CS/CSE-DS), Semester 1st

ENGLISH & PROFESSIONAL COMMUNICATION

Subject Code: 25C1EPU-101

M.Code:

Date of Examination: 23-12-2025

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

Q. No.	Question	Course Outcome	Bloom's Level
SECTION-A			
1.	Answer briefly:		
a.	Select the sentence that contains a cliché: i. Actions speak louder than words. ii. Consistent effort often outweighs empty promises.	CO-1	L1
b.	Interpret the mistakes in the given abbreviations and rewrite correctly: "CIA-Central Intelligence Agency" , "LAN- Live Area Network"	CO-1	L2
c.	Find and fix the noun-pronoun disagreement in the given sentences: i. The mangoes are very sour. Where did you buy it? ii. The army has reached its destination.	CO-2	L1
d.	Interpret and fix the misplaced modifiers in the given sentences: i. My brother only has two children. ii. Reading a book frequently will change the whole course of a man's life.	CO-2	L2
e.	List any two features of a precise writing.	CO-3	L1
f.	"Effective writing is always clear, engaging, and purposeful." Interpret the reason.	CO-3	L2
g.	Outline the ways by which the regular practice of reading comprehension exercises strengthen critical thinking abilities.	CO-4	L2

h.	Interpret what happens when a piece of writing has a weak introduction compared to one with a strong introduction.	CO-5	L2
i.	Interpret any two reasons regarding the importance of good presentation skills in professional settings.	CO-6	L2
j.	Show with an example the way of writing a heading in a business letter when the name and designation both are given.	CO-6	L1
SECTION-B			
2.	a. Choose the word from the options which best expresses the meaning of the given words: i. ABUNDANT: _____ (Options: scarce, plentiful, moderate, limited) ii. PERSEVERANCE: _____ (Options: Giving up, laziness, persistence, confusion) ii. ACHIEVE: _____ (Options: Fail, attempt, accomplish, begin) b. Choose the word from the options which conveys the antonym of the given words: i. EXPAND: _____ (Options: Grow, stretch, contract, increase) ii. PARTIAL: _____ (Options: Complete, some, half, limited)	CO-1	L3
3.	Examine and correct the redundancy in the following sentences: i. The CEO gave a free complimentary gift to each and every employee in the company. ii. In my personal opinion, I think we should postpone the meeting until a later time in the future. iii. The students gathered together in a small little group to collaborate together on their joint project assignment. iv. She returned back to her house at 10 a.m. in the morning to repeat the same routine again. v. The witness repeated the same story again during the trial.	CO-2	L4
4.	Read the following passage and do as directed: i. Deduct the words/ sentences from the passage to form a precis. ii. Paraphrase this passage. In today's fast paced world, maintaining a healthy lifestyle has become increasingly challenging. With busy schedules, people often neglect physical activity and opt for quick, unhealthy meals. This has led to a rise in lifestyle related diseases such as obesity, diabetes, and heart problems. However, incorporating regular exercise and a balanced diet can significantly improve overall health. Simple changes like	CO-3	L5

	walking more, choosing nutritious foods, and reducing stress can make a big difference. It is essential to prioritize health to lead a fulfilling life.		
5.	<p>Read the following paragraph and choose the correct answer from the paragraph for the questions that follow:</p> <p>The rapid advancement of technology has created an unprecedented divide between generations, fundamentally altering how different age groups communicate, learn, and perceive the world around them. While younger generations, often called "digital natives," have grown up immersed in smartphones, social media, and instant connectivity, older generations frequently struggle to adapt to these technological changes. This generational gap extends beyond mere comfort with gadgets—it reflects deeper differences in attention spans, information processing, and social interaction patterns. Young people tend to multitask efficiently, absorbing information in short bursts from multiple sources simultaneously, whereas older individuals often prefer focused, linear learning approaches. However, this technological divide isn't entirely one-sided. While younger generations excel at navigating digital platforms, they sometimes lack the deep analytical skills and patience for sustained concentration that older generations possess. Moreover, excessive reliance on technology has led to concerns about decreased face-to-face communication skills and shortened attention spans among youth. The challenge for society lies not in choosing sides, but in finding ways to bridge this gap, allowing each generation to learn from the other's strengths while addressing their respective weaknesses.</p> <p>Questions:</p> <p>i. Analyze the main argument presented in this paragraph. What is the author's central idea/thesis about the digital generation gap?</p> <p>ii. Identify and explain two specific differences between younger and older generations mentioned in the text. How do these differences affect their daily lives?</p> <p>iii. The author states that "this technological divide isn't entirely one-sided." Analyze its meaning and provide evidence from the paragraph to support this claim.</p> <p>iv. Analyze the solution proposed by the author in the final sentence. Do you think this approach is realistic? Give your view point.</p> <p>v. Give antonyms of "excessive" and "deep".</p>	CO-4	L5

6.	Make use of professional email writing etiquettes and draft an email to your boss requesting him for your promotion from Junior Manager to a Senior Manager.	CO-6	L3
SECTION-C			
7.	<p>Make use of the appropriate subject-verb agreement rules and correct the following sentences:</p> <p>i. The man and the woman has absconded.</p> <p>ii. A dictionary and an atlas is missing from the library.</p> <p>iii. The children as well as their mother is missing.</p> <p>iv. Neither the students nor the teacher are satisfied with the results.</p> <p>v. The list of complaints have been submitted.</p>	CO-2	L3
8.	Identify ways to develop good and catchy content writing skills and explain how these skills can be applied to create engaging blogs, social media posts, or articles that attract readers.	CO-5	L3
9.	You are Priya Sharma, a resident of Greenfield Apartments, Sector 15, Chandigarh. You have been facing frequent power outages in your residential area for the past three weeks. The electricity cuts occur daily between 6:00 PM to 10:00 PM, which is peak usage time for families. This has caused significant inconvenience as children cannot study properly, food gets spoiled due to refrigerator shutdowns, and online work from home has become impossible. Explaining all the problems write a complaint letter to the Chief Engineer, Chandigarh Electricity Board, Sector 9, Chandigarh - 160009.	CO-6	L5

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3.	Test for the matrix $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 3 & -1 \\ 0 & -1 & 3 \end{bmatrix}$ is diagonalizable or not.	CO3	L4
4.	Solve the partial differential equation $r - 4s + 4t = e^{2x+y}$.	CO6	L3
5.	Analyze the system of linear equations $x + y + z = 6, x + 2y + 3z = 10, x + 2y + kz = \lambda$ by examining the relationships among the coefficients, for which values of k and λ possesses (i) No solution (ii) Unique solution (iii) Infinite number of solutions.	CO1	L4
SECTION-C			
6.	Let $V(R)$ be the vector space of all 2×2 matrices and T be a linear operator on $V(R)$ such that $T(v) = Mv$, where $v \in V(R)$ and $M = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$. Construct the matrix of T relative to standard basis of $V(F)$.	CO2	L3
7.	Evaluate the matrices P and Q such that PAQ is in the normal form where A is the matrix $\begin{bmatrix} 1 & 1 & 2 \\ 1 & 2 & 3 \\ 0 & -1 & -1 \end{bmatrix}$.	CO1	L5
8.	Inspect the form of equation $(p + q)(px + qy) = 1$ and identify the reasoning that leads to complete solution.	CO4	L4
9.	If the displacement of a particle moving at any time t is given by $x = a \cos kt + b \sin kt$, show that the point executes simple harmonic motion. Also determine i) amplitude ii) the maximum velocity iii) the maximum acceleration iv) the periodic time.	CO5	L5

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3.	Test for the matrix $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 3 & -1 \\ 0 & -1 & 3 \end{bmatrix}$ is diagonalizable or not.	CO3	L4
4.	Solve the partial differential equation $r - 4s + 4t = e^{2x+y}$.	CO6	L3
5.	Analyze the system of linear equations $x + y + z = 6, x + 2y + 3z = 10, x + 2y + kz = \lambda$ by examining the relationships among the coefficients, for which values of k and λ possesses (i) No solution (ii) Unique solution (iii) Infinite number of solutions.	CO1	L4
SECTION-C			
6.	Let $V(R)$ be the vector space of all 2×2 matrices and T be a linear operator on $V(R)$ such that $T(v) = Mv$, where $v \in V(R)$ and $M = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$. Construct the matrix of T relative to standard basis of $V(F)$.	CO2	L3
7.	Evaluate the matrices P and Q such that PAQ is in the normal form where A is the matrix $\begin{bmatrix} 1 & 1 & 2 \\ 1 & 2 & 3 \\ 0 & -1 & -1 \end{bmatrix}$.	CO1	L5
8.	Inspect the form of equation $(p + q)(px + qy) = 1$ and identify the reasoning that leads to complete solution.	CO4	L4
9.	If the displacement of a particle moving at any time t is given by $x = a \cos kt + b \sin kt$, show that the point executes simple harmonic motion. Also determine i) amplitude ii) the maximum velocity iii) the maximum acceleration iv) the periodic time.	CO5	L5

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Total No. of Pages: 02

Total No. of Questions: 09

B.Tech (IT/CSE/AIML/AIDS/IOT/CSE DS/CS/RAI), Semester 3rd
MATHEMATICS-III

Subject Code: BTAM302-23

M.Code: 94630

Date of Examination: 03-12-2025

Max. Marks: 60

Time: 3 Hrs.

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

Q. No.	Question	Course Outcome	Bloom's Level																				
SECTION-A																							
1.	Answer briefly:																						
a.	What do you mean by Kurtosis?	CO-1	L1																				
b.	If arithmetic mean is 56.50, median is 59.50 and standard deviation is 12.40. Find the skewness.	CO-1	L2																				
c.	Two cards are drawn at random from a well-shuffled pack of 52 cards. What is the probability of drawing two aces?	CO-2	L1																				
d.	If A, B and C are three mutually exclusive and exhaustive events associated with random experiments. Find P(A) given that $P(B) = \frac{3}{2}P(A), P(C) = \frac{1}{2}P(B)$	CO-2	L2																				
e.	Explain any two properties of Binomial Distribution.	CO-3	L1																				
f.	If the probability of defective bolt is 0.1, find the S.D. for the defective bolt in a total of 400.	CO-3	L2																				
g.	Define Correlation.	CO-4	L1																				
h.	If the regression coefficient of Y on X is 0.8 and that of X on Y is 0.5, find the correlation coefficient.	CO-4	L2																				
i.	Define Type-I and Type-II errors.	CO-5	L1																				
j.	A sample of 400 male students is found to have a mean height of 67.47 inches. Can it be reasonably regarded as sample from a large population with mean height 67.39 inches and S.D. 1.30 inches?	CO-5	L2																				
SECTION-B																							
2.	Calculate the first four moments about mean for the following data:	CO-1	L4																				
	<table border="1" style="display: inline-table; border-collapse: collapse; text-align: center;"> <tr> <td style="padding: 2px;">X:</td> <td style="padding: 2px;">1</td> <td style="padding: 2px;">2</td> <td style="padding: 2px;">3</td> <td style="padding: 2px;">4</td> <td style="padding: 2px;">5</td> <td style="padding: 2px;">6</td> <td style="padding: 2px;">7</td> <td style="padding: 2px;">8</td> <td style="padding: 2px;">9</td> </tr> <tr> <td style="padding: 2px;">F:</td> <td style="padding: 2px;">1</td> <td style="padding: 2px;">6</td> <td style="padding: 2px;">13</td> <td style="padding: 2px;">25</td> <td style="padding: 2px;">30</td> <td style="padding: 2px;">22</td> <td style="padding: 2px;">9</td> <td style="padding: 2px;">5</td> <td style="padding: 2px;">2</td> </tr> </table>	X:	1	2	3	4	5	6	7	8	9	F:	1	6	13	25	30	22	9	5	2		
X:	1	2	3	4	5	6	7	8	9														
F:	1	6	13	25	30	22	9	5	2														

3.	<p>A random variable X has the following probability distribution</p> <table border="1"> <tr> <td>X</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> </tr> <tr> <td>P(X)</td> <td>k</td> <td>3k</td> <td>5k</td> <td>7k</td> <td>9k</td> <td>11k</td> <td>13k</td> </tr> </table> <p>Solve: (a) the value of k (b) $P(X \geq 4)$ and $P(2 < X \leq 5)$</p>	X	0	1	2	3	4	5	6	P(X)	k	3k	5k	7k	9k	11k	13k	CO-2	L3										
X	0	1	2	3	4	5	6																						
P(X)	k	3k	5k	7k	9k	11k	13k																						
4.	<p>In a normal distribution 31% of items are under 45 and 8% of items are over 64. Evaluate mean and standard deviation of the distribution.</p>	CO-3	L5																										
5.	<p>Calculate rank correlation coefficient from the following data</p> <table border="1"> <tr> <td>X</td> <td>12</td> <td>15</td> <td>18</td> <td>20</td> <td>16</td> <td>15</td> <td>18</td> <td>22</td> <td>15</td> <td>21</td> <td>18</td> <td>15</td> </tr> <tr> <td>Y</td> <td>10</td> <td>18</td> <td>19</td> <td>12</td> <td>15</td> <td>19</td> <td>17</td> <td>19</td> <td>16</td> <td>14</td> <td>13</td> <td>17</td> </tr> </table>	X	12	15	18	20	16	15	18	22	15	21	18	15	Y	10	18	19	12	15	19	17	19	16	14	13	17	CO-4	L4
X	12	15	18	20	16	15	18	22	15	21	18	15																	
Y	10	18	19	12	15	19	17	19	16	14	13	17																	
6.	<p>Two types of drugs were used to control the high blood pressures on 6 and 8 patients and decreases in systolic blood pressures (upper limit of B.P.) are as below:</p> <table border="1"> <tr> <td>Drug A</td> <td>12</td> <td>18</td> <td>30</td> <td>15</td> <td>7</td> <td>14</td> <td></td> <td></td> </tr> <tr> <td>Drug B</td> <td>15</td> <td>16</td> <td>12</td> <td>10</td> <td>21</td> <td>25</td> <td>28</td> <td>17</td> </tr> </table> <p>Interpret if there is any significant difference in the efficiency of drugs?</p>	Drug A	12	18	30	15	7	14			Drug B	15	16	12	10	21	25	28	17	CO-5	L5								
Drug A	12	18	30	15	7	14																							
Drug B	15	16	12	10	21	25	28	17																					
SECTION-C																													
7.	<p>From the following data calculate Karl Pearson's coefficient of skewness:</p> <table border="1"> <tr> <td>Marks (more than)</td> <td>0</td> <td>10</td> <td>20</td> <td>30</td> <td>40</td> <td>50</td> <td>60</td> <td>70</td> <td>80</td> </tr> <tr> <td>No. of students</td> <td>150</td> <td>140</td> <td>100</td> <td>80</td> <td>80</td> <td>70</td> <td>30</td> <td>14</td> <td>0</td> </tr> </table>	Marks (more than)	0	10	20	30	40	50	60	70	80	No. of students	150	140	100	80	80	70	30	14	0	CO-1	L4						
Marks (more than)	0	10	20	30	40	50	60	70	80																				
No. of students	150	140	100	80	80	70	30	14	0																				
8.	<p>If the probability that an individual suffers a bad reaction from a certain injection is 0.001. Evaluate the probability that out of 2000 individuals.</p> <p>(a) exactly 3 individuals will suffer a bad reaction (b) none will suffer a bad reaction (c) more than one individual will suffer (d) more than two individual will suffer</p>	CO-3	L5																										
9.	<p>Given the following data on sales and purchase</p> <table border="1"> <tr> <td>Sales</td> <td>91</td> <td>97</td> <td>108</td> <td>121</td> <td>67</td> <td>124</td> <td>51</td> <td>73</td> <td>111</td> <td>57</td> </tr> <tr> <td>Purchase</td> <td>71</td> <td>75</td> <td>69</td> <td>97</td> <td>70</td> <td>91</td> <td>39</td> <td>61</td> <td>80</td> <td>47</td> </tr> </table> <p>(a) Obtain regression equations Y on X and X on Y. (b) Calculate coefficient of correlation. (c) Estimate Y when X is 88 and X when Y is 56.</p>	Sales	91	97	108	121	67	124	51	73	111	57	Purchase	71	75	69	97	70	91	39	61	80	47	CO-4	L3				
Sales	91	97	108	121	67	124	51	73	111	57																			
Purchase	71	75	69	97	70	91	39	61	80	47																			

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SECTION-C

7.	Justify the use of friend functions over member functions in operator overloading. Support your justification with a suitable C++ example and evaluate the situations where friend functions provide greater flexibility.	CO-2	L5
8.	Analyze the effect of access specifiers (public, protected, private) on reusability, flexibility, and extensibility of derived classes. In your opinion, which access mode leads to better design practices? Justify your evaluation with reasons.	CO-3	L4
9.	Evaluate the role of polymorphism in C++ by comparing early and late binding with examples.	CO-4	L5

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Roll No.

Total No. of Pages: 02

Total No. of Questions: 09

B.Tech (CSE/AIML/AIDS/IOT/CSE DS/CS/RAI), Semester 3rd

DATA STRUCTURE & ALGORITHMS

Subject Code: BTCS-301-18

M.Code: 76436

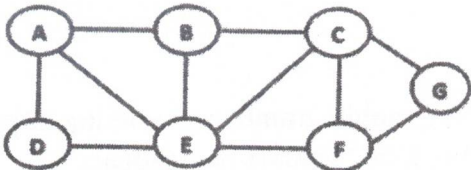
Date of Examination: 09-12-2025

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

Q. No.	Question	Course Outcome	Bloom's Level
SECTION-A			
1.	Answer briefly:		
a.	List basic operations performed on data structures.	CO-1	L1
b.	Explain what a Priority Queue is and describe how it differs from a normal queue.	CO-1	L2
c.	List how Stacks and Queues are represented in data structure.	CO-2	L1
d.	Explain why stack is called a LIFO data structure.	CO-2	L2
e.	State the properties of a Binary Search Tree (BST).	CO-3	L1
f.	Differentiate between min-heap and max-heap with an example.	CO-3	L2
g.	Define chaining as a method for handling collisions in hashing with example.	CO-4	L1
h.	Contrast and compare between Linear Search and Binary Search .	CO-4	L2
i.	Define path and loop in a graph.	CO-5	L1
j.	Illustrate two real-world applications of graphs with example.	CO-5	L2
SECTION-B			
2.	Construct a stack using a linked list. Push 10, 20, 30, 40 and show the step by step insertion structure with diagram along with the corresponding algorithm.	CO-1	L3
3.	Solve the given array with quick sort and write algorithm to explain all steps. 55, 47, 88, 12, 30, 99, 23, 65, 71	CO-2	L3
4.	Elaborate the concept of BFS traversal of the following graph with 'A' as the source vertex and also write algorithm for it. 	CO-3	L5

5.	Analyze how Insertion Sort works by illustrating each iteration on given elements [8, 3, 5, 4, 7, 6, 2] and explain with algorithm how elements are compared and shifted.	CO-4	L4
6.	Develop an algorithm to insert an element into a queue, in which the queue is implemented as linked list.	CO-5	L6
SECTION-C			
7.	Categorize the various arithmetic expressions using example. Convert the following infix expression into postfix notation using stack and write algorithm to explain all steps. $(A + B) * (C \wedge D - E) \wedge (F + G * H) - I$	CO-1	L4
8.	Compare and contrast stack and queue data structures. Explain their working principles, operations (push, pop, enqueue, dequeue) and applications with neat diagrams.	CO-3	L4
9.	Explain collision resolution in hashing using the separate chaining technique. Using a hash table of size 10 and the hash function $h(k) = k \bmod 10$, insert the keys: 12, 22, 32, 42, 15. Draw the hash table showing how collisions are handled. Discuss the advantages and disadvantages of separate chaining.	CO-4	L5

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Roll No.

Total No. of Pages: 02

Total No. of Questions: 09

B.Tech (AIDS/AIML/CSE/CSE DS/CS/IOT/IT/RAI), Semester-3rd

DIGITAL ELECTRONICS

Subject Code: BTES 301-18

M.Code:76435

Date of Examination: 06-12-2025

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

Q. No.	Question	Course Outcome	Bloom's Level
SECTION-A			
1.	Answer briefly:		
a.	Find the hexadecimal equivalent of octal number $(651.124)_8$.	CO-1	L1
b.	Illustrate addition of $(1101)_2$ and $(1010)_2$ using 1's complement method.	CO-1	L2
c.	List any 4 type of min-term implicants and write down examples for each.	CO-2	L1
d.	Show a logic circuit for expression $A'BC + AC$.	CO-2	L2
e.	What is the use of a de-multiplexer as a logic element?	CO-3	L1
f.	Explain the main role and the use of parity checker.	CO-3	L2
g.	Explain in brief about asynchronous counter.	CO-4	L2
h.	Illustrate the difference between volatile and Non-Volatile Memory.	CO-5	L2
i.	Classify various D/A conversion techniques.	CO-6	L2
j.	Define the term quantization error in ADC.	CO-6	L1
SECTION-B			
2.	Solve XS-3 addition of these two decimal numbers 56 and 31.	CO-1	L3
3.	Simplify the following function in SOP form $f(A,B,C,D)=\prod M(0,2,4,6,8,10,12,14) + d(1,11,13,15)$	CO-2	L4
4.	Solve the following function with 8:1 MUX $F(A,B,C,D)=\sum m(1,3,4,11,12,13,14,15)$.	CO-3	L3

5.	Identify the operation of JK flip flop using excitation table.	CO-4	L3
6.	Apply the concept of quantization error in ADCs.	CO-6	L3
SECTION-C			
7.	Simplify $(1000111.10011)_2$ binary number into decimal, then back to binary. Analyze and compare whether the result is identical to the original.	CO-1	L4
8.	Discuss and design the working of mod-6 counter in detail using K map.	CO-4	L6
9.	Elaborate the organization, working principle, and applications of ROM, PROM, EPROM, and EEPROM.	CO-5	L6

Note: Disclosure of identity by writing mobile number or making of passing request on any paper of Answer Sheet will lead to UMC against the student.

Roll No.

Total No. of Pages: 02

Total No. of Questions: 09

B.Tech (CSE/RAI/IOT/AIDS/AIML/CSE DS/CS), Semester 3rd

DEVELOPMENT OF SOCIETIES

Subject Code: HSMC101-18

M.Code: 76439

Date of Examination: 29-11-2025

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

Q. No.	Question	Course Outcome	Bloom's Level
SECTION-A			
1.	Answer briefly:		
a.	"Clan is a group of people having similar thought process". Recall it.	CO-1	L1
b.	Explain how the family system contributed to the development of clans.	CO-1	L2
c.	What do you understand by the industrial social system?	CO-2	L1
d.	Demonstrate briefly how clans gave rise to larger societies.	CO-2	L2
e.	How does a one-party system affect the freedom of citizens?	CO-3	L1
f.	Compare Bureaucracy and Aristocracy with respect to governing system.	CO-3	L2
g.	List any two characteristics of marxism given by Karl Marx.	CO-4	L1
h.	Compare Pre-British and British economic structures in India.	CO-4	L2
i.	List the features of socialist economy.	CO-5	L1
j.	Explain human scale development with example.	CO-5	L2
SECTION-B			
2.	"Individuals are characterized as patterns of society." Discover it.	CO-1	L4
3.	Identify how the biological needs of human beings contributed to the formation of families.	CO-2	L3
4.	Determine the concept of governance in bureaucracy and explain in detail its advantages and disadvantages.	CO-3	L5
5.	Categorize Gandhian decentralization and swaraj with current centralized planning models.	CO-4	L4
6.	Compare buddhist economics and traditional economics with respect to economic development.	CO-5	L5
SECTION-C			
7.	Analyze how kinship and blood relations shaped the transition from families to clans.	CO-1	L4

8.	Analyze the key differences between capitalist, socialist, and mixed models of governance in terms of political and economic control.	CO-3	L4
9.	Interpret the effectiveness of India's post-independence industrial strategies in transforming a colonial economy into a self-reliant and diversified economic system.	CO-4	L5

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Roll No.

Total No. of Pages: 02

Total No. of Questions: 09

B.Tech (CSE/AI/ML/AIDS/DS/IoT), Semester: 4th
COMPUTER ORGANIZATION AND ARCHITECTURE

Subject Code: BTES - 401-18

M. Code: 77627

Date of Examination: 24-11-2025

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

- SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
- SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

Q. No.	Questions	Course Outcomes	Bloom's Level
SECTION-A			
1.	Answer briefly:		
a.	What is an interrupt?	CO1	L1
b.	Illustrate the significance of address and data bus.	CO1	L2
c.	What is the advantage of using carry look-ahead adder?	CO2	L1
d.	What is the role of cache memory?	CO5	L1
e.	Define the function of flag register in 8085 MP.	CO1	L1
f.	Explain the concept of memory interleaving.	CO5	L2
g.	Infer how many address lines are required to address the 1000 memory locations.	CO5	L2
h.	What is a control unit ?	CO3	L1
i.	Outline the usage of parallel processing.	CO4	L2
j.	What is a privileged instruction?	CO3	L1

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SECTION-B			
2.	Analyze the Flynn's classification of the processors with appropriate diagrams.	CO4	L4
3.	Evaluate the micro programmed and hardwired design approaches of a control unit.	CO3	L5
4.	Identify the various addressing modes of microprocessor 8085 and select an appropriate instruction to explain each.	CO2	L3
5.	Examine any four memory replacement algorithms with appropriate examples.	CO5	L4
6.	By examining the instruction format and its constituent parts, categorise the instructions according to their size.	CO2	L4
SECTION-C			
7.	Construct an architectural diagram of microprocessor 8085 and explain in detail.	CO1	L3
8.	Choose an appropriate diagram to design a hypothetical CPU and also identify the role of each part.	CO3	L6
9.	Explain the basic concept of pipelining with a real life example and derive the expressions for throughput and speedup.	CO4	L5

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Roll No.

Total No. of Pages: 02

Total No. of Questions: 09

B.Tech (CSE/AIIML/AIDS/IoT/DS), Semester: 4th
DESIGN AND ANALYSIS OF ALGORITHMS

Subject Code: BTCS403-18

M. Code: 77629

Date of Examination: 17-12-2025

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

- SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
- SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

Q. No.	Questions	Course Outcomes	Bloom's Level
SECTION-A			
1.	Answer briefly:		
a.	What do you understand by algorithm evaluation?	CO1	L1
b.	Outline the various steps in the design of an algorithm.	CO1	L2
c.	What is Knapsack problem?	CO2	L1
d.	Demonstrate travelling salesman problem with the help of an example.	CO2	L2
e.	Define Depth First Search algorithm.	CO3	L1
f.	Explain flow network with example.	CO3	L2
g.	What is asymptotic time complexity?	CO4	L1
h.	Explain tractable and non-tractable problems with example.	CO4	L2
i.	What are approximate and optimal solutions?	CO5	L1
j.	Explain heuristics and its characteristics.	CO5	L2
SECTION-B			
2.	Analyze the conditions for using Masters Method for solving recurrences and its limitations.	CO1	L4
3.	Examine the concept of Greedy Method with the help of suitable example.	CO2	L4
4.	Evaluate Bellman Ford shortest path algorithm with the help of an example.	CO3	L5
5.	Compare and Contrast N, NP, NP Hard and NP Complete problems.	CO4	L3

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6.	Explain randomization and approximation algorithms with the help of an example.	CO5	L5
SECTION-C			
7.	Solve the recurrence equation $T(n) = 9T(n/3) + n$ with the help of substitution method.	CO1	L3
8.	Classify the algorithms used to obtain minimum spanning tree. Justify whether these algorithms generate same output or not.	CO3	L4
9.	Interpret the vertex cover problem with the help of an example.	CO4	L5

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Roll No.

Total No. of Pages: 2

Total No. of Questions: 09

B.Tech (CSE/IT/AIIML/AIDS/DS/IOT), Semester- 4th

DISCRETE MATHEMATICS

Subject Code: BTCS-401-18

M.Code: 77626

Date of Examination: 11-12-2025

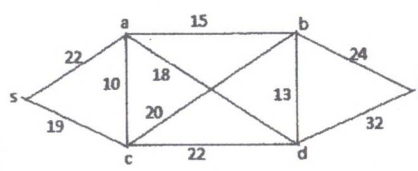
Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

- SECTION-A is COMPULSORY consisting of TEN questions carrying two marks each.
- SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
- SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

Q. No.	Questions	Course Outcome	Bloom's Level
SECTION-A			
1.	Answer briefly:		
a.	Define equivalent sets with example.	CO1	L1
b.	Explain the domain and range of the relation $R = \{(x, y) : x \in N, x < 5, y = 3\}$.	CO1	L2
c.	From 5 consonants and 4 vowels, how many words can be constructed using 3 consonants and 2 vowels?	CO2	L1
d.	Explain pigeonhole principle.	CO2	L2
e.	Show that $(p \wedge q) \rightarrow p$ is a tautology.	CO3	L1
f.	Explain the Converse and Contrapositive of the implication "if it snows tonight, then I will stay at home".	CO3	L2
g.	Define an abelian group.	CO4	L1
h.	Explain commutative ring with unity with example.	CO4	L2
i.	Does there exists a simple graph with six vertices of degrees 1, 1, 3, 4, 6, 7? Explain.	CO5	L2
j.	What will be the chromatic number of complete graph with n - vertices?	CO5	L1

SECTION-B			
2.	Examine whether intersection of two partial order relations is a partial order relation. But union of two partial order relations need not be a partial order relation. Give suitable example.	CO1	L4
3.	a) Examine how many people must you have to guarantee that at least 12 of them will have birthday on the same day of the week? b) Find the number of positive integers from 1 to 1000 which are divisible by none of 5, 6 and 8.	CO2	L4
4.	a) Construct the truth table for $(p \wedge q) \vee r = (p \vee r) \wedge (q \vee r)$ b) Test the validity of the following argument: If a man is bachelor, he is unhappy. If a man is unhappy, he dies young. Therefore bachelors die young.	CO3	L3
5.	Solve the set C^* of all non-zero complex numbers form an infinite abelian group under the operation of multiplication of complex numbers.	CO4	L3
6.	a) Prove that sum of degree of all vertices in a graph is equal to twice the number of edges in G b) Prove that in a graph the number of vertices of odd degree is even.	CO5	L5
SECTION-C			
7.	Let $f : R \rightarrow R$ and $g : R \rightarrow R$ be a real valued functions defined by $f(x) = 2x^3 - 1, x \in R$ and $g(x) = \left(\frac{x+1}{2}\right)^{1/3}, x \in R$. Examine whether f and g is inverse of each other?	CO1	L4
8.	Prove that a finite integral domain is a field.	CO4	L5
9.	Estimate shortest path from s to f for the following graph: 	CO5	L6

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Roll No.

Total No. of Pages:04

Total No. of Questions: 11

B. Tech (CSE/ECE/AIIML/AIDS/DS/IOT), Semester 4th
UNIVERSAL HUMAN VALUES/ UNIVERSAL HUMAN VALUES-II

Subject Code: HSMC-122-18

M. Code: 77630/91979

Date of Examination: 19-11-25

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

- SECTION-A is COMPULSORY consisting of TEN questions carrying ONE marks each.
- SECTION-B contains FIVE questions carrying FOUR marks each and students have to attempt all the questions.
- SECTION C contains FIVE questions carrying SIX marks each and students have to attempt all the questions.

Q. No.	Question	Course Outcome	Bloom's Level
SECTION-A			
1.	Answer briefly:		
a.	How can you maintain harmony in relationship? आप रिश्ते में सामंजस्य कैसे बनाए रख सकते हैं? तुम्हीं रिश्ते में सद्भावना कैसे बनाए रख सकते हो?	CO1	L1
b.	Outline the basic guidelines for value education. मूल्य शिक्षा के लिए बुनियादी दिशा-निर्देशों की रूपरेखा तैयार करें। मूल्य शिक्षा लक्ष्य-बुनियादी दिशा-निर्देशों की रूपरेखा तैयार करें।	CO1	L2
c.	List the problems that we are facing today because of operating on the basis of pre-conditioned desires and sensation. पूर्व-निर्धारित इच्छाओं और संवेदना के आधार पर काम करने के कारण आज हम जिन समस्याओं का सामना कर रहे हैं, उन्हें सूचीबद्ध करें। उन्हें सही ढंग से समझें। उन्हें सही ढंग से समझें। उन्हें सही ढंग से समझें। उन्हें सही ढंग से समझें।	CO2	L1
d.	Interpret, how do we go into conflicts when our activities are not guided by our natural acceptance. व्याख्या करें, हम संघर्षों में कैसे जाते हैं जब हमारी गतिविधियाँ हमारी स्वाभाविक स्वीकृति से निर्देशित नहीं होती हैं। व्याख्या करें, हम संघर्षों में कैसे जाते हैं जब हमारी गतिविधियाँ हमारी स्वाभाविक स्वीकृति से निर्देशित नहीं होती हैं। व्याख्या करें, हम संघर्षों में कैसे जाते हैं जब हमारी गतिविधियाँ हमारी स्वाभाविक स्वीकृति से निर्देशित नहीं होती हैं। व्याख्या करें, हम संघर्षों में कैसे जाते हैं जब हमारी गतिविधियाँ हमारी स्वाभाविक स्वीकृति से निर्देशित नहीं होती हैं।	CO2	L2

c.	What is prosperity? Is it different from happiness? समृद्धि क्या है? क्या यह खुशी से अलग है? समृद्धि क्या है? क्या यह खुशी से अलग है? समृद्धि क्या है? क्या यह खुशी से अलग है?	CO3	L1
f.	Infer natural acceptance of human values. मानवीय मूल्यों की स्वाभाविक स्वीकृति। मानवीय मूल्यों की स्वाभाविक स्वीकृति। मानवीय मूल्यों की स्वाभाविक स्वीकृति।	CO3	L2
g.	Summarize what humanistic education is all about. संक्षेप में बताइए कि मानवतावादी शिक्षा क्या है। संक्षेप में बताइए कि मानवतावादी शिक्षा क्या है। संक्षेप में बताइए कि मानवतावादी शिक्षा क्या है।	CO4	L2
h.	Explain natural acceptance of human values. मानवीय मूल्यों की स्वाभाविक स्वीकृति की व्याख्या कीजिए। मानवीय मूल्यों की स्वाभाविक स्वीकृति की व्याख्या कीजिए। मानवीय मूल्यों की स्वाभाविक स्वीकृति की व्याख्या कीजिए।	CO4	L2
i.	Illustrate the term self-regulation in nature. प्रकृति में स्व-नियमन शब्द का चित्रण करें। प्रकृति में स्व-नियमन शब्द का चित्रण करें। प्रकृति में स्व-नियमन शब्द का चित्रण करें।	CO5	L2
j.	Define Ethical Human Conduct. नैतिक मानव आचरण को परिभाषित कीजिए। नैतिक मानव आचरण को परिभाषित कीजिए। नैतिक मानव आचरण को परिभाषित कीजिए।	CO5	L1
SECTION-B			
2.	Utilize harmony in nature and identify the meaning of co-existence with nature. प्रकृति में सामंजस्य का उपयोग करें और प्रकृति के साथ सह-अस्तित्व के अर्थ की पहचान करें। प्रकृति में सामंजस्य का उपयोग करें और प्रकृति के साथ सह-अस्तित्व के अर्थ की पहचान करें। प्रकृति में सामंजस्य का उपयोग करें और प्रकृति के साथ सह-अस्तित्व के अर्थ की पहचान करें।	CO1	L3
3.	"Skills and Human Values are Complementary". Analyze this statement with example. "कौशल और मानवीय मूल्य पूरक हैं।" उदाहरण के साथ इस कथन का विश्लेषण करें। "कौशल और मानवीय मूल्य पूरक हैं।" उदाहरण के साथ इस कथन का विश्लेषण करें। "कौशल और मानवीय मूल्य पूरक हैं।" उदाहरण के साथ इस कथन का विश्लेषण करें।	CO2	L4
4.	Elaborate the five dimensions of human endeavor and how they are helpful in achieving comprehensive human goals. Also explain the state of society today in terms of fulfilment of comprehensive human goal. मानव प्रयास के पाँच आयामों का विस्तार से वर्णन करें कि वे व्यापक मानव लक्ष्यों को प्राप्त करने में कैसे सहायक हैं। व्यापक मानव लक्ष्य की पूर्ति के संदर्भ में आज समाज की स्थिति की भी व्याख्या करें। मानव प्रयास के पाँच आयामों का विस्तार से वर्णन करें कि वे व्यापक मानव लक्ष्यों को प्राप्त करने में कैसे सहायक हैं। व्यापक मानव लक्ष्य की पूर्ति के संदर्भ में आज समाज की स्थिति की भी व्याख्या करें। मानव प्रयास के पाँच आयामों का विस्तार से वर्णन करें कि वे व्यापक मानव लक्ष्यों को प्राप्त करने में कैसे सहायक हैं। व्यापक मानव लक्ष्य की पूर्ति के संदर्भ में आज समाज की स्थिति की भी व्याख्या करें।	CO3	L5

	ਵਿਆਪਕ ਮਨੁੱਖੀ ਟੀਚੇ ਦੀ ਪੂਰਤੀ ਦੇ ਸੰਦਰਭ ਵਿੱਚ ਅੱਜ ਸਮਾਜ ਦੀ ਸਥਿਤੀ ਦੀ ਵੀ ਵਿਆਖਿਆ ਕਰੋ।		
5.	List the four orders of nature. Also, analyze the interconnectedness and mutual fulfilment in four orders of nature with examples. ਪ੍ਰਕ੍ਰਿਤੀ ਦੇ ਚਾਰ ਕ੍ਰਮਾਂ ਦੀ ਸੂਚੀ ਬਨਾਓ। ਇਸਦੇ ਅਲਾਗ, ਉਦਾਹਰਣਾਂ ਦੇ ਸਾਥ ਪ੍ਰਕ੍ਰਿਤੀ ਦੇ ਚਾਰ ਕ੍ਰਮਾਂ ਵਿੱਚ ਪਰਸਪਰ ਜੁੜਾਵ ਅਤੇ ਆਪਸੀ ਪੂਰਤੀ ਦਾ ਵਿਸ਼ਲੇਸ਼ਣ ਕਰੋ। ਕੁਦਰਤ ਦੇ ਚਾਰ ਆਦੇਸ਼ਾਂ ਦੀ ਸੂਚੀ ਬਣਾਓ। ਨਾਲ ਹੀ, ਉਦਾਹਰਣਾਂ ਦੇ ਨਾਲ ਕੁਦਰਤ ਦੇ ਚਾਰ ਕ੍ਰਮ ਵਿੱਚ ਪਰਸਪਰ ਸੰਬੰਧਾਂ ਅਤੇ ਆਪਸੀ ਪੂਰਤੀ ਦਾ ਵਿਸ਼ਲੇਸ਼ਣ ਕਰੋ।	CO4	L4
6.	Apply ethical principles to identify current issues in professional ethics and list five unethical practices along with the methods used to curb them. ਪੇਸ਼ੇਵਰ ਨੈਤਿਕਤਾ ਵਿੱਚ ਮੌਜੂਦਾ ਮੁੱਦਿਆਂ ਦੀ ਪਛਾਣ ਕਰਨ ਦੇ ਲਿਏ ਨੈਤਿਕ ਸਿਫ਼ਤਾਂ ਦੀ ਲਾਗੂ ਕਰੋ ਅਤੇ ਉਨ੍ਹਾਂ ਦੇ ਅਨੁਕੂਲ ਲਗਾਓ ਦੇ ਲਿਏ ਉਪਯੋਗ ਕੀਤੇ ਗਏ ਤਰੀਕਿਆਂ ਦੇ ਸਾਥ ਪੰਜ ਅਨੈਤਿਕ ਪ੍ਰਥਾਵਾਂ ਦੀ ਸੂਚੀਬੱਧ ਕਰੋ। ਪੇਸ਼ੇਵਰ ਨੈਤਿਕਤਾ ਵਿੱਚ ਮੌਜੂਦਾ ਮੁੱਦਿਆਂ ਦੀ ਪਛਾਣ ਕਰਨ ਲਈ ਨੈਤਿਕ ਸਿਫ਼ਤਾਂ ਨੂੰ ਲਾਗੂ ਕਰੋ ਅਤੇ ਉਨ੍ਹਾਂ ਨੂੰ ਰੋਕਣ ਲਈ ਵਰਤੇ ਜਾਣ ਵਾਲੇ ਤਰੀਕਿਆਂ ਦੇ ਨਾਲ ਪੰਜ ਅਨੈਤਿਕ ਅਭਿਆਸਾਂ ਦੀ ਸੂਚੀ ਬਣਾਓ।	CO5	L3
SECTION-C			
7.	Explain in detail various basic requirements to fulfil human aspiration. ਮਾਨਵ ਆਕਾਂਸ਼ਿਆਂ ਦੀ ਪੂਰਤੀ ਕਰਨ ਦੇ ਲਿਏ ਵਿਸ਼ਿਸ਼ਟ ਬੁਨਿਆਦੀ ਆਵਸ਼ਯਕਤਾਵਾਂ ਦੀ ਵਿਸਤਾਰ ਸੇ ਸਮਝਾਓ। ਮਨੁੱਖੀ ਇੱਛਾਵਾਂ ਨੂੰ ਪੂਰਾ ਕਰਨ ਲਈ ਵੱਖ-ਵੱਖ ਬੁਨਿਆਦੀ ਜ਼ਰੂਰਤਾਂ ਬਾਰੇ ਵਿਸਥਾਰ ਵਿੱਚ ਦੱਸੋ।	CO2	L5
8.	Identify the differences between human and animal consciousness, and how 'shiksha' and 'sanskar' help transform a person toward human consciousness. ਮਾਨਵ ਅਤੇ ਪਸ਼ੂ ਚੇਤਨਾ ਦੇ ਭੇਦਾਂ ਦੀ ਪਛਾਣ ਕਰੋ, ਅਤੇ ਕਿਵੇਂ 'ਸਿੱਖਿਆ' ਅਤੇ 'ਸੰਸਕਾਰ' ਇੱਕ ਵਿਅਕਤੀ ਨੂੰ ਮਨੁੱਖੀ ਚੇਤਨਾ ਵੱਲ ਬਦਲਣ ਵਿੱਚ ਮਦਦ ਕਰਦੇ ਹਨ।	CO3	L3
9.	Determine the concept of an undivided society and the universal order and explain how both these can help to create a world family. ਅਭਿਯੋਗਿਤ ਸਮਾਜ ਅਤੇ ਸਾਰ्वੱਮਿਕ ਵਿਵਸਥਾ ਦੀ ਅਵਗਠਨਾ ਦਾ ਨਿਰਧਾਰਨ ਕਰੋ ਅਤੇ ਸਮਝਾਓ ਕਿ ਇਹ ਦੋ ਦੋਨਾਂ ਨੂੰ ਇੱਕ ਵਿਸ਼ਵ ਪਰਿਵਾਰ ਬਣਾਉਣ ਵਿੱਚ ਮਦਦ ਕਰ ਸਕਦੇ ਹਨ।	CO4	L5

	ਇੱਕ ਅਟੁੱਟ ਸਮਾਜ ਅਤੇ ਸਰਬਵਿਆਪੀ ਵਿਵਸਥਾ ਦੀ ਧਾਰਨਾ ਨੂੰ ਨਿਰਧਾਰਤ ਕਰੋ ਅਤੇ ਸਮਝਾਓ ਕਿ ਇਹ ਦੋਨਾਂ ਇੱਕ ਵਿਸ਼ਵ ਪਰਿਵਾਰ ਬਣਾਉਣ ਵਿੱਚ ਕਿਵੇਂ ਮਦਦ ਕਰ ਸਕਦੇ ਹਨ।		
10.	Analyze the universal human order and examine your role in progressing toward it. ਸਾਰਵੱਮਿਕ ਮਾਨਵ ਵਿਵਸਥਾ ਦਾ ਵਿਸ਼ਲੇਸ਼ਣ ਕਰੋ ਅਤੇ ਇਸ ਵਿੱਚ ਆਪਣੀ ਭੂਮਿਕਾ ਦੀ ਜਾਂਚ ਕਰੋ। ਸਰਬਵਿਆਪੀ ਮਨੁੱਖੀ ਵਿਵਸਥਾ ਦਾ ਵਿਸ਼ਲੇਸ਼ਣ ਕਰੋ ਅਤੇ ਇਸ ਵਿੱਚ ਆਪਣੀ ਭੂਮਿਕਾ ਦੀ ਜਾਂਚ ਕਰੋ।	CO5	L4
11.	Explain self-organization and health. Evaluate their role in achieving the harmony in nature. स्व-संगठन और स्वास्थ्य की व्याख्या कीजिए। प्रकृति में सामंजस्य प्राप्त करने में उनकी भूमिका का मूल्यांकन करें। स्ਵ-ਸੰਗਠਨ ਅਤੇ ਸਿਹਤ ਦੀ ਵਿਆਖਿਆ ਕਰੋ। ਕੁਦਰਤ ਵਿੱਚ ਸਦਭਾਵਨਾ ਪ੍ਰਾਪਤ ਕਰਨ ਵਿੱਚ ਉਹਨਾਂ ਦੀ ਭੂਮਿਕਾ ਦਾ ਮੁਲਾਂਕਣ ਕਰੋ।	CO1	L5

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Roll No.

Total No. of Pages: 02

Total No. of Questions: 09

B.Tech (AIML/AIDS/ IOT/CSE-DS), Semester 5th

PROGRAMMING IN PYTHON

Subject Code: BTAIML 501-20

M.Code: 93173/93939/92370/92344

Date of Examination: 04 -12-2025

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is **COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. SECTION-B contains **FIVE** questions carrying **FIVE** marks each and students have to attempt any **FOUR** questions.
3. SECTION C contains **THREE** questions carrying **TEN** marks each and students have to attempt any **TWO** questions.

Q. No.	Question	Course Outcome	Bloom's Level
SECTION-A			
1.	Answer briefly:		
a.	Outline the practical applications of Python in Data Science and Machine Learning.	CO-1	L2
b.	Compare mutable and immutable data types with examples.	CO-1	L2
c.	Show the use of the input() function in Python.	CO-2	L1
d.	Demonstrate the syntax of a nested for loop in Python.	CO-2	L2
e.	Show Python code for extracting all digits from a given a string "Python123is45fun".	CO-3	L1
f.	Explain the term lambda function with a basic example.	CO-3	L2
g.	Define exception handling.	CO-4	L1
h.	Compare text mode and binary mode in file handling.	CO-4	L2
i.	Explain the role of self in designing Python classes.	CO-5	L2
j.	Show Python code to display the current system date and time.	CO-5	L2
SECTION-B			
2.	Develop a Python program that determines whether an integer is even, odd, zero or negative using operators and conditional statements.	CO-1	L3
3.	Analyse <i>if</i> , <i>if-else</i> , and <i>if-elif-else</i> statements in Python by supporting your explanation with code illustrations.	CO-2	L4
4.	Build a Python program to implement a simple calculator using functions for addition, subtraction, multiplication, and division. Identify how function decomposition helps in code modularity.	CO-3	L3

5.	Explain the concept of Object-Oriented Programming (OOP) by writing code in Python with focus on classes and objects. Determine how attributes and methods are defined, accessed and modified.	CO-4	L5
6.	Explain the concept of data compression in Python. Examine the commonly used modules for compression and decompression of files.	CO-5	L5
SECTION-C			
7.	Analyse Python operators and expressions by building code for computing the total bill amount for the given scenario: An electricity board charges: ₹5 per unit for the first 100 units, ₹8 per unit for the next 100 units and ₹10 per unit for units above 200. Print the total bill amount for a household consuming 275 units.	CO-1	L4
8.	Identify the difference between pass by value and pass by reference in Python by writing a program that modifies a List and Tuple inside a function.	CO-3	L3
9.	Compare the difference between built-in exceptions and user-defined exceptions in Python. Write examples for both and explain situations where user-defined exceptions are preferable.	CO-4	L5

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5.	Compare and contrast 'learning from examples' with 'learning by taking advice' with its advantages and disadvantages.	CO-4	L4
6.	Critically access the limitations of using expert system shells in complex and dynamic domains.	CO-5	L5
SECTION-C			
7.	Analyze the components of an intelligent agent and their interactions in a chess-playing AI.	CO-1	L4
8.	Evaluate the challenges of computing probabilities in large state spaces.	CO-3	L4
9.	Determine the historical significance and modern relevance of Winston's Learning Program. From a modern data-driven perspective, criticize the major weaknesses of Winston's symbolic approach.	CO-4	L5

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Roll No.

Total No. of Pages: 02

Total No. of Questions: 09

B.Tech (CSE-DS/AIDS/AIML), Semester-5th
STATISTICAL COMPUTING TECHNIQUES USING R

Subject Code: BTES-501-20

M.Code: 92341/93936/93170

Date of Examination: 01-12-2025

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

Q. No.	Question	Course Outcome	Bloom's Level
SECTION-A			
1.	Answer briefly:		
a.	What are vectors in R programming?	CO-1	L1
b.	Classify the types of data used in R programming.	CO-1	L2
c.	Show how to assign values to a variable in R with an example.	CO-2	L1
d.	Explain the role of read.csv() function.	CO-2	L2
e.	Define random number generation in statistical computing.	CO-3	L1
f.	Outline the role of scatterplots in identifying data relationships.	CO-3	L2
g.	Explain the purpose of using Bootstrap method in R.	CO-4	L1
h.	Demonstrate with an example how glm() function is used in R.	CO-4	L2
i.	Define outliers in the context of Exploratory Data Analysis.	CO-5	L1
j.	Compare S3 and Reference Classes in terms of object mutability.	CO-5	L2
SECTION-B			
2.	Analyze basic R functions with example.	CO-1	L4
3.	Solve a problem using conditional statements "if a number is positive".	CO-2	L3
4.	The marks of 5 students in a test are: 20, 25, 30, 35, and 40. After calculating the variance and standard deviation, Explain whether the standard deviation reveals the uniformity or variation in students' performance. Explain whether the data indicates c.	CO-3	L5
5.	Compare Regularization and Tree based modelling methods in R.	CO-4	L4

6.	Determine the use of the dplyr package to work with large dataset.	CO-5	L5
SECTION-C			
7.	Interpret the significance of R as a tool for handling large datasets in statistical analysis.	CO-1	L5
8.	Identify random number generation in R. Construct with R code how to generate random numbers from Uniform, Normal, Poisson distributions and represent them graphically using histograms.	CO-3	L3
9.	Determine the Bootstrap method to estimate standard error in R.	CO-4	L5

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Roll No.

Total No. of Pages: 02

Total No. of Questions: 09

B.Tech (CSE/AIDS/AIML/IOT/CSE-DS), Semester 5th
FORMAL LANGUAGES AND AUTOMATA THEORY

Subject Code: BTCS502-18

M.Code: 78321/93172/93938/92360/92343

Date of Examination: 17-11-2025

Time: 3 Hrs.

Max. Marks: 60

INSTRUCTIONS TO CANDIDATES:

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

Q. No.	Question	Course Outcome	Bloom's Level
SECTION-A			
1.	Answer briefly:		
a.	Recall about the acceptability of a string using DFA.	CO-1	L1
b.	Classify four tuples of a grammar G with the help of an example.	CO-1	L2
c.	Recall the difference between DFA and NFA. Give an example.	CO-2	L1
d.	Outline the steps for minimizing a finite automaton and summarize why minimization is required.	CO-2	L2
e.	When is a CFG said to be in GNF?	CO-3	L1
f.	Consider the grammar $S \rightarrow aAS \mid a$ $A \rightarrow SbA \mid SS \mid ba$ Show how the string aabb _a a is generated and illustrate its derivation tree.	CO-3	L2
g.	Explain the importance of LBAs in formal language theory.	CO-4	L2
h.	Outline the closure properties of Turing-recognizable languages.	CO-5	L2
i.	Compare SAT and 3-SAT and prove that 3-SAT is NP-complete.	CO-6	L2
j.	State Rice's Theorem.	CO-6	L1
SECTION-B			
2.	Identify the language $L = \{a^n b^m c^m d^m \mid n \geq 1, m \geq 1\}$ and categorize its structure by analyzing an appropriate grammar representation.	CO-1	L3
3.	Explain about Arden's theorem, for constructing the RE from given FA.	CO-2	L4
4.	Consider grammar with productions $E \rightarrow I$ $E \rightarrow E + E$ $E \rightarrow E * E$ $E \rightarrow (E)$ $I \rightarrow \varepsilon \mid 0 \mid 1 \mid \dots \mid 9$ Determine whether the above grammar is ambiguous for the given string $\omega = 3*2+5$	CO-3	L5

5.	Construct a LBA which can accept $L = \{ww^R \mid w \text{ belongs to } \{0,1\}^*\}$	CO-4	L6
6.	Appraise the importance of polynomial reductions in classifying problems.	CO-6	L3
SECTION-C			
7.	Identify the automata machines that accept different languages according to the Chomsky hierarchy.	CO-1	L3
8.	What is PDA? Identify how does a PDA handle the recognition of context free languages and what role does its stack play in this process.	CO-4	L3
9.	Evaluate a Turing Machine that recognizes all strings having equal numbers of 0's and 1's and conclude its correctness.	CO-5	L5

Note: Disclosure of identity by writing mobile number or making of passing request on any paper of Answer Sheet will lead to UMC against the student.