Department of CSE (AI&ML)

B.Tech mid Question Bank (R22 Regulation)

Academic Year: 2025 - 2026

Subject Name: AUTOMATA THEORY AND COMPILER DESIGN (22AM401PC)

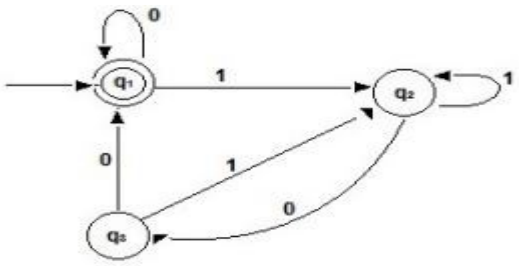
Faculty Name: G.Sravan Rao

PART-A

Q.No	Questions	BL	CO	Unit No
1	Define DFA.	L1	CO1	I
2	Define NFA.	L1	CO1	I
3	Write DFA for the language over {0,1} : set of all strings that contain 100 as substring.	L2	CO1	I
4	Design NFA to accept set of all strings over {0,1} does not contain 3 consecutive zeros.	L2	CO1	I
5	Define Kleene Closure and Positive Closure.	L1	CO2	II
6	For the Grammar {S → AS | a , A → SbA | SS | ba} construct Left most derivation for the string aabbaaa?	L2	CO2	II
7	Perform right most derivation for the string aaabbabbba with respect to the Grammar S → aB | bA , A →a| aS | bAA , B→b | bS | aBB	L2	CO2	II
8	What is meant by name equivalence?	L1	CO2	II
9	Give the formal definition of PDA.	L1	CO3	III
10	Explain the working of a PDA with stack operations (push and pop).	L2	CO3	III
18	What is a DAG? Mention its applications	L1	CO5	V
19	What are the various types of intermediate code representation?	L2	CO5	V
20	Construct a DAG for the expression a=b*-c + b*-c.	L2	CO5	V

PART-B

1	Design a DFA to accept odd number of a's and even number of b's, where ∑= {a,b}.	L3	CO1	I

2	Give NFA to recognize strings consisting of a, b such that strings contain sub string 'ab' at the end.	L2	CO1	I
3	Design NFA accepting string with a's and b's such that string containing two consecutive a's or two consecutive b's.	L3	CO1	I
4	Construct NFA with ε which accepts a language consisting the strings of any no. of 0's followed by any no. of 1's followed by any no. of 2's. And also convert into NFA without ε.	L4	CO1	I
5	Convert the following NFA with ε to equivalent DFA. **a** | **b** | **ε** **→P** | **Φ** | **P** | **Q** **Q** | **Q** | **Φ** | **R** **Ⓡ** | **Q** | **P** | **Φ**	L2	CO1	I
6	Construct the NFA with equivalent DFA accepting the following language, set of all strings over ∑ = {a,b} starting with the prefix "ab"	L4	CO1	I
7	Define Ambiguous Grammar? Check whether the grammar S →aAB, A →bC|cd, C→cd, B→c|d Is Ambiguous or not?	L4	CO2	II
8	Construct a Left most Derivation for the string 0011000 using the grammar S→A0S|0|SS, A→S1A|10.	L3	CO2	II
9	Discuss the Pumping lemma for Context Free Languages concept with example $\{a^n b^n c^n$ where $n>0\}$	L2	CO2	II
10	Convert the following Context Free Grammar (CFG) to Chomsky Normal Form (CNF) S→AaB | aB A→€ B→bbA | €	L3	CO2	II
11	Construct regular expression for the following finite automata:  	L3	CO2	II

12	Find the GNF equivalent to the following $A \rightarrow BB \mid a$ $B \rightarrow AA \mid b$	L4	CO2	II
13	Design a push down Automata for the language $L= \{WCW^R \mid W \text{ is in } (0+1)^*\}$.	L3	CO3	III
14	Explain the components of a Pushdown Automaton and the purpose of each component.	L2	CO3	III
15	Design Push down Automata for the language $L = \{a^n b^{2n} \mid n \geq 1\}$	L3	CO3	III
16	Describe the working principle of a PDA with a suitable example language.	L2	CO3	III

CMR TECHNICAL CAMPUS

B. Tech Mid Question Bank (R22 Regulation)

Academic Year: 2025-26 Semester: IV

Subject Name: DBMS (22CS402PC)

Faculty Name: Mr M Madhusudhan, Dr V Malsoru, Mr B Ramji

PART-A

Q. No	Questions	BL	CO	Unit No
1	Relate the terms Database and Database management Systems.	BL4	CO1	I
2	List the advantages of DBMS.	BL1	CO1	I
3	Define instances and Schemas of database.	BL1	CO1	I
4	Give an example for total participation and partial participation.	BL2	CO1	I
5	How to represent the strong Entity set and Weak entity set in ER-Model?	BL2	CO1	I
6	Draw the diagram for levels of abstraction and explain.	BL3	CO1	I
7	List the integrity constraints in relational model.	BL2	CO2	II
8	Give examples of selection and projection operations in relational algebra.	BL1	CO2	II
9	What is Querying relational data? Justify with one example.	BL1	CO2	II
10	Illustrate division Operation in relational algebra.	BL3	CO2	II
11	Write short notes on altering tables and views.	BL6	CO2	II
12	Explain Domain Relational Calculus.	BL2	CO2	II
13	Give examples for UNION, INTERSECT and EXCEPT Clauses.	BL1	CO3	III
14	Define Aggregate Operators.	BL1	CO3	III
15	Demonstrate how to add a NOT NULL Column to a Table.	BL4	CO3	III

PART-B

Q. No	Questions	BL	CO	Unit No
1	Compare and Contrast File Systems with Database Systems.	BL2	CO1	I
2	Discuss about different types of Data Models.	BL2	CO1	I
3	Write about various database system applications in detail	BL2	CO1	I
4	Draw and explain Data Abstraction and Data Independence in detail.	BL4	CO1	I
5	Describe the Structure of DBMS.	BL2	CO1	I
6	What is ER model? Explain the basic symbols used for entities, attributes and relationships.	BL3	CO1	I
7	What is an attribute? Explain various types of attributes with examples.	BL1	CO1	I
8	What is Key? Distinguish between Super key, Candidate key, Primary Key, Foreign Key for a relation with examples.	BL1	CO1	I
9	How to represent generalization, specialization and aggregation using ER Diagrams. Explain with suitable example.	BL4	CO1	I
10	Develop an E -R Diagram for Banking enterprise system	BL6	CO1	I
11	Illustrate about integrity constraints with suitable examples	BL3	CO2	II

12	How to alter, destroy tables and views? Give example queries	BL2	CO2	II
13	Explain Views and its advantages and Disadvantages.	BL2	CO2	II
14	Elaborate on logical database design with examples.	BL2	CO2	II
15	Explain the fundamental operations in relational algebra with examples.	BL2	CO2	II
16	Explain Tuple relational calculus.	BL2	CO2	II
17	Discuss briefly about Domain relational calculus with suitable example.	BL2	CO2	II
18	Explain Enforcing integrity Constraints over a Relation.	BL2	CO2	II
19	Consider the following relations Sailors (sid, sname, rating, age) Boats (bid, bname, color) Reserves (sid, bid, day) Write the statements in Relational Algebra, Relational Calculus, Domain Relational Calculus and SQL for the following questions. a) Find the names of sailors who have reserved a Red boat. b) Find the names of sailors who have reserved at least one boat. c) Find the names of sailors who have reserved a Red and a Green boat. d) Find the names of sailors who have reserved a Red or a White boat. e) Find the names of sailors who have reserved all boats	BL6	CO2	II
20	Consider the following relational schema. *Student (id, name, age, city)* Retrieve the names of all students. Display the id's of all students who are having age above 20. Display the names and id's of all students who are having age between 20 and 25 and lives in Hyderabad city.	BL6	CO3	III
21	Discuss about Complex integrity constraints in SQL.	BL2	CO3	III
22	Discuss Basic SQL Queries of DDL & DML Commands.	BL2	CO3	III

Department of CSE (AI&ML)

B.Tech Mid Question Bank (R22 Regulation)

Academic Year: 2025-26 **Semesters: IV**

Subject Name: Introduction to Artificial Intelligence [22AM404PC]

Faculty Name: Dr.Mahesh Kotha

PART-A

Q.No	Questions	BL	CO	Unit No
1	What is AI?	L1	CO1	1
2	List the applications of AI.	L1	CO1	1
3	What is meant by agent perception?	L1	CO1	1
4	Give a brief note on Intelligent systems	L1	CO1	1
5	What is optimal decision?	L1	CO2	2
6	What is CSP's?	L1	CO2	2
7	Define prepositional logic.	L1	CO2	2
8	Define Horn clauses.	L1	CO2	2
9	What is first order logic?	L1	CO3	3
10	What are the rules of inference ?	L1	CO3	3

PART-B

Q.No	Questions	BL	CO	Unit No
1	Explain different types of informed search algorithms .	L2	CO1	1
2	Discuss different types of uninformed search algorithms with example	L3	CO1	1
3	Explain model and utility based agent with diagram	L2	CO1	1
4	List and Explain the applications of AI	L2	CO1	1
5	Explain Hill climbing search Algorithm with neat sketch.	L3	CO1	1
6	Explain about the types of agents in AI with neat diagrams	L3	CO1	1
7	Explain propositional logic.	L2	CO2	2
8	Discuss agents based on propositional logic.	L2	CO2	2
9	List the inference rules along with suitable examples for first order logic	L3	CO2	2

10	Explain Min Max algorithm with neat diagram.	L3	CO2	2
11	Explain alpha beta pruning algorithm with neat diagram.	L3	CO2	2
12	Explain about the knowledge based agent with neat diagram.	L3	CO2	2
13	Discuss syntax and semantics of First order logic	L2	CO3	3
14	Explain about Propositional vs First order Inference	L3	CO3	3
15	Explain the knowledge engineering of first-order logic	L2	CO3	3
16	Explain about the backward and forward chaining with example	L3	CO3	3

DEPARTMENT OF CSE(AI&ML)

B.TECH IV- SEMESTER

B. Tech Mid Question Bank (R22 Regulation)

Name of the Course: Mathematical and Statistical Foundations

Course Code: 22MA403BS

Faculty Name: Dr.M.Swetha

Academic Year: 2025-2026

Semester : IV

PART-A

<table>
<tr><th>Q. No</th><th>Questions</th><th>BL</th><th>CO</th><th>Unit No</th></tr>
<tr><td>1</td><td>If x is a discrete Random variable , Show that E(a x +b) = a E (x) +b</td><td>L1</td><td>CO1</td><td>I</td></tr>
<tr><td>2</td><td>Define random variable and types of random variable with example</td><td>L1</td><td>CO1</td><td>I</td></tr>
<tr><td>3</td><td>If x is a discrete Random variable , Show that $V(aX+b)=a^2V(X)$</td><td>L1</td><td>CO1</td><td>I</td></tr>
<tr><td>4</td><td>If $f(x)=kx^2, 0<x<3$ is probability density function.Find k</td><td>L1</td><td>CO1</td><td>I</td></tr>
<tr><td>5</td><td>If X is a continuous Random variable and K is a constant.Show that $Var(KX)=K^2Var(X)$</td><td>L1</td><td>CO1</td><td>I</td></tr>
<tr><td>6</td><td>Define covariance of random variables.</td><td>L2</td><td>CO1</td><td>I</td></tr>
<tr><td>7</td><td>If X & Y are independent random variables with means 2,3 then find the mean of the random variable Z=2X-5Y</td><td>L1</td><td>C01</td><td>I</td></tr>
<tr><td>8</td><td>If X is a discrete random variable having probability distribution , find $p(x\leq 2)$ if
<table>
<tr><td>X=x</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>P(X=x)</td><td>a</td><td>2a</td><td>a</td></tr>
</table></td><td>L1</td><td>CO1</td><td>Ii</td></tr>
<tr><td>9</td><td>Explain binomial distribution , Poisson distribution</td><td>L2</td><td>CO2</td><td>II</td></tr>
</table>

10	Determine the binomial distribution for which the mean is 4 and variance 3.find p(X ≥ 1).	L1	CO2	II
11	Find the value of n and p of the binomial distribution for which mean is 4 and variance3	L2	CO2	II
12	If the probability of a defective bolt is 0.2 ,find mean for the distribution of bolts in a total of 400.	L1	CO2	II
13	Derive the mean of Poisson distribution	L1	CO2	II
14	Classify properties of normal distribution	L1	CO2	II
15	Write applications of Normal distribution?	L1	CO2	II
16	Define population, sample, parameter & statistics.	L1	CO3	III
17	(i)Define small sample, large sample. (ii) What is the value of the correction factor if n=5, N=200.	L1	CO3	III
18	How many different samples of size two can be chosen, from a finite population of size 25.	L1	C03	III

PART-B

Q .No	Questions	BL	CO	Unit No
1	A random variable X has the following probability function: X: 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 P(x): 0 | K | 2k | 2k | 3k | k^2 | $2k^2$ | $7k^2$ +k Evaluate (i) k (ii) P(X<6),P(X≥6), P(0<X<5) and p(0≤ X≤4) (iii) mean (iv) variance(v)Determine the Distribution Function of X	L5	CO1	I

2	A random variable X has the following probability function: X | 0 | 1 | 2 | 3 | 4 | 5 | 6 P(X) | k | 3k | 5k | 7k | 9k | 11k | 13k (i) Determine k,(ii) Evaluate P(X<4), (ii) P(X≥5),P(3<X≤6), (iii) what will be the minimum value of k so that P(X≤2) ¿ 0.3, (iv) Determine the Distribution function of X, (v) Mean ,(vi) Variance.	L5	CO1	I
3	Let X denote the maximum of the two numbers that appear when a pair of fair dice is thrown once. Determine the (i) Discrete probability distribution (ii) Expectation (iii) variance.	L5	CO1	I
4	A sample of 4 items is selected at random from a box containing 12 items of which 5 are defective. Find the expected number E of defective items.	L1	CO1	I
5	A random variable X is defined as the sum of the numbers on the faces when two dice are thrown. Find the mean and variance of X.	L1	CO1	I
6	A fair die is tossed. Let the Random Variable X denote the twice the number appearing on the die.(i) Write the Probability distribution of X.(ii) The mean (iii) The Variance.	L1	CO1	I
7	If a random variable has the probability density function f(x) = $\begin{cases} k(x^2-1), -1 \le x \le 3. \\ 0, elsewhere \end{cases}$ Find value of k and p($\frac{1}{2} \le x \le \frac{5}{2}$).	L2	CO1	I
8	Suppose a continuous random variable x has the probability density f(x) = kx^2e^{-x}, for x>0 , Find (i) K (ii) Mean (iii) variance.	L2	CO1	I
9	If a continuous random variable has the probability density function f(x)=$\begin{cases} kxe^{-\lambda x}; x \ge 0; \lambda ¿ 0 ; \\ 0 \quad ; otherwise \end{cases}$ Determine (i) k (ii) Mean (iii) Variance	L2	CO1	I

<table>
<tr><td>10</td><td>Probability density function of random variable x is f(x) $=\begin{cases}\frac{1}{2}sinx, for\ 0<x<\pi \\ 0, for x\le 0\end{cases}$
Evaluate mean, mode and median of the distribution and

Find the probability between 0 and $\frac{\pi}{2}$.</td><td>L5</td><td>CO1</td><td>I</td></tr>
<tr><td>11</td><td>Is the function defined a density function f(x)=$\begin{cases}e^{-x}, x\ge 0 \\ 0, x<0\end{cases}$
If so determine the probability that the variate this density will fall in the interval (1,2)?find the cumulative probability F(2)</td><td>L5</td><td>CO1</td><td>I</td></tr>
<tr><td>12</td><td>The probability of a defective bolt is 1/8, find (i) the mean (ii) The variance for the distribution of defective bolts of 640.</td><td>L1</td><td>CO2</td><td>II</td></tr>
<tr><td>13</td><td>Out of 800 families with 5 children each,how many would you expect to have (i)3 boys (ii) 5 girls (iii)either 2 or 3 boys (iv)atleast one boy? Assume equal probability for Boys and Girls.</td><td>L1</td><td>C02</td><td>II</td></tr>
<tr><td>14</td><td>20 % of items produced from a factory are defective. Evaluate the probability that in a sample of 5 chooser at random (i) none is defective (ii) one is defective
(iii) P(1<x<4).</td><td>L5</td><td>CO2</td><td>II</td></tr>
<tr><td>15</td><td>Derive the mean and variance of a Binomial distribution.</td><td>L6</td><td>CO2</td><td>II</td></tr>
<tr><td>16</td><td>The probabilities of a man hitting a target is 1/3 .If he fires 6 times, find the probability that he fires (i) at the most 5 times (ii) exactly once (iii) At least two times.</td><td>L1</td><td>CO2</td><td>II</td></tr>
<tr><td>17</td><td>The mean of B.D is 3 and variance is $\frac{9}{4}$. (i) Find the value of n (ii) P(X$\ge$7)$(iii)P(1\le x\le 6)$</td><td>L1</td><td>CO2</td><td>II</td></tr>
<tr><td>18</td><td>Determine Poisson frequency distribution for the following data
<table><tr><td>x</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>f(x)</td><td>109</td><td>65</td><td>22</td><td>3</td><td>1</td></tr></table></td><td>L5</td><td>CO2</td><td>II</td></tr>
<tr><td>19</td><td>The average number of phone calls /minute coming into a switch board between 2 p.m. and 4.p.m is 2.5.Determine the probability that during one particular minute there will be
(i) 4 or fewer (ii) more than 6 calls.</td><td>L5</td><td>CO2</td><td>II</td></tr>
</table>

20	If x is a poisson variant such that 3 P(x=4) = $\frac{1}{2}$ P(x=2) +P(x=0) then find (i) mean (ii) P(x≤ 2).	L2	CO2	II
21	In a normal distribution 40% of the items are under 30 and 15% are over 60. Find the mean and variance of the distribution	L1	CO2	II
22	If X is a normal variate with mean 30 and standard deviation 5. Find the probabilities that i) 26<X<40 ii) X>45	L1	CO2	II
23	If the masses of 300 students are normally distributed with mean 68 kgs and standard deviation 3 kgs. How many students have masses (i) greater than 72 kg (ii) less than or equal to 64 kg (iii) between 65 and 71 kg inclusive.	L3	CO2	II
24	A population consist of 1,2,3,4,5,6 . Consider all samples of size 2 which can be drawn without replacement . (a)Find mean , standard deviation of the population; (b) The mean of sampling distribution of means; (c) The standard deviation of sampling distribution of means.	L1	CO3	III
25	If the population is 2,3,6,8,11. Consider all samples of size 2 which can be drawn with replacement . (a)Find mean , standard deviation of the population. (b) The mean of sampling distribution of means. (c) The standard deviation of sampling distribution of means.	L1	CO3	III
26	If the population is 3,6,9,15,27. Consider all samples of size 2 which can be drawn with replacement . (a)Find mean , standard deviation of the population. (b) The mean of sampling distribution of means. (c) The standard deviation of sampling distribution of means.	L1	CO3	III
27	A population consist of 5,10,14,18,13,24 . Consider all samples of size 2 which can be drawn without replacement . (a)Find mean , standard deviation of the population; (b) The mean of sampling distribution of means; (c) The standard deviation of sampling distribution of means.	L1	CO3	III

Department of CSE [Artificial Intelligence & Machine Learning]

B.Tech Mid Question Bank (R22 Regulation)

Academic Year:2025-26 Semester: IV

Subject Name: Object Oriented Programming through Java
Faculty Name: P.Vishnu, G.Pavan, K.Madhu, S.Kiran

PART-A

Q.No	Questions	BL	CO	Unit No
1	Define the basic characteristics of object-oriented programming	L1	CO1	I
2	Explain the scope and lifetime of variables in Java	L2	CO1	I
3	What is a constructor?	L1	CO1	I
4	Explain the need for abstract classes.	L2	CO1	I
5	What is the purpose of CLASSPATH?	L1	CO2	II
6	Define an interface in Java.	L1	CO2	II
7	Explain reading console input using Scanner class.	L2	CO2	II
8	Explain the use of auto boxing in java?	L2	CO2	II
9	Define exception in Java	L1	CO3	III
10	Explain about built in exceptions?	L2	CO3	III

PART-B

Q.No	Questions	BL	CO	Unit No
1	Explain Java buzzwords and features.	L2	CO1	I
2	Explain different types of operators in Java with examples	L3	CO1	I
3	Discuss how this, super, and final keywords are used in Java inheritance with suitable examples	L3	CO1	I
4	Compare ad-hoc polymorphism and pure polymorphism with examples.	L4	CO1	I
5	Discuss various control statements in Java with examples.	L2	CO1	I
6	What is inheritance? Explain different types of inheritances with suitable programs	L3	CO1	I
7	Describe the process of importing and accessing a package with suitable examples	L2	CO2	II

8	How to design and implement an interface in Java? Explain with an example.	L3	CO2	II
9	Distinguish between Byte Stream classes and Character Stream classes.	L4	CO2	II
10	Evaluate the use of Random Access fileoperations with example	L5	CO2	II
11	Describe the process of importing and accessing a package with an example.	L2	CO2	II
12	Briefly explain Byte Streams and Character Streams with suitable examples.	L3	CO2	II
13	Explain how try, catch, and finally blocks work with an example.	L2	CO3	III
14	Explain the various in-build exception handling classes in java	L3	CO3	III
15	Differentiate between Checked and UnChecked Exceptions with examples.	L3	CO3	III
16	Write a Java program that demonstrates how certain exception types are not allowed to be thrown.	L4	CO3	III