Subject Code:22MA403BS	SET-II	HT NO:			7	R					

CMR TECHNICAL CAMPUS

UGC AUTONOMOUS

B. Tech. IV Sem Regular/Supply End Examinations, June-2025

Mathematical and Statistical Foundations

Common to CSM, AIML

Time: 3 Hours **Max. Marks: 60**

Note

i. This Question paper contains Part- A and Part- B.
ii. All the Questions in Part A are to be answered compulsorily.
iii. All Questions from Part B are to be answered with internal choice among them.

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PART-A

10 X 01 = 10 Marks

			Marks	CO	BL
1.	a	Define Discrete Random variable.	1	CO1	L1
	b	Define classical definition of Probability.	1	CO1	L1
	c	Define Poisson distribution.	1	CO2	L1
	d	Define Binomial Distribution.	1	CO2	L1
	e	Define the term 'statistic'.	1	CO3	L1
	f	State central limit theorem.	1	CO3	L1
	g	If the maximum error with 99% confidence is 0.25 and the sample size is 400 then Find the S.D	1	CO4	L1
	h	Define regression.	1	CO4	L1
	i	Explain about Type-I and Type-II errors.	1	CO5	L1
	j	Write any three properties of F-distribution	1	CO5	L1

PART- B

5 X 10 = 50 Marks

			Marks	CO	BL
2.		A random variable x has the following probability distribution.	10	CO1	L5

x	0	1	2	3	4	5	6
P(X)	k	3k	5k	7k	9k	11k	13k

i) Determine K (ii) Evaluate $P(X < 4)$, $P(X \geq 5)$, $P(3 < X \leq 6)$ (iii) what will be the minimum value of K so that $P(X \leq 2) > 0.3$ (iv) Determine the distribution function of X (v) Mean (vi) Variance.

OR

3		A continuous random variable has the probability density function $f(x) = \begin{cases} kxe^{-\lambda x}; & x \geq 0;\ \lambda > 0; \\ 0; & otherwise \end{cases}$ Determine (i) k (ii) Mean (iii) Variance.	10	CO1	L5
4	a	The mean of B.D is 3 and variance is $\frac{9}{4}$. Find the value of n (ii) $P(X \geq 7)$ (iii) $P(1 \leq X \leq 6)$.	5	CO2	L3
	b	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	5	CO2	L3

OR

5		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.	10	CO2	L3
6		Samples of size 2 are taken from the population 3,6,9,15,27. Which can be drawn with replacement? Find i).The mean of the population. ii).The standard deviation of the population. iii).The mean of the sampling distribution of means. iv).The standard deviation of the sampling distribution of means	10	CO3	L3

OR

7	a	What is the effect on standard error if a sample is taken from an infinite population of size increased from 400 to 900?	5	CO3	L3
	b	What is the population correction factor if population and sample sizes are 6 and 4 respectively?	5	CO3	L3
8	a	What is the maximum error one can expect to make with probability 0.9, when using the mean of a random sample of size n = 64 to estimate the mean of a population with σ^2 = 2.56?	5	CO4	L3
	b	A random sample of 10 ball bearings produced by a company have a mean diameter of 0.496 cm with a standard deviation of 0.002 cm. Find the maximum error estimate E and 95% confidence interval for the actual mean diameter of all ball bearings produced by the company assuming that the sampling is from a normal population.	5	CO4	L3

OR

9		Find the regression line y on x for the following data	10	CO4	L3

X	0	5	10	15	20	25
Y	12	15	17	22	24	30

10	A company claims that the light bulbs are superior to those of its main competitor. If a study showed that a sample of $n_1 = 40$ of its bulbs has a mean lifetime of 647 hrs of continuous use with a standard deviation of 27 hrs, while a sample of $n_2 = 40$ bulbs made by the competitor had a mean lifetime of 638 hrs of continuous use with a standard deviation of 31 hrs. Does this support the claim at 5% level of significance?	10	CO5	L5
	OR			
11	The nicotine content in milligrams of the samples of tobacco was found as follows.	10	CO5	L5

Sample A	24	27	26	21	25	-
Sample B	27	30	28	31	24	36

Can it be said that the two samples come from normal population with the same mean.

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Subject Code: 22AM401PC	SET-II	HT NO:			7	R					

CMR TECHNICAL CAMPUS

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B. Tech. IV Sem Regular/Supply End Examinations, June-2025

Automata Theory and Compiler Design

Common to CSM, AIML

Time: 3 Hours **Max. Marks: 60**

Note

i. This Question paper contains Part- A and Part- B.
ii. All the Questions in Part A are to be answered compulsorily.
iii. All Questions from Part B are to be answered with internal choice among them.

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PART-A

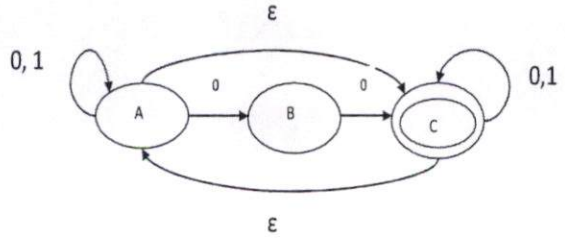
10 X 01 = 10 Marks

			Marks	CO	BL
1.	a	What is Finite Automata? What are the elements of FA?	1	CO1	1
	b	Design a DFA which accepts all strings of 1's and 0's in which the numbers of 0's are even and 1's are even?	1	CO1	3
	c	Find the regular expression representing the set of all strings over {a, b} in which there are at Least two occurrences of 'b' between any two occurrences of 'a'?	1	CO2	3
	d	State pumping lemma.	1	CO2	2
	e	Which one is powerful among DPDA and NPDA? And why?	1	CO3	2
	f	Differentiate between Recursive and REL?	1	CO3	2
	g	List the phases of compiler.	1	CO4	1
	h	Discuss top-down parsing.	1	CO4	2
	i	Give the three-address code for the expression x = (a+b) * (e-(d+f)).	1	CO5	3
	j	Define L-attributed definition.	1	CO5	2

PART- B

5 X 10 = 50 Marks

			Marks	CO	BL
2.		Construct DFA for a given NFA with E-moves as shown below figure.	10	CO1	3

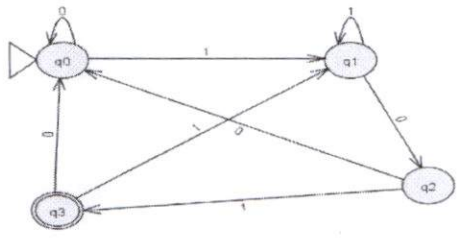


OR

3		Design DFA accepting the language whose binary interpretation i is divisible by 5 over the alphabet {0, 1}?	10	CO1	3
4	a	Find the regular expression for the corresponding finite	5	CO2	4

285

automata given in the following Figure



	b	Construct NFA with Ɛ-moves for the regular expression (Show Intermediate Steps Also): (0+1)*(01+110)*	5	CO2	3
		OR			
5	a	Find LMD, RMD and derivation tree for string 00110101 for the grammar below. Also, check whether the grammar is ambiguous or not. S →0B | 1A A →0| 0S | 1AA B →1 | 1S | 0BB	8	CO2	4
	b	Explain the closure properties CFL.	2	CO2	2
6	a	Construct the PDA for the Language L= {$a^p b^q c^r$ | p, q, r >1 and p +q=r}	8	CO3	4
	b	Discuss the properties of recursive languages.	2	CO3	2
		OR			
7		Construct Turing Machine for reversing of a given binary string on the input tape with an example.	10	CO3	3
8	a	Consider the following grammar: E →TE' E'→ +E | ε T → FT' T'→ T | ε F → PF' F'→*F'| ε P → (E) | a | b | ε i. Compute FIRST and FOLLOW for each non-terminal of above grammar. ii. Show that the grammar is LL (1).	7	CO4	4
	b	Explain working of predictive parser.	3	CO4	2
		OR			
9		Construct SLR parsing table for given Grammar: S→CC C→ cC C→ d	10	CO4	3
10	a	Discuss about Syntax Directed Translation with example.	4	CO5	2
	b	Explain about bottom-up evaluation of S-Attributed Definition with an example.	6	CO5	2
		OR			
11	a	Discuss and analyze about all the allocation strategies in runtime storage environment.	6	CO5	4
	b	Give translation scheme for generation of Three address code for Boolean expressions?	4	CO5	3

Subject Code: 22AM404PC	SET-	HT NO:			7	R					

CMR TECHNICAL CAMPUS

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B. Tech. IV Sem Regular/Supply End Examinations, June-2025

Introduction to Artificial Intelligence

Common to CSM,AIML

Time: 3 Hours **Max. Marks: 60**

Note

i. This Question paper contains Part- A and Part- B.
ii. All the Questions in Part A are to be answered compulsorily.
iii. All Questions from Part B are to be answered with internal choice among them.

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PART-A

10 X 01 = 10 Marks

			Marks	CO	BL
1.	a	Define a problem-solving agent	01	CO1	L1
	b	How does local search differ from global search in continuous spaces?	01	CO1	L2
	c	What are constraint satisfaction problems (CSPs)?	01	CO2	L1
	d	How does Alpha-Beta Pruning improve search efficiency?	01	CO2	L2
	e	What is ontological engineering?	01	CO3	L1
	f	Describe the process of forward chaining in first-order logic.	01	CO3	L2
	g	What is the analysis of planning approaches?	01	CO4	L1
	h	Describe the concept of hierarchical planning.	01	CO4	L2
	i	What does it mean to act under uncertainty in AI?	01	CO5	L1
	j	How are conditional distributions represented efficiently in AI?	01	CO5	L2

PART- B

5 X 10 = 50 Marks

			Marks	CO	BL
2.	a	Discuss the differences between breadth-first search and depth-first search with examples.	06	CO1	L4
	b	Illustrate the process of simulated annealing search with an example	04	CO1	L3
		OR			
3	a	Explain the hill-climbing search algorithm with an example	05	CO1	L4
	b	Compare and contrast local search and global search strategies	05	CO1	L4
4	a	Discuss how Alpha-Beta pruning optimizes the decision-making process in games.	07	CO2	L4
	b	Explain the concept of knowledge-based agents with examples	03	CO2	L2
		OR			
5	a	Illustrate the process of backtracking search in CSPs with an	04	CO2	L3

Subject Code: 22AM404PC	SET-	HT NO:			7	R					

		example			
	b	Discuss the process of propositional theorem proving using resolution	06	CO2	L3
6	a	Compare forward chaining and backward chaining in first-order logic	05	CO3	L4
	b	Discuss the process of resolution in first-order logic and its importance	05	CO3	L3
		OR			
7	a	Discuss the role of ontological engineering in knowledge representation.	03	CO3	L2
	b	Critically evaluate the advantages and limitations of using First-Order Logic in knowledge representation	07	CO3	L5
8	a	Explain the use of planning graphs in classical planning.	05	CO4	L3
	b	Analyze the effectiveness of different algorithms for planning with state-space search.	05	CO4	L4
		OR			
9	a	Describe the concept of hierarchical planning and its applications .	04	CO4	L2
	b	Analyze the benefits and limitations of planning graphs in AI.	06	CO4	L4
10	a	Discuss the representation of conditional distributions in Bayesian networks.	06	CO5	L3
	b	Describe the process of approximate inference in Bayesian networks	04	CO5	L2
		OR			
11	a	Discuss relational and first-order probability in the context of probabilistic reasoning.	07	CO5	L5
	b	Discuss the representation of knowledge in an uncertain domain	03	CO5	L3

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Subject Code: 22AM405PC	SET-II	HT NO:			7	R					

CMR TECHNICAL CAMPUS

UGC AUTONOMOUS

B. Tech. IV Sem Regular/Supply End Examinations, June-2025

Object Oriented Programming Through Java

Common to CSM, AIML

Time: 3 Hours **Max. Marks: 60**

Note

i. This Question paper contains Part- A and Part- B.
ii. All the Questions in Part A are to be answered compulsorily.
iii. All Questions from Part B are to be answered with internal choice among them.

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PART-A

10 X 01 = 10 Marks

			Marks	CO	BL
1.	a	What is encapsulation in Java?	1	CO1	L1
	b	Explain the role of constructors in Java.	1	CO1	L2
	c	What is the purpose of CLASSPATH in Java?	1	CO2	L1
	d	Define generics in Java.	1	CO2	L2
	e	What is the difference between throw and throws?	1	CO3	L2
	f	Write the syntax to create a thread using Runnable interface.	1	CO3	L1
	g	Name any two interfaces in Java Collections.	1	CO4	L1
	h	What is the difference between HashSet and TreeSet?	1	CO4	L2
	i	What is the use of JPanel in Swing?	1	CO5	L1
	j	State one difference between AWT and Swing.	1	CO5	L2

PART- B

5 X 10 = 50 Marks

			Marks	CO	BL
2.	a	Describe the concept of class hierarchies with suitable examples.	5	CO1	L2
	b	Write a Java program to illustrate method overloading.	5	CO1	L3
		OR			
3	a	Differentiate between static and dynamic binding with examples.	5	CO1	L2
	b	Explain the role of the "super" keyword in inheritance with a program.	5	CO1	L3
4	a	Explain nested interfaces with an example.	5	CO2	L2
	b	Write a Java program to demonstrate character stream operations.	5	CO2	L3
		OR			

Subject Code: 22AM405PC	SET-II	HT NO:			7	R					

5	a	Discuss the access protection levels in Java with respect to packages.	5	CO2	L2
	b	Illustrate the use of RandomAccessFile with a Java program.	5	CO2	L3
6	a	Explain the termination and resumptive models of exception handling.	5	CO3	L2
	b	Write a Java program that handles multiple exceptions using multiple catch blocks.	5	CO3	L3
		OR			
7	a	Explain nested try blocks with an example.	5	CO3	L2
	b	Write a program to create two threads and manage their priorities.	5	CO3	L3
8	a	Describe the usage of TreeSet and its sorting mechanism.	5	CO4	L3
	b	Explain the differences and use cases of ArrayDeque and Stack.	5	CO4	L4
		OR			
9	a	Write a program demonstrating the use of LinkedList and Iterator.	5	CO4	L3
	b	Explain the concept of Comparators in sorting custom objects.	5	CO4	L4
10	a	Develop a GUI application using Swing components.	5	CO5	L6
	b	Explain how event handling works for keyboard events with an example.	5	CO5	L3
		OR			
11	a	Create a GUI using JComboBox and JTabbedPane with suitable functionality.	5	CO5	L6
	b	Discuss the use of anonymous inner classes in event handling.	5	CO5	L3

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Subject Code: 22CS/IT/AM/DS 402PC	SET-I	HT NO:			7	R					

CMR TECHNICAL CAMPUS

UGC AUTONOMOUS

B. Tech. IV Sem Regular /Supply Examinations, June-2025

Database Management Systems

Common to CSE, IT, CSIT, CSM, CSD

Time: 3 Hours **Max. Marks: 60**

Note

i. This Question paper contains Part- A and Part- B.
ii. All the Questions in Part A are to be answered compulsorily.
iii. All Questions from Part B are to be answered with internal choice among them.

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PART-A

10 X 01 = 10 Marks

			Marks	CO	BL
1.	a	Define DBMS?	1	CO1	L1
	b	What are the disadvantages of file processing system?	1	CO1	L1
	c	What is a Relation Schema?	1	CO2	L1
	d	What is Relational Algebra?	1	CO2	L1
	e	What are various Data types in SQL?	1	CO3	L1
	f	Define BCNF?	1	CO3	L1
	g	Define a Transaction?	1	CO4	L1
	h	What is recovery management component?	1	CO4	L1
	i	Differentiate between primary index and secondary index?	1	CO5	L2
	j	Define the phases of two phase locking protocol?	1	CO5	L1

PART- B

5 X 10 = 50 Marks

			Marks	CO	BL
2.	a	Define Database? Explain in brief about applications of Database Systems?	5	CO1	L2
	b	Difference between File System and Database Systems?	5	CO1	L6
		OR			
3	a	Define Instance and Schema? List different data models and explain?	5	CO1	L1
	b	Explain Relationship and Relationship set and types with suitable example?	5	CO1	L3
4	a	Explain following Term with suitable example a) Primary Key b) Candidate Key c) Super Key	5	CO2	L2
	b	Discuss about querying relational data in detail?	5	CO2	L6
		OR			

Subject Code: 22CS/IT/AM/DS 402PC	SET-I	HT NO:			7	R					

5	a	What is database schema? Explain the selection , projection, natural join, union and Cartesian product operations.	5	CO2	L2
	b	Explain the tuple relational calculus and domain relational calculus?	5	CO2	L6
6	a	Explain Data Manipulation Commands with syntax and examples?	5	CO3	L2
	b	What are the problems caused by Redundancy? Explain about Normalization and need for normalization?	5	CO3	L2
		OR			
7	a	Explain DDL Commands with syntax and examples?	5	CO3	L2
	b	Compare Third NF and BCNF with relevant table structure?	5	CO3	L6
8	a	Explain ACID properties of transaction management?	5	CO4	L2
	b	Explain Time-Stamp based protocols with example?	5	CO4	L2
		OR			
9	a	What is serializability? Explain in detail its types	5	CO4	L2
	b	Explain Validation based protocols?	5	CO4	L2
10	a	Discuss about file organizations and indexing?	5	CO5	L6
	b	Explain about Index structures?	5	CO5	L2
		OR			
11	a	Differentiate between the primary index and a secondary index?	5	CO5	L4
	b	Explain Indexed Sequential Access Methods?	5	CO5	L2

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