Hall Ticket No: | | | | | | | | | | |

Question Paper Code: 24MATP101

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

MCA I Year I Semester (R24) Supplementary End Semester Examinations, January 2026

Mathematical Foundations for Computer Applications

Time: 3Hrs **Max Marks: 60**

Attempt all the questions. All parts of the question must be answered in one place only.
In Q.No 1 to 5 answer either A or B only

Q.No	Question	Marks	CO	BL
Q.1(A)	Let X denote, the number of holes that for can be drilled per bit. The density for X is given the following table:	12M	1	3

x	1	2	3	4	5	6	7	8
p(x)	0.02	0.03	0.05	0.2	0.4	0.2	0.07	p(8)

(i) Find p(8) and Mean of X
(ii) Find the table for F
(iii) Use F to find the probability that a randomly selected bit can be used to drill between three and five holes inclusive.
(iv) Find variance of X

OR

Q.1(B)	For the following bivariate probability distribution obtain, (i) marginal distributions of X and Y (ii) the conditional distribution of X given Y=0 (iii) the conditional distribution of Y given X=1	12M	1	3

X\Y	0	1	2
0	0.02	0.08	0.18
1	0.15	0.02	0.25
2	0.03	0.12	0.15

Q.2(A)	(i) Derive moment generating function of Geometric Distribution	6M	2	3
	(ii)The average number of accidents on a certain national highway per day is 8. Assume that the number of accidents on any given day follows a Poisson distribution. Find the probability that on a particular day the number of accidents will be (i) at most 3 (ii) at least 2	6M	2	3

OR

Q.2(B)	In a factory, the amount of time (in minutes) it takes to assemble a product is normally distributed with a mean of 12 minutes and a standard deviation of 2 minutes. What is the probability that a randomly selected product takes (i) between 10 and 14 minutes (ii) less than 10 minutes (iii) more than 15 minutes to assemble?	12M	2	4

Q.3(A)	Use the basic logic equivalences to show each of the following equivalences. (a) φ: (p ∨ ¬ (p ∧ q)) ≡ T (b) ψ: (¬ (¬p → q) ∨ ¬ (p ∧ ¬q)) ≡ (¬p ∨ q)	12M	3	3
	OR			
Q.3(B)	Find a CNF equivalent to the formula: ψ: (((A → ¬B) ∨ (A ↔ C)) → (¬B ∨ C)).	12M	3	3
Q.4(A)	Two relations R and S from a set A containing four elements to a set B containing five elements are given in terms of their adjacency matrices: $M_R = \begin{bmatrix} 1 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 & 0 \end{bmatrix}; M_S = \begin{bmatrix} 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 1 \end{bmatrix}$. Find the adjacency matrix of each of the relations R ∩ S, R ∪ S, R^{-1}, ¬R, S^{-1} and ¬S	12M	4	3
	OR			
Q.4(B)	State pigeon hole principle. i. There are 235 students in a discrete math class. How many students can be chosen by the professor from the class who are born the same month. ii. Prove that among 132 non-negative integers chosen at random, we can choose at least 19 integers that have the same remainder in the division by 7.	12M	4	3
Q.5(A)	Check whether the following graphs are isomorphic or not. Justify? i.  G  H ii.  G  H	12M	5	3
	OR			
Q.5(B)	Explain Hamiltonian circuits and Hamiltonian paths, Chromatic number, Trees, Traversal of trees with suitable examples	12M	5	3

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Question Paper Code: 24MCAP103

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS)

MCA I Year I Semester (R24) Supplementary End Semester Examinations – December 2025

PYTHON PROGRAMMING

Time: 3Hrs

Max Marks: 60

Attempt all the questions. All parts of the question must be answered in one place only.
In Q.no 1 to 5 answer either A or B only

Q.No	Question	Marks	CO	BL
Q.1(A)	Explain the highlighting features of python	12M	1	2
	OR			
Q.1(B)	What is meant by sequence datatype? Explain its types	12M	1	2
Q.2(A)	Justify the use of lambda functions	12M	2	5
	OR			
Q.2(B)	Discuss about self-calling functions with suitable examples	12M	2	2
Q.3(A)	Apply the split function uses in variable applications	12M	3	3
	OR			
Q.3(B)	Describe about array operations with suitable examples	12M	3	2
Q.4(A)	Explain set comprehension through examples	12M	4	2
	OR			
Q.4(B)	Discuss the various file I/O functions with examples	12M	4	2
Q.5(A)	Apply exception to validate user inputs	12M	5	3
	OR			
Q.5(B)	Illustrate the SQL-DML operations in python	12M	5	2

*** END***

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Question Paper Code: 24MCAP104

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

(UGC-AUTONOMOUS INSTITUTION)

MCA I Year I Semester (R24) Supplementary End Semester Examinations, December - 2025

OPERATING SYSTEMS

Time: 3Hrs **Max Marks: 60**

Attempt all the questions. All parts of the question must be answered in one place only.
In Q.No 1 to 5 answer either A or B only

Q.No	Question	Marks	CO	BL
Q.1(A)	What is Operating System and explain any four types of Operating Systems with architecture diagram.	12M	1	2
	OR			
Q.1(B)	Analyze different process scheduling techniques and their impact on system performance.	12M	1	4
Q.2(A)	Describe Deadlocks Prevention, Deadlock Avoidance and Deadlock Detection in an operating system environment.	12M	2	2
	OR			
Q.2(B)	Discuss different CPU scheduling algorithms with their advantages and disadvantages.	12M	2	4
Q.3(A)	Discuss the concept of virtual memory and demand paging.	12M	3	4
	OR			
Q.3(B)	Illustrate the Copy-on-Write mechanism in an operating system to optimize memory usage.	12M	3	3
Q.4(A)	Analyze various disk scheduling algorithms by comparing their efficiency, advantages, and drawbacks with suitable examples	12M	4	4
	OR			
Q.4(B)	Discuss RAID structure and its levels with their advantages.	12M	4	4
Q.5(A)	Differentiate RTOS and Distributed Operating System with real world examples.	12M	5	4
	OR			
Q.5(B)	Analyze different types of Mobile Operating Systems by comparing their architecture, features, and performance.	12M	5	4

***** END*****