



MCA DEGREE EXAMINATIONS: NOV/DEC 2018

(Regulation 2017)

First Semester

MASTER OF COMPUTER APPLICATIONS

P17MAT1101: Mathematics For Computer Applications

COURSE OUTCOMES

- CO1:** Analyze the given propositions and finding results using mathematical logic operators.
CO2: Identify the different types of grammars and able to generate various languages.
CO3: Find eigen values and eigen vectors of real symmetric and non-symmetric matrices.
CO4: Solve the system of linear homogeneous as well as non-homogeneous equations and analyze the consistency of the system of linear equations.
CO5: Find the solution of non linear algebraic and transcendental equations by numerical methods.
CO6: Predict the interpolated values using difference formulae.

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

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|---|-----|-------------------|
| 1. Define universal and existential quantifiers. | CO1 | [K ₁] |
| 2. Negate the statements "Every student in this class is intelligent" in two different ways. | CO1 | [K ₂] |
| 3. Define context-free grammar. Why is it called so? | CO2 | [K ₁] |
| 4. When is a grammar said to be ambiguous? | CO2 | [K ₂] |
| 5. Find the Eigenvalues of A^2 and A^{-1} , where $A = \begin{pmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{pmatrix}$ | CO3 | [K ₂] |
| 6. State Cayley-Hamilton theorem. | CO3 | [K ₁] |
| 7. Define rank of a matrix. | CO4 | [K ₁] |
| 8. Can Gauss-Seidel method possible for any type of system of equation, Justify. | CO4 | [K ₂] |
| 9. Write the relationship formula between forward difference and divided difference. | CO5 | [K ₂] |
| 10. Explain inverse interpolation. | CO6 | [K ₂] |

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11. a) Construct an argument to show that the following premises imply the conclusion (8) CO1 [K₃]
 “it rained”.
 “If it does not rain or if there is no traffic dislocation, then the sports day will be held and the cultural programme will go on”; “If the sports day is held, the trophy will be awarded” and the “the trophy was not awarded”.
- b) Show that the premises “one student in this class knows how to write programs in JAVA” and “Everyone who knows how to write programs in JAVA can get a high-paying job” imply the conclusion “someone in this class can get a high-paying job”. (8) CO1 [K₄]
12. a) Find a phrase-structure grammar which generates the language L which consists of all words in a and b with unequal number of a's than b's. (8) CO2 [K₃]
- b) State pumping lemma for regular languages. Use it to prove that (8) CO2 [K₄]
 $L = \{0^n 1^n : n \geq 1\}$ is not regular.
13. a) Find the eigenvalues and eigenvectors of $A = \begin{pmatrix} 3 & -1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{pmatrix}$ (8) CO3 [K₃]
- b) Verify Cayley Hamilton theorem and hence find A^{-1} , A^4 for matrix $A = \begin{pmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{pmatrix}$ (8) CO3 [K₃]
14. a) Solve the system of equations using Gauss-Seidal method: $8x - 3y + 2z = 20$, $4x + 11y - z = 33$, $6x + 3y + 12z = 35$ (8) CO4 [K₄]
- b) Apply Gauss-Jordan method to find the solution of the following system: (8) CO4 [K₃]
 $10x + y + z = 12$, $2x + 10y + z = 13$, $x + y + 5z = 7$.
15. a) Find the real positive root $3x - \cos x - 1 = 0$ by Newton's method correct to 5 decimal places. (8) CO5 [K₄]
- b) Solve for a positive root of $x^3 - 4x + 1 = 0$ by Regula Falsi method. (8) CO5 [K₃]

16. a) From the data given below, find the number of students whose weight is between 60 and 70. (8) CO6 [K₄]

Weight in lbs	0-40	40-60	60-80	80-100	100-120
No. of students	250	120	100	70	50

- b) Use Lagrange's formula to fit a polynomial to the data (8) CO6 [K₃]

x	-1	0	2	3
y	-8	3	1	12
