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Reg. No.....

FIRST SEMESTER B.A./B.Sc. DEGREE EXAMINATION, NOVEMBER 2019

(CBCSS-UG)

B.C.A.

BCA 1C 01—MATHEMATICAL FOUNDATION FOR COMPUTER APPLICATIONS

(2019 Admissions)

Time : Two Hours

Maximum : 60 Marks

Section A (Short Answer Type Questions)

Answer all questions.

Each correct answer carries a maximum of 2 marks.

Ceiling 20 marks.

1. Define transpose of a matrix with an example.
2. Define symmetric and skew symmetric matrices.
3. If $A = \begin{bmatrix} 2 & 1 \\ 1 & 7 \end{bmatrix}$, $B = \begin{bmatrix} -2 & 5 \\ 0 & 8 \end{bmatrix}$. Then find $4A-8B$.
4. Define augmented matrix.
5. State Cayley-Hamilton theorem.
6. Define the rank of a matrix.
7. Define limit of a function.
8. Find $\frac{dy}{dx}$ if $y = \sin^2 x \cos x$.
9. Find the derivative of $x^2 \cos x$.
10. Evaluate $\int x \log x dx$.
11. Define an odd function. What is the value of $\int_{-a}^a f(x) dx$ if $f(x)$ is an odd function ?
12. Evaluate $\int \tan x dx$.

Turn over

Section B (Short Essay Type Questions)

Answer all questions.
Each question carries 5 marks.

Ceiling 30 marks.

13. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ -1 & 1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 2 & -1 \\ 1 & 3 & 4 \\ 0 & -2 & -3 \end{bmatrix}$ find the products AB and BA . Show that $AB \neq BA$.

14. Compute the inverse of A . Where $A = \begin{bmatrix} 1 & 0 & 2 \\ 2 & 1 & 0 \\ 3 & 2 & 1 \end{bmatrix}$.

15. Solve the linear system

$$\begin{aligned} -x_1 + x_2 + 2x_3 &= 2 \\ 3x_1 - x_2 + x_3 &= 6 \\ -x_1 + 3x_2 + 4x_3 &= 4. \end{aligned}$$

16. Find the angle between $a = [1, 2, 0]$ and $b = [3, -2, 1]$.

17. Find the derivative of e^x using the first principal.

18. Differentiate $x^2 e^x \sin x$.

19. Integrate $\frac{\cos^3 x + 1}{\cos^2 x}$.

Section C Essay Type Questions)

Answer any one question.
The question carries 10 marks.

20. If $A = \begin{bmatrix} 2 & 0 \\ 3 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 1 \\ 2 & 4 \end{bmatrix}$. Verify $(AB)^{-1} = B^{-1}A^{-1}$.

21. (a) Prove that $\int_0^{\pi/4} \sin^2 x \, dx = \frac{\pi}{4}$.

(b) Integrate $\frac{1}{9x^2 - 1}$.