K20U 3326
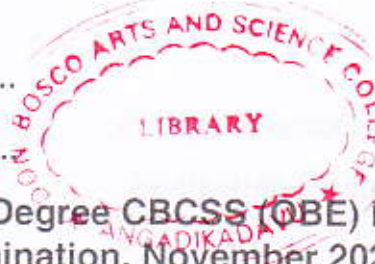
I Semester B.Sc. Degree CBCSS (OBE) Reg./Sup./Imp.
Examination, November 2020
(2019 Admn. Onwards)
COMPLEMENTARY ELECTIVE COURSE IN MATHEMATICS
1C01MAT-BCA : Mathematics for BCA – I

Time : 3 Hours

Max. Marks : 40

PART – A

Questions **1 – 5**. Answer **any 4** questions. **Each** question carries **1** mark.

1. Define equivalent matrices.

2. Write the nth derivative of $\sin(ax + b)$.

3. Define linear dependence.

4. Find the derivative of $\sin^3 x$.

5. State complement laws in Boolean algebra.

PART – B

Questions **6 – 15**. Answer **any 7** questions. **Each** question carries **2** marks.

6. Solve $2x + 3y = 5$.

    $3x - 2y = 1$ using Cramer's rule.

7. Show that the vectors $(1, 3, 4, 2)$, $(3, -5, 2, 2)$ and $(2, -1, 3, 2)$ are linearly dependent.

8. Define subalgebra. Give an example.

9. Find the derivative of $\sqrt{\sec (2x + 3)}$.

10. Find the derivative of $\tan x . \tanh x$.

11. Find the nth derivative of $\dfrac{x^2 + 3x + 3}{x + 1}$.

12. Find the rank of matrix $\begin{bmatrix} 1 & 3 \\ 1 & -4 \\ -1 & 3 \end{bmatrix}$ by reducing it to normal form.

13. If $x^2 + y^2 = 1$ find $\dfrac{d^2y}{dx^2}$.

P.T.O.

14. State De Morgan's laws in Boolean algebra.

15. State Leibnitz's theorem for n^{th} derivatives.

PART – C

Questions **16 – 22**. Answer **any 4** questions. **Each** question carries **3 marks**.

16. Find the rank of $\begin{bmatrix} 3 & -1 & 2 \\ -6 & 2 & 4 \\ -3 & 1 & 2 \end{bmatrix}$.

17. Find the nth derivative of $\dfrac{x}{x^2-1}$.

18. If $(1 - x^2) y_2 - xy_1 - a^2 y = 0$ prove that
$(1 - x^2) y_{n+2} - (2n + 1) xy_{n+1} - (n^2 + a^2)y_n = 0.$

19. Define dual of a statement. State and prove principle of duality.

20. Find $\dfrac{\partial y}{\partial x}$ if $x = a[\cos t + \log\tan(t/2)]$, $y = a\sin t$.

21. For the matrix $A = \begin{bmatrix} 1 & -1 & -1 \\ 1 & 1 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ find two non-singular matrices P and Q such that
PAQ is in normal form.

22. Find the derivative of $\tan^{-1}\left(\dfrac{2x}{1-x^2}\right)$ with respect to $\sin^{-1}\left(\dfrac{2x}{1+x^2}\right)$.

PART – D

Questions **23 – 26**. Answer **any 2** questions. **Each** question carries **5 marks**.

23. Using partition method find the inverse of $\begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$.

24. If $y = e^{a\sin^{-1}x}$, show that $(1 - x^2) y_{n+2} - (2n+1)xy_{n+1} - (n^2 + a^2)y_n = 0.$

25. Define Boolean algebra and give two examples.

26. Differentiate $[x^{\tan x} + \sin x^{\cos x}]$.

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