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Total No. of Questions : 09

B.Sc. (Hons)Agriculture (2019 Batch) (Sem.–1)

ELEMENTARY MATHEMATICS

Subject Code : BSAG-106-19(B)

M.Code : 76930

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Write briefly :

a) If the angle between two lines is $\frac{\pi}{4}$ and slope of one of the lines is $\frac{1}{2}$, find the slope of the other line.

b) Find the equation of a line perpendicular to the line $x - 2y - 3 = 0$ and passing through the point $(1, -1)$.

c) Find centre and radius of the circle with equation $x^2 + y^2 + 8x + 10y - 8 = 0$.

d) Evaluate $\lim_{x\to\infty} \frac{\sqrt{1+x}-1}{x}$.

e) Find $\frac{dy}{dx}$ for $y = \frac{x+1}{x-1}$.

f) If $A = \begin{bmatrix} 2 & 3 \\ 1 & -4 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -2 \\ -1 & 3 \end{bmatrix}$, then verify that $(AB)^T = B^T A^T$.

g) Evaluate $\int \frac{1-\sin x}{\cos^2 x} dx$.

h) For $A = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 3 & 4 \end{bmatrix}$, find AB and BA.

i) Differentiate $y = xe^x$ with respect to x.

j) Evaluate $\int \frac{dx}{e^x + e^{-x}}$.

SECTION-B

2. Find the area of a triangle with vertices (4, 4), (3, –2) and (–3, 16).

3. Find the derivative of $f(x)$ using the first principle where $f(x) = \sin x$.

4. Evaluate $\int e^{-3x} \sin x \, dx$.

5. Find $\frac{1}{2}(A + A^T)$ and $\frac{1}{2}(A - A^T)$ when $A = \begin{bmatrix} 0 & a & b \\ -a & 0 & c \\ -b & -c & 0 \end{bmatrix}$.

6. Prove that $\begin{vmatrix} b+c & a & a \\ b & c+a & b \\ c & c & a+b \end{vmatrix} = 4abc$.

SECTION-C

7. Find the condition that the line $y = mx + c$ is tangent to the circle $x^2 + y^2 = a^2$.

8. If $y = \sin^{-1} x$, show that $(1 - x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} = 0$.

9. Find inverse of the matrix $A = \begin{bmatrix} 3 & -2 & 3 \\ 2 & 1 & -1 \\ 4 & -3 & 2 \end{bmatrix}$.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.