Seat No. _____

HS-19BBA203

B. B. A. (Sem. II) (CBCS)

(W.E.F. 2019) Examination

May - 2023

Advanced Techniques of Business Mathematics

Time : $2\frac{1}{2}$ Hours / Total Marks : **70**

Instructions : (1) Answer all questions.
(2) Figures to the right indicate marks.
(3) Use of calculator is permissible.

1 (a) Explain rules of Determinant with examples : **10**

(b) Solve without expanding (5 marks each) : **10**

(1) $\begin{vmatrix} x & 2 & 2 \\ 2 & x & 2 \\ 2 & 2 & x \end{vmatrix} = 0$ (ii) $\begin{vmatrix} x+2 & x+5 & x+8 \\ 2003 & 2006 & 2009 \\ 100 & 103 & 106 \end{vmatrix}$

OR

1 (a) Solve using Cramer's method : **10**

$$\frac{3}{x}-\frac{4}{y}-\frac{2}{z}=1, \quad \frac{1}{x}+\frac{2}{y}+\frac{1}{z}=2, \quad \frac{2}{x}+\frac{5}{y}-\frac{2}{z}=3$$

(a) Prove that : **10**

$$\begin{vmatrix} x & y & z \\ x^2 & y^2 & z^2 \\ x^3 & y^3 & z^3 \end{vmatrix} = xyz\,(x-y)\,(y-z)\,(z-x)$$

2 (a) Define with example : **10**

(i) Matrix (ii) Equal matrices
(iii) Skew-symmetric Matrix (iv) Orthogonal Matrix
(v) Square Matrix

(b) If $A=\begin{bmatrix}1 & 2 & 1\\ 0 & 1 & -1\\ 3 & -1 & 1\end{bmatrix}$ then prove that $A^3-3A^2-A+9I_3=O$ **10**

OR

2 (a) Using Matrix method, solve : **10**

$x+y=0,\ 2x+3z=0,\ 2z-y=1$

(b) If A = $\begin{bmatrix}4 & 2\\ 3 & 1\end{bmatrix}$ and $B=\begin{bmatrix}3 & 2\\ 7 & 5\end{bmatrix}$ then prove that **10**

(i) $(A+B)' = A' + B'$

(ii) $(AB)^{-1} = B^{-1}A^{-1}$

3 Evaluate : **15**

(i) $\lim\limits_{x\to 1}\dfrac{x^3+2x^2-6x+3}{x^3-5x^2+2x+2}$

(ii) $\lim\limits_{x\to\infty}\left(1+\dfrac{1}{2x}\right)^x$

(iii) $\lim\limits_{x\to 2}\dfrac{x^3-8}{x-2}$

(iv) $\lim\limits_{x\to 0}\dfrac{e^{2x}-1}{x}$

OR

3 Evaluate : **15**

(i) $\lim\limits_{n\to\infty}\dfrac{(2n+1)(n+1)(n-1)}{n(n+2)(n+3)}$

(ii) $\lim\limits_{n\to 0}\dfrac{7^x-5^x}{x}$

(iii) $\lim\limits_{n\to 0}\dfrac{1}{x}\left[\dfrac{3x+10}{5x+2}-5\right]$

(iv) $\lim\limits_{h\to 0}\dfrac{f(2+h)-f(2)}{h},\ f(x)=x^2$

4	(a)	Explain Simple Interset and Compound Interest.	**8**
	(b)	A person has setup a sinking fund in order to have Rs.40,00,000 in 10 years for the children's college education and marriage. How much should be set a side each quarter into an account paying 6% interest compounded quarterly.	**7**

OR

4	(a)	Write a note on Annuity and explain with example.	**8**
	(b)	A machine is available in Rs.80,000 or by leasing it for 5 years at an annual rent of Rs.20,000. If money can be borrowed at 14% p.a., Is it profitable to go for leasing ?	**7**