VCD 17623 FYBMS Sem II Business Mathematics 2.5hrs 75Marks

Instructions:

- All questions are compulsory
- **In Q.1 , attempt both the sub questions A and B**
- **In Q.2, Q.3, and Q.4 , attempt "A and B" OR "C and D"**
- **In Q.5, attempt "A and B" OR " C "**
- Figures to the right indicate marks.
- Use of non-programmable calculator is allowed.

Q.1.A. Choose the correct alternative (Any 8) **(08)**

1) The simple interest for 3 years at 9% p.a. for ₹5000 is _____.
   a) ₹1300 b) ₹1350 c) ₹6350 d) ₹5000

2) The total money including principal and interest is called _____.
   a) Term b) Amount c) Annuity d) Loan

3) For the function $f(x) = 7x + 9$, the value of $f(2)$ is _____.
   a) 23 b) -23 c) 16 d)32

4) The point where there is "no profit no loss" is called _____.
   a) Zero point b) Break Even point c)Equilibrium Point d)Balance Point

5) If $A = \begin{bmatrix} 9 & 1 \\ 4 & 3 \end{bmatrix}$, then $A^T =$ _____.
   a) $\begin{bmatrix} 9 & 4 \\ 1 & 3 \end{bmatrix}$ b) $\begin{bmatrix} 1 & 4 \\ 9 & 3 \end{bmatrix}$ c) $\begin{bmatrix} 4 & 3 \\ 1 & 9 \end{bmatrix}$ d) $\begin{bmatrix} 3 & -4 \\ -1 & 9 \end{bmatrix}$

6) If two rows (or two columns) of determinant are same, then its value is _____.
   a) -1 b) 1 c) Zero d) none of these.

7) The derivative of a derivative is called _____.
   a) anti-derivative b)first order derivative c)second order derivative d)interpolation

8) The value of ${}^nC_0$ is _____.
   a) N b) 0 c) n! d) 1

9) If the Total Cost Function $C = D^2 + 2D - 20$, then the average cost function is _____.
   a) $2D + 2$ b) $D + 2 - \frac{20}{D}$ c) -20 d) $D^2 + 3D - 20D$

10) The relation between the operators E and Δ is _____.
   a) $\Delta = E + 1$ b) $E = \Delta + 1$ c) $E = \Delta - 1$ d) $E + \Delta = 1$

Q.1.B. State whether the following statements are True or False (Any 7) **(07)**

1) The future value of an amount is always greater than its present value.
2) EMI stands for Equal Monthly Installments.
3) The relation between permutation and combination is ${}^{n}P_r = {}^{n}C_r \times r!$
4) The adjoint of a matrix is obtained by taking transpose of the minor matrix.
5) The sum of two Identity matrices is an Identity matrix.
6) If A is a singular matrix, A^{-1} exists.
7) If R is the Total Revenue Function then, its derivative is called Total Average Revenue.
8) In input-output analysis, the final demands of the consumers are known.
9) The forward differences are denoted by Operator E .
10) $y = logx$ is called linear function.

Q.2.A Solve the following:

i. If $f(x) = \begin{cases} 2+3x & \text{for } 1 \le x < 4 \\ 3+x & \text{for } 4 \le x < 7 \\ 2x+7 & \text{otherwise} \end{cases}$ **(04)**

Find $f(0), f(-3), f(2), f(6)$

ii. If $f(x) = kx - 3$ and $f(3) = 6$, find the value of k. Hence find $f(-1), f(2)$ **(03)**

Q.2.B Find the amount at the end of one year of an annuity of ₹4000 payable at each quarter with the rate of interest 12% p.a. **(08)**

OR

Q.2.C Answer the following:

i. How many different 5 digit numbers can be formed from the digits 1, 2, 3, 4, 5 and 6, none of the digit being repeated in any one of the numbers so formed? **(03)**

ii. Find the value of n if ${}^{n}C_6 : {}^{n-3}C_3 = 91 : 4$ **(04)**

Q.2.D A principal amount to ₹11880 after 4 years and to ₹14040 after 7 years. Find the principal and the rate of interest. **(08)**

Q.3.A Solve the following:

i. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 1 \end{bmatrix}$, find the matrix $A^2 - 2A$. **(03)**

ii. Show that the matrix $A = \begin{bmatrix} 1 & 3 \\ 0 & 3 \end{bmatrix}$ satisfies the equation $A^2 - 4A + 3I = O$. **(04)**

Hence find A^{-1}.

Q.3.B Solve the following using Cramer's Rule. **(08)**

$$x + 2y + 2z = 1$$
$$2x + 3y + 4z = 4$$
$$-x + y + 3z = -2$$

OR

Q.3.C For the following input-output model. Find the total outputs if final demand are increased by 30 each. Also calculate labour requirements for this output. **(08)**

Industry	Consumption by Industry		Final Demand	Total Output
	1	2		
1	70	80	60	210
2	50	90	40	180
Labour	90	10		

Q.3.D Find the inverse of the matrix $A = \begin{bmatrix} 1 & 2 & 5 \\ 2 & 8 & 1 \\ -1 & 1 & 1 \end{bmatrix}$ by adjoint method. **(07)**

Q.4.A Find derivative of **(08)**

i. $y = \frac{x}{e^x + 2}$

ii. $y = x^7 + 7^x + 7^7$

Q.4.B Find maxima and minima for the function $f(x) = x^3 - 9x^2 + 24x + 7$ **(07)**

OR

Q.4.C The Demand function is $D = \frac{p+3}{p-1}$ where D is the demand and p is the price of commodity. Find the elasticity of demand when the price is 5. **(07)**

Q.4.D The number of students with marks above 90% at the HSC Examination of M.K.V College for years is given below. Estimate the number of students with marks above 90% for the year 2015. **(08)**

Year	2011	2012	2013	2014
Demand	75	82	95	115

Q.5.A Food I contains 2, 1 and 3 units of vitamin A, B and C respectively. The same figures for Food II are 1, 2 and 1 respectively and for Food III are 2, 0 and 1 respectively. Find the amounts of Food I, II and III that can exactly satisfy the daily requirements of vitamins. The daily requirements of vitamin A, B and C are 9, 7 and 8 units respectively. If the cost per unit for Food I, II and III are 8, 6, and 4 respectively, then find the total cost for the same. **(08)**

Q.5.B If $f(x) = x^3 - 2x^2 + 3x + 1$, find the value of $f(x)$ for $x = 0, 1, 2, 3, 4,$ and 5. Prepare the forward difference table and verify that the third order differences are constant. **(07)**

OR

Q.5.C Write short notes on the following (Any 3) **(15)**

i. Annuity and Types of Annuity
ii. Types of Matrices
iii. Types of Economic Functions
iv. Assumptions of Input-Output Analysis
v. Describe Newton's Forward and Newton's Backward Interpolation Formula