(Pages : 4) **5114 - B32 - IISC - R - May - 2014**

SECOND SEMESTER B.Com. (Revised) DEGREE EXAMINATION, 2014

Business Mathematics - II

Time : Three Hours Maximum : 80 Marks

Instructions to Candidates :

- Simple calculator is allowed.
- Graph sheets will be supplied on request.

Section - A **(10×2=20)**

I. *Answer any **ten** of the following.*

1) Define adjoint of a square matrix.

2) Find (x, y) if $(4,5) + (x, y) = (7,3)$

3) State any two properties of determinants.

4) If $f(x) = x^2 + 4$ show that $f(1) = f(-1)$.

5) Evaluate $\lim_{x \to 4} \frac{x^3 - 64}{x - 4}$

6) Explain in brief a polynomial in x.

7) Define proper rational fraction. Give an example

8) Form the equation whose roots are $5 + \sqrt{3}$ & $5 - \sqrt{3}$

9) Solve $\frac{x}{3} + \frac{3}{x} = \frac{10}{3}$

10) In LPP, define objective function.

11) If $x^2 + y^2 = r^2$ find dy/dx.

12) Define cost function.

Section - B

II. Answer any **three** of the following.

13) If $A = \begin{bmatrix} 3 & -4 \\ 1 & -1 \end{bmatrix}$, show that $A^2 - 2A + I = 0$

14) Solve the following equations using Cramer's rule $7x+2y=25,\ 2x-y=4$.

15) $\int_0^1 \frac{x^4+1}{x^2}dx$

16) Solve the following equations by the method of cross multiplication.
$5x-3y=7,\quad x+8y=10$

17) Resolve $\frac{5x+1}{(x+2)(x-1)}$ into partial fractions.

18) Define :

i) Optimal value

ii) Product function. **(3×5=15)**

Section - C

III. Answer any **three** of the following.

19) a) Find the inverse of the following matrix

$$A = \begin{pmatrix} 3 & 0 & 1 \\ 6 & -2 & -7 \\ 1 & 4 & 2 \end{pmatrix}$$ **(8)**

b) Prove that $\begin{vmatrix} 1+a & b & c \\ a & 1+b & c \\ a & b & 1+c \end{vmatrix} = 1+a+b+c$ **(7)**

20) a) A firm has the revenue function $R = 100\,q - q^2$ and the cost - function $T = q^3 - \frac{55}{2}q^2$. Find the maximum profit. **(8)**

b) If $y = \sqrt{x+1} + \sqrt{x-1}$, prove that $(x^2-1)\frac{d^2y}{dx^2} + x\frac{dy}{dx} = \frac{1}{4}y$. **(7)**

21) a) If α, β are the roots of $3x^2 - 5x + 7 = 0$ find

i) $\alpha^2 - \beta^2$

ii) $\alpha\,\beta^{-1} + \beta\,\alpha^{-1}$ **(8)**

b) In a perfect competition the demand Curve of a commodity is $D = 20 - 3p - p^2$ and the supply Curve is S = $5p$ - 1, where p is the price, D is demand and S is supply. Find the equilibrium price and the quantity exchanged. **(7)**

22) a) Resolve $\dfrac{3x+1}{(x-1)(x^2+1)}$ into partial fractions. **(8)**

b) Resolve $\dfrac{3x^2+x-2}{(x-2)^2(1-2x)}$ into partial fractions. **(7)**

23) a) A manufacturing unit produces three types of fans A, B, C, the following matrix shows the sale of fan sets in two different cities.

$$\begin{array}{l} \text{City I} \\ \text{City II} \end{array} \begin{pmatrix} A & B & C \\ 200 & 150 & 100 \\ 150 & 100 & 50 \end{pmatrix}$$

If cost price of each set A, B, C, is Rs. 1000, Rs. 2000, Rs. 3000, respectively and selling price Rs. 1500, Rs. 3000, Rs. 4000 respectively, find the total profit using matrix algebra only. **(8)**

b) A trucking company owns three types of trucks X, Y, Z which are equipped to carry three different types of machines per load as follows.

	Trucks		
	Type X	Type Y	Type Z
Machine I	2	3	4
Machine II	1	1	2
Machine III	3	2	2

How many trucks of each type should be used to carry exactly 29 of type I machine, 13 of type II machine and 16 of type III machines. Assume that each truck is fully loaded. **(7)**

24) a) Solve the following LPP graphically

Max $Z = 4x + 6y$

Subject to constraints

$x + y = 5$

$x \geq 2$

$y \leq 4$ **(8)**

$x \geq 0,\ y \geq 0$

b) A dealer wishes to purchase a number of fans and sewing machines. He has only Rs. 57600 to invest and has a space for almost 200 items. A fan costs him Rs. 1600 and a sewing machine Rs. 2200. His expectation is that he can sell a fan at a profit of Rs. 120 and sewing machine at a profit of Rs. 180. Assuming he can sell all the items that he can buy. Formulate LPP to determine how should he invest his money to maximize his profit. **(7)**
