

**BACHELOR OF COMMERCE [HONS]
FOURTH SEMESTER [SPECIAL REPEAT]
BUSINESS MATHEMATICS
BCM – 402**

**SET
A**

[USE OMR SHEET FOR OBJECTIVE PART]

Duration: 3 hrs.

Full Marks: 70

Time: 30 mins.

Marks: 20

(Objective)

1 × 20 = 20

Choose the correct answer from the following:

- A matrix is singular if
 - $|A| = 0$
 - $|A| \neq 0$
 - $|A| < 0$
 - $|A| > 0$
- A matrix having all elements are zero called
 - Row matrix
 - Column matrix
 - Null matrix
 - None
- The value of the $\begin{vmatrix} 5 & 6 \\ 3 & -2 \end{vmatrix}$ is
 - 28
 - 28
 - 8
 - 8
- If $\begin{bmatrix} \sin \theta & -\cos \theta \\ \cos \theta & \sin \theta \end{bmatrix} + \begin{bmatrix} \sin \theta & \cos \theta \\ -\cos \theta & \sin \theta \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ then value of θ is
 - $\frac{\pi}{2}$
 - $\frac{\pi}{3}$
 - $\frac{\pi}{4}$
 - $\frac{\pi}{6}$
- The range of the function $f(x) = \sqrt{x}$ is
 - $[0, \infty]$
 - $(0, \infty)$
 - $[0, \infty)$
 - $(0, \infty]$
- The graph of the function $f(x) = x^2$ is called
 - Parabola
 - Ellipse
 - Hyperbola
 - Circle
- The value of $\lim_{x \rightarrow 0} \frac{\sin x}{x}$ is
 - 1
 - 0
 - 1
 - None

16. Annuity means
- The number of payments is fixed
 - each payments is made at the end of each equal period
 - The interest is compounded at the end of each period.
 - All of these
17. Capital value of annuity
- Present value
 - Sum of all present value
 - Only interest value
 - None of this
18. Formulation for present value V of annuity is
- $V = P \left[\frac{1 - (1 - i)^{-n}}{i} \right]$
 - $V = P \left[\frac{1 - (1 + i)^{-n}}{i} \right]$
 - $V = P \left[\frac{1 - (1 + i)^n}{i} \right]$
 - All of these
19. Equation of x axis is
- $x=0$
 - $x=0, y=0$
 - $y=0$
 - None of these
20. Linear means the relationship
- Among two or more variables
 - involving one variables
 - Between two variables
 - None of these

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(Descriptive)

Time : 2 Hr. 30 Mins.

Marks : 50

[Answer question no.1 & any four (4) from the rest]

1. Solve by matrix inversion method 10
 $2x - 3y + 5z = 11$
 $3x + 2y - 4z = -5$
 $x + y - 2z = -3$
2. 7+3=10
 a) Find the domain and range of the function $f(x) = \frac{x^2 - 3x + 2}{x^2 + x - 6}$
 b) Draw the graph of the function $y = x^2$.
3. 10
 If $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & -3 \\ 2 & -1 & 3 \end{bmatrix}$

Then show that $A^3 - 6A^2 + 5A + 11I = O$.

4. Evaluate the limits

5+5=10

(a) $\lim_{x \rightarrow 0} \frac{\sqrt{1+x} - \sqrt{1-x}}{x}$

(b) $\lim_{x \rightarrow 1} \frac{x^2 - 1}{\sqrt{3x+1} - \sqrt{5x-1}}$

5. Find the derivatives using first principle of derivatives

5+5=10

a) $f(x) = \tan x$

b) $f(x) = \sin x$

6. a) Find the amount of an annuity consisting of payments of Rs. 800 at the end of every 3 months for 3 years at the rate of 8% compounded yearly.

5+5=10

b) A loan of Rs. 1000 is to be repaid in 5 equal annual payments, the interest being 6% p.a. compound interest and the first payment being made after a year. Analyze the payments onto those on account of interest and on account of amortization of the principal

7. Solve graphically the following LPP

10

Maximize $z = 8x_1 + 5x_2$

Subject to the constraints $x_1 \leq 150$

$x_2 \leq 250$

$2x_1 + x_2 \leq 500$

$x_1, x_2 \geq 0$

8. A company produces two types of pens A and B. Pen A is of superior quality and pen B is of lower quality. Profits from pen A and B are Rs 5 and Rs 3 per pen respectively. Raw material required for each pen of type A is twice as that of pen of type B. The supply of raw material is sufficient only for 1000 pens of type B. Pen A requires special clips and 400 such clips are available per day. Pen B also requires particular types of clip and 700 such clips are available per day.

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Find graphically the product mix so that the company can maximize its profit.

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