BACHELOR OF COMMERCE [HONs]
FOURTH SEMESTER
BUSINESS MATHEMATICS
BCM – 402
[USE OMR SHEET FOR OBJECTIVE PART]

SET
A

Duration: 3 hrs.

Full Marks: 70

(Objective)

Time: 30 mins.

Marks: 20

Choose the correct answer from the following:

1 ×20=20

1. A matrix is singular if
   a. $|A| = 0$
   b. $|A| \neq 0$
   c. $|A| < 0$
   d. $|A| > 0$

2. A matrix having all elements are zero called
   a. Row matrix
   b. Column matrix
   c. Null matrix
   d. None

3. The value of the $\begin{vmatrix} 5 & 6 \\ 3 & -2 \end{vmatrix}$ is
   a. 28
   b. -28
   c. 8
   d. -8

4. 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
   a. $\dfrac{\pi}{2}$
   b. $\dfrac{\pi}{3}$
   c. $\dfrac{\pi}{4}$
   d. $\dfrac{\pi}{6}$

5. The range of the function $f(x) = \sqrt{x}$ is
   a. $[0,\infty]$
   b. $(0,\infty)$
   c. $[0,\infty)$
   d. $(0,\infty]$

6. The graph of the function $f(x) = x^2$ is called
   a. Parabola
   b. Ellipse
   c. Hyperbola
   d. Circle

7. The value of $\lim\limits_{x\to 0} \dfrac{\sin x}{x}$ is
   a. -1
   b. 0
   c. 1
   d. None

[1]

USTM/COE/R-01

8. $\dfrac{d}{dx}\left(\sqrt{x}\right) = ?$

a. $\dfrac{1}{2\sqrt{x}}$

b. $\dfrac{1}{\sqrt{x}}$

c. $\sqrt{x}$

d. None

9. $\dfrac{d}{dx}\left(\tan x\right) = ?$

a. $\sec x \tan x$

b. $\sec x$

c. $\sec^2 x$

d. None

10. Find the interest on Rs 10,200 for 7 years and 6 months at the rate 6% annum is

a. Rs 4500

b. Rs 6590

c. Rs 4580

d. Rs 4590

11. If n is the number of years , I is the simple interest, r is the rate of interest and p is the principal value then choose the correct answer of the following

a. $n = \dfrac{100}{prI}$

b. $n = \dfrac{100p}{Ir}$

c. $n = \dfrac{100I}{pr}$

d. $n = \dfrac{100I}{Ir}$

12. If n is the number of years , I is the component interest, r is the rate of interest and p is the principal value then choose the correct answer of the following

a. $p = \dfrac{Ar}{1 + \dfrac{n}{100}}$

b. $p = \dfrac{A}{1 + \dfrac{nr}{100}}$

c. $p = \dfrac{An}{1 + \dfrac{r}{100}}$

d. None of these

13. Simple interest on Rs 1 for 1 years is

a. Rs $\dfrac{r}{100}$

b. Rs $\dfrac{1}{100}$

c. Rs $\dfrac{n}{100}$

d. None of these

14. If the interest is compounded monthly then the formula for compound amount will be

a. $A = P(1 + \dfrac{i}{2})^{2n}$

b. $A = P(1 + \dfrac{i}{4})^{4n}$

c. $A = P(1 + \dfrac{i}{3})^{3n}$

d. $A = P(1 + \dfrac{i}{12})^{12r}$

15. If the interest is compounded quarterly then the formula for compound amount will be

a. $A = P(1 + \dfrac{i}{2})^{2n}$

b. $A = P(1 + \dfrac{i}{4})^{4n}$

c. $A = P(1 + \dfrac{i}{3})^{3n}$

d. $A = P(1 + \dfrac{i}{12})^{12r}$

16. Annuity means
    a. The number of payments is fixed
    b. each payments is made at the end of each equal period
    c. The interest is compounded at the end of each period.
    d. All of these

17. Capital value of annuity
    a. Present value
    b. Sum of all present value
    c. Only interest value
    d. None of this

18. Formulation for present value V of annuity is
    a. $V = P[\dfrac{1-(1-i)^{-n}}{i}]$
    b. $V = P[\dfrac{1-(1+i)^{-n}}{i}]$
    c. $V = P[\dfrac{1-(1+i)^{n}}{i}]$
    d. All of these

19. Equation of x axis is
    a. x=0
    b. x=0, y=0
    c. y=0
    d. None of these

20. Linear means the relationship
    a. Among two or more variables
    b. involving one variables
    c. Between two variables
    d. 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 $f(x) = \dfrac{x^2 - 3x + 2}{x^2 + x - 6}$

   b) Draw the graph of the function $y = x^2$.

3. If   10
   $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & -3 \\ 2 & -1 & 3 \end{bmatrix}$

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

4. Evaluate the limits   5+5=10

(a) $\lim_{x \to 0} \dfrac{\sqrt{1+x} - \sqrt{1-x}}{x}$

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

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   5+5=10
      the end of every 3 months for 3 years at the rate of 8% compounded
      yearly.
   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 constrains $x_1 \leq 150$
   $x_2 \leq 250$
   $2x_1 + x_2 \leq 500$
   $x_1, x_2 \geq 0$

8. A company produces two types of pens A and B. Pen A is of superior   10
   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.
         Find graphically the product mix so that the company can
   maximize its profit.

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