$= \cos x, \frac{\pi}{2} \le x \le \pi.$

If f(x) is continuous in the interval $-\pi \le \times \le \pi$ find the values of a and b.

Group – D

4. Answer **any *three*** questions : 10×3=30

(1) (a) Define Scalar matrix.

(b) Solve by matrix inversion method the following system of equation : 2x + y + z = 2, x + 3y – z = 5, 3x + y – 2z = 6. 2+8

(2) (a) Define Identity Matrix.

(b) Show that $\begin{vmatrix} 1 & a & a2 \\ a2 & 1 & a \\ a & a2 & 1 \end{vmatrix} = (a^3 - 1)^2$. 2+8

BBA 1st Semester (Honours) Examination-2022-23

BACHELOR OF BUSINESS ADMINISTRATION

Course ID : 13212 Course Code : BBA/CC-02

Course Title : Business Mathematics

(New Syllabus)

Time : 3 Hours *Full Marks :* 80

The figures in the right hand margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Group – A

1. Answer ***all*** questions : 1×10=10

(i) If the matrix A is both Symmetric and Skew-Symmetric then-

(a) A is a zero matrix (b) A is a diagonal matrix

(c) A is a scalar matrix (d) A is a square matrix

(e) None of these

(ii) If $A=\begin{pmatrix}0 & 7\\ 0 & 0\end{pmatrix}$ and $f(x)=1+x+x^2+x^3+\text{--------}+x^{20}$ then f(A)=

(a) 0 (b) $\begin{pmatrix}1 & 7\\ 0 & 0\end{pmatrix}$

(c) $\begin{pmatrix}1 & 7\\ 0 & 1\end{pmatrix}$ (d) $\begin{pmatrix}0 & 7\\ 1 & 1\end{pmatrix}$

(e) None of these.

(iii) The Solution of the equation

$$\begin{vmatrix} x+1 & 3 & 5 \\ 2 & x+2 & 5 \\ 2 & 3 & x+4 \end{vmatrix} = 0$$ is given by

(a) x = 1 (b) x = 2

(c) x = 3 (d) x = 4

(e) None of these

(iv) If $f(x+3) = 2x^2 - 3x + 1$, find f(x+l)

(a) $2x^2 - 11x + 15$ (b) $x^2 - 11x - 15$

(c) $2x^2 + 11x + 15$ (d) $x^2 + 11x - 15$

(e) None of these

Group – C

3. Answer **any *four*** questions : 5×4=20

(a) Show that the matrix $A=\begin{pmatrix}1 & 2\\ 3 & 4\end{pmatrix}$ Satisfies the equation $A^2 = 5A + 2I_2$. Hence, find the value of A^{-1}.

(b) If $f(x) = 2|x| + |x-2|$, find f'(l).

(c) If $y = Ae^{mx} + Be^{-mx}$, Proved that $y_2 - m^2y = 0$.

(d) Find the angle through which the axis are to be rotated so that the equation $x\sqrt{3} + y + 6 = 0$ may be reduced to the form x = c. Also determine the value of c.

(e) If $\left(2+\sqrt{3}\right)$ is a root of the equation $x^2 + px + q = 0$, then write the values of p and q.

(f) The function f is defined as follows :

$$f(x) = -2\sin x, -\pi \le x \le -\frac{\pi}{2'}$$

$$= a \sin x+b, -\frac{\pi}{2} < x < \frac{\pi}{2'}$$

(j) Determine the ratio in which the line 3x + y – 9 = 0 divides the segment joining the points (1,3) and (2,7).

(k) Evaluate : $\lim_{x \to \pi} \left(\frac{\sin x}{\pi - x} \right)$

(l) If f(x) = mx+c and f(0) = f'(0) = 1. What is f(2)?

(m) Determine the rank of a matrix $\begin{bmatrix} 1 & 0 & 3 \\ 4 & -1 & 5 \\ 2 & 0 & 6 \end{bmatrix}$ is =

(n) Is f(x) = |x| continuous at x = 0?

(o) If $\frac{\log x}{y-z} = \frac{\log y}{z-x} = \frac{\log z}{x-y}$ then prove that $x^x.y^y.z^z=1$

(v) Find the equation whose roots are 1,–2

(a) $x^2 + x - 2 = 0$ (b) $x^2 - x + 2 = 0$

(c) $x^2 - x - 2 = 0$ (d) $x^2 + x + 2 = 0$

(e) None of these.

(vi) $f(x)=\left(\frac{\sin ax}{x} \right), x \neq 0$ and f(0) = k,Find the value of k for which f(x) is continuous at x = 0

(a) 0 (b) 1

(c) -a (d) a

(e) None of these

(vii)Find $\frac{dy}{dx}$ when $x = at^2$, y = 2at

(a) $\frac{1}{t}$ (b) $-\frac{1}{t}$

(c) t (d) –t

(e) None of these

(viii) $\int \frac{dx}{1+\sin x} =$

(a) tan x (b) sec x

(c) tan x + sec x (d) tan x-sec x

(e) None of these

(ix) The distance between the points (0,0) and (3,–4) is

(a) 5 (b) 4

(c) –5 (d) –4

(e) None of these

(x) In how many ways can 6 persons stand in a queue?

(a) 520 (b) 720

(c) 620 (d) 600

(e) None of these

Group – B

2. Answer **any *ten*** question : 2×10=20

(a) Find the values of x and y,if $2\begin{pmatrix}1 & 3\\ 0 & x\end{pmatrix}+\begin{pmatrix}y & 0\\ 1 & 2\end{pmatrix}=\begin{pmatrix}5 & 6\\ 1 & 8\end{pmatrix}$

(b) If f(x) = x + |x|,find f(3) and f(–3).

(c) If $y=\frac{x}{x+1'}$, show that $y_5(0)=5!$

(d) $\int \frac{1+\cos x}{x+\sin x}dx$

(e) Out of 7 consonant and 4 vowels, how many words of 3 consonants and 2 Vowels can be formed?

(f) Without expending, Show that $\begin{vmatrix}2 & 0 & 1\\ 1 & 3 & 0\\ 0 & 1 & 4\end{vmatrix}=\begin{vmatrix}0 & 1 & 2\\ 3 & 0 & 1\\ 1 & 4 & 0\end{vmatrix}$

(g) If a,b are the roots of the equation $x^2 + x + 1 = 0$, then $a^2 + b^2 =$

(h) The product of three numbers in A.P. is 224,and the largest number is 7 times the smallest. Find the numbers.

(i) The first term of a G.P. is 1.The sum of the third and fifth terms is 90. Find the common ratio of the G.P.

(3) (a) Define Limit. Distinction between $\lim_{x \to a} f(x)$ and $f(a)$.

(b) $\int \frac{dx}{5 + 4\cos x}$. 5+5

(4) (a) Define Logarithm.

(b) If $\log_a bc = x$, $\log_b ca = y$ and $\log_c ab = z$ then prove that $\frac{1}{x+1} + \frac{1}{y+1} + \frac{1}{z+1} = 1$. 2+8

(5) (a) In how many ways can 5 girls and 3 boys be seated in a row so that no two boys are together?

(b) How many three digit odd numbers can be formed by Using the digits 1,2,3,4,5,6 if:(i) the repetition of digits is not allowed? (ii) the repetition of digits is allowed? 2+8

(6) (a) The sum of the first four terms of an A.P. is 56.The sum of the last four terms is 112. If its first term is 11, then find the number of terms.

(b) The first term of a G.P. is 1.The sum of the third and fifth term is 90.Find the common ratio of the G.P. 5+5