18BCV08/18BCU08

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2023
(Second Semester)

Branch – **BIOCHEMISTRY**

MATHEMATICS

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1 If $x = \cos\theta + i\sin\theta$ then $x^n + 1/x^n =$ ----------.
i) $\cos n\theta$ ii) $2\cos n\theta$ iii) $2i\sin n\theta$ iv) $\sin n\theta$

2 _____ is the matrix whose eigenvalues are a-5, b-5, c-5, where a, b, c are the eigenvalues of $A = \begin{pmatrix} -1 & -2 & -3 \\ 4 & 5 & -6 \\ 7 & -8 & 9 \end{pmatrix}$.

i) $\begin{pmatrix} -6 & -7 & -8 \\ -1 & 0 & -11 \\ 2 & -13 & 4 \end{pmatrix}$ ii) $\begin{pmatrix} -6 & -2 & -3 \\ 4 & 0 & -6 \\ 7 & -8 & 4 \end{pmatrix}$ iii) $\begin{pmatrix} -1 & -2 & -3 \\ 4 & 5 & -6 \\ 7 & -8 & 9 \end{pmatrix}$ iv) $\begin{pmatrix} 4 & 3 & 2 \\ 9 & 10 & -1 \\ 12 & -3 & 13 \end{pmatrix}$

3 In Gauss Jordan method, the given set of equations transformed into.
i)Triangular form ii) Diagonal form
iii) Inverse Form iv) None of these

4 The process of computing the value of a function outside the given range is called ----------.
i) Interpolation ii) extrapolation
iii) first difference iv) last difference

5 If n is even we can use simpson's one third rule.
i) True ii) False iii) not necessary iv) not defined

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6 a Find $\lim_{\theta \to 0} \frac{\tan\theta + \sec\theta - 1}{\tan\theta - \sec\theta + 1}$.

OR

b Expand $\sin^8\theta$ in a series of cosines of multiples of θ

7 a Find the eigen values of the matrix $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$

OR

b If $= \begin{bmatrix} 5 & 3 \\ 1 & 3 \end{bmatrix}$, determine A^n in terms of A.

8 a Solve by Gauss- elimination method: $3x + y - z = 3; 2x - 8y + z = -5; x - 2y + 9z = 8$

OR

b Solve by Gauss- Jordan method: $x + 2y + 3z = 6;\ 2x + 4y + z = 7;\ 3x + 2y + 9z = 14$.

Cont...

9 a Using Lagrang's interpolation formula, find y(10) from the following table:

x:	5	6	9	11
y:	12	13	14	16

OR

b Using Newton's Divided difference formula , find the value of f(2) from the following:

x:	4	5	7	10	11	13
y:	48	100	294	900	1210	2028

10 a Evaluate $\int_1^2 \frac{dx}{1+x^2}$ taking h = 0.1, using Trapezoidal rule.

OR

b Evaluate $\int_0^1 e^x dx$ faking h= 0.125 ,using Simpson's rule.

SECTION -C (30 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 6 = 30)

11 a Express $\frac{\sin 6\theta}{\sin\theta}$ in terms of cosθ .

OR

b Express $\sin^3\theta\cos^4\theta$ in terms of sines of multiples of θ.

12 a Find eigen values and eigen vectors of $A = \begin{pmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{pmatrix}$

OR

b Using Cayley-Hamilton Theorem find A^{-1} for $A = \begin{pmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{pmatrix}$

13 a Solve by Gauss- jacobi method: $10x-2y+z=12;\ x+9y-z=10;\ 2x-y+11z=20$

OR

b Solve by Gauss- seidel method: $8x - y + z = 18,\ 2x + 5y - 2z = 3,\ x + y - 3z = -16$

14 a Using Newton's forward interpolation formula find y at x = 1.02

x:	1.0	1.1	1.2	1.3	1.4
y:	1.841	1.891	0.932	0.964	0.985

OR

b Fit a polynomial of degree two which takes the values

x:	0	1	2	3	4	5	6	7
y:	1	2	4	7	11	16	22	29

15 a Find the first two derivatives of the function tabulated below at x=3 and x = 4

x:	3.0	3.2	3.4	3.6	3.8	4.0
y:	-14	-10.032	-5.296	-0.256	6.672	14

OR

b Using Romberg's method, evaluate I= $\int_0^2 \frac{dx}{1+x}$ correct to three decimal places.

Hence evaluate $\log_e 2$.

Z-Z-Z

END