PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2022
(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. The expansion of $cos^n\theta$ is _____
   i) $cosn\theta + nC_1 \cos(n-2)\theta + nC_2 \cos(n-4)\theta + \cdots$
   ii) $\frac{1}{2}(cosn\theta + nC_1 \cos(n-2)\theta + nC_2 \cos(n-4)\theta + ..)$
   iii) $\frac{1}{2^{n-1}}(cosn\theta + nC_1 \cos(n-2)\theta + nC_2 \cos(n-4)\theta + \cdots .)$
   iv) $\frac{1}{2^n}(cosn\theta + nC_1 \cos(n-2)\theta + nC_2 \cos(n-4)\theta + \cdots)$

2. The characteristic equation of the matrix is _____
   i) $A - \lambda I = 0$ ii) $|A - \lambda I| = 0$
   iii) $|A - \lambda I| \neq 0$ iv) $|I - \lambda A| = 0$

3. The rate of convergence of Gauss – Seidel method is twice that of _____method
   i) Gauss- Elimination ii) Guass –Jacobi
   iii) Gauss – Jordan iv) Triangularization

4. The n^{th} divided difference of the polynomial of the n^{th} degree are_____
   i) Constant ii) zero
   iii) infinity iv) polynomial variable

5. Error in the trapezoidal rule is of order _____
   i) h^2 ii) h^3
   iii) h^4 iv) h

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

6. a. Expand $\tan 7\theta$ in terms of $tan\,\theta$.
   OR
   b. Express $\cos n\theta$ in terms of cosines of multiples of θ.

7. a. Find the eigen values of the matrix $\begin{bmatrix} 3 & 2 \\ 2 & 3 \end{bmatrix} = 0$.
   OR
   b. Define similar matrix. Also state Caley – Hamilton theorem.

8. a. Compare Gauss –Elimination and Guass- Seidal iterative methods.
   OR
   b. Write down the procedure to solve the Guass –Elimination method.

Cont...

9. a. State the Gregory - Newton's Forward Interpolation and Lagrange's Interpolation formula for both equal and unequal intervals.

OR

b. Find f(8) by using Newton's divided difference formula for the following

x	:4	5	7	10	11	13
f(x)	:48	100	294	900	1210	2028

10.a. Write down the formula for $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ by Newton's method.

OR

b. Write short notes on trapezoidal rule.

SECTION -C (30 Marks)

Answer **ALL** questions

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

11.a. Prove that $32\cos^6\theta = \cos6\theta + 6\cos4\theta + 15\cos2\theta + 10$.

OR

b. Prove that $\frac{\sin7\theta}{\sin\theta} = 64\cos^6\theta - 80\cos^4\theta + 24\cos^2\theta - 1$.

12.a. Verify the Caley – Hamilton theorem of the matrix $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$.

OR

b. Find all eigen values and the eigen vectors of the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 2 & 3 \\ 0 & 0 & 2 \end{bmatrix}$.

13.a. Solve by Guass- Elimination method 2x+y+4z = 12 ; 8x-3y+2z=20 ; 4x+11y-z=33.

(OR)

b. Solve by Guass- Seidal method 27x+6y-z=85; 6x+15y+2z=72; x+y+54z=110.

14.a. Using Newton's formula find the pressure of the steam for a temperature of 142° for the following

Temperature °C	:140	150	160	170	180
Pressure kg f/cm^2	:3.685	4.854	6.302	8.076	10.225

OR

b. Given the values

x	: 14	17	31	35
f(x)	:68.7	64	44	39.1

Find the values of f(x) corresponding to x=27 using Lagrange's method.

15.a. From the following table find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ of values of x and y for x=1.05

x:1	1.05	1.1	1.15	1.2	1.25	1.3
y:1	1.0247	1.04881	1.07238	1.09544	1.11803	1.14017

OR

b. Dividing the range into 10 equal parts find the approximate value of $\int_0^{\pi} \sin x\, dx$ by

i. Trapezoidal rule ii. Simpson's rule

Z-Z-Z END