

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2022
(Third Semester)

Branch - NUTRITION FOOD SERVICE MANAGEMENT AND DIETETICS

MATHEMATICS

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks (5 x 1 = 5)

- In the expansion of $\cos n\theta$, the coefficient of $\cos^n \theta$ is _____
(i) 2 (ii) 2^n (iii) 2^{n-1} (iv) 2^{2n}
- If A is any 3×2 matrix then $(A^T)^T$ is _____
(i) 3×2 matrix (ii) 2×3 matrix
(iii) 2×2 matrix (iv) 3×3 matrix
- The rate of convergence of Gauss – Seidel is _____
(i) Thrice as fast as in Jacobi's method
(ii) Roughly twice that of Jacobi's method
(iii) Exactly as in Jacobi's method.
(iv) Thrice as slow as in Jacobi's method
- The process of computing the value of the function inside the given argument is called _____
(i) Interpolation (ii) Extrapolation
(iii) Partial fraction (iv) Inverse interpolation
- In Trapezoidal rule, the interval is $(0,1)$ and $h=0.25$, then the value of n is _____
(i) 1 (ii) 2 (iii) 3 (iv) 4

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks (5 x 3 = 15)

- 6 a Express $\cos 8\theta$ in terms of $\sin \theta$.
OR

b Find $\lim_{\theta \rightarrow 0} \frac{\tan \theta + \sec \theta - 1}{\tan \theta - \sec \theta + 1}$.

- 7 a Calculate A^4 when $A = \begin{bmatrix} -1 & 3 \\ -1 & 4 \end{bmatrix}$.

OR

b Find the Eigen values of $\begin{pmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{pmatrix}$.

- 8 a Solve the system of equation by Gauss–Elimination method
 $2x + y + 4z = 12$, $8x - 3y + 2z = 20$, $4x + 11y - z = 33$.

OR

b Solve by Gauss–Jordan method
 $5x - 2y + 3z = 18$, $x + 7y - 3z = 22$, $2x - y + 6z = 22$.

- 9 a Find the value of y for $x=5$ using Newton's interpolation for the following data

x	4	6	8	10
y	1	3	8	16

OR

Cont...

- b. Using Lagrange's interpolation find $y(2)$ from the following data:

x	0	1	3	4	5
y	0	1	8	256	625

- 10 a Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by Trapezoidal rule with $h=0.2$.

OR

- b Evaluate $\int_0^1 xe^x dx$ by Simpson's $\frac{1}{3}$ rule with $h=0.25$.

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 $\cos \theta$.

OR

- b Expand $\sin^3 \theta \cos^5 \theta$ in a series of sines of multiples of θ .

- 12 a Find the Eigen values and Eigen vector of $\begin{pmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{pmatrix}$.

OR

- b Find the characteristic equation of the matrix $\begin{pmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{pmatrix}$ and hence obtain the inverse.

- 13 a Solve the following systems of equation by Gauss- Jacobi methods
 $10x + 2y + z = 9$, $x + 10y - z = -22$, $-2x + 3y + 10z = 22$.

OR

- b Solve the system by Gauss-Seidal method.

$$10x - 5y - 2z = 3, \quad 4x - 10y + 3z = -3, \quad x + 6y + 10z = -3$$

- 14 a Using Newton's formula, calculate the population during the year 1895 and 1925.

Year	1891	1901	1911	1921	1931
Population(thousands)	46	66	81	93	101

OR

- b Find the value of $f(x)$ corresponding to $x=27$.

x	14	17	31	35
f(x)	68.7	64.0	44.0	39.1

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

x	1	1.05	1.1	1.15	1.2	1.25	1.3
y	1	1.025	1.049	1.072	1.095	1.118	1.14

OR

- b Evaluate $\int_0^1 \frac{dx}{1+x}$ using Romberg's method and correct to three decimal places. Hence evaluate \log_e^2 .