

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION DECEMBER 2018
(First Semester)

Branch - **CHEMISTRY**

MATHEMATICS -1

Time: Three Hours

Maximum: 75 Marks

SECTION-A OO Marks!

Answer **ALL** questions

ALL questions carry **EQUAL** marks

(10 x 1 = 10)

The equation $x^3+x^2+x+1=0$ has-----

- (i) two real roots and one complex root (ii) three real roots
(iii) one real root and two complex roots (iv) three complex roots

The equation $x^4-3x^3+4x^2+x+1=0$ will be transformed by decreasing the roots by unity into the reciprocal equation

- (i) $x^4-x^3+x^2+x-1=0$ (ii) $x^4+x^3+x^2+x+1=0$ (iii) $x^4-x^3-x^2-x+1=0$ (iv) $x^4-4x^3-18x^2-3x+2=0$

The radius of curvature of the curve $y=4 \sin x$ at $x = \frac{\pi}{2}$ is

- (i) 4 (ii) 1 (iii) , 0 (iv) 1

The evolute of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is

- (i) another ellipse (ii) a parabola (iii) a circle (iv) a four cusped cycloid

$\int_0^{\pi} \cos^2 x dx =$

- 0
(i) 0 (ii) $\frac{\pi}{2}$ (iii) $\frac{\pi}{4}$ (iv) $\frac{\pi}{8}$

$\int_0^{\pi} \sin^9 x dx =$

- 0
(i) $\frac{64}{105}$ (ii) $\frac{128}{315}$ (iii) $\frac{48}{105}$ (iv) $\frac{128\pi}{730}$

The value of $\int_0^1 \int_0^1 \int_0^1 x^2 y^2 z^2 dz dy dx =$

- (i) 13 (ii) 26 (iii) 4 (iv) 3

The value of $\int_0^1 \int_0^1 (x^2 + y^2) dy dx =$

- $\frac{5}{6}$ (ii) 1 (iii) 1 (iv) 0

Expansion of $\cos^n \theta$ is

- (i) $-\frac{1}{2^n} [\cos^n \theta + n C_1 \cos(n-2)\theta + n C_2 \cos(n-4)\theta + \dots]$
(ii) $[\cos^n \theta + n C_1 \cos(n-2)\theta + n C_2 \cos(n-4)\theta + \dots]$
(iii) $-\frac{1}{2^n} [\cos^n \theta + n C_1 \cos(n-2)\theta + n C_2 \cos(n-4)\theta + \dots]$
(iv) $-\frac{1}{2^n} [\cos^n \theta + n C_1 \cos(n-1)\theta + n C_2 \cos(n-2)\theta + \dots]$

SECTION - B (25 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks (5 x 5 = 25)

11 a Classify that the relations between the roots and the co-efficients of equation.

OR

b Narrate by one the roots of $x^4 - 4x^3 - 7x^2 + 22x + 24 = 0$ and hence solve it.

12 a Calculate $\int_0^{\pi} x \cos x - a \cos 3x; y = 3a \sin x - a \sin 3x$.

OR

b Find the centre of curvature of $y = x^2$ at the origin.

13 a Calculate (i) $\int \frac{1}{2x^2 + 3x + 4} dx$ (ii) $\int \frac{1}{3 - 2x - 3x^2} dx$

OR

2 a 3 ,

b Solve the value of J

$$\int_0^1 \sqrt{2ax - x^2} dx$$

2.3 2

14 a Solve $\int_0^1 \int_1^2 \int_1^2 x y^2 z dz dy dx$.

0 1 1

OR

b Examine the area of the cardioid $r = a(1 + \cos \theta)$ by double integration.

15a Using De Moivre's theorem, expand $\cos^8 \theta$ in a series of cosines of multiples of θ .

OR

b If $x + iy = \sin(A + iB)$, show that $\frac{x^2 + y^2}{\cosh^2 B \sinh^2 B} = 1$ and $\frac{y}{x} = \tan A \cot A = 1$.

SECTION - C (40 Marks!)

Answer ALL questions

ALL questions carry EQUAL Marks (5 x 8 = 40)

16 a Solve the equation $3x^6 + x^4 - 27x^2 + 27x - 3 = 0$.

OR

b Transform the equation $x^4 - 8x^3 - x^2 + 68x + 60 = 0$ into one which does not contain the term in x^3 . Hence discuss the equation.

3 - 3

17 a Discover P at (9,0) on $y^2 = \dots$.

OR

b Discover the centre of curvature of the curve, $x = a(\cos t + \sin t); y = a(\sin t - \cos t)$ and point out that its evolute is a circle.

18 a Examine, (i) $\int (2x + 3)\sqrt{2x^2 + 3x + 4} dx$, (ii) $\int (3x + 7)\sqrt{1 - x - x^2} dx$.

OR

b Examine $\int_0^{\pi} \sin x + \cos x dx$

$$\int_0^1 \int_0^2 \int_0^4 \sqrt{2x - x^2} dx dy dz$$

19 a Identify the value $\int_0^1 \int_0^2 \int_0^4 \sqrt{2x - x^2} dx dy dz$.

0 0 0

OR

b Discover the volume of the tetrahedron bounded by the coordinate planes and

x, y, z ,

a, b, c

20 a Discuss $\cos 60^\circ$ and $\frac{\sin 60^\circ}{\sin 30^\circ}$ in series of powers of $\cos \theta$.

OR

b If $x + iy = \tan(A + iB)$, then discover that,