

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION MAY 2017
(First Semester)

Branch - MATHEMATICS

CLASSICAL ALGEBRA & TRIGONOMETRY

Time : Three Hours

Maximum : 75 Marks

SECTION-A (20 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(10x2 = 20)

Define the limit of a sequence and give a example.

If $U_1+u_2+\dots+u_n+\dots$ is convergent, then prove that $\lim_{n \rightarrow \infty} = 0$.

State Raabe's test.

Define conditionally convergent series and given an example.

Frame the equation whose one root is $-2 + 4i$.

If a, p, y are the roots of the equation $x^3 + px^2 + qx + r = 0$, find the value of X a p

Prove that $\cosh 2x = \frac{1 + \tanh^2 x}{1 - \tanh^2 x}$.

8 Separate into real and imaginary parts of $\sinh(a + ip)$.

9 Find $\text{Log}(1 + i)$.

10 Sum to n terms the series $\sin a + \sin 2a + \sin 3a + \dots$

SECTION - B (25 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks (5x5 = 25)

11 a If $\{a_n\}$ converges to a and $\{b_n\}$ to b, then prove that $\{a_n b_n\}$ converges to ab.

OR

b Test the convergence of the series $\frac{115}{1.2.3} + \frac{7}{2.3.4} + \frac{7}{3.4.5} + \frac{7}{4.5.6} + \dots$

12 a Test the convergency the series $\sum_{n=0}^{\infty} \frac{1}{2^n + 1}$

OR

1.3a(a + b) 1.3.5 a(a + 1)(a + 2)
2 b 2.4b(b + 1) 2.4.6 b(b + 1)(b + 2)

convergent if $a > 0$, $b > 0$ and $b > a + \sqrt{a}$.

13 a Find the sum of the cubes of the roots of the equation $x^5 = x^2 + x + 1$.

OR

b Solve the equation $x^4 - 10x^3 + 26x^2 - 10x + 1 = 0$.

14 a Expand $\sin^4 \theta \cos^2 \theta$ in a series of cosines of multiples of θ .

OR

b If $\cos(x+iy) = \cos x + i \sin x$, prove that $\cos 2x + \cosh 2y = 2$.

15 a Prove that $i^n = e^{A4n+A/2} f_w$ here n is an integer.

OR

Find the sum the series to infinity : $\cos \theta + \frac{c^3}{c^5} \cos 3\theta + \dots + \cos 5\theta + \dots$

SECTION - C (30 Marks)

Answer any THREE Questions

ALL Questions Carry EQUAL Marks (3 x 10 = 30)

- 16 State and prove Cauchy's general principle of convergence.
- 17 Examine the convergence of the series $1^{(n+1)(n+2)} \dots (n+n)$
- 18 If $a, 3, y$ are the roots of $x^3 + px^2 + qx + r = 0$, from the equation whose roots are $p + y - 2a, y + a - 2p, a + p - 2y$.

i) If $\tan^{-1} x = \tanh^{-1} y$

ii) Find $\lim_{\theta \rightarrow 0} \frac{\tan \theta + \sec \theta - 1}{\tan \theta - \sec \theta + 1}$

20 If $\frac{1}{2} < \theta < \frac{1}{2}$, find the sum to infinity of the series

$$1 + \frac{1}{2} \cos 2\theta - \frac{1}{2.4} \cos 4\theta + \frac{1.3}{2.4.6} \cos 6\theta - \dots$$

Z-Z-Z

END