PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2018
(Third Semester)

Branch – **MATHEMATICS WITH COMPUTER APPLICATIONS**

CLASSICAL ALGEBRA & TRIGONOMETRY

Time : Three Hours Maximum : 75 Marks

SECTION-A (20 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 x 2 = 20)

1 Define Symmetric function of the roots.
2 Define Reciprocal equation.
3 Define Convergent sequence.
4 Define Dedikind's theorem.
5 Define D Alembert's ratio.
6 Show that the series $\sum_{n=1}^{\infty}\frac{1}{n^3+n^4x^2}$ is uniformly convergent for all values of x.
7 Expand $\cos n\theta$.
8 Verify $\sinh 2x = 2\sinh x\cosh x$.
9 Find log(x+iy).
10 Prove that $2\sqrt{3}\left[1-\frac{1}{3}+\frac{1}{5}.\frac{1}{3^2}-\frac{1}{7}.\frac{1}{3^3}+\ldots\right]=\pi$.

SECTION - B (25 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 5 = 25)

11 a Solve the equation $x^4-5x^3+4x^2+8x-8=0$ given that one of the roots is $1-\sqrt{5}$.

OR

b If α,β,γ are the roots of the equation $x^3+ax^2+bx+c=0$ from the equation whose roots are $\alpha\beta,\beta\gamma$ and $\gamma\alpha$.

12 a Show that $\left\{\frac{n}{n+1}\right\}$ is a monotonic increasing sequence.

OR

b Show that the series $1+\frac{1}{2}+\frac{1}{3}+\ldots$ is divergent.

13 a Discuss the convergence of the series $\sum(-1)^{n-1}.\frac{1}{n^p}$ when $0<p\le 1$.

OR

b Show that the series $\sum_{1}^{\infty}\frac{x}{n(1+nx^2)}$ is uniformly convergent for all values of x.

14 a Express $\cos 8\theta$ in terms of $\sin\theta$.

OR

b Separate into real and imaginary parts of $\tanh(1+i)$.

15 a Deduce the expansion of $\tan^{-1}x$ in powers of x from the expansion of log(a+ib)

OR

b Prove that $\tan^{-1}\frac{1}{2}+\tan^{-1}\frac{1}{3}=\frac{\pi}{4}$.

Cont...

SECTION - C (30 Marks)

Answer any **THREE** Questions
ALL Questions Carry **EQUAL** Marks (3 x 10 = 30)

16 Solve the equation $81x^3-18x^2-36x+8=0$ whose roots are in harmonic progression.

17 Find the limit of the sequence $\{a_n\}$ where $a_n = \left(1+\frac{1}{n}\right)^n$

18 Test for convergency and divergency of the series $1+\frac{2x}{2!}+\frac{3^2x^2}{3!}+\frac{4^3x^3}{4!}+\frac{5^4x^4}{5!}+....$

19 If $\tan(x+y)=u+iv$, prove that $\frac{u}{v}=\frac{\sin 2x}{\sinh 2y}$.

20 Sum the series $\sin^3\frac{\theta}{3}+3\sin^3\frac{\theta}{3^2}+3^2\sin^3\frac{\theta}{3^3}+...$ to n terms.

Z-Z-Z END