14MCU08

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2019
(Third Semester)

Branch – **MATHEMATICS WITH COMPUTER APPLICATIONS**

CLASSICAL ALGEBRA AND TRIGONOMETRY

Time : Three Hours Maximum : 75 Marks

SECTION-A (20 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks (10 x 2 = 20)

1 Express the symmetric function of the roots $x^3 + px^2 + qx + r = 0$ if α, β and γ are the roots.

2 Define Reciprocal equation.

3 Define Dedikind's theorem.

4 Define monotonic increasing sequence.

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

6 State Raabe's test.

7 Expand $\sin n\theta$.

8 Verify $\cos h^2 x - \sin h^2 x = 1$.

9 Find $\log(1 - i)$.

10 Prove that $2\sqrt{3}[1 - \frac{1}{3} + \frac{1}{5}.\frac{1}{3^2} - \frac{1}{7}.\frac{1}{3^3} + ...] = \pi$.

SECTION - B (25 Marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks (5 x 5 = 25)

11 a Frame an equation with rational coefficients, one of whose roots is $\sqrt{5} + \sqrt{2}$.

OR

b If α, β and 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 Prove that $1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + ...$ is convergent.

13 a Test for convergence of the series $a + b + a^2 + b^2 + a^3 + b^3 + ...$

OR

b Examine the convergence of $\frac{1^2}{2^2} + \frac{1^2.3^2}{2^2.4^2} + \frac{1^2.3^2.5^2}{2^2.4^2.6^2} + ...$

14 a Find the equation, whose roots are $\tan\frac{\pi}{5}$, $\tan\frac{2\pi}{5}$, $\tan\frac{3\pi}{5}$ and $\tan\frac{4\pi}{5}$.

OR

b Prove that $\tan 2\theta = \frac{2\tan\theta}{1 - \tan^2\theta}$.

15 a Find the sum of the series $\operatorname{cosec}\theta + \operatorname{cosec} 2\theta + \operatorname{cosec} 2^2\theta + ... \operatorname{cosec} 2^{n-1}\theta$.

OR

b Prove that $\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{8} = \frac{\pi}{4}$.

SECTION - C (30 Marks)

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

16 Solve the equation $6x^5 - x^4 - 43x^3 + 43x^2 + x - 6 = 0$.

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

18 Discuss the convergency of the series $\frac{1}{1+x}+\frac{1}{1+2x^2}+\frac{1}{1+3x^3}+\frac{1}{1+4x^4}+.....$

19 Separate into real and imaginary parts of $\tan^{-1}(x+iy)$.

20 Sum the series :
Sin h x + sin h(x + y) + sin h (x + 2y) + ... to n terms

Z-Z-Z END