B.Sc DEGREE EXAMINATION,APRIL 2019
I Year I Semester
Trigonometry and Analytical Geometry of 2 Dimensions

Time : 3 Hours **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. Write down the expansion of $tan\ n\theta$ in powers of $tan\ \theta$.
2. Write down the expansion of $sin\ \theta$ in a series of ascending powers of θ.
3. Express $\sinh^{-1}x$ in terms of logarithmic function.
4. Express $\tanh^{-1}x$ in terms of logarithmic function.
5. Write down the expression for $log\ x$.
6. Write down the expression for $Log_e(iy)$.
7. State Gregory's series
8. What is sum to infinity of the series $1+\frac{1}{2}cos\ 2\theta-\frac{1}{2.4}cos\ 4\theta+\frac{1.3}{2.4.6}cos\ 6\theta-\ldots$ for $-\frac{\pi}{2}<\theta<\frac{\pi}{2}$.
9. Write down the polar of a point (x_1, y_1) with respect to a parabola $y^2 = 4ax$.
10. Write down the equation of the tangent to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ at (x_1, y_1).
11. Show that $sech^2\ x = 1 - tanh^2\ x$
12. Write down the expansion of $cos\ \theta$ in powers of θ, when θ is expressed in radians.

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. Express $cos\ 8\theta$ in terms of $sin\ \theta$.
14. Prove that $cosh^2x + sinh^2x = cosh\ 2x$.
15. Find $Log(1-i)$.
16. Sum to infinity of the series $c\ sin\ \alpha+\frac{c^2}{2!}sin\ 2\alpha+\frac{c^3}{3!}sin\ 3\alpha+\ldots$
17. Find the polar of the point $(3, 4)$ with respect to the parabola $y^2 = 4ax$.
18. Expand $cos^6\theta$ in series of cosines of multiples of θ.
19. Express $cosh^6\theta$ in terms of hyperbolic cosines of multiples of θ.

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. Express $\frac{sin\ 6\theta}{sin\ \theta}$ in terms of $cos\ \theta$.
21. If $sin(A + iB) = x + iy$, then prove that

    a.) $\frac{x^2}{sin^2\ A} - \frac{y^2}{cos^2\ A} = 1.$

    b.) $\frac{x^2}{cosh^2\ B} + \frac{y^2}{sinh^2\ B} = 1$

22. Deduce the expansion of $tan^{-1}x$ in powers of x from the expansion of $log(a+ib)$.
23. Find the sum to infinity of the series $sin\ \alpha + c\ sin\ (\alpha + \beta) + \frac{c^2}{2}\ sin\ (\alpha + 2\beta) + \ldots$ when $|c| < 1$.
24. Find the locus of poles of all tangents to the parabola $y^2 = 4ax$ with the respect to parabola $y^2 = 4bx$.

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