B.Sc. DEGREE EXAMINATION,APRIL 2020
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. If $x = cos\theta + isin\theta$, what is the value of $(x - \frac{1}{x})^n$?
2. Write the expression for $sinn\theta$.
3. If $tan\frac{x}{2} = tanh\frac{y}{2}$, prove that $cosxcoshy = 1$.
4. What is the real part of $sin(\theta + i\phi)$
5. Find the general value of $Log\ (x{+}iy)$
6. Find the value of $Log\ (1{+}i)$
7. Prove that $\pi{=}2\sqrt{3}\ \left\{1{-}\frac{1}{3^2}{+}\frac{1}{5}\ .\frac{1}{3^2}{-}\frac{1}{7}\ .\frac{1}{3^3}{+}\ldots\right\}$
8. Write Gregory's series.
9. Write the condition for the line $y{=}mx{+}c$ to be a tangent to the parabola $y^2{=}4ax$
10. Find the pole of the line $Ax{+}By{+}c{=}0$ with respect to the parabola $y^2{=}4ax$
11. If $tan\ hx{=}sin\ \theta$, show that $cos\ hx{=}sec\ \theta$
12. Find A and B if $cos\ \ (x{+}iy) = (A{+}iB)$

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

Answer any **FIVE** questions

13. Express $cos9\theta$ in terms of $sin\theta$
14. Show that $sin\ h_x{}^{-1}{=}log_e(x{+}\sqrt{x^2{+}1})$
15. Show that $Log_i i{=}\dfrac{4n{+}1}{4m{+}1}$, where m and n are integers.
16. Sum to infinity the series $c\ sin\ \alpha{+}\dfrac{c^2}{2!}\ sin\ 2\alpha{+}\dfrac{c^3}{3!}\ sin\ 3\alpha\ {+}\ldots$
17. Show that the conjugate lines through a focus of an ellipse are at right angles.
18. Expand $sin^6\theta$ in series of cosines of multiples of θ
19. Find the locus of the poles of all tangents to the parabola $y^2{=}4ax$ with respect to the parabola $y^2{=}4bx$

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

Answer any **THREE** questions

20. Expand $sin^4\theta\ cos^2\theta$ in series of cosines of multiplies of θ
21. Separate into real and imaginary parts $tan^{-1}(x+iy)$
22. If $Log\ sin\,(\theta+i\phi)=L+iB$, prove that $2e^{2L}=cosh2\phi-cos\ 2\theta$
23. Sum to infinity the series $sin\ \alpha+c\ sin\,(\alpha+\beta)+\frac{c^2}{2}\ sin\ (\alpha+2\ \beta)+\ldots$ when $|c|<1$
24. The polar of a point P with respect to the parabola $y^2=4ax$ meets the curve in Q and R. Show that if P lies on the line $lx+my+n=0$, then the middle point of QR lies on the parabola $l\left(y^2-4ax\right)+2a\,(lx+my+n)=0$.