SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN (AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai — 600 044.
B.Sc. END SEMESTER EXAMINATIONS APRIL-2022
SEMESTER - I
08UMACT1001 **&** UMA/CT/1001 - **Trignometry and Analytical Geometry of Two dimensions**

Total Duration : 3 Hrs. **Total Marks : 60**

Section A

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. Expand $\cos 6\theta$ in terms of $\sin\theta$.
2. Separate real and imaginary parts of $\tan^{-1}$(x+iy).
3. Prove that, $i^i = e^{-}(4n+1)\frac{\pi}{2}$
4. Find the sum to infinity of the series $c\cos\alpha$ - $\frac{c^3}{3}\cos 3\alpha + \frac{c^5}{5}\cos 5\alpha$ - ...
5. Find the polar of the point (x_1, y_1) with respect to the parabola $y^2 = 4ax$.
6. Expand $\sin^7\theta$ in a series of sines of multiples of θ.
7. Show that, $\tanh^{-1} x = \frac{1}{2}\, log_e \left(\frac{1+x}{1-x}\right)$.
8. Find the sum to infinity of the series $c\sin\alpha + \frac{c^2}{2!}\sin 2\alpha + \frac{c^3}{3!}\sin 3\alpha + ...$

Section B

Answer any **THREE** questions $(3 \times 10 = 30$ Marks)

9. Show that, $\frac{\sin 6\theta}{\sin\theta} = 32\cos^5\theta - 32\cos^3\theta + 6\cos\theta$.
10. If $u = log\tan(\frac{\pi}{4}+\frac{\theta}{2})$, then show that $\tanh\frac{u}{2} = \tan\frac{\theta}{2}$ and θ = -i log tan $(\frac{\pi}{4}+i\frac{u}{2})$.
11. If log $\sin(\theta+i\varphi) = A + i\,B$, then show that
    (i) 2 $e^{2A} = \cos h\, 2\varphi$ - $\cos 2\theta$
    (ii) $\cos(\theta - B) = e^{2\varphi}\cos(\theta + B)$
12. Find the sum to infinity of the series
    $\cos\alpha + \frac{1}{2}\cos(\alpha+\beta) + \frac{1.3}{2.4}\cos(\alpha+2\beta) + \frac{1.3.5}{2.4.6}\cos(\alpha+3\beta)$...
13. Find the pole of the line $lx+my+n=0$ with respect to the ellipse
    $\frac{x^2}{a^2}+\frac{y^2}{b^2} = 1$.

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