V.P.& R.P.T.P.Science College , Vallabh Vidyanagar.
B.Sc.(Semester - I) Internal Test
US01CMTH01
(ANALYTIC GEOMETRY AND COMPLEX NUMBERS)

Date. 6/10/2016 ; Thursday 1.30 p.m. to 2.30 p.m. Maximum Marks: 25

Que.1 Fill in the blanks. 3

(1) Parametric equation for $\sqrt{x} - \sqrt{y} = \sqrt{a}$ are .....

(a) $x = a\sec^4\theta$; $y = a\tan^4\theta$ (b) $x = a\tan^4\theta$; $y = a\sec^4\theta$

(c) $x = a\cos^3\theta$; $y = a\sin^3\theta$ (d) $x = a\cos^4\theta$; $y = a\sin^4\theta$

(2) Reciprocal curve of $r = \frac{10}{3-2\sin\theta}$ is .....

(a) cardioid (b) Ellipse (c) Surround the pole (d) Hyperbola

(3) If $z = 2 + 3i$ then $z.\overline{z}$ = ...

(a) 13 (b) $\sqrt{13}$ (c) -5 (d) 5

Que.2 Answer the following (Any Two) 4

(1) Find equation of normal to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ at $(acos\theta, bsin\theta)$.

(2) Find equation of tangent to the circle with radius 2 at the point $(2, 135^0)$.

(3) Find the cube roots of unity .

Que.3 (a) If a curve is given by $x = f(t)$; $y = g(t)$ and that both x and y get numerically large as t approaches some number , say a . Then prove that an oblique asymptote to the curve , if it exist, is given by $y = mx + c$, where $m = \lim_{t\to a} \frac{dy}{dx}$ and $c = \lim_{t\to a}(y - mx)$. 4

(b) Find tangent parallel to axes for $x = cos^2\theta$; $y = 2sin\theta$. 2

OR

Que.3 (a) Sketch the curve given by $y = \frac{x^2-1}{x^2-4}$. 4

(b) Find any one oblique asymptote for the curve given by $x = t + \frac{1}{t^2}$; $y = t - \frac{1}{t^2}$. 2

Que.4 (a) In usual notation prove that $r = \frac{p\,e}{1 - e\,\cos\theta}$. 3

(b) If any straight line through the pole meets the circle $r^2 - 2rd\cos(\theta - \alpha) + d^2 - a^2 = 0$ at point P and Q . Then prove that $OP \cdot OQ = d^2 - a^2$. 3

OR

Que.4 (a) Prove that polar equation of circle with centre (r_1, θ_1) and radius a is given by $r^2 + r_1^2 - 2rr_1cos(\theta - \theta_1) = a^2$. Also find equation of circle if centre is on polar axis at distance a from the pole . 4

(b) Find the perpendicular distance of line $2\sqrt{2} = r(\sqrt{3}cos\theta + sin\theta)$ from the pole . 2

Que.5 State and prove De-Moivre's theorem . 6

OR

Que.5 (a) Prove that $(1 + cos\theta + isin\theta)^n + (1 + cos\theta - isin\theta)^n = 2^{n+1}cos^n(\theta/2)cos(n\theta/2)$. 3

(b) Prove that $cos6\theta = 32cos^6\theta - 48cos^4\theta + 18cos^2\theta - 1$. 3

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