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

Date. 8/10/2015 ; Thursday **1.30 p.m. to 2.30 p.m.** **Maximum Marks: 25**

Que.1 Fill in the blanks. 3

(1) Parametric equation for $x^{2/3} - y^{2/3} = a^{2/3}$ are ....
(a) $x = a\cos^3\theta$; $y = a\sin^3\theta$ (b) $x = a\sec^3\theta$; $y = a\tan^3\theta$
(c) $x = \cos^3\theta$; $y = \sin^3\theta$ (d) $x = a\tan^3\theta$; $y = a\sec^3\theta$

(2) Polar equation of vertical line through the point $(-3, 180^0)$ is ....
(a) $3 = r\cos\theta$ (b) $3 = r\sin\theta$ (c) $3 = -r\sin\theta$ (d) $3 = -r\cos\theta$

(3) For $z = 1 + \cos\alpha + i\sin\alpha$, amp z = ...
(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{2} - \frac{\alpha}{2}$ (c) $\frac{\alpha}{2}$ (d) $\frac{\pi}{2} + \frac{\alpha}{2}$

Que.2 Answer the following (Any Two) 4

(1) Find any one oblique asymptote , for the curve given by $x = t + \dfrac{1}{t^2}$; $y = t - \dfrac{1}{t^2}$.
(2) If $sin\alpha + sin\beta + sin\gamma = cos\alpha + cos\beta + cos\gamma = 0$ then prove that $sin3\alpha + sin3\beta + sin3\gamma = 3sin(\alpha + \beta + \gamma)$
(3) Find polar equation of circle centre at $(5, 210^0)$ and radius is 2.

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 an oblique asymptote to the curve , if it exist, is given by $y = mx + c$, where $m = \lim\limits_{t\to a} \dfrac{dy}{dx}$ and $c = \lim\limits_{t\to a} (y - mx)$. 3

(b) A circle of radius a rolls along a line without sliding . Show that the path traced by a point on the radius b units $(b < a)$ from the centre is given by $x = a\theta - b\sin\theta$; $y = a - b\cos\theta$. 3

OR

Que.3 (a) Sketch the curve given by $y = \dfrac{(x-1)(x+2)}{x(x+4)}$. 5

(b) Determine the extent for the curve given by $x = 4t^2 - 4t$; $y = 1 - 4t^2$. 1

Que.4 (a) In usual notation prove that $r = \dfrac{p\,e}{1 \pm e\,\sin\theta}$. 5

(b) Find the perpendicular distance of $4 = r(cos\theta - sin\theta)$ from the pole . 1

OR

Que.4 (a) Prove that equation of line not passing through the pole is $p = rcos(\theta - \omega)$,where (p, ω) is the foot of the perpendicular from the pole . Also find equation of horizontal line. 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

Que.5 (a) State and prove De-Moivre's theorem . 5

(b) Find the modulus of $\dfrac{(3 + \sqrt{2}\,i)^2}{1 + 3i}$. 1

OR

Que.5 (a) Express $\dfrac{\sin 6\theta}{\sin\theta}$ as a polynomial in $cos\theta$. 3

(b) Expand $cos^8\theta$ in a series of cosines of multiples of θ . 3

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