

R09

Code No: 09A30201

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B.Tech II Year I Semester Examinations, May/June-2013

Mathematics-III

(Common to EEE, ECE, EIE, ETM, ECOMPE, ICE)

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

1.a) Prove that $\int_0^1 \frac{x^8(1-x^6)dx}{(1+x)^{24}} = 0$

b) Prove that $J_4(x) = \left(\frac{48}{x^3} - \frac{8}{x}\right)J_1(x) + \left(1 - \frac{24}{x^2}\right)J_0(x)$ [15]

2.a) Prove that $\int_{-1}^1 x^2 P_{n+1} P_{n-1} dx = \frac{2n(n+1)}{(2n+1)(2n-1)(2n+3)}$

b) Prove that $(1-x^2)T_n'(x) = nT_{n-1}(x) - nxT_n'(x)$ [15]

3.a) Find the analytic function whose real part is $e^{2x}(x\cos 2y - y\sin 2y)$

b) Show that the function defined by $f(z) = \frac{x^3(1+i) - y^3(1-i)}{(x^2+y^2)}$ at $z \neq 0$, and $f(0) = 0$ is continuous and satisfies C.R equations at the origin, but $f'(0)$ does not exist. [15]

4.a) Evaluate $\int_0^{1+i} (x^2 - iy) dz$ along i) The straight line $y = x$ ii) Along $y = x^2$

b) Evaluate $\int_C \frac{(z+4)dz}{(z^2+2z+5)}$ where $\text{Cis}|z+1-i|=2$ [15]

5.a) Expand $\frac{z}{(z+1)(z+2)}$. About $z = 2$.

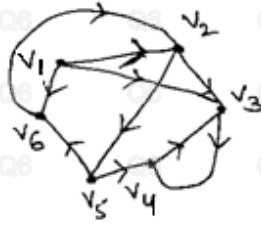
b) Expand $\frac{4z+3}{(z-3)(z+2)}$ in the annular region between $|z|=2$ and $|z|=3$ [15]

6. Evaluate $\int_0^{2\pi} \frac{d\theta}{5-3\cos\theta}$ by contour integration in complex plane. [15]

7.a) Show that the transformation $w=z^2$ maps the circle $|z-1|=1$ into the cardioid $\rho = 2(1+\cos\theta)$ where $w = \rho e^{i\varphi}$

b) Find the bilinear mapping which maps the points $z = -1, -i, -1$ into $i, 0, -i$. [15]

8.a) Find the in degree out degree of each vertex of the following graph



b) Give the adjacency matrix of the graph
 $G = [a, b, c, d, R]$, $R = [(a, b), (b, c), (d, c), (d, a)]$.

[15]

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