R09

Code No: 53007

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, November/December - 2018
MATHEMATICS-III
(Common to EEE, ECE, EIE)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1.a) Show that $\int_0^{\pi/2} \sin^m\theta \cos^n\theta \, d\theta = \frac{1}{2}\beta\left(\frac{m+1}{2}, \frac{n+1}{2}\right)$.

b) Evaluate $\int_0^{\pi/2} \sin^5\theta \cos^{7/2}\theta \, d\theta$. [8+7]

2. Prove that $p_n(x) = \frac{1}{2^n n!}\frac{d^n}{dx^n}(x^2-1)^n$. [15]

3.a) Find K such that $f(x,y) = x^3 + 3kxy^2$ is harmonic and find its conjugate.

b) Find the analytic function whose real part is $y + e^x \cos y$. [8+7]

4.a) State and prove Cauchy's integral formula.

b) Evaluate $\int_c \frac{e^{2z}}{(z+1)^4} dz$ around $C: |Z-1| = 3$. [7+8]

5.a) Expand $f(z) = \sin z$ in Taylor's series about (i) $z = \frac{\pi}{4}$ (ii) $z = \frac{\pi}{2}$.

b) Express $f(x) = \frac{z}{(z-1)(z-3)}$ in a series of positive and negative power of $(z-1)$. [7+8]

6. Show that $\int_0^{\pi} \frac{d\theta}{a+b\cos\theta} = \frac{\pi}{\sqrt{a^2-b^2}}, (a > b > 0)$ by the method of residues. [15]

7.a) Find the image of the region in the z- Plane between the lines $y = 0$ *and* $y = \pi/2$.

b) Determine the bilinear transformation that maps $(0,1,\infty)$ in the z –plane $(-1,-i,1)$ in the w-plane. [7+8]

8.a) Prove that a tree with 'n' vertices has precisely n-1 edges.

b) Prove that a connected graph G is Euler if and only if the degree of every vertex is even. [7+8]

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