R09

Code No: 53007

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year I Semester Examinations, May/June - 2019
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) Prove that $\beta\left(m,\frac{1}{2}\right) = 2^{2m-1}\beta(m,m)$

b) Show that $J_n(x) = \frac{1}{\pi}\int_0^{\pi} \cos(n\theta - x\sin\theta)d\theta$. [7+8]

2.a) Show that $(1-2xt+t^2)^{-\frac{1}{2}} = P_0(x) + P_1(x)t + P_2(x)t^2 + \cdots$

b) Prove that $P_n' - P_{n-2}' = (2n-1)P_{n-1}$. [8+7]

3.a) If $\tan\log(x+iy) = a+ib$, where $a^2+b^2 \neq 1$. Show that $\tan\log(x^2+y^2) = \frac{2a}{i-a^2-b^2}$.

b) If $u = e^x[(x^2-y^2)cosy - 2xysiny]$ is a real part of an analytic function. Find the analytic function. [7+8]

4.a) Evaluate $\int_{(0,0)}^{(1,1)}[3x^2+5y+i(x^2-y^2)]dz$ along with $y^2 = x$.

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

5.a) Find the Laurent series of $\frac{z^2-1}{(z+2)(z+3)}$ for $|z| > 3$.

b) Find the order of all zeros for the function $e^{\tan z}$. [8+7]

6. Show that using residue theorem, $\int_0^{2\pi} \frac{1}{a+bsin\theta}d\theta = \frac{2\pi}{\sqrt{a^2-b^2}}, a > b > 0$. [15]

7.a) Under the transformation $w = \frac{1}{z}$. Find the image of the circle $|z-2i| = 2$.

b) Find the bilinear transformation which maps the points (-1,0,1) into the points (0,*i*,3*i*). [7+8]

8.a) Define the following:
i) A circuit
ii) Connected graph
iii) Hamiltonian path.

b) Prove that number of edges in a bipartite graph with n vertices is at most (n^2/4). [8+7]

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