Code No: 53007 **R09**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD
B.Tech II Year I Semester Examinations, May/June - 2015
MATHEMATICS-III
(Common to EEE, ECE, EIE, ETM, ECM, AGE)

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

Answer any five questions
All questions carry equal marks

- - -

1.a) Evaluate $\int_0^1 x^4(\log\frac{1}{x})^3 dx$ using Gamma functions.

b) Prove that $\frac{d}{dx}\left[xJ_n(x)J_{n+1}(x)\right]=x\left[J_n{}^2(x)-J_{n+1}^2(x)\right]$. [7+8]

2.a) Prove that $(2n+1)xP_n(x)=(n+1)P_{n+1}(x)+(n)P_{n-1}(x)$.

b) Evaluate $\int_0^1 x^3(1-x^2)^{1/2}T_2(x)dx$. [8+7]

3.a) Find the analytic function whose real part is $e^{2x}(xCos2y-ySin2y)$.

b) Find the general and principal values of $\log(1+i\sqrt{3})$. [8+7]

4. Verify Cauchy's theorem for the function $f(z)=3z^2+iz-4$ if C is the square with vertices at $\pm1\pm i$. [15]

5.a) Expand ze^z about $z=1$.

b) Expand the function $\frac{1}{z^2}$ when $|z-2|<2$. [7+8]

6.a) Find the residue of $\frac{1}{(z-\sin z)}$ at $z=0$.

b) Evaluate using residue theorem $\int_0^\infty \frac{dx}{(x^4+16)}$. [6+9]

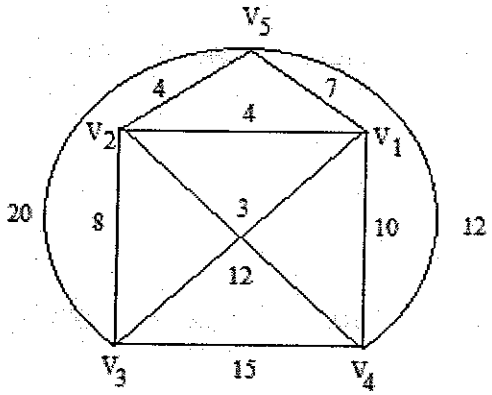
7.a) Find the image of the region $0<y<2$, under the mapping $w=\frac{1}{z}$.

b) Find the image of $|z|<1$ and $|z|>1$ under the transformation $w=\frac{iz+1}{z+i}$. [7+8]

8.a) Prove that in a graph G, the sum of even degrees at each vertex is equal to the sum of the odd degrees at each vertex which is equal to the total number of edges.

b) Prove that the number of odd degree vertices in a graph is always even.

c) Find the minimal spanning tree using Kruskals algorithm. [4+4+7]



--ooOoo--