R15 Code No: 123AH JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD **B.Tech II Year I Semester Examinations, November/December - 2016 MATHEMATICS-III** (Common to EEE, ECE, EIE, ETM)

Time: 3 Hours

Max. Marks: 75

Note: This question paper contains two parts A and B. Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A

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		(25 Marks)
1.a)	Solve $(x^2D^2+xD-4)y=0$.	[2]
b)	Find the particular solution of $4x^2\left(\frac{d^2y}{dx^2}\right) + 8x\left(\frac{dy}{dx}\right) + y = \frac{4}{\sqrt{x}}$.	[3]
c)	Express $x^2 - 1$ in terms of $P_n(x)$.	[2]
d)	Express J_2 in terms of J_0 and J_1 .	[3]
e)	Show that $f(z) = z z $ is not analytic anywhere.	[2]
f)	Find the harmonic conjugate of $u = 2xy + 3y$.	[3]
g)	Expand $\frac{1}{(z+1)}$, when $z > 1$.	[2]
h)	Find the co-efficient of z^3 in the expansion of $\frac{1}{z^2(1-z)}$.	[3]
i)	Evaluate the residue of $\frac{e^{z}}{z^{2}(z^{2}+9)}$ at $z = 0$.	[2]
j)	Find the image of $c < y < d$ under the transformation $w = e^{z}$.	[3]

Find the image of c < y < d under the transformation $w = e^{z}$. j)

PART-B

(50 Marks)

Solve in series $3x^2\left(\frac{d^2y}{dx^2}\right) + x\left(\frac{dy}{dx}\right) + y = x$ 2.

OR

3. Solve
$$(1+x)^2 \left(\frac{d^2 y}{dx^2}\right) + (1+x)\left(\frac{dy}{dx}\right) + y = 4\cos\log(1+x)$$
. [10]

- Prove that $\cos(x\cos\theta) = J_0 2J_2\cos2\theta + 2J_4\cos4\theta$ -----4.a)
 - Prove that $\sin(x\cos\theta) = 2J_3\cos 3\theta + 2J_5\cos 5\theta --$. b) [5+5]

Show that $\int_{-1}^{1} p_m \psi \psi \psi x$. Ma **naResults.co.in** 5. [10]

- 6.a) Find the analytic function whose real part is $\left(r \frac{1}{r}\right) \sin \theta$
- b) Evaluate $\int_{c} x^{2} y \, dx + (x^{2} y^{2}) \, dy$ form (0,0) to (1,3) along y=x². [5+5]
- 7. If $F(a) = \int_{c} \frac{(3z^{2} + 7z + 1)}{(z a)} dz$ using cauchy's integral formula where C is |z| = 2. Find F(1), F(3) F''(1-i). [10]

8. Expand
$$\frac{z}{(z+1)(z-3)}$$
 where (a) $c:|z| > 3$ (b) $c:|z| < 1$. [10]

OR

9. Expand
$$f(z) = \frac{z+3}{z(z^2-z-2)}$$
 in power of z
(a) $c: 0 < |z| < 1$ (b) $c: 1 < |z| < 2$ (c) $c: |z| > 2$. [10]

- 10.a) Prove that under the transformation w=1/z, the image of the lines y=x-1 and y=0 are the circle $u^2 + v^2 u v = 0$ and the line v=0, respectively.
 - b) Find the bilinear transformation which maps the points $(-1,\infty,1)$ to (-1,-2,i). [5+5] **OR**
- 11.a) Find the image of the triangle with vertices i,1+i and 1 in Z-plane under the transformation w=3z+4-2i. [5+5]

b) Show that the transformation $w = \frac{5-4z}{4z-2}$ transforms the circle |z| = 1 into a circle of radius unity in w-plane and find the centre of the circle. [5+5]

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