(DEC 221)

B. Tech. DEGREE EXAMINATION, MAY - 2015

(Examination at the end of Second Year)

ELECTRONICS & COMMUNICATIONS

Paper - I : Mathematics - IV

Time : 3 Hours **Maximum Marks : 75**

Answer question No.1 compulsory *(15)*

Answer ONE question from each unit *(4 × 15 = 60)*

1) a) Define entire function.

b) Define Cauchy Riemann equation in Cartesian form.

c) Define orthogonal system.

d) Define Taylor’s series.

e) Define Bessel’s equation.

f) Define Legendre’s equation.

g) Define frobenius method.

h) Define Removable singularity.

i) Define Residue theorem.

j) Find the Residue of $f(z) = \dfrac{1}{(z-1)(z+3)}$ at $z = 1$

k) Define pole.

l) Write expression for $p_3(x)$.

m) Write orthogonal property of Legendre polynomial.

n) Define conjugate of a function.

o) Define zero's of a function.

UNIT - I

2) a) State and prove Riemann equation for polar coordinates.

b) Show that $f(z) = xy + iy$ is every where continuous but is not analytic.

OR

3) a) If $w = \log z$ find $\frac{dw}{dz}$ and determine where w is non – analytic.

b) Find the orthogonal trajectories of family of curve $x^4 - 6x^2y^2 + y^4 = C$.

UNIT – II

4) a) Find the Taylor's serie's expansion of $f(z) = \dfrac{2z^2 + 9z + 5}{z^3 + z^2 - 8z - 12}$ about $z_0 = 1$.

b) Compute $\oint_c \dfrac{z+4}{z^2+2z+5}\,dz$ where c is $|z+1 - i| = 2$

OR

5) a) State and prove taylor's series.

b) Find the taylors series expansion of $f(z) = \dfrac{2z^2 + 9z + 5}{z^3 + z^2 - 8z - 12}$.

UNIT - III

6) a) State and prove Residue theorem.

b) Show that $\int_0^{2\pi} \dfrac{\cos 2\theta}{1 - 2a\cos\theta + a^2}\,d\theta = \dfrac{2\pi a^2}{1-a^2} (a^2 < 1)$.

OR

7) a) Prove that $\int_0^{2\pi} \dfrac{d\theta}{a + \cos\theta} = \dfrac{2\pi}{\sqrt{a^2-1}} a > 1$

b) Solve the series in equation $y'' + xy' + y = 0$.

UNIT – IV

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

b) P.T. $P_n'(x) = xP_{n-1}'(x) + nP_{n-1}(x)$.

OR

9) a) Prove that $\frac{d}{dx}\ xJ_1(x)\ = xJ_0(x)$.

b) Show that $\int_{-1}^{1} xp_n(x)\ p_{n-1}\ \ x\ \ dx = \frac{2n}{4n^2-1}$.

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