Code: 13A54302

R13

B.Tech II Year I Semester (R13) Regular Examinations December 2014

MATHEMATICS – III

(Common to EEE, ECE and EIE)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) Evaluate $\int_0^\infty e^{-\sqrt{x}}dx$.

(b) If $P = {}^1/_4$, then $\Gamma(P)\,\Gamma(1-P) =$

(c) In Rodrigue's formula, $P_n(x) = CD^n\{(x^2-1)^n\}$ where $C =$

(d) $\int J_0(x)J_1(x)dx =$

(e) The harmonic conjugate of $u(x,y) = x^2 - y^2$ is $v =$

(f) The mobius transformation that maps the points $0, i, \infty$ respectively into $0,1,\infty$ is…..

(g) $\int_0^{1+i} z^2 dz =$.

(h) Define removable singularity with one example.

(i) Taylor's series expansion for $f(z) = (z-1)/(z+1)$ about $z = 0$

(j) $\text{Res}_{z=-2}[z^2/(z-1)(z+2)^2] =$

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT - I

2 Express $\int_0^3 \frac{dx}{\sqrt{9-x^2}}$ in terms of Beta function.

OR

3 Evaluate $\int_0^2 (8-x^3)^{-1/3}dx$ using $\beta - \Gamma$ function.

UNIT - II

4 Show that $J_n(x) = \frac{1}{\pi}\int_0^\pi (\cos n\theta - x\sin\theta)\,d\theta$, n being an integer.

OR

5 Prove that $P_n(-x) = (-x)^n P_n(x)$.

UNIT - III

6 Prove that $u = e^{-x}[(x^2-y^2)\cos y + 2xy\sin y]$ is harmonic and find the analytic function whose real part is u.

OR

7 Find the bilinear transformation that maps the points $(0,1,\infty)$ in the $z-$plane onto the points $(-1,-2,-i)$ in the $w-$plane.

UNIT - IV

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

OR

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

UNIT - V

10 Find the poles of $f(z) = \frac{z^2-2z}{(z+1)^2(z^2+1)}$ and the residues at these poles.

OR

11 Show that $\int_0^\infty \frac{x^2dx}{(x^2+a^2)(x^2+b^2)} = \frac{\pi}{2(a+b)}$.

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