R07

Code: R7210201

B.Tech II Year I Semester (R07) Supplementary Examinations December 2015

MATHEMATICS - III

(Common to EEE, ECE, EIE, E.Con.E & ECC)

(For 2008 regular admitted batch only)

Time: 3 hours Max. Marks: 80

Answer any FIVE questions

All questions carry equal marks

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

(b) $J_0(x) = \frac{1}{\pi}\int_0^{\pi} \cos(xsin\theta)d\theta = \frac{1}{\pi}\int_0^{\pi} \cos(xcos\theta)d\theta$.

2 (a) Show that $u = e^{-x}(xsiny - ycosy)$ is harmonic.

(b) Find the regular function whose imaginary part is $\log(x^2 + y^2) + x - 2y$.

3 (a) Find all solutions of $e^z = 3 + 4i$.

(b) Find all principle values of $(1 + i\sqrt{3})^{(1+i\sqrt{3})}$.

4 (a) Using Cauchy's integral formula, calculate $\int_C \frac{z}{(z-1)(z-2)^2}dz$ where $c: |z - 2| = 1/2$.

(b) Evaluate $\int_C z^{-2}\,dz$ where C is (i) $|z| = 1$.

5 Find the Taylor's expansion of $f(z) = \frac{2z^3+1}{z^2+3}$ about the point (i) $z = i$ (ii) $z = 1$.

6 Find the residues of $\frac{z^2-2z}{(z+1)^2(z^2+1)}$.

7 (a) Prove that all the zeros of $z^7 - 5z^3 + 12 = 0$ lie between the circles $C_1: |z| = 1$ and $C_2: |z| = 2$.

(b) State and prove fundamental theorem of algebra.

8 Find and plot the image of the regions:

(i) $x > 1$.

(ii) $y > 0$.

(iii) $0 < y < (\frac{1}{2})$.

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