

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST-3
(May 2018)

B.Tech CE - II SEMESTER

COURSE NAME : Mathematics-II
COURSE CODE : 10B11MA201
COURSE CREDITS : 04

MAXM. MARKS : 35
MAXM. TIME : 2 Hours

NOTE : Attempt all questions. Marks are indicated against each question.

1. Determine the analytic function $f(z) = u + iv$, whose real part

$$u = e^{2x}(x \cos 2y - y \sin 2y). \quad \text{[CO-5] [4]}$$

2. Evaluate $\int_C \frac{z+4}{z^2+2z+5} dz$, where C is the circle $|z+1+i|=2$, CCW. [CO-5] [4]

3. Using Cauchy Integral formula evaluate the integral $\int_C \frac{dz}{(z^2+4)^2}$, where C is the circle $|z-i|=2$, CCW. [CO-5] [4]

4. Expand $\frac{1}{z^2-3z+2}$ in the region $1 < |z| < 2$. [CO-6] [4]

5. If $J_{\frac{1}{2}}(x) = \sqrt{\frac{2}{\pi x}} \sin x$ and $J_{-\frac{1}{2}}(x) = \sqrt{\frac{2}{\pi x}} \cos x$, show that
- $$J_{\frac{5}{2}}(x) = \sqrt{\frac{2x}{\pi}} \left[\left(\frac{3}{x^3} - \frac{1}{x} \right) \sin x - \frac{3}{x^2} \cos x \right] \quad \text{[CO-3] [4]}$$

6. Solve the differential equation $y'' + y = 0$ in power series $y = \sum_{n=0}^{\infty} C_n x^n$. [CO-2] [4]

7. Find the value of the integral $\int_C \frac{z^2}{(z-1)^2(z+2)} dz$, using the Residues, where C is the circle $|z| = \frac{5}{2}$ CCW. [CO-6] [5]

8. Using the contour integral, determine the value of the real integral $\int_0^{2\pi} \frac{d\theta}{13+5\sin\theta}$. [CO-7] [6]
