

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST 3 EXAMINATION - DECEMBER 2018

B.Tech III Semester (CSE, ECE, IT)

COURSE CODE: 10B11MA201

MAX. MARKS: 35

COURSE NAME: MATHEMATICS-II

COURSE CREDITS: 04

MAX. TIME: 2 HRS

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Marks are indicated against each question in square brackets.

1. Test the series for convergence, $\frac{x^2}{2\sqrt{1}} + \frac{x^3}{3\sqrt{2}} + \frac{x^4}{4\sqrt{3}} + \dots, x > 0$. [CO-1][5]

2. Find the Fourier sine series for the function $f(x) = e^{5x}$ for $0 < x < \pi$. [CO-4][5]

3. Show that for the function $f(z) = \begin{cases} \left(\frac{-z}{z}\right)^2, & z \neq 0 \\ 0, & z = 0 \end{cases}$, the Cauchy-Riemann equations are satisfied at

the origin. Does $f'(0)$ exist? Justify your answer. [CO-5][5]

4. Find the bilinear transformation which maps the points $z = 1, i, -1$ into the points $w = i, 0, -i$.

[CO-5][5]

5. Expand $f(z) = \frac{1}{(z-1)(z-2)}$ for $1 < |z| < 2$ using Laurent's series. [CO-6][5]

6. Evaluate $\int_0^{2\pi} \frac{\cos \theta}{5 + 4 \cos \theta} d\theta$ by using the calculus of residues. [CO-7][5]

7. Apply calculus of residues to prove that $\int_{-\infty}^{\infty} \frac{x^2}{(x^2 + a^2)(x^2 + b^2)} dx = \frac{\pi}{a+b}, (a > 0, b > 0)$. [CO-7] [5]

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