PVP 14

Code: EC3T1

II B.Tech - I Semester–Regular/Supplementary Examinations
November 2016

ENGINEERING MATHEMATICS - III
(ELECTRONICS AND COMMUNICATION ENGINEERING)

Duration: 3 hours Max. Marks: 70

PART – A

Answer ***all*** the questions. All questions carry equal marks
11x 2 = 22 M

1.

a) Write the condition for the convergence of the Newton – Raphson's formula $x_{i+1} = x_i - \frac{f(x_i)}{f'(x_i)}$

b) Establish a relationship between the forward difference operator Δ and the shift operator E.

c) Using Euler's method find $y(0.1)$, given that $y' = (x^3 + xy^2)e^{-x}, y(0) = 1$

d) Given that $\frac{dy}{dx} = x + y, y(1) = 1$, find a first approximation formula by Picard's method to find y at given x .

e) Separate the real and imaginary parts of $f(z) = \sin z$.

f) Show that the imaginary part of $f(z) = e^z$ is a harmonic function.

g) Evaluate the integral $\int_0^{1+i} (x^2 - iy)\,dz$ along the line y = x .

h) Expand $f(z) = \frac{z-1}{z^2}$ in Taylor series about the point z = 1.

i) Find the residues at the poles of $f(z) = \cot z$ in (- π/2, π/2).

j) Write the statement of Cauchy's Residue theorem.

k) Define conformal mapping and state the sufficient condition for the function $w = f(z)$ to represent conformal mapping.

PART – B

Answer any ***THREE*** questions. All questions carry equal marks.

3 x 16 = 48 M

2.

a) Find a real root of the equation $2x - \log_{10} x = 7$ by the Method of false position. 8 M

b) A curve passes through the points (0 , 18), (1, 10), (3, –18) and (6 , 90). Find the slope of the curve at x = 2. 8 M

3.

a) Tabulate $y(0.1), y(0.2)$ using Taylor series method given that $y' = y^2 + x$ and $y(0) = 1$ 8 M

b) Using Milnes Predictor – corrector method find the solution of the equation $y' = x - y^2$ at x = 0.8, given that $y(0) = 0, y(0.2) = 0.02, y(0.4) = 0.0795, y(0.6) = 0.1762$ 8 M

4.

a) Prove that the function $f(z) = \frac{x^3(1+i) - y^3(1-i)}{x^2+y^2}, z \neq 0$

$= 0, z = 0$

satisfies Cauchy – Riemann equations at origin , yet $f'(0)$ does not exist. 8 M

b) Find an analytic function whose real part is $e^{-x}(x \sin y - y \cos y)$ 8 M

5.

a) Evaluate $\int_C \frac{e^z}{(z^2+\pi^2)^2} dz$ where C is | z | = 4. 8 M

b) Obtain all possible Laurent series of the function $\frac{7z-2}{(z+1)z(z-2)}$ about $z_0 = -1$ 8 M

6.

a) Show that $\int_0^{\pi} \frac{d\theta}{a^2 + \sin^2\theta} = \frac{\pi}{a\sqrt{1+a^2}}$ for $a > 0$ using Residue theorem. 8 M

b) Show that the transformation $w = \frac{1}{z}$ maps a circle to a circle or to a straight line if the former passes through origin. 8 M