Code No: R161110   **R16**   SET - 1

I B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2018
MATHEMATICS-II (NM&CV)
(Com to ECE, EIE, ECom E)

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is Compulsory
3. Answer any **FOUR** Questions from **Part-B**
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PART –A

1. a) Why we apply Numerical methods in finding the roots of the equations? (2M)

   b) Write the relation between δ, E (2M)

   c) Evaluate $\int_0^2 \frac{dx}{1-x}$ using Trapezoidal Rule. (2M)

   d) Is the function $f(z) = xy + iy$ analytic? (2M)

   e) Write C-R equations in polar form. (2M)

   f) Identify the singularity of $f(z) = \frac{z+1}{z(z-1)}$ at $z = 0$, $z = 1$. (2M)

   g) Define absolute convergence of the series. (2M)

PART -B

2. a) Solve $e^x = 3x$ by iteration method. (7M)

   b) Solve $x = \sqrt[3]{15}$ by bisection method. (7M)

3. a) Find y(1.3) using Newton's Backward difference formula from the table. (7M)

X	1	2	3	4
Y	349	482	591	655

   b) Find y(4) from the following data. (7M)

x	1	5	7	8
y	2	3	12	14

4. a) Find the solution of $\frac{dy}{dx} = \frac{x-y}{xy}$, y(1)=1 at x=1.5,1.6 using Taylor's series method. (7M)

   b) Find the solution of $\frac{dy}{dx} = x^2 - y^2$, y(2.5)=4 at x=3.0 ,3.5 using Modified series method. (7M)

5. a) Find the Harmonic conjugate of $\log\sqrt{x^2 + y^2}$ (7M)

   b) Find the Orthogonal trajectories of the family of curves $r^2 \cos 2\theta = c$ (7M)

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6. a) Evaluate $\int_C \frac{z+2}{z} dz$, where C is   (7M)

   (i) Upper half of the circle $|z|=2$ in the clock wise direction.

   (ii) Lower half of the circle $|z|=2$ in the anti-clock wise direction.

   b) *Represent f(z)* $= \frac{4z+3}{z(z-3)(z+2)}$ *in Laurent's series*   (7M)

   (i) $|z|=1$ (ii) $2 < |z| < 3$ (iii)$|z| > 3$

7. a) Evaluate $\int\limits_{0}^{\infty} \frac{x \sin mx}{(16+x^2)} dx$ (7M)

   b) Find the poles and residues of f(z) $= \frac{1-e^{2z}}{z^4}$ (7M)

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PART –A

1. a) What is mean by order of convergence. (2M)

   b) Write the relation between μ, E (2M)

   c) Evaluate $\int_0^5 \frac{dx}{3+x^2}$ using Trapezoidal Rule. (2M)

   d) Define limit and continuity of a complex function f(z). (2M)

   e) Prove that $f(z) = \sin z$ is analytic. (2M)

   f) Given an example for Non – Isolated Singularity. (2M)

   g) State Cauchy's integral theorem. (2M)

PART -B

2. a) Solve $e^{-x} = 10x$ by Newton Raphson method. (7M)

   b) Solve $\frac{1}{x} = \sin x$ by False position method. (7M)

3. a) Find y(38) using Gauss Backward difference formula from the table. (7M)

X	30	35	40	45	50
Y	15.9	14.9	14.1	13.3	12.5

   b) Find the y(3) from the following data. (7M)

x	0	1	2	6
y	2	3	12	147

   (7M)

4. a) Find the solution of $\frac{dy}{dx} = x - y$, y(0)=1 at x=0.1,0.2 using Picard's method.

   b) Find the solution of $\frac{dy}{dx} = x^2 - y$, y(0)=1 at x=0.1,0.2 using RK method of fourth order. (7M)

5. a) Find the analytic function $f(z) = u + iv$ where $v(x, y) = e^{-x}(x\cos y + y\sin y)$ (7M)

   b) Find the Orthogonal trajectories of the family of curves $x^4 - 6x^2y^2 + y^4 = c$ (7M)

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6. a) Evaluate $\int_C |z|^2 \, dz$ around the square with vertices $(0,0), (1,0), (1,1), (0,1)$, taken in positive sence.   (7M)

   b) Expand $f(z) = \dfrac{e^{2z}}{(z-1)^2}$ about $z = 1$ (7M)

7. a) Evaluate valuate $\oint_C \dfrac{z-3}{z^2+2z+5}$ where C is the circle   (7M)

        i) $|z+1-i| = 2$,   ii) $|z+1+i| = 2$

   using residue theorem.

   b) Show by the method of Contour integration Evaluate $\displaystyle\int_0^\infty \dfrac{\cos mx}{\left(a^2 + x^2\right)} \, dx$ (7M)

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PART –A

1. a) Write the formula to calculate the second approximation in False position method.   (2M)

    b) Prove that $\Delta \nabla = \Delta - \nabla$ (2M)

    c) Evaluate $\int_0^4 \frac{dx}{3+x^4}$ using Trapezoidal Rule.   (2M)

    d) Find Find $\underset{z \to 0}{Lt} \frac{z^2}{|z|}$ (2M)

    e) Find a and b if $f(z) = \left(x^2 - 2xy + ay^2\right) + i\left(bx^2 - y^2 + 2xy\right)$ is analytic.   (2M)

    f) Evaluate $\int_{(1,1)}^{(2,8)} x^2 + ixy)dz \ along \ by \ curve \ x = t, y = t^3$ (2M)

    g) Find the Residue of f(z) = $cosecz$ at z = 0.   (2M)

PART -B

2. a) Solve $3x+\sin x - e^x = 0$ by Bisection method.   (7M)

    b) Solve logx-cosx = 0 by Newton Raphson method.   (7M)

3. a) Find f(2.5) if f(1.7) = 5.4 , f(1.8) = 6.0 , f(1.9) = 6.86 , f(2) = 7.89.   (7M)

    b) Evaluate y(7)   from the following table.   (7M)

X	1	2	4	5	7
Y	2	4	6	8	10

4. a) Find the solution of $\frac{dy}{dx} = x+\sqrt{y}$, y(1)=1 at x=1.1,1.2 using RK method of fourth order   (7M)

    b) Evaluate $\int_0^1 e^{\tan x}dx$ using (i) Simpson's 1/3rd Rule (i) Simpson's 3/8th Rule   (7M)

5. a) Show that $f(z) = \begin{cases} \dfrac{xy^2(x+iy)}{x^2 + y^4} & if \ z \neq 0 \\ 0 & if \ z = 0 \end{cases}$ (7M)

    satisfies C-R equations at the origin but $f^1(z)$ does not exist

b) Find analytic function $f(z)$ given that $u + v = \dfrac{2sin2x}{e^{2y} + e^{-2y} - 2cos2x}$ (7M)

6. a) Evaluate $\oint_c (z + 1)dz$ where c is the boundary of the square whose vertices are at the points   z=0,   z =1,   z =1+i, z = i (7M)

   b) Find Laurent's series f(z) = $\dfrac{1}{(z+2)(z^2+1)}$ in (7M)

      (i) $|z|$ <1   (ii) $1 < |z| < 2$ (iii) $|z| > 2$

7. a) Find the poles and residues of f(z) = $\dfrac{z^2}{(z-1)^2(z+2)}$ (7M)

   b) Evaluate by Contour integration $\displaystyle\int_0^\infty \dfrac{dx}{a^2 + x^2}$ (7M)

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PART –A

1. a) Write the iterative formula to find $\sqrt{10}$ using Newton Raphson method.   (2M)

   b) Find $\Delta^2(\sin x)$ if h = 1.   (2M)

   c) What is RK method of first order?   (2M)

   d) Check analyticity by using C-R equations for $f(z) = e^x(\cos y + i \sin y)$ (2M)

   e) Evaluate $\int_0^{1+i}(x^2 - iy)dz$ along the paths y = x².   (2M)

   f) State generalized Cauchy's integral formula.   (2M)

   g) Find the residue of $f(z) = \frac{1}{z^3}$ at z = 0.   (2M)

PART -B

2. a) Solve $x = \sqrt{28}$ by False position method.   (7M)

   b) Solve $3x - \log x_{10} = 6$ by Iteration method.   (7M)

3. a) Fit y(0.5) from the following data.   (7M)

x	-1	0	1	2
y	1	5	7	12

   b) Find y(4) for the following data   (7M)

x	0	1	3	5
y	70	81	86	96

4. a) Find the solution of $\frac{dy}{dx} = x + ye^x$, y(2)=1at x=2.5,3.0 using modified Euler's method.   (7M)

   b) Evaluate $\int_0^\pi \frac{dx}{1+x^2}$ using (i) Simpson's 1/3rd Rule (i) Simpson's 3/8th Rule.   (7M)

5. a) If $f(z)$ is an analytic function show that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right)|f(z)|^2 = 4|f^1(z)|^2$ (7M)

   b) If $f(z)$ is an analytic function with constant modulus then $f(z)$ is constant.   (7M)

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6. a) Find the Laurent's series of $f(z) = \frac{z}{(z^2-1)(z^2+4)}$ for   (7M)

    (i) $|z| < 1$ (ii) $1 < |z| < 2$ (iii) $|z| > 2$

    b) Evaluate $\int_C \frac{e^2}{(z^2+\pi^2)^2}$ dz   where $C: |z| = 4$.   (7M)

7. a) Evaluate $\oint_c \frac{dz}{z \sin z}$, where C is the Circle $|z| = 1$ using residue theorem.   (7M)

    b) Evaluate $\int_0^\pi \frac{d\theta}{3 + 2\cos\theta}$ by the method of Residues.   (7M)