# B.Tech I Year (R13) Supplementary Examinations December 2019 <br> MATHEMATICS - II <br> (Common to EEE, ECE, EIE, CSE \& IT) 

Time: 3 hours
Max. Marks: 70

## PART - A

(Compulsory Question)
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1 Answer the following: ( $10 \times 02=20$ Marks $)$
(a) Find the Eigen values and the corresponding of $\left[\begin{array}{ll}5 & 4 \\ 1 & 2\end{array}\right]$.
(b) Show that $A=\left[\begin{array}{cc}2 & 3+4 i \\ 3-4 i & 2\end{array}\right]$ is Hermitian.
(c) Define algebraic and transcendental equations with example each.
(d) The value of $\int_{1}^{2} \frac{1}{x} d x$ by Simpson's $1 / 3$ rule (taking $\mathrm{n}=4$ ) is $\qquad$ .
(e) If $\frac{d y}{d x}=-y, y(0)=1, h=0.01$ then by Euler's method the value of $y_{1}$ is $\qquad$ .
(f) Write the Fourier series of $f(x)$ in $[C, C+2 L]$.
(g) Find the Fourier cosine transform $f(x)=e^{-a x}$.
(h) Define convolution theorem.
(i) Write the two dimensional Laplace equation.
(j) Form a partial differential equation by eliminating the arbitrary constants $a \operatorname{and} b$ from the equation: $z=a x+b y$.

PART - B
(Answer all five units, $5 \times 10=50$ Marks)

## UNIT - I

Reduce the matrix $A=\left[\begin{array}{cccc}2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7\end{array}\right]$
into its normal form and hence find its rank.

OR
Reduce the quadratic form $3 x^{2}+3 y^{2}+3 z^{2}+2 x y+2 x z-2 y z$ into canonical form using orthogonal transformation and find its rank, index and signature.

## UNIT - II

4 (a) Using Newton-Raphson method compute $\sqrt{41}$ correct to four decimal places.
(b) Find the root of an equation $2 x-\log x=6$ by Regula-falsi method.

OR
5 (a) Evaluate $\int_{0}^{1} x^{3} d x$ with five sub-intervals by Trapezoidal rule.
(b) Evaluate $\int_{1}^{2} \frac{e^{x}}{x} d x$ using Simpson's $\frac{1}{3}$ rule for $\mathrm{n}=4$.

UNIT - III
Using Euler's method, solve for $y$ at $x=0.1$ from $\frac{d y}{d x}=x+y+x y, y(0)=1$ taking step size $h=0.025$.

## OR

Find the Half range cosine series of $f(x)=x(1-x)$ in $[0,2]$.

UNIT - IV
8 Find the Fourier series for $f(x)= \begin{cases}-\pi, & -\pi<x<0 \\ x, & 0<x<\pi \\ \frac{-\pi}{2}, & x=0\end{cases}$

Hence deduce that $\frac{1}{1^{2}}+\frac{1}{3^{2}}+\frac{1}{5^{2}}+\ldots=\frac{\pi^{2}}{8}$.
OR
9 (a) Find $Z(n \sin n \theta)$.
(b) Find $Z^{-1}\left(\frac{z^{3}}{(z-3)(z-2)^{2}}\right),|z|>3$.

UNIT - V
Form the PDE by eliminating arbitrary function $f\left(x^{2}+y^{2}+z^{2}, x y z\right)=0$.
OR
11 A bar of length $l$ with insulated sides is initially $0^{\circ} \mathrm{C}$ temperature throughout the end $x=0$ is kept at $0^{\circ} \mathrm{C}$ for all time and heat is suddenly applied such that $\frac{\partial u}{\partial x}=10$ at $x=l$ for all time. Find the temperature function $u(x, t)$.

