Subject Code: R13207/R13 **Set No - 1**

I B. Tech II Semester Supplementary Examinations April/May - 2017

MATHEMATICS-II (MATHEMATICAL METHODS)

(Common to CE, ME, CSE, PCE, IT, Chem E, Aero E, Auto E, Min E, Pet E, Metal E, Textile Engg.)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

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PART-A

1. (a) Write the working rule to find the root of the equation y= f(x) by False position method.
   (b) Prove that $(1+\nabla)(1-\nabla)=1$
   (c) By RK method of second order find y (0.3) given that $\frac{dy}{dx} = x - y,\ y(0)=1$
   (d) Expand f(x) = $\begin{cases} x, 0 < x < \pi \\ 0, \pi < x < 2\pi \end{cases}$ as Fourier series.
   (e) If $F_s(p)$ is Fourier sine transform of f(x). Then prove that
   $$F_s[f(x)\cos ax] = \frac{1}{2}[F_s(p+a) + F_s(p-a)]$$
   (f) Find Z[a^n].

[3+3+4+4+4+4]

PART-B

2. (a) Find the root of the equation x^3-9x+1 = 0 by using Newton Raphson method.
   (b) Find the root of the equation $xe^x = 1$ by using bisection method.

[8+8]

3. (a) Find f(2.5) using Newton's forward formula for the following table

x	0	1	2	3	4	5	6
y=f(x)	0	1	16	81	256	625	1296

   (b) Find the Lagrange's polynomial for the following data

x	0	2	3	6
y	648	704	729	792

[8+8]

4. (a) By modified Euler's method find y (0.2) ,y(0.4) given that $\frac{dy}{dx} = y^2 - x,\ y(0)=1$
   (b) Obtain Picard's expansion for $\frac{dy}{dx} = x + y,\ y(0)=1$, hence evaluate y (0.1).

[8+8]

5. (a) Find the half-range sine series for the function f(x) = x^2 in the range 0<x<2.
   (b) Find the Fourier expansion for f(x) = sinax in [0, π].

[8+8]

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6. (a) Find the Fourier transform of f(x) defined by $f(x) = 1 - x^2 - 1 < x < 1$

   (b) Find the Fourier cosine transform of e^{-ax}, a > 0 and hence deduce the inversion formula $\int_0^\infty \frac{cos\ px}{a^2 + p^2}\, dp$

[8+8]

7. (a) Find the inverse Z – transform of $\left[\frac{z}{z^2 + 11z + 24}\right]$

   (b) Using Z – transforms, solve $y_{n+2} - 6\ y_{n+1} + 9\ y_n = 3^n$ with $y_0 = 0$ and $y_1 = 1$.

[8+8]

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