

**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  $f(x) = \sin x$  in  $[0, \pi]$ .
- [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  $y_{n+2} - 6y_{n+1} + 9y_n = 3^n$  with  $y_0 = 0$  and  $y_1 = 1$ .  
[8+8]

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