**Subject Code: R13107/R13** **Set No - 1**

**I B. Tech I Semester Supplementary Examinations December - 2016**

# MATHEMATICS-II (MATHEMATICAL METHODS)

**(Common to ECE, EEE, EIE, BioTech, EComE, Agri.E)**

**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) Find the Root of the equation 3x= 1+cosx by using Iteration method.
   (b) If the interval of differencing is unity prove that $\Delta\left(\frac{2^x}{x!}\right)=\frac{2^x(1-x)}{(x+1)!}$
   (c) Find y(1.1) by second order RK method given that $\frac{dy}{dx}=x-y$ , y(1)=1
   (d) Write the Fourier half range sine series for f(x) = x in [0,1]
   (e) Find $Z\left[\sin\frac{n\pi}{2}\right]$
   (f) If F(p) is the complex Fourier transform of f(x), then prove that complex Fourier transform of $f(x)\cos ax$ is $\frac{1}{2}[F(p+a)+F(p-a)]$

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

## PART-B

2. (a) Find the root of the equation $4\sin x = e^x$ by using bisection method.
   (b) Find the root of the equation $x=x^4-10$ by using False position method .

[8+8]

3. (a) Find the Lagrange's polynomial for the following data, hence find y(15)

| x | -5 | 6 | 9 | 11 |
|---|---|---|---|---|
| y | 12 | 13 | 14 | 16 |

   (b) Fit a cubic polynomial for the following data
   $y_0=-5, y_1=-1, y_2=9, y_3=25, y_4=55, y_5=105$

[8+8]

4. (a) Evaluate y (0.1) , y(0.2) by Taylor's series method for $\frac{dy}{dx}=\frac{x+y}{y-x}$, $y(0)=1$.

   (b) By modified Euler's formula find y(0.3), y(0.6) given that $\frac{dy}{dx}=x^2-y^2, y(0)=1$

[8+8]

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5. (a) Expand the function $f(x) = x^2$ as a Fourier series in $[\pi,\pi]$

Hence deduce that $\frac{1}{1^2}-\frac{1}{2^2}+\frac{1}{3^2}-\frac{1}{4^2}+\ldots\ldots=\frac{\pi^2}{12}$

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

[8+8]

6. (a) Using Fourier integral show that $e^{-ax}-e^{-bx}=\frac{2(b^2-a^2)}{\pi}\int_0^\infty \frac{\lambda\sin\lambda x}{(\lambda^2+a^2)}d\lambda, a,b>0$

(b) Find finite Fourier cosine transform of $f(x) = x + a$ for $0 < x < \pi$.

[8+8]

7. (a) If $f(z)=\frac{2z\ +3z+4}{(z-1)^3}, |z|>3$, then find the value of f(1), f(2) and f(3).

(b) Evaluate $Z^{-1}\left[\frac{z^2}{(z-1)(z-3)}\right]$ using convolution theorem.

[8+8]

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