

**I B. Tech I Semester Supplementary Examinations, May - 2017**  
**MATHEMATICS-II (MM)**  
 (Com. to ECE, EEE, EIE, BOT, E.Com.E, AGE)

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 **THREE** Questions from **Part-B**

**PART -A**

1. a) What is the order of convergence and write the order of convergence for iteration method. (3M)
- b) Prove that  $\Delta^2 f_i = (f_i + f_{i+1}) \cdot \Delta f_i$  (3M)
- c) Write the merits and demerits of Euler's method. (4M)
- d) Write the Fourier half range sine series for  $f(x) = \sin x$  in  $[0, \pi]$ . (4M)
- e) Find  $Z \left[ \frac{1}{(n+1)!} \right]$  (4M)
- f) If  $F(p)$ , is the complex Fourier transform of  $f(x)$ , then prove that the complex Fourier transform of  $f(x - a)$  is  $e^{ipa} F(p)$ . (4M)

**PART -B**

2. a) Find the root of the equation  $xe^x = 2$  by using Bisection method. (8M)
  - b) Find the root of the equation  $x^3 - 5x + 1 = 0$  by using Newton Raphson method. (8M)
  3. a) Find the unique polynomial  $p(x)$  of degree 2 or less such that  $p(1)=1$ ,  $p(3)=27$ ,  $p(4)=64$ . (8M)
  - b) Area A of circle and diameter d is given for the following values (8M)
- |   |      |      |      |      |      |
|---|------|------|------|------|------|
| d | 80   | 85   | 90   | 95   | 100  |
| A | 5026 | 5674 | 6362 | 7088 | 7854 |
- Calculate the area of circle of diameter 105.

4. a) Solve  $y' = xy$ ,  $y(0) = 1$  by using Picard's Method. (8M)
- b) Find  $y(1.25), y(1.5)$  using RK method of fourth order for  $\frac{dy}{dx} = y - x^2$ ,  $y(0) = 1$  (8M)
5. a) Find the Fourier series for  $f(x) = 2x - x^2$  in  $0 < x < 3$ . (8M)
- b) Find the cosine series of  $f(x) = \sin kx$  for  $k$  not an integer. (8M)
6. a) Find the Fourier cosine and sine transform of  $e^{-ax}$ ,  $a > 0$  and hence deduce the inversion formula for (i)  $\int_0^{\infty} \frac{p \cos px}{a^2 + p^2} dp$  ii)  $\int_0^{\infty} \frac{p \sin px}{a^2 + p^2} dp$ . (8M)
- b) Find the Fourier transforms  $f(x) = \begin{cases} x & \text{if } |x| \leq a \\ 0 & \text{if } |x| > a \end{cases}$  (8M)
7. a) Find  $Z(2 \cdot 3^n + 5 \cdot n)$  and deduce  $Z[2 \cdot 3^{n+3} + 5(n+3)]$  using shifting theorem. (8M)
- b) Find the inverse Z - transform of  $\left[ \frac{z}{z^2 + 11z + 24} \right]$  (8M)