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PACE INSTITUTE OF TECHNOLOGY & SCIENCES::ONGOLE  
(AUTONOMOUS)

II B.TECH I SEMESTER END SUPPLEMENTARY EXAMINATIONS, MARCH/APRIL - 2023

MATHEMATICS-III

(Common to CE,EEE,ME,ECE,CSE,CSIT,IT,AME,CSE(IoTCSBT) Branches)

Time: 3 hours

Max. Marks: 60

Note: Question Paper consists of Two parts (Part-A and Part-B)

PART-A

Answer all the questions in Part-A (5X2=10M)

Q.No.	Questions	Marks	CO	KL
1.	a) Develop an iterative formula to find $\sqrt[k]{N}$ using Newton Raphson method	[2M]	1	
	b) Explain merits and demerits of Taylor series method	[2M]	2	
	c) Obtain the Fourier coefficient $a_n$ for $f(x) = x^2$ in $-\pi \leq x \leq \pi$ .	[2M]	3	
	d) State the Fourier integral theorem.	[2M]	4	
	e) Eliminate the arbitrary constants a and b from $z = ax + by + ab$ .	[2M]	5	

PART-B

Answer One Question from each UNIT (5X10=50M)

Q.No.	Questions	Marks	CO	KL										
UNIT-I														
2.	a) Find an approximate value of the real root of $x - \cos x = 0$ by Bisection method correct up to four decimal places between 0 and 1.	[5M]	1											
	b) Using Lagrange's formula, calculate $y(40)$ from the following table.	[5M]	1											
	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td><math>x</math></td> <td>30</td> <td>35</td> <td>45</td> <td>55</td> </tr> <tr> <td><math>y</math></td> <td>148</td> <td>96</td> <td>68</td> <td>34</td> </tr> </table>	$x$	30	35	45	55	$y$	148	96	68	34			
$x$	30	35	45	55										
$y$	148	96	68	34										
OR														
3.	a) Find the root of the equation $xe^x = \cos x$ by method of false position correct up to four decimal places between 0 and 1.	[5M]	1											
	b) Applying Newton's Forward Interpolation formula, compute the value of $\sqrt{5.5}$ , given that $\sqrt{5} = 2.236, \sqrt{6} = 2.449, \sqrt{7} = 2.646, \sqrt{8} = 2.828$ correct up to 3 decimal places.	[5M]	1											
UNIT-II														
4.	a) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ , by using (a) Simpson's $\frac{1}{3}$ rule (b) Simpson's $\frac{3}{8}$ rule (c) Trapezoidal rule.	[5M]	2											
	b) Using Modified Euler's method, find an approximate value of $y$ when $x = 0.3$ given that $\frac{dy}{dx} = x + y$ and $y = 1$ when $x = 0$	[5M]	2											
OR														

5.		Using Runge–Kutta method of fourth order, solve $y' = \frac{y^2 - x^2}{y^2 + x^2}$ , $y(0) = 1$ at $x = 0.2, x = 0.4$	[10M]	2	
UNIT-III					
6.		Find the Fourier series to represent the function $f(x) = e^{-ax}$ , $-\pi \leq x \leq \pi$ . Hence deduce that $2 \left[ \frac{1}{2^2 + 1} - \frac{1}{3^2 + 1} + \frac{1}{4^2 + 1} - \dots \right] = \frac{\pi}{\sinh \pi}$ .	[10M]	3	
OR					
7.	a)	Expand $f(x) = \cos x$ , $0 < x < \pi$ in half range sine series.	[5M]	3	
	b)	Find the Fourier series of $f(x) = \frac{\pi - x}{2}$ , $0 < x < 2$ .	[5M]	3	
UNIT-IV					
8.		Find Fourier transform of $f(x) = \begin{cases} 1 - x^2, &  x  \leq 1 \\ 0, &  x  > 1 \end{cases}$ , hence evaluate $\int_0^{\infty} \frac{x \cos x - \sin x}{x^3} \cos\left(\frac{x}{2}\right) dx$	[10M]	4	
OR					
9.	a)	Find the Fourier cosine transform of $e^{-x^2}$	[5M]	4	
	b)	Find the Fourier sine transform of $e^{-\frac{ax}{x}}$	[5M]	4	
UNIT-V					
10.		Solve by the method of separation of variable $u_x = 4u_y$ , $u(0, y) = 8e^{-3y}$	[10M]	5	
OR					
11.		Derive one-dimensional wave equation.	[10M]	5	

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