Name: Enrolment No:	

Course: Mathematical & Statistical Methods Semester : 3
Program: MSc Physics Time : 03 hrs
Course Code: MATH8023P Max. Marks : 100

Instructions: Use scientific calculator as allowed.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1.	Discuss the rectangular and trapezoidal methods of numerical integration, with the help of plots and equations.	4	CO2
Q 2.	Describe Secant method of finding roots with the help of legible plots and equations.	4	CO3
Q 3.	Explain Parseval's Theorem and its physical significance.	4	CO4
Q 4.	Solve the ordinary differential equation $\frac{dy}{dx} = -\frac{4x}{y}$, given y (2) =3.	4	CO1
Q 5.	Determine the value of $\sqrt[3]{10}$ using Newton-Raphson's method accurate upto 6 places of decimal.	4	CO2

SECTION B
(4Qx10M= 40 Marks)

Q 6.	Evaluate the integral $J = \int_0^1 \frac{dx}{(1+x^2)}$ by Simpson's rule with 2m=10.	10	CO1
Q 7.	Derive the Laplace transform of $\cos a\,t$ and $\sin a\,t$. OR Evaluate Laplace transform of Heavyside step function given by $u(t\text{-}a)$.	10	CO3
Q 8.	Test for exactness. If exact, solve the differential equation by finding the integrating factor. a). $2xy^2 + 4 = 2((3 - x^2 y))\frac{dy}{dx}$ b). $e^x(\cos y\,dx - \sin y\,dy) = 0$	5+5	CO1
Q 9.	Discuss briefly the concept and applications of Monte Carlo method.	10	CO4

SECTION-C
(2Qx20M=40 Marks)

Q 10	Using the Laplace transforms solve the given initial value problems- a). $y'' - 4y' + 40y = 122e^{-3t}$, with y(0) = 0 and $y'(0)$ =8. b). $y'' - 4y' + 13y = e^{2t} \sin(3t)$ given, y(0)=4, $y'(0)$=3.	10+10	CO5

Q 11	Determine the Fourier series of the function a). $f(x) = x + \pi$ if $-\pi < x < \pi$ and $f(x + 2\pi) = f(x)$ b). $f(x) = x^2$ if $-1 < x < 1$ given $p = 2$ OR a). Find the Fourier transform using the first principles of the function $f(x) = 1$ if $|x| < 1$ and $f(x) = 0$ otherwise. b). Discuss 5 properties of Laplace transform.	10+10	CO3