Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FOURTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019

Course Code: MA202
Course Name: PROBABILITY DISTRIBUTIONS, TRANSFORMS AND NUMERICAL METHODS

Max. Marks: 100 Duration: 3 Hours

Normal distribution table is allowed in the examination hall.

PART A (MODULES I AND II)
Answer two full questions.

1 a) A random variable X takes the values -3,-2,-1,0,1,2,3 such that P(X=0)=P(X>0) =P(X<0) and P(X=-3) = P(X=-2) = P(X=-1) = P(X=1) = P(X=2) = P(X=3).Obtain the probability distribution and the distribution function of X (7)

b) If the sum of the mean and variance of a binomial distribution for 5 trials is 1.8 Find the probability distribution function. (8)

2 a) It is known that 2% of the accounts in a company are delinquent. If 5 accounts are selected at random, compute the following probabilities (i) atmost 2 accounts will be delinquent (ii) atmost 4 accounts will be delinquent (7)

b) Find the value of k and hence find the mean and variance of the distribution (8)
$f(x) = kx^2e^{-x}$ $0<x<\infty$

3 a) If X is uniformly distributed over $(-\alpha,\alpha)$, $\alpha<0$. Find α so that (i) $P(x>1) = 1/3$ (ii) $P(|x| <1) = P(|x| >1)$ (7)

b) 5% of the observation in a normal distribution are below 5 and 25% of the observations are between 5 and 25. Find mean and SD (8)

PART B (MODULES III AND IV)
Answer two full questions.

4 a) Find the fourier transform of $f(x)=\begin{cases} 1-|x| & if \quad |x| \le 1 \\ 0 & if \quad |x|>1 \end{cases}$ and also find fourier inverse transform (7)

b) Using fourier sine integral for $f(x) = e^{-ax}$ show that $\int_0^\infty \frac{\lambda \sin\lambda x}{\lambda^2+a^2} d\lambda = \pi e^{-ax}$ (8)

5 a) Find the fourier sine transform of e^{-x}, $x \ge 0$ .Hence evaluate $\int_0^\infty \frac{x \sin x}{1+x^2} dx$ (7)

b) Find the Laplace transform of (i) $te^{-t}\sin t$ (ii) $\frac{\sin^2 t}{t}$ (8)

6 a) Solve $\frac{d^2y}{dt^2} - 4\frac{dy}{dt} + 5y = 4e^{3t}$ given that $y = 2, \frac{dy}{dt} = 7$ when $t = 0$ (7)

b) Using convolution theorem find $L^{-1}\frac{s}{(s^2+a^2)^2}$ (8)

PART C (MODULES V AND VI)

Answer two full questions.

7 a) Using Newton Raphson method find correct to four decimal places, the root between 0 and 1 of the equation $x^3 - 6x + 4 = 0$ (8)

b) The population of a town is as follows (12)

Year	1941	1951	1961	1971	1981	1991
Population (in lakhs)	20	24	29	36	46	51

Estimate the population increase during the period 1946 to 1976

8 a) Apply Lagrange's formula to obtain the value of y when x=35 given that (6)

x	30	34	38	42
y	-30	-13	3	18

b) Solve the equation using Gauss elimination method (7)

$2x + y + z = 10$, $3x + 2y + 3z = 18$, $x + 4y + 9z = 16$

c) Solve the system of equations $4x + 2y + z = 14$, $x + 5y - z = 10$, $x + y + 8z = 20$ using Gauss-Seidal iteration method (7)

9 a) A solid of revolution is formed by rotating about the x axis, the area between the x axis, the line x=0 and x=1 and a curve through the points with the following coordinates (7)

X	0.0	0.25	0.50	0.75	1.00
Y	1.0000	.9896	.9589	.9089	.8415

Estimate the volume of the solid formed using Trapezoidal rule

b) Using Euler's method find y(0.2) and y(0.4) given $\frac{dy}{dx} = x + y$, $y(0) = 1$ and $h = 0.2$ (6)

c) Use the fourth order Runge-Kutta method to find y(0.2) from $\frac{dy}{dx} = y - x$,$y(0) = 2$ taking h=0.1 (7)