Total Pages: 2

Reg No.:_______________ Name:_______________________

ENGG. COLLEGE LIBRARY ... EDUCATIONAL TRUST ... UTHURUTHY

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B.TECH DEGREE EXAMINATION, JULY 2017

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 has the following probability mass function (8)

X :	0	1	2	3	4	5	6	7
P(x) :	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2 + k$

Find (i) value of k (ii) $P(0 < x < 5)$ (iii) $P(x \geq 6)$

b) An insurance company agent accepts policies of 5 men, all of identical age and good health. Probability that a man of this age will be alive 30 years is $\frac{2}{3}$. Find the probability that in 30 years (i) all 5 men (ii) at least one men will be alive. (7)

2 a) Show that for a poisson distribution with parameter λ, mean = variance = λ (7)

b) In a given city 6% of all drivers get at least one parking ticket per year. Use the poisson approximation to the binomial distribution to determine the probabilities that among 80 drivers (randomly chosen in this city) (8)

(i) 4 will get at least one parking ticket in any given year

(ii) at least 3 will get at least one parking ticket in any given year

(iii) anywhere from 3 to 6 inclusive, will get at least one parking ticket in any given year.

3 a) The marks obtained in mathematics by 1000 students are normally distributed with mean 78% and standard deviation 11%. Determine (8)

(i) How many students got marks above 90%

(ii) What was the highest mark obtained by the lowest 10% of students

b) Derive the mean and variance of the uniform distribution in the interval (a,b) (7)

PART B (MODULES III AND IV)

Answer two full questions.

4 a) Express $f(x) = 1, \ 0 < x < \pi$ (7)

$0, \ x > \pi,$

a Fourier sine integral and evaluate $\int_0^\infty \frac{1-\cos\pi\omega}{\omega} \ \sin x\omega \, d\omega$

b) Using Fourier integral representation show that (8)

$$\int_0^\infty \frac{\sin\omega - \omega\cos\omega}{\omega^2} \ \sin x\omega d\omega = \frac{\pi}{2}x, \ if \ 0 < x < 1$$

$\frac{\pi}{4}$, if $x = 1$

0, if $x > 1$

5	a)	Find the Fourier cosine transform of $f(x) = x^2$, if $0 < x < 1$ 0, if $x > 1$	(7)
	b)	Find the Laplace transform of (i) $\sinh t \cos t$ (ii) $(t-1)^3$	(8)
6	a)	Find the inverse Laplace transform of $\frac{1}{(s+\sqrt{2})(s-\sqrt{3})}$	(7)
	b)	Solve the initial value problem, using Laplace transforms. $y'' + y' + 9y = 0$, $y(0) = 0.16$, $y'(0) = 0$	(8)

PART C (MODULES V AND VI)

Answer two full questions.

7 a) Using Newton Raphson Method Compute the square root of 51 correct to 4 decimal places (7)

b) For the following data calculate the value of y when x = 9 (7)

x :	8	10	12	14	16	18
y :	10	19	32.5	54	89.5	154

c) Given $f(2) = 5$, $f(2.5) = 6$, find the linear interpolating polynomial using Lagrange's formula and also find $f(2.2)$ (6)

8 a) Determine the interpolating polynomial for the following data (6)

x :	-1	0	1	3
y :	2	1	0	-1

Hence find the value of y when x = 2

b) Solve the following by Guass – Seidel Method (8)

$6x + 15y + 2z = 72$

$x + y + 54z = 110$

$27x + 6y - z = 85$

c) Evaluate $\int_0^6 \frac{dx}{1+x^2}$, using Simpsons rule by taking step size h=1 (6)

9 a) Using Euler Method, Solve $y' = x + y$, $y(0) = 1$ for $x = 0.2$ (6)

b) Find y(0.1) by improved Euler method given $y = -xy^2$, $y(0) = 2$ (6)

c) Apply Runge – Kutta fourth order method to find an approximate value of y when $x = 0.1$ given that $\frac{dy}{dx} = x + y$ and y = 1 when $x = 0$ (8)

****