

**KTU B.Tech S4 model Questions for Probability distributions, Transforms  
and Numerical Methods**

MODEL QUESTION PAPER Prepared by [ktubtechquestions.com](http://ktubtechquestions.com)

FOURTH SEMESTER B.TECH DEGREE EXAMINATION

May/June 2017

**MA202 Probability distributions, Transforms and Numerical Methods**

Time: 3 Hrs

Marks: 100

**PART A**

( Answer any two )

1. a) check whether the following can serve as probability distribution and why ?

$$f(x) = x^2/25 \text{ where } x=0,1,2,3,4 \text{ (5 Marks)}$$

(b) Give the probability mass function

x	0	1	2	3
P(x)	0.1	0.3	0.5	0.1

Find mean , variance and  $V(2X-5)$  (5 marks)

(c) If the probability is 0.05 that a certain wide-flange column will fail under a given axial load .what are the probabilities that among 16 such columns

(i) atmost 2 will fail (ii) atleast 4 will fail

2. a)

A Discrete random variable  $X$  has the following probability distribution

$X$	0	1	2	3	4	5	6	7	8
$P(X)$	$a$	$3a$	$5a$	$7a$	$9a$	$11a$	$13a$	$15a$	$17a$

Find (i) the value of  $a$

(ii)  $P(X < 3)$

(iii) Distribution function of  $X$

b) If  $X$  is a binomially distributed random variables with mean 2 and variance  $4/3$ . Find  $P(X=5)$ ?

(c) A binomial distribution with parameter  $n=5$  satisfies the property  $8P(X=4) = P(X=2)$ . Find the value of  $p$  and  $P(X > 1)$

3. (a) It has been claimed that in 60% of all solar-heat installations the utility bill is reduced by at least one-third. Accordingly, what are the probabilities that the utility bill will be reduced by at least one-third in

(i) four of 5 installations.

(ii) At least four of 5 installations (7 Marks)

(b) It is known that 5% of the books bound at a certain bindary have defective bindings. Find the probability that 2 of 100 books bound by this bindary will have defective binding using (a) The formula for the binomial distribution (b) The Poisson approximation to binomial distribution. (8 marks)

## PART B

(Answer any two)

4 Find the transform of each of the following functions.

(a)  $f(t) = t \cosh(3t)$

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(b)  $h(t) = t^2 \sin(2t)$

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5 Find the inverse transform of each of the following.

$$(a) F(s) = \frac{6}{s} - \frac{1}{s-8} + \frac{4}{s-3}$$

$$(b) H(s) = \frac{19}{s+2} - \frac{1}{3s-5} + \frac{7}{s^5}$$

c) Express the differential equation in Laplace transformation form

$$\frac{d^2x}{dt^2} + 6\frac{dx}{dt} + 8x = 0 \text{ given } x(0^+) = 0 \text{ and } x'(0^+) = 2$$

6 a) Obtain the fourier sin transform of

$$f(x) = \begin{cases} x & \text{for } 0 < x < 1 \\ 2-x & \text{for } 1 < x < 2 \\ 0 & \text{for } x > 2 \end{cases}$$

b) Obtain the inverse cosine transform of  $e^{-s}$ .

### PART C

( Answer any two )

7 a) Find the positive solution of  $2\sin x = x$  using Newton-Raphson method.

b) Use Newton-Raphson method to find a root of the equation  $x^3 - 2x - 5 = 0$ .

c) Using Lagrange's formula, fit a polynomial for the following data.

x : 1 2 7 8

Y: 4 5 5 4 Find the value of y when = 6.

8 a) Using Newton's Forward Difference formula estimate the value of  $f(15)$  from the following data

x : 10 20 30 40 50

f(x) : 46 66 81 93 101

b) Using Newton's backward Difference Interpolation formula, estimate the value of  $f(42)$  from the following data.

x : 20 25 30 35 40 45

f(x) : 35.4 33.2 29.1 26.0 23.1 20.4

- 9 a) Solve the following system of equations by Gauss elimination method with partial pivoting.

$$\begin{aligned}8x_2 + 2x_3 &= -7 \\3x_1 + 5x_2 + 2x_3 &= 8 \\6x_1 + 2x_2 + 8x_3 &= 26\end{aligned}\quad (10 \text{ marks})$$

- b) Find Solve the following system by Gauss elimination (i) without pivoting (ii) with partial pivoting.

$$\begin{aligned}0.0004x_1 + 1.402x_2 &= 1.406 \\0.4003x_1 - 1.502x_2 &= 2.501\end{aligned}\quad (10 \text{ marks})$$