Reg. No. | | | | | | | | | |

M.E./M.TECH. DEGREE EXAMINATIONS, MAY/JUNE 2017

FIRST SEMESTER

COMPUTER SCIENCE AND ENGINEERING

MA16187 –APPLIED PROBABILITY AND STATISTICS

(Regulation 2016)

(Statistical tables are Permitted)

QP Code: 889960

Time: Three hours **Maximum : 100 marks**

Answer **ALL** questions

PART A - (10 X 2 = 20 Marks)

1. Define MGF of Random variables X.
2. Define Memoryless Property of the Exponential distribution.
3. Evaluate k, if the joint probability density function of a random variable (X,Y) is given by $f(x,y)=kx(x-y)$ in $0\le x\le 2, -x<y<x, f(x,y)=0$, elsewhere.
4. If the joint pdf of two dimensional random variable (X,Y) is given by $f(x,y)=xy^2+\frac{x^2}{8}; 0\le x\le 2, 0\le y\le 1$ then find $P(X>1)$.
5. Define Unbiased Estimator.
6. Write the normal equations for fitting a st.line by the method of least square.
7. Define Parameters and Statistics.
8. Define Type I and Type II errors.
9. Define Random vectors and Random matrices
10. Define Principle component analysis.

PART B - (5 X16 = 80 Marks)

11. (a) (i) A discrete Random variable X has the following probability distribution: **(8)**

Values of X	0	1	2	3	4	5	6	7
P(x)	0	a	2a	2a	3a	a^2	$2a^2$	$7a^2 + a$

Find (i) the value of ‘a’ (ii) P(1.5<X <4.5 / X>2).

(ii) Find the MGF of the Binomial Distribution. **(8)**

(OR)

(b) (i) Find variance of normal distribution. **(8)**

(ii) State and prove Memoryless property for geometric distribution **(8)**

12. (a) (i) If the joint pdf of the random variable (X,Y) is given by $f(x,y)=\frac{1}{2\pi\sigma^2}e^{-(x^2+y^2)/2\sigma^2}, -\infty<x,y<\infty$ then find $P(X^2+Y^2\le a^2)$. **(8)**

(ii) If the joint pdf of the random variable (X,Y) is given by $f(x,y)=kxye^{-(x^2+y^2)}, x>0, y>0$ then find the value of k and prove that X and Y are independent. **(8)**

(OR)

(b) If (X,Y) is a 2D RV uniformly distributed over the triangular region R bounded by $x=3, y=0, y=\frac{4}{3}x$. Then find the correlation coefficient between X and Y. **(16)**

13. (a) From a random sampling for normal population N(μ,σ^2), find the maximum likelihood estimator for **(16)**

(i) μ when σ^2 is unknown

(ii) σ^2 when μ is unknown

(iii) the simultaneous estimation of μ and σ^2.

(OR)

(b) Find the correlation coefficient and lines of regression from the following data: **(16)**

X	65	66	67	67	68	69	70	72
Y	67	68	65	68	72	72	69	71

14. (a) (i) A manufacturing company claims that at least 95% of its products supplied confirms to the specification. Out of a sample of 200 numbers, 18 are defective. Test the claim at 5% level of significance. **(8)**

(ii) The following data give the number of aircraft accidents that occurred during the various days of a week: **(8)**

Day:	Mon	Tue	Wed	Thu	Fri	Sat
Number of accidents:	15	19	13	12	16	15

Test whether the accidents are uniformly distributed over the week.

(OR)

(b) (i) A test was given to a large group of boys who scored on the average 64.5 marks. The same test was given to a group of 400 boys who scored an average of 62.5 marks with a S.D. 12.5 marks. Examine if the difference is significant. **(8)**

(ii) A sample of 20 items has mean 42 units and S.D. 5 units. Test the hypothesis that is it a random sample from a normal population with mean 45 units. **(8)**

15. (a) Suppose the random variables X_1, X_2, X_3 have the covariance matrix **(16)**

$\boldsymbol{\Sigma} = \begin{bmatrix} 1 & -2 & 0 \\ -2 & 5 & 0 \\ 0 & 0 & 2 \end{bmatrix}$. Calculate the of principal components.

(OR)

(b) Find the axes of constant probability countours for a bivariate normal distribution when $\sigma_{11} = \sigma_{22}$. **(16)**