

Code No: A10006

MLR INSTITUTE OF TECHNOLOGY

(An Autonomous Institution)

I B.Tech I Sem Supplementary Examinations- December-2016

PROBABILITY THEORY AND MATHEMATICAL METHODS

(Common CSE,IT & Aero)

Time: 3 hours

Max.Marks :75

Note: 1. This question paper contains two parts A and B.

2. Part A is compulsory which carries 25 marks. Answer all Questions in part A.

3. Part B consists of 5 units. Answer any one full question from each unit. Each question carries 10 Marks and may have a,b,c as sub questions.

PART A

(25 Marks)

1. a) The following table gives a set of values of x and the corresponding values of y =f(x)

X	0	1	2	3	4
y	1	1.5	2.2	3.1	4.6

Find $\Delta^2(2)$. [2M]

b) Given $\frac{dy}{dx} = xy$, $y(0) = 1$, determine $y(0.1)$ using Euler's method. [2M]

c) Write formula for Simpson $1/3^{rd}$ and $3/8^{th}$ rule. [2M]

d) Find the unit normal vector to the surface $xy^3z^2=4$ at the point $(-1,-1,2)$ [2M]

e) State Baye's theorem. [2M]

2. a) Derive normal equations for fitting straight line $y= a+bx$. [3M]

b) Find a root of $x^3-5x +1 =0$ using bisection method in three iterations. [3M]

c) Given that $\frac{dy}{dx} = 1+xy$ and $y(0) = 1$, find $f(x)$ using Picard's method in Three approximations. [3M]

d) Find the directional derivative of $\phi=xy^2+yz^2$ at $(2, -1, 1)$ in the direction of $i+2j+2k$. [3M]

e) Calculate mean and variance for the following distribution.

X	0.3	0.2	0.1	0	1	2	3
P(x)	0.05	0.10	0.30	0	0.3.	0.15	0.1

PART B

(50 Marks)

3. a) Solve $x= 1+\tan^{-1}x$ by iteration method upto 3 decimal places. [5M]

b) Find the root of $xe^x-2 = 0$ by regular-falsi method upto three decimal places. [5M]

OR

4. a) Given that $\sqrt{6500} = 80.6223$, $\sqrt{6510} = 80.6846$, $\sqrt{6520} = 80.7456$, $\sqrt{6530} = 80.8.84$ find $\sqrt{6526}$ by using Gauss backward formula. [5M]

b) The values of a function $f(x)$ are given below on certain value of x. Find the value of $f(4)$ using Lagranges interpolation formula. [5M]

x	0	2	3	6
f(x)	-4	2	14	58

5. a) The following table of values of x and y is given

x	0	1	2	3	4	5	6
y	6.9897	7.4036	7.7815	8.1291	8.4510	8.7506	9.0309

Find dy/dx at $x=6$ by Newton's backward formula. [5M]

- b) A river is 80 feet wide . The depth d in feet at a distance x feet from one bank is given by the following table, find approximately area of the river. [5M]

x	0	10	20	30	40	50	60	70	80
d	0	4	7	9	12	15	14	8	3

OR

6. Fit a second degree polynomial to the following data by the method of least squares. [10M]

x	0	1	2	3	4
y	1	1.8	1.3	2.5	6.3

7. Apply Runge-kutta method to find an approximate values of $y(0.1)$, $y(0.2)$ given $y' = x+y$, $y(0)=1$. [10M]

OR

8. Use Milne's method to find $y(0.3)$ from $y' = x^2 + y^2$, $y(0)=1$. Find the initial values $y(-0.1)$, $y(0.1)$ and $y(0.2)$ from the Taylor's series method. [10M]

9. a) prove that $\nabla^2 f(r) = f''(r) + \frac{2}{r} f'(r)$. [5M]

- b) Apply divergence theorem to evaluate $\iint_S \vec{F} \cdot \vec{n} \, ds$, where $\vec{F} = 2x^2y\mathbf{i} - y^2\mathbf{j} + 4xz^2\mathbf{k}$ where S is the cylinder $y^2 + z^2 = 9$ and $x=2$ in the first octant. [5M]

OR

10. a) Find the divergence and curl of the vector $xyzi + 3x^2yj + (xz^2 - y^2z)k$. [5M]

- b) Verify Green's theorem in the xy -plane $\oint (xy^2 - 2xy)dx + (x^2y + 3)dy$ around the boundary C of the region enclosed by $y^2 = 8x$ and $x=2$. [5M]

11. a) Three machines I, II, III produce 40%, 30%, 30% of the total number of items of factory. The percentages of defective items of these machines 4%, 2%, 3%. If an item is selected at random, find the probability that item is defective. [5M]

- b) Find mean, variance of uniform probability distribution $f(x) = 1/n$ for $x=1, 2, 3, \dots, n$ [5M]

OR

12. a) A discrete random variable X has the mean 6 and variance 2. If it is assumed that the distribution is binomial find the probability the $5 \leq x \leq 7$. [5M]

- b) The marks obtained in Mathematics by 1000 students is normally distributed with mean 78% and standard deviation 11%, determine how many students got marks above 90%. [5M]
