18MAB204T – Probability & Queueing Theory

UNIT I – Random Variables and Statistical Averages

MULTIPLE CHOICE QUESTIONS

1. The height of persons in a country is a random variable of the type
   (a) Continuous (b) Discrete (c) Neither discrete nor continuous
   (d) Continuous as well as discrete
2. $\underset{x\to\infty}{Lt}\ F(x) =$ _____
   (a) 0 (b) 2 (c) 1 (d) - 1
3. A random variable X has the following probability function:

x	0	1	2	3	4
P(x)	k	2k	5k	7k	9k

   The value of k = _____
   (a) $\frac{2}{24}$ (b) $\frac{21}{24}$
   (c) $\frac{}{12}$
   (d) $\frac{2}{4}$ — —
4. The probability density function of a continuous random variable is $f(x) = ce^{-|x|}; -\infty < x < \infty$ then the value of c = _____
   (a) $\frac{1}{2}$ (b) $\frac{1}{4}$ (c) $\frac{3}{4}$ (d) $\frac{1}{6}$
5. If X is a random variable which can take only non – negative values, then
   (a) $E(X^2) = [E(X)]^2$ (b) $E(X^2) \geq [E(X)]^2$
   (c) $E(X^2) \leq [E(X)]^2$ (d) None of the above
6. If c is a constant (non random variable), then $E(c)$ is
   (a) 0 (b) 1 (c) $cf(c)$ (d) c
7. If $f(x) = \frac{1}{10}; x = 10$ then E(x) is
   (a) 0 (b) 2 (c) 1 (d) - 1
8. $\text{var}(4x+8)$ is
   (a) $12.\text{var}(x)$ (b) $4.\text{var}(x)+8$ (c) $16.\text{var}(x)$ (d) $16.\text{var}(x)+8$
9. Family size can be represented by the random variable x. determine the average family size

x	2	3	4	5
P(x)	0.17	0.47	0.26	0.10

(a) 2.94 (b) 3.00 (c) 3.29 (d) 3.86

10. If X is a random variable and r is an integer, then $E(X^r)$ represents

(a) r^{th} central moment (b) r^{th} factorial moment

(c) r^{th} raw moment (d) none of the above

11. If random variable x has the p.d.f $f(x)=\begin{cases}3x;\ 0<x<1\\ 0;\ otherwise\end{cases}$, then the p.d.f of $y=4x+3$ is

(a) $\frac{3}{4}(y-3)$ (b) $\frac{3}{16}(y-3)$ (c) $\frac{1}{4}(y-3)$ (d) $\frac{3}{2}(y-3)$

12. If the exponential distribution is given as $f(x)=e^{-x};\ 0\le x\le\infty$, then the mean of the distribution is

(a) 1 (b) 0 (c) 2 (d) - 1

13. The expectation of the number on a die when thrown

(a) 1 (b) $\frac{7}{2}$ (c) 3 (d) 2

14. A coin is tossed until a head appears. What is the expectation of the number of tosses required?

(a) 2 (b) 1 (c) 4 (d) 5

15. A random variable x has the p.d.f given by $f(x)=\begin{cases}2e^{-2x};\ x\ge 0\\ 0;\quad x<0\end{cases}$, then the m.g.f is

(a) $\frac{2}{2-t}$ (c) —— $2(2-t)^{-3}$ (d) $3(3-t)^{-2}$

(b) $_{-t}3$

16. If a random variable x has the p.d.f $f(x)=\frac{1}{4};-2<x<2$, then $P(x<1)$ is

(a) $\frac{2}{3}$ (b) $\frac{3}{4}$ (c) $\frac{1}{4}$ (d) $\frac{1}{2}$

17. If $E[x^2]=8$ and E[x] = 2, then var(x) is _____

(a) 3 (b) 2 (c) 1 (d) 4

18. A random variable x has mean $\mu=12$ and variance $\sigma^2=9$ and an unknown probability distribution, then $P(6<x<18)$ is

(a) $\frac{1}{2}$ (b) $\frac{3}{4}$ (c) $\frac{1}{4}$ (d) $\frac{1}{8}$

19. The C.D.F of a continuous random variable is given by $F(x)=\begin{cases}0; & x<0\\ 1-e^{-x/5};\ 0\le x\le\infty\end{cases}$

(a) $\frac{1}{5}e^{-\frac{1}{5}x}$ (b) $\frac{1}{10}e^{-\frac{1}{5}x}$ (c) $e^{-\frac{1}{5}x}$ (d) $\frac{1}{2}e^{-\frac{1}{2}x}$

20. A continuous random variable x has a p.d.f $f(x)=3x^2;0\le x\le 1$, find the value of b such that $P(x>b)=0.05$

(a) $\left(\frac{16}{20}\right)^{1/3}$ (b) $\left(\frac{19}{20}\right)^{1/3}$ (c) $\left(\frac{13}{20}\right)^{1/3}$ (d) $\left(\frac{15}{19}\right)^{1/4}$

21. If $\mu_1=0,\mu_2=\frac{1}{5},\mu_3=0$ and $\mu_4=\frac{3}{35}$, then $\beta_2=$ ____

(a) $\frac{13}{7}$ (b) $\frac{17}{9}$ (c) $\frac{15}{7}$ (d) $\frac{13}{5}$

22. If the random variable x has the p.d.f $f(x)=\begin{cases} ax^3; & 0<x<1 \\ 0; & otherwise \end{cases}$ then the value of a is

(a) 3 (b) 4 (c) $\frac{1}{2}$ (d) $\frac{3}{4}$

23. Let x be a continuous random variable with p.d.f $f(x)=\frac{x}{2};1<x<5$, then the p.d.f of $y=2x-3$ is

(a) $\frac{y+3}{8}$ (b) $\frac{y+2}{8}$ (c) $\frac{y-3}{8}$ (d) $\frac{y+4}{8}$

24. If $P(X=x)=\frac{x}{15};x=1,2,3,4,5$ then $P\left(\frac{1}{2}<X<\frac{5}{2}/X>1\right)$ is.

(a) $\frac{2}{15}$ (c) $\frac{2}{7}$ (d) $\frac{1}{7}$

(b) $\frac{1}{5}$

MULTIPLE CHOICE QUESTIONS- ANSWERS

1. (a)
2. (c)
3. (d)
4. (a)
5. (c)
6. (d)
7. (c)
8. (c)
9. (c)
10. (c)
11. (b)
12. (a)
13. (b)
14. (a)
15. (a)
16. (b)
17. (d)
18. (b)
19. (a)
20. (b)
21. (c)
22. (b)
23. (a)
24. (d)