SRM Institute of Science and Technology

Ramapuram campus

Department of Mathematics

18MAB204T- Probability and Queueing Theory

Year/Sem: II/IV **Branch: CSE, IT**

Unit I - PROBABILITY AND RANDOM VARIABLES

1.	The amount of time, in hours, that a computer functions before breaking down is a random variable of thetype (a) Continuous (b)Discrete (c) Neither discrete norcontinuous (d) Continuous as well as discrete	**Ans: (a)**	**(CLO-1, Remember)**
2.	The rth moment of a random variable about mean is called (a) Moment generating function (b) arbitrary moment (c) central moment (d) neutral moment	**Ans: (c)**	**(CLO-1, Apply)**
3.	A random variable X has the following probabilityfunction: x: 0, 1, 2, 3, 4 P(x): K, 2k, 5k, 7k, 9k Then the value of k= --------- (a)1/24(b) 1/12 (c)1 (d) 24/21	**Ans: (a)**	**(CLO-1, Apply)**
4.	The probability function of a random variable X is given by $p(x)=\begin{cases} \frac{1}{4}, & for\, x=-2 \\ \frac{1}{4}, & for\, x=0 \\ \frac{1}{2}, & for\, x=10 \\ 0, & elsewhere \end{cases}$ Find P (X ≤ 0) (a)1/4(b) 1/12 (c)1/2 (d) 1/20	**Ans: (c)**	**(CLO-1, Apply)**
5.	The p.d.f. of X is defined as $f(x)=\begin{cases} k, & for\, 0<x\le 4 \\ 0, & otherwise \end{cases}$ then the value of k is (a)1/4(b) 1/2 (c)3/4 (d) 1/20	**Ans: (a)**	**(CLO-1, Apply)**

<table>
<tr><td>6.</td><td>Consider a random variable X with p.d.f
$$f(x)=\begin{cases}3x^2, \text{ if } 0<x<1\\ 0, \text{otherwise}\end{cases}$$ Find E (X)
(a)1/4(b) 1/2 (c)1/8 (d) 3/4</td><td>Ans: (d)</td><td>(CLO-1, Apply)</td></tr>
<tr><td>7.</td><td>If X is a continuous R.V, then $\frac{d}{dx}F(x)=f(x)$ at all points here F(x) is --------
(a) integrable (b) Constant (c) 1 (d) Differentiable</td><td>Ans: (d)</td><td>(CLO-1, Apply)</td></tr>
<tr><td>8.</td><td>The value of ‘k’ from the following table is------
<table><tr><td>x</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>p(x)</td><td>0.1</td><td>k</td><td>0.2</td><td>2k</td><td>0.3</td><td>3k</td></tr></table>(a) 1 (b) $\frac{1}{10}$ (c) $\frac{1}{15}$ (d) $\frac{2}{3}$</td><td>Ans:(c)</td><td>(CLO-1, Apply)</td></tr>
<tr><td>9.</td><td>A commuter train arrives punctually at a station every 25 minutes. Each morning, a commuter leaves his house and casually walks to the train station. Let X denote the amount of time, in minutes, that commuter waits for the train from the time he reaches the train station. It is known that the probability density function of X is
$$f(x)=\begin{cases}\frac{1}{25}, \text{ for } 0<x<25\\ 0, \text{ otherwise.}\end{cases}$$ What is the expected value of the random variable X.
(a) 1/5 (b) 25/2 (c)1/25 (d)3/25</td><td>Ans: (b)</td><td>(CLO-1, Apply)</td></tr>
<tr><td>10.</td><td>The value of $P(1/2<X<2/3)$ from the
<table><tr><td>x</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>p(x)</td><td>0.1</td><td>1/15</td><td>0.2</td><td>2/15</td><td>0.3</td><td>3/15</td></tr></table>(a) 0.5 (b) ∞ (c) undefined (d) 1</td><td>Ans: (c)</td><td>(CLO-1, Apply)</td></tr>
<tr><td>11.</td><td>The Relation between Variance and Standard deviation is ------
(a) var $= S.D^2$ (b) var $=\sqrt{S.D}$
(c) var$-S.D=0$ (d) var $=\sqrt[2]{S.D}$</td><td>Ans: (a)</td><td>(CLO-1, Apply)</td></tr>
<tr><td>12.</td><td>The Relation between Covariance and Mean is ------
(a) $\operatorname{cov}(X,Y)=E(XY)-E(X)E(Y)$ (b) $\operatorname{cov}(X,Y)=E(XY)+E(X)E(Y)$
(c) $\operatorname{cov}(X,Y)=E(XY)-(E(X)E(Y))^2$ (d) $\operatorname{cov}(X,Y)=E(XY)^2-(E(X)E(Y))^2$</td><td>Ans: (a)</td><td>(CLO-1, Remember)</td></tr>
</table>

13.	The value of k if the pdf $f(x) = kx^2 e^{-x}$, $x \geq 0$ is -------- (a) 0.5 (b) ∞ (c) 0 (d) 1	**Ans: (a)**	**(CLO-1, Apply)**
14.	Given E(X) = 5 and E(Y) = -2, then E(X – Y) is (a) 3 (b) 5 (c) 7 (d) –2	**Ans:(c)**	**(CLO-1, Apply)**
15.	A variable that can assume any possible value between two points is called (a) discrete random variable(b) continuous random variable (c) discrete sample space(d) random variable	**Ans: (b)**	**(CLO-1, Remember)**
16.	The generalized form of Tchebycheff's inequality is ------------ (a) $P[\lvert X-\mu\rvert \geq k\sigma] \leq \frac{1}{k^2}$ (b) $P[\lvert X-\mu\rvert > k\sigma] = 1-\frac{1}{k^2}$ (c) $P[\lvert X-\mu\rvert < k\sigma] = \frac{1}{k^2}$ (d) $P[\lvert X-\mu\rvert > k\sigma] = \frac{1}{k^2}$	**Ans: (a)**	**(CLO-1, Remember)**
17.	The conditions satisfied by the pmf is …… (a) $p(x) \geq 0 \,\&\, \sum p(x) = 1$ (b) $f(x) \geq 0 \,\&\, \int_{-\infty}^{\infty} f(x)dx = 1$ (c) $p(x) \leq 0 \,\&\, \sum p(x) = 0$ (d) $f(x) \leq 0 \,\&\, \int_{-\infty}^{\infty} f(x)dx = 1$	**Ans: (a)**	**(CLO-1, Remember)**
18.	If Var(X) = 4, then Var(4X+5) is (a)89 (b) 69 (c) 64 (d) 9	**Ans: (c)**	**(CLO-1, Remember)**
19.	If X and Y are independent random variables with Var 2 and 3 respectively, thenVar(3X+4Y) is (a) 66 (b) 7 (c) 25 (d) 18	**Ans: (a)**	**(CLO-1, Remember)**
20.	If X and Y are independent random variables with Var 2 and var 3 respectively, thenVar(2X - Y) is (a) 66 (b) 11 (c) 25 (d) 18	**Ans: (b)**	**(CLO-1, Remember)**
21.	If E(X) =3 ,then E(3X+4) is (a) 15 (b) 13 (c) 9 (d) 10	**Ans: (b)**	**(CLO-1, Remember)**
22.	If E(X+3) =6 ,then E(3X+4) is (a) 15 (b) 13 (c) 9 (d) 10	**Ans: (b)**	**(CLO-1, Remember)** ,

23.	Var(6X+4) is (a)6Var(X) (b) 36Var(X) (c)Var(X) (d)0	**Ans: (b)**	**(CLO-1, Remember)**
24.	Var (aX+b) = (a)aVar(X)+b (b) a^2 Var(X) (c)aVar(X) (d)Var(X)	**Ans: (b)**	**(CLO-1, Remember)**
25.	If c is a constant in a continuous probability distribution, then p(x = c) is always equal to (a) zero(b) one(c) negative(d) does not exist	**Ans: (a)**	**(CLO-1, Remember)**
26.	If X is a discrete random variable with probability distribution P(X=x)=kx, x=1,2,3,4, Find P(2<x<4). (a) 3/10 (b) 1/15 (c) 1/2 (d) 1/30	**Ans: (a)**	**(CLO-1, Apply)**
27.	The value of F(-∞) is (a) 0.5 (b)0.05 (c)0 (d) 1	**Ans: (c)**	**(CLO-1, Remember)**
28.	A set of numerical values assigned to a sample space is called (a) random sample(b) random variable (c) random numbers(d) random experiment	**Ans: (b)**	**(CLO-1, Remember)**
29.	If a random variable has the moment generating function Mx(t)= 2/(2-t), determine the mean of X. (a) 1/4 (b)1/3 (c)1/2 (d) 2	**Ans: (c)**	**(CLO-1, Apply)**
30.	If the probability density function of X is given by f(x) =2(1-x), 0<x<1, Find mean (a) 1/4 (b)1/3 (c)1/2 (d) 2	**Ans: (b)**	**(CLO-1, Apply)**
31.	The distribution function F(x) is equal to (a) P (X = x)(b) P (X ≤ x) (c) P (X ≥ x)(d) P (X > x)	**Ans: (b)**	**(CLO-1, Remember)**

32.	Let X be a random variable and $Y = 2X + 1$. What is the variance of Y if variance of X is 5 ? (a)10 (b) 20 (c) 5 (d) 1	**Ans:(b)**	**(CLO-1, Remember)**
33.	If the range of X is {0,1,2,3,4} and P(X=x)=0.2. Determine the mean (a) 3/4 (b)1/15 (c) 1/2 (d) 2	**Ans: (d)**	**(CLO-1, Apply)**
34.	A discrete probability function p(x) is always non-negative and always lies between (a) 0 and ∞(b) 0 and 1(c) –1 and +1(d) –∞ and +∞	**Ans: (b)**	**(CLO-1, Remember)**
35.	E [X − E (X)] is equal to (a) E(X)(b)V(X)(c) 0(d) E(X) − X	**Ans: (c)**	**(CLO-1, Apply)**
36.	If X and Y are independent random variables , then the MGF of their sum is equal to…………of their MGFs. (a) Product (b)sum (c) Difference (d)symmetric difference	**Ans: (a)**	**(CLO-1, Remember)**