



**Department of Computer Science and Engineering**

**MA8402 - Probability and Queueing Theory**

**Unit I - MCQ Bank**

1. Given  $P(A) = 0.4$ ,  $P(B) = 0.5$  and  $P(A \cup B) = 0.9$ , then:

- A. A and B are not mutually exclusive events
- B. A and B are equally likely events
- C. A and B are independent events
- D. **A and B are mutually exclusive events**

Answer: (D)

2. If  $A_1, A_2, A_3, \dots, A_k$  are  $k$  mutually exclusive events, then:

- A.  **$P(A_1 \cup A_2 \cup A_3 \cup \dots \cup A_k) = P(A_1) + P(A_2) + P(A_3) + \dots + P(A_k)$**
- B.  $P(A_1 \cup A_2 \cup A_3 \cup \dots \cup A_k) > 1$
- C.  $P(A_1 \cap A_2 \cap A_3 \cap \dots \cap A_k) = 1$
- D.  $P(A_1 \cap A_2 \cap A_3 \cap \dots \cap A_k) = P(A_1 \cup A_2 \cup A_3 \cup \dots \cup A_k)$

Answer: (A)

3.  $E[X - E(X)]^2$  is:

- A.  $E(X)$
- B.  $E(X^2)$
- C.  **$\text{Var}(X)$**
- D.  $S.D(X)$

Answer: (C)

4.  $\text{Var}(4X + 8)$  is:

- A.  $12 \text{Var}(X)$
- B.  $4 \text{Var}(X) + 8$
- C.  **$16 \text{Var}(X)$**
- D.  $16 \text{Var}(X) + 8$

Answer: (C)

5. The probability function of a random variable is defined as:

x	-1	-2	0	1	2
f(x)	k	2k	3k	4k	5k

Then k is equal to:

- A. Zero
- B. 1/4
- C. 1/15**
- D. One

Answer: (C)

6. An expected value of a random variable is equal to its:

- A. Variance
- B. Standard deviation
- C. Mean**
- D. Covariance

Answer: (C)

7.  $\text{Var}(X)$  is equal to:

- A.  $E(X^2)$
- B.  $[E(X)]^2$
- C.  $E(X^2) - [E(X)]^2$**
- D.  $E(X^2) + [E(X)]^2$

Answer: (C)

8. The mean and standard deviation of the binomial probability distribution 'are respectively:

- A.  $np$  and  $npq$
- B.  $np$  and  $\sqrt{npq}$**
- C.  $np$  and  $nq$
- D.  $n$  and  $p$

Answer: (B)

9. The Pdf of a random variable X is  $f(x) = 2x$ ,  $0 < x < 1$ , find the p.d.f of  $Y = 3x + 1$

- A.  $\frac{2}{9}(y-1)$ ,  $1 < y < 4$ .**
- B.  $(y-1)$ ,  $1 < y < 4$ .
- C.  $(y+1)$ ,  $1 < y < 2$ .
- D.  $\frac{2}{9}(y-1)$ ,  $10 < y < 4$ .

Answer: (A)

10. If a random variable X takes the value 1,2,3,4 such that  $2P(X = 1) = 3P(X = 2) = P(X = 3) = 5P(X = 4)$ .

Find the probability distribution of X.

A.  $k = \frac{29}{30}$

**B.  $k = \frac{30}{61}$**

C.  $k = \frac{61}{30}$

D.  $k = \frac{30}{49}$

Answer: **(B)**

11. The relationship between probability distribution function F(x) and the probability density function f(x) is -----.

**A.  $f(x) = \frac{d}{dx}F(x)$**

B.  $f(x) = \frac{d^2}{dx^2}F(x)$

C.  $f^2(x) = \frac{d}{dx}F(x)$

D.  $f(x) = \frac{d}{dx}F^2(x)$

Answer: **(A)**

12.  $E(aX+b) =$  -----

A.  $a E(x)$

**B.  $a E(x)+b$**

C.  $a^2 E(x)+b$

D.  $E(x)+b$

Answer: **(B)**

13. For a binomial distribution, mean is 6 and standard deviation is  $\sqrt{2}$ , find 'n'.

A. 0

**B. 9**

C. 1

D. 4

Answer: **(B)**

14. A CRV 'X' has pdf given by  $f(x) = 3x^2$ ,  $0 \leq x \leq 1$ . Find K such that  $P(x > K) = 0.05$ .

- A. 0.3456
- B. 0.7410
- C. 0.7890
- D. **0.9830**

Answer: (D)

15. The MGF of Binomial distribution is -----.

- A.  $(q + pe^t)^n$
- B.  $(p + q)^n$
- C.  $(p + qe^t)^n$
- D.  $(q + p)$

Answer: (A)

16. The mean of the binomial distribution is 20 and standard deviation is 4. Find the parameters of the distribution.

- A.  $q = 3/5, p = 7/5, n = 100$
- B.  **$q = 4/5, p = 1/5, n = 100$**
- C.  $q = 7/5, p = 3/5, n = 100$
- D.  $q = 9/5, p = 11/5, n = 100$

Answer: (B)

17. If 'X' is a uniform variable in  $[-2, 2]$ , find the mean and variance of 'X'.

- A. 1, 5/3
- B. 0, 7/3
- C. **0, 4/3**
- D. 1, 4/3

Answer: (C)

18. X is a discrete R.V having the p.m.f

$$X : -1 \quad 0 \quad 1$$

$$P(X) : k \quad 2k \quad 3k. \text{ Find } P(X \geq 0).$$

- A.  $k = 5/6, P(X \geq 0) = 1/6$ .
- B.  $k = 7/6, P(X \geq 0) = 11/6$ .
- C.  $k = 5/6, P(X \geq 0) = 5/6$ .
- D.  **$k = 1/6, P(X \geq 0) = 5/6$ .**

Answer: (D)

19. The random variable  $X$  has the p.m.f.  $P(x) = x/15$ ,  $x=1,2,3,4,5$  and  $=0$  elsewhere. find  $P(1/2 < X < 5/2 | X > 1)$ .

- A. **1/7.**
- B. 7/9.
- C. 5/9.
- D. 1/6

Answer: (A)

20. A dice is thrown 3 times. If getting a '6' is considered a success, find the probability of at least two successes.

- A.  $p = 7/6, q=11/6, n=3, P(\text{at least two successes}) = 1/27$
- B.  $p = 1/6, q=7/6, n=3, P(\text{at least two successes}) = 5/27$
- C.  $p = 5/6, q=5/6, n=3, P(\text{at least two successes}) = 2/27$
- D.  **$p = 1/6, q=5/6, n=3, P(\text{at least two successes}) = 2/27$**

Answer: (D)

21. If the p.d.f of a R.V.  $X$  is  $f(x)=x/2$  in  $0 \leq x \leq 2$ , find  $P(X > 1.5 | X > 1)$ .

- A. 0.7833
- B. 0.9833
- C. **0.5833**
- D. 0.3833

Answer: (C)

22. The density function of a random variable 'X' is given by  $f(x) = Kx(2-x), 0 \leq x \leq 2$ . Find K.

- A.  $k= 7/4$ .
- B.  **$k= 3/4$ .**
- C.  $k= 11/6$ .
- D.  $k= 1/6$ .

Answer: (B)

23. If MGF of  $X$  is  $(5 - 4e^t)^{-1}$ , find the distribution of  $X$  and  $P(x=5)$ .

- A.  **$P(x=5) = \frac{4^5}{5^6}$**
- B.  $P(x=5) = \frac{5^5}{7^6}$
- C.  $P(x=5) = \frac{7^5}{5^6}$
- D.  $P(x=5) = \frac{9^5}{5^6}$

Answer: (A)

24. A binomial random variable is approximated to Poisson random variable when sample value is ----- and probability is close -----.

A. *Small, zero.*

**B. *large, zero.***

C. *large, one.*

D. *Small, Two.*

Answer: **(B)**

25. Poisson distribution is not a ----- distribution.

A. *Asymmetrical*

B. *Equal*

**C. *Symmetrical***

D. *bell shaped*

Answer: **(C)**

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