

[N.B. – Answer all the questions. Each question carries ONE mark. Block fully, with a black ball-point pen, the circle of the letter that stands for the correct/best answer in the “Answer sheet” for the Multiple Choice Questions Examination.]

Candidates are asked not to leave any mark or spot on the question paper.

1. If a population exponentially declines, when is it reduced to half?
- (a) $\frac{\log_{10} 2}{r}$

(b) $\frac{\log_e 2}{r}$

(c) $\frac{\log_e 2}{r^2}$

(d) $\frac{\log_e 3}{r}$
2. Vital statistics records –
- i. marriage

ii. birth

iii. sickness and death
- Which one is correct?
- (a) i and ii

(b) i and iii

(c) ii and iii

(d) i, ii and iii
3. Total number of children born to each 1000 people in any country or region is called –
- (a) TFR

(b) GFR

(c) CBR

(d) GRR
4. $f(x) = 3x; 0 < X < 2$; What is $F(2)$?
- (a) 6

(b) 3

(c) 1

(d) 0
5. A coin is flipped twice. What is the probability of getting heads first and tails second?
- (a) $\frac{1}{4}$

(b) $\frac{1}{3}$

(c) $\frac{1}{2}$

(d) $\frac{2}{4}$
6. Tossing a die r times generates how many outcomes?
- (a) $6 \times r$

(b) r^6

(c) 6^r

(d) 2^r
7. A survey shows that 5 out of every 200 customers in a store pay with cash. If a customer is picked randomly, what is the probability that they pay using another method?
- (a) 0.050

(b) 0.500

(c) 0.975

(d) 0.025
8. If $E(X^2) = 45$ and $V(X) = 21$, what is $E(X)$?
- (a) $4\sqrt{3}$

(b) $5\sqrt{2}$

(c) $6\sqrt{2}$

(d) $7\sqrt{2}$
9. In a binomial distribution with $p = 0.6$ and $P(x) = 0.7682$, $n =$?
- (a) 3

(b) 9

(c) 10

(d) 14
10. For a Poisson-distributed variable with mean $m = 4$, which of the following is true?
- i. $E(X) = 4$

ii. $V(X) = 2$

iii. $E(X^2) = 18$
- Which one is correct?
- (a) i and ii

(b) i and iii

(c) ii and iii

(d) i, ii and iii
- Answer the questions 11-13 based on the following information

X	0	1	2	3
P(X)	$\frac{1}{4}$	m	$\frac{1}{3}$	$\frac{1}{6}$

11. **What is the value of m ?**
 (a) $\frac{1}{3}$ (b) $\frac{5}{12}$ (c) $\frac{1}{4}$ (d) $\frac{1}{6}$
12. **Find $F(2)$.**
 (a) $\frac{1}{2}$ (b) $\frac{3}{4}$ (c) $\frac{5}{6}$ (d) $\frac{2}{3}$
13. **What is $P(X > 1)$?**
 (a) $\frac{1}{2}$ (b) $\frac{5}{12}$ (c) $\frac{1}{3}$ (d) $\frac{7}{12}$
14. **Given $P(A) = 0.7$, $P(A \cup B) = 0.9$, and $P(A \cap B) = 0.5$, what is $P(B)$?**
 (a) 0.8 (b) 0.6 (c) 0.7 (d) 0.5
15. **If $E(X) = 2$ and $E(X^2) = 8$, then the value of the $V(X) = ?$**
 (a) 0 (b) 2 (c) 4 (d) 8
16. **A box contains 9 blue and 3 red balls. If two balls are randomly picked, what is the probability that at least one is red?**
 (a) $\frac{3}{11}$ (b) $\frac{1}{3}$ (c) $\frac{18}{33}$ (d) $\frac{5}{11}$
17. **Given $P(A \cup B) = 0.7$, $P(A \cap B) = 0.2$, what are $P(A)$ and $P(B)$?**
 (a) $P(A) = 0.5$ and $P(B) = 0.4$ (b) $P(A) = 0.4$ and $P(B) = 0.6$
 (c) $P(A) = 0.4$ and $P(B) = 0.3$ (d) $P(A) = 0.7$ and $P(B) = 0.3$
18. **If $E(X) = 6$, what is $E(5 - X)$?**
 (a) 1 (b) 0 (c) -1 (d) 2

Answer the questions 19-21 based on the following information

The probability function of random variable x is given below:

$$P(x) = \frac{2x+1}{k}; x = 1, 2, 3, 4$$

19. **What is the value of k ?**
 (a) 18 (b) 25 (c) 12 (d) 24
20. **What is $E(X)$?**
 (a) 1.75 (b) 2.92 (c) 3.25 (d) 2.25
21. **What is $V(X)$?**
 (a) 1.05 (b) 3.0 (c) 1.5 (d) 1.25
22. **What is the probability that at least one item in a sample space will occur?**
 (a) 0 (b) 0.5 (c) 1 (d) Undefined
23. **In a binomial distribution with $p = 0.6$ and $n = 9$, what is $P(6)$?**
 (a) 0.2007 (b) 0.2508 (c) 0.2311 (d) 0.7682
24. **Which of the following statements about a binomial distribution are true?**
 i. The probability of success remains constant for each trial.
 ii. The trials are dependent on each other.
 iii. The number of trials is fixed in advance.
Which one is correct?
 (a) i and ii (b) i and iii (c) ii and iii (d) i, ii and iii
25. **If the variance of a Poisson distribution is 3.5, what is $P(1)$?**
 (a) 0.1465 (b) 0.1358 (c) 0.1839 (d) 0.2184

“Why speculate when you can calculate?” - John C. Baez

Answer Key

1. (b) $\frac{\log_e 2}{r}$
2. (d) i, ii and iii
3. (c) CBR
4. (c) 1
5. (a) $\frac{1}{4}$
6. (c) 6^r
7. (c) 0.975
8. (b) $5\sqrt{2}$
9. (b) 9
10. (b) i and iii
11. (c) $\frac{1}{4}$
12. (c) $\frac{5}{6}$
13. (a) $\frac{1}{2}$
14. (c) 0.7
15. (c) 4
16. (d) $\frac{5}{11}$
17. (a) $P(A) = 0.5$ and $P(B) = 0.25$
(b) 0.1358
18. (c) -1
19. (d) 24
20. (b) 2.92
21. (a) 1.05
22. (c) 1
23. (d) 0.7682
24. (b) i and iii