

[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