

## NEC

Answer the following Questions

- A bag contains 10 blue marbles, 20 black marbles and 30 red marbles. A marble is drawn from the bag, its color recorded and it is put back in the bag. This process is repeated 3 times. The probability that no two of the marbles drawn have the same color is  
 (A)  $1/36$  (B)  $1/6$  (C)  $1/4$  (D)  $1/3$
- A bag contains 2 red, 3 green and 2 blue balls. Two balls are drawn at random. What is the probability that none of the balls drawn is blue?  
 (A)  $\frac{10}{21}$  (B)  $\frac{11}{21}$  (C)  $\frac{2}{7}$  (D)  $\frac{5}{7}$
- If  $x$  and  $y$  are integers and  $\sqrt{xy} = 10$ . Which of the following can't be a value of  $x + y$ ?  
 (A) 25 (B) 29 (C) 50 (D) 52
- If  $m$  and  $n$  are non-zero integers and  $m > n$ , which of the following must be positive?  
 (A)  $mn$  (B)  $m + n$   
 (C)  $\frac{m}{n}$  (D)  $m - n$
- For the differential equation  $f(x, y) \frac{dy}{dx} + g(x, y) = 0$  to be exact is  
 (A)  $\frac{\partial f}{\partial y} = \frac{\partial g}{\partial x}$  (B)  $\frac{\partial f}{\partial x} = \frac{\partial g}{\partial y}$   
 (C)  $f = g$  (D)  $\frac{\partial^2 f}{\partial x^2} = \frac{\partial^2 g}{\partial y^2}$
- Find the unit digit of the expansion  $25^{6251} + 36^{528} + (7 - 1)^{54}$ .  
 (A) 1 (B) 2 (C) 6 (D) 7
- Oranges are bought at the rate of 10 for ₹ 25 and sold at the rate of 9 for ₹ 25. The profit is:  
 (A)  $9\frac{1}{11}\%$  (B) 10%  
 (C)  $11\frac{1}{9}\%$  (D)  $12\frac{1}{2}\%$
- If the cost price is 96% of the selling price, then what is the profit percent?  
 (A) 4.36% (B) 4.05% (C) 4.17% (D) 4.89%

9. What values of  $x, y, z$  satisfy the following system of linear equations.
- $$\begin{bmatrix} 1 & 2 & 3 \\ 1 & 3 & 4 \\ 2 & 2 & 3 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 6 \\ 8 \\ 12 \end{bmatrix}$$
- (A)  $x = 6, y = 3, z = 2$  (B)  $x = 12, y = 3, z = -4$   
(C)  $x = 6, y = 6, z = -4$  (D)  $x = 12, y = -3, z = 4$
10. A grocer buys two kind of rice at ₹ 1.80 and ₹ 1.20 per kg respectively. In what proportion should be these be mixed, so that by selling the mixture at ₹ 1.75 per kg, 25% may be gained?  
(A) 2 : 1 (B) 3 : 2 (C) 11 : 1 (D) 1 : 2
11. The analytic function has singularities at where  $f(z) = \frac{z-1}{z^2+1}$   
(A) 1 and  $-1$  (B) 1 and  $i$   
(C) 1 and  $-i$  (D)  $i$  and  $-i$
12. A dealer sells 7 chairs and buys 9 tables, thus increasing his cash by ₹ 60. Then at the same prices, he buys 9 chairs and sells 13 tables, thus decreasing his cash by ₹ 20. Find the price of each table.  
(A) ₹ 13 (B) ₹ 14.50 (C) ₹ 45.00 (D) ₹ 40.00
13. Find 'p' so that the sum of the roots of equation  $px^2 + 8x + 12p = 0$  may be equal to their product.  
(A)  $1/3$  (B)  $-1/3$  (C)  $-2/3$  (D)  $-4/3$
14. Solve 'x' for the system  $2x + 3y + z = 9, 4x + y = 7, x - 3y - 7z = 6$   
(A) 2 (B) 0 (C) 1 (D)  $\infty$
15. Two trains of lengths 100 meters and 75 meters respectively are running towards each other on parallel tracks with speeds of 40 km/hr and 86 km/hr respectively. They will cross each other, after they meet, in  
(A) 8 seconds (B) 12 seconds  
(C) 15 seconds (D) 5 seconds
16. X and Y can do work in 15 days, Y and Z can do it in 20 days, Z and X can do it in 12 days. In how many days can they complete the work, if they work together?  
(A) 15 (B) 10 (C) 8 (D) 12
17. Given  $y = \int_1^{x^2} \cos t \, dt$ , then  $\frac{dy}{dx} =$  \_\_\_\_\_  
(A)  $2x^2 \cos x^2$  (B)  $2x^2 \sin x^2$   
(C)  $2x \cos x^2$  (D)  $2x \sin x^2$
18. An angle which is greater than  $180^\circ$  but less than  $360^\circ$  is called:  
(A) an acute angle (B) an obtuse angle  
(C) an adjacent angle (D) a reflex angle

19. The ratio of the measure of an angle of a regular octagon to the measure of its exterior angle is:  
 (A) 1 : 2                                      (B) 1 : 3                                      (C) 2 : 3                                      (D) 3 : 1
20. For the scalar field  $u = \frac{x^2}{2} + \frac{y^2}{3}$ , the magnitude of the gradient at the point (1, 3) is  
 (A)  $\sqrt{13/9}$                                       (B)  $\sqrt{9/2}$                                       (C)  $\sqrt{5}$                                       (D) 9/2
21. Find the sum of all four-digit numbers formed by the digit 1, 2, 3, and 4 if repetition is not allowed.  
 (A) 27,000                                      (B) 33,330                                      (C) 66,660                                      (D) 44,400
22. All the opposite faces of a big cube are coloured with red, black and green colours. After this it is cut into 64 small equal cubes. How many small cubes are there whose only one face is coloured?  
 (A) 32                                      (B) 8                                      (C) 16                                      (D) 24
23. Two dices are thrown simultaneously. The probability that the sum of numbers on both exceeds 8 is  
 (A) 4/36                                      (B) 7/36                                      (C) 9/36                                      (D) 10/36
24. The figure alongside represents a perfectly matched multiplication operation where each alphabet represents a different number from 0 to 9.
- $$\begin{array}{r} \text{A A} \\ \times \text{B C} \\ \hline \text{B 9 7} \\ \text{D D E} \\ \hline \text{9 5 7} \end{array}$$
- What is the square of D?  
 (A) 4                                      (B) 36                                      (C) 64                                      (D) 81
25. Which of the following is a solution of the differential equation  $\frac{d^2y}{dx^2} + p \frac{dy}{dx} + (q + 1)y = 0$ ?  
 Where  $p = 4, q = 3$   
 (A)  $e^{-3x}$                                       (B)  $xe^{-x}$                                       (C)  $xe^{-2x}$                                       (D)  $x^2e^{-2x}$
26. Eighty-five children went to an amusement park where they could ride on the Merry-Go-Round, Roller coaster and Ferris wheel. It was known that 20 of them took all three rides and 55 of them at least two of the three rides. Each ride costs ₹ 1 and the total receipts of the amusement park were ₹ 145. How many children did not try any of the rides?  
 (A) 5                                      (B) 10                                      (C) 15                                      (D) 20

27. In a row of boys, Vijay is eighth from the right and Bharat is twelfth from the left. When Vijay and Bharat interchange positions, Bharat becomes twenty first from the left. Which of the following will be Vijay's position from the right?
- (A) 21<sup>st</sup> (B) 17<sup>th</sup>  
(C) 8<sup>th</sup> (D) Cannot be determined
28. A group of 78 people watch Zee TV, Star Plus or Sony. Of these, 36 watch Zee TV, 48 watch Star Plus and 32 watch Sony, 14 people watch both Zee TV and Star Plus, 20 people watch both Star Plus and Sony and 12 people watch both Sony and Zee TV. Find the ratio of the number of people who watch only Zee TV to the number of people who watch only Sony.
- (A) 9 : 4 (B) 3 : 2  
(C) 5 : 3 (D) 6 : 5
29. The Laplace transform of  $(t^2 - 2t)u(t - 1)$  is \_\_\_\_\_
- (A)  $\frac{2}{s^3}e^{-s} - \frac{2}{s^2}e^{-s}$  (B)  $\frac{2}{s^3}e^{-2s} - \frac{2}{s^2}e^{-s}$   
(C)  $\frac{2}{s^3}e^{-s} - \frac{2}{s}e^{-s}$  (D) None of these
30. The 5<sup>th</sup> and 13<sup>th</sup> terms of an A.P. are 5 and  $-3$  respectively. The first term of the A.P. is:
- (A) 1 (B) 14  
(C)  $-15$  (D) None of these