## **DECODE NDA 2 2024**

## Mock Test No 4

## 04 Aug 2024

Max Marks : 75

1. The 2 vectors  $\hat{j} + \hat{k}$  and  $3\hat{i} - \hat{j} + 4\hat{k}$  represent the two sides AB and AC, respectively of a  $\triangle ABC$ . The length of the median through A is

(A)  $\frac{\sqrt{34}}{2}$  (B)  $\frac{\sqrt{48}}{2}$  (C)  $\sqrt{18}$  (D) None

2. The number of vectors of unit length perpendicular to the vectors  $2\hat{i} + \hat{j} + 2\hat{k}$  and  $\hat{j} + \hat{k}$  is

(A) one (B) two (C) three (D) infinite

- 3. For data -1, 1, 4, 3, 8, 12, 17, 19, 9, 11; if M is the median of first 5 observations and N is the median of last 5 observations, then what is the value of 4M N ?
  - (A) 7 (B) 4 (C) 1 (D) 0
- 4. The mean and variance of five observations are 14 and 13.2 respectively. Three of the five observations are 11, 16 and 20. What are the other two observations ?

(A) 8 and 15 (B) 9 and 14 (C) 10 and 13 (D) 11 and 12

- 5. The mean and standard deviation of a set of values are 5 and 2 respectively. If 5 is added to each value, then what is the coefficient of variation for the new set of values ?
  - (A) 10 (B) 20 (C) 40 (D) 70
- 6. A car manufacturing factory has two plants, X and Y. Plant X manufactures 70% of cars and plant Y manufactures 30%. 80% of the cars at plant X and 90% of the cars at plant Y are rated of standard quality. A car is chosen at random and is found to be of standard quality. What is the probability that it has come from plant X?

(A) 
$$\frac{27}{83}$$
 (B)  $\frac{56}{83}$  (C)  $\frac{28}{83}$  (D)  $\frac{55}{83}$ 

7. Three persons, A, B and C, fire at a target in turn, starting with A. Their probability of hitting the target are 0.4, 0.3 and 0.2 respectively. The probability of two hits is

(A) 0.024 (B) 0.188 (C) 0.336 (D) 0.452

- 8. If the vectors  $2\hat{i} 3\hat{j} + \hat{k}$ ,  $\hat{i} + 2\hat{j} 3\hat{k}$  and  $\hat{j} + p\hat{k}$  are coplanar, then the value of p is ?
  - (A) 1 (B) -1 (C) 5 (D) -5
- 9. If a vector of magnitude 2 units makes an angle  $\frac{\pi}{3}$  with  $2\hat{i}$ ,  $\frac{\pi}{4}$  with  $3\hat{j}$  and an acute angle  $\theta$  with  $4\hat{k}$ , then what are the components of the vector ?
  - (A) (1,  $\sqrt{2}$ , 1) (B) (1,  $-\sqrt{2}$ , 1) (C) (1,  $-\sqrt{2}$ , - 1) (D) (1,  $\sqrt{2}$ , - 1)

- 10. The central angles p, q, r and s (in degrees) of four sectors in a Pie Chart satisfy the relation9p = 3q = 2r = 6s. What is the value of 4p q ?
  - (A) 12 (B) 24 (C) 30 (D) 36
- 11. A number *x* is chosen at random from first n natural numbers. What is the probability that the number chosen satisfies  $x + \frac{1}{x} > 2$ ?
  - (A)  $\frac{1}{n}$  (B)  $\frac{1}{2n}$  (C)  $\frac{n-1}{n}$  (D) 1

Consider the following for the next two (02) items that follow :

Let A and B be two events such that  $P(A \cup B) \ge 0.75$  and  $0.125 \le P(A \cap B) \le 0.375$ .

- 12. What is the minimum value of P(A) + P(B)?
  - (A) 0.625 (B) 0.750 (C) 0.825 (D) 0.875
- 13. What is the maximum value of P(A) + P(B)?
  - (A) 0.75 (B) 1.125 (C) 1.375 (D) 1.625
- 14. What is the probability that the month of December has 5 Sundays ?
  - (A) 1 (B)  $\frac{1}{4}$  (C)  $\frac{3}{7}$  (D)  $\frac{2}{7}$

- 15. The coefficient of correlation is independent of
  - (A) change of scale only
  - (B) change of origin only
  - (C) both change of scale and change of origin
  - (D) neither change of scale nor change of origin
- 16. A particle is acted upon by constant forces  $4\hat{i} + \hat{j} 3\hat{k}$  and  $3\hat{i} + \hat{j} \hat{k}$  which displaces it from a point  $\hat{i} + 2\hat{j} + 3\hat{k}$  to the point  $5\hat{i} + 4\hat{j} + \hat{k}$ . The work done in standard units by the forces is given by
  - (A) 40 (B) 30 (C) 25 (D) 15
- 17. If  $\overline{a}$ ,  $\overline{b}$ ,  $\overline{c}$  are non coplanar vectors and  $\lambda$  is a real number, then the vectors  $\overline{a} + 2\overline{b} + 3\overline{c}$ ,  $\lambda \overline{b} + 4\overline{c}$  and  $(2\lambda - 1)\overline{c}$  are non coplanar for
  - (A) all values of  $\lambda$
  - (B) all except one value of  $\boldsymbol{\lambda}$
  - (C) all except two value of  $\lambda$
  - (D) no value of  $\lambda$
- 18. The values of a, for which the points A, B, C with position vectors  $2\hat{i} + \hat{j} + \hat{k}$ ,  $\hat{i} 3\hat{j} 5\hat{k}$  and  $\hat{a}\hat{i} 3\hat{j} + \hat{k}$  respectively are the vertices of a right angled triangle with C =  $\frac{\pi}{2}$  are
  - (A) 2 and 1 (B) -2 and -1 (C) -2 and 1 (D) 2 and -1

- 19. The probability that A speaks truth is  $\frac{4}{5}$ , while this probability for B is  $\frac{3}{4}$ . The probability that they contradict each other when asked to speak on a fact is
  - (A)  $\frac{3}{20}$  (B)  $\frac{1}{5}$  (C)  $\frac{7}{20}$  (D)  $\frac{4}{5}$
- 20. The median of a set of 9 distinct observations is 20.5. If each of the largest 4 observations of the set is increased by 2, then the median of the new set
  - (A) is increased by 2
  - (B) is decreased by 2
  - (C) is two times the original median
  - (D) remains the same as that of original set
- 21. It is given that the events A and B are such that  $P(A) = \frac{1}{4}$ ,  $P(A|B) = \frac{1}{2}$  and  $P(B|A) = \frac{2}{3}$ . Then P(B) is
  - (A)  $\frac{1}{6}$  (B)  $\frac{1}{3}$  (C)  $\frac{2}{3}$  (D)  $\frac{1}{2}$
- 22. What is the median of the numbers 4.6, 0, 9.3, -4.8, 7.6, 2.3, 12.7, 3.5, 8.2, 6.1, 3.9, 5.2?
  - (A) 3.8 (B) 4.9 (C) 5.7 (D) 6.0
- 23. The mean of five numbers is 30. If one number is excluded, their mean becomes 28. The excluded number is
  - (A) 28 (B) 30 (C) 35 (D) 38

24. In a leap year the probability of having 53 Sundays or 53 Mondays is

(A) 
$$\frac{2}{7}$$
 (B)  $\frac{3}{7}$  (C)  $\frac{4}{7}$  (D)  $\frac{5}{7}$ 

- 25. If A, B, C are three mutually exclusive and exhaustive events of an experiment such that 3P(A) = 2P(B) = P(C), then P(A) is equal to
  - (A)  $\frac{1}{11}$  (B)  $\frac{2}{11}$  (C)  $\frac{5}{11}$  (D)  $\frac{6}{11}$

Consider the following for the next three (03) items that follow :

Consider the following grouped frequency distribution :

Class	0-10	10-20	20-30	30-40	40-50	50-60
Frequency	1	2	4	6	4	3

## 26. What is the median of the distribution ?

(A) 34 (B) 34.5 (C) 35 (D) 35.5

27. What is the mean deviation about the median ?

(A) 11.4 (B) 11.1 (C) 10.8 (D) 10.5

28. What is the mean deviation about the mean ?

(A) 10.15 (B) 10.65 (C) 11.15 (D) 11.65

29. What are the values of x for which the angle between the vectors  $2x^{2}\hat{i} + 3x\hat{j} + \hat{k}$  and  $\hat{i} - 2\hat{j} + x^{2}\hat{k}$  is obtuse ?

(A) 0 < x < 2 (B) x < 0 (C) x > 2 (D) None

30. The angle between the vectors  $\hat{i} - \hat{j}$  and  $\hat{j} - \hat{k}$  is

(A) 
$$\frac{\pi}{3}$$
  
(B)  $\frac{2\pi}{3}$   
(C)  $-\frac{\pi}{3}$   
(D)  $\frac{5\pi}{6}$