# 50 Questions for NDA II 2019 Exam

1.If a, b, c are in HP, then the equation a(b-c) $x^2$ + b(c-a)x + c(a-b) = 0 has

A. real and distinct roots
B. has equal roots
C. has no real root
D. none of these

2.Find the two-hundredth term, a200, of the sequence

2; 5; 8; 11; …………….

A. 399
B. 499
C. 599
D. 699

3.A teacher is making a multiple-choice quiz. She wants to give each student the same questions but have each student's questions appear in a different order. If there are twenty-seven students in the class, what is the least number of questions the quiz must contain?

A. 5
B. 4
C. 3
D. 10

4.The coefficient of $x^n$ in the expansion of $\log_e$ (1 + 3x + 2$x^2$)

A. $(-1)\left(\dfrac{2^n+1}{n}\right)$

B. $\left(\dfrac{(-1)n+1}{n}\right)(2^n+1)$

C. $\left(\dfrac{2^n+1}{n}\right)$

D. None of these

5.Which of the following is affected the least with extreme observations

A. Median
B. Mode
C. Harmonic mean
D. Arithmetic mean

6.Which number will complete the given series?

0, 5, 22, 57, ?, 205

A. 198
B. 116
C. 172
D. 92

7.If $A^5 = O$ such that $A^n \neq I$ for $1 \leq n \leq 4$, then $(1 - A)^{-1}$ equals

A. $A^4$
B. $A^3$
C. $1 + A$
D. None of these

8.There are four machines and it is known that exactly two of them are faulty. They are tested, one by one in a random order till both the faulty machines are identified. Then the probability that only two tests are needed, is

A. 1/3
B. 1/6
C. 1/2
D. 1/4

9.Which of the following is affected the least with extreme observations

A. Median
B. Mode
C. Harmonic mean
D. Arithmetic mean

10.If $c > 0$ and $4a + c < 2b$, then $ax^2 - bx + x = 0$ has a root in which one of the following intervals?

A. (0, 2)
B. (2, 3)

C. (3, 4)
D. (-2, 0)

11. If $Re\left(\dfrac{z-1}{z+1}\right) = 0,$ where $z = x + iy$ is a complex number, then which one of the following is correct?

A. $z = 1 + i$
B. $|z| = 2$
C. $z = 1 - i$
D. $|z| = 1$

12. If $z = \left(\dfrac{\sqrt{3}}{2} + \dfrac{i}{2}\right)^{107} + \left(\dfrac{\sqrt{3}}{2} + \dfrac{i}{2}\right)^{107}$, then what is the imaginary part of z equal to?

A. 0
B. $\dfrac{1}{2}$
C. $\dfrac{\sqrt{3}}{2}$
D. 1

13. If $f(x) = \begin{bmatrix} \cos x & -\sin x & 0 \\ \sin x & \cos x & 0 \\ 0 & 0 & 1 \end{bmatrix},$ then which of the following are correct?

1) $f(\theta) \times f(\phi) = f(\theta + \phi).$

2) The value of the determinant of the matrix $f(\theta) \times f(\phi)$ is 1.

3) The determinant of f(x) is an even function.

Select the correct answer using the code given below :

A. 1 and 2 only
B. 2 and 3 only
C. 1 and 3 only
D. 1, 2 and 3

14. Which of the following are correct in respect of the system of equations $x + y + z = 8, x - y + 2z = 6$ and $3x - y + 5z = k$ ?

1) They have no solution, if k = 15.

2) They have infinitely many solutions, if k = 20.

3) They have unique solution, if k = 25.

Select the correct answer using the code given below :

A. 1 and 2 only
B. 2 and 3 only
C. 1 and 3 only
D. 1, 2 and 3

15.IF a + b + c = 0, then one of the solutions of $\begin{vmatrix} a-x & c & b \\ c & b-x & a \\ b & a & c-x \end{vmatrix} = 0$ is

A. x = a

B. $x = \sqrt{\dfrac{3\left(a^2 + b^2 + c^2\right)}{2}}$

C. $x = \sqrt{\dfrac{2\left(a^2 + b^2 + c^2\right)}{3}}$

D. x = 0

16.Let matrix B be the adjoint of a square matrix A, _I_ be the identity matrix of same order as A. If k (≠ 0) is the determinant of the matrix A, then what is AB equal to?

A. _I_
B. k_I_
C. $k_2 I$
D. (1/k)_I_

17.Consider the following in respect of matrices A and B of same order :

1) $A^2 - B^2 = (A + B)(A - B)$

2) $(A - I)(I + A) = O \Leftrightarrow A^2 = I$

Where I is the identity matrix and O is the null matrix.

Which of the above is/are correct?

A. 1 only
B. 2 only
C. Both 1 and 2
D. Neither 1 nor 2

18. If $\begin{bmatrix} x & -3i & 1 \\ y & 1 & i \\ 0 & 2i & -i \end{bmatrix} = 6 + 11i,$ then what are the values of x and y respectively?

A. -3, 4
B. 3, 4
C. 3, -4
D. -3, -4

###COMMON###19###20###**Direction**: Consider the following for the next 02 (two) items:

Let A and B be (3 × 3) matrices with det A = 4 and det B = 3.

###DONE###

19.

What is det (2AB) equal to?

A. 96
B. 72
C. 48
D. 36

20. Find the middle term in expansion of $(3 + x)^6$

A. $540x^3$
B. $540x^2$
C. $540x^4$
D. None of the above

21. Find the 9th term in the expansion of $\left( \dfrac{a}{b} - \dfrac{b}{2a^2} \right)^{12}$

A. $\dfrac{495b^2}{256a^{14}}$

B. $\dfrac{495b^4}{256a^{12}}$

C. $\dfrac{256b^4}{495a^{12}}$

D. *none of the above*


22.If 2nd, 3rd and 6th terms of an AP are the three consecutive terms of a GP then find the common ratio of the GP.

A. 3
B. 2
C. -3
D. 4


23.A man starts repaying a loan as the first instalment of 10000. If he increases the instalment by 500 every month, what amount will he pay in 30thinstalment?

A. 30
B. 32
C. 31
D. 34


24.What is the solution of the differential equation $\ln\left(\dfrac{dy}{dx}\right) = ax + by$ ?

Where c is an arbitrary constant.

A. $a\,e^{ax} + b\,e^{by} = c$

B. $\dfrac{1}{a}e^{ax} + \dfrac{1}{b}e^{by} = c$

C. $a\,e^{ax} + b\,e^{-by} = c$

D. $\dfrac{1}{a}e^{ax} + \dfrac{1}{b}e^{-by} = c$


25.What is the derivative of $\sec^2(\tan^{-1}x)$ with respect to x?

A. 2x
B. $x^2 + 1$
C. $x + 1$

D. $x^2$

26. If $y = \sin(\ln x)$, then which one of the following is correct?

A. $\dfrac{d^2y}{dx^2} + y = 0$

B. $\dfrac{d^2y}{dx^2} = 0$

C. $x^2 \dfrac{d^2y}{dx^2} + x \dfrac{dy}{dx} + y = 0$

D. $x^2 \dfrac{d^2y}{dx^2} - x \dfrac{dy}{dx} + y = 0$

27. The equation of the curve passing through the point (-1, -2) which satisfies $\dfrac{dy}{dx} = -x^2 - \dfrac{1}{x^3}$, is

A. $17x^2y - 6x^2 + 3x^5 - 2 = 0$
B. $6x^2y + 17x^2 + 2x^5 - 3 = 0$
C. $6xy - 2x^2 + 17x^5 + 3 = 0$
D. $17x^2y + 6xy - 3x^5 + 5 = 0$

28. Which one of the following differential equations represents the family of straight lines which are at unit distance from the origin?

A. $\left(y - x\dfrac{dy}{dx}\right)^2 = 1 - \left(\dfrac{dy}{dx}\right)^2$

B. $\left(y + x\dfrac{dy}{dx}\right)^2 = 1 + \left(\dfrac{dy}{dx}\right)^2$

C. $\left(y - x\dfrac{dy}{dx}\right)^2 = 1 + \left(\dfrac{dy}{dx}\right)^2$

D. $\left(y + x\dfrac{dy}{dx}\right)^2 = 1 - \left(\dfrac{dy}{dx}\right)^2$

29. What is the area of one of the loops between the curve $y = c \sin x$ and x-axis?

A. c
B. 2c
C. 3c
D. 4c

30.Find the value of $\int e^{\cos^2 x} \sin 2x dx$

A. $-e^{\sin^2 x} + c$

B. $-e^x + c$

C. $-e^{\cos^2 x} + c$

D. None of the above

31.Find the area of the common region between $x^2 + y^2 = 16$ and $x^2 = 6y$

A. $\dfrac{\pi + 4\sqrt{3}}{3}$

B. $\dfrac{16\pi + 4\sqrt{3}}{3}$

C. $\dfrac{16\pi + \sqrt{3}}{3}$

D. None of the above

32.Find the area bounded by the line 2y=5x+7, the x-axis and the line x=2 and x=8

A. 96

B. 98

C. 97

D. None of the above

33.At present a firm is manufacturing 2000 items. It is estimated that the rate of change of production P with respect to additional number of workers x is given by dP/dx=100-12√x. if the firm employs 25 more workers, then the new level of production of items is

A. 3000

B. 3500

C. 4500

D. 2500

34.Find the area of the area of bounded region by two parabolas $y^2 = 4x$ and $x^2 = 4y$

A. 16/3

B. 12/5

C. 16/5

D. 16

35.If $x\,dy = y\,dx + y^2 dy, y > 0$ and y(1) = 1, then what is y(-3) equal to?

A. 3 only
B. -1 only
C. Both -1 and 3
D. Neither -1 nor 3

36.If $A = \left(x \in R : x^2 + 6x - 7 < 0\right)$ and $B = \left(x \in R : x^2 + 9x + 14 > 0\right)$, then which of the following is/are correct?

1) $A \cap B = \left(x \in \mathbb{R} : -2 < x < 1\right)$

2) $A \setminus B = \left(x \in \mathbb{R} : -7 < x < -2\right)$

Select the correct answer using the code given below :

A. 1 only
B. 2 only
C. Both 1 nor 2
D. Neither 1 nor 2

37.In an examination, 70% students passed in Physics, 80% students passed in Chemistry, 75% students passed in Mathematics and 85% students passed in Biology, and x% students failed in all the four subjects. What is the minimum value of x?

A. 10
B. 12
C. 15
D. None of the above

38.What is the solution of the differential equation $\dfrac{dx}{dy} = \dfrac{x + y + 1}{x + y - 1}$?

Where c is an arbitrary constant.

A. y − x + 4 ln(x + y) = c
B. y + x + 2 ln(x + y) = c
C. y − x + ln(x + y) = c

D. y + x + 2 ln(x + y) = c

39.What is $\lim\limits_{x\to\frac{\pi}{6}} \dfrac{2\sin^2 x + \sin x - 1}{2\sin^2 x - 3\sin x + 1}$ equal to?

A. $-\dfrac{1}{2}$

B. $-\dfrac{1}{3}$

C. -2

D. -3

40.In a right-angled triangle ABC, if the hypotenuse AB = p, then what is $\overrightarrow{AB}.\overrightarrow{AC} + \overrightarrow{BC}.\overrightarrow{BA} + \overrightarrow{CA}.\overrightarrow{CB}$ equal to?

A. p

B. $p^2$

C. $2p^2$

D. $\dfrac{p^2}{2}$

41.A force $\vec{F} = 3\hat{i} + 2\hat{j} - 4\hat{k}$ is applied at the point (1, -1, 2). What is the moment of the force about the point (2, -1, 3)?

A. $\hat{i} + 4\hat{j} + 4\hat{k}$

B. $2\hat{i} + \hat{j} + 2\hat{k}$

C. $2\hat{i} - 7\hat{j} - 2\hat{k}$

D. $2\hat{i} + 4\hat{j} + \hat{k}$

42.Let $\bar{a}, \bar{b}$ and $\bar{c}$ be three mutually perpendicular vectors each of unit magnitude. If $\bar{A} = \bar{a} + \bar{b} + \bar{c}, \bar{B} = \bar{a} - \bar{b} + \bar{c}$ and then $\bar{C} = \bar{a} - \bar{b} - \bar{c}$, which one of the following is correct?

A. $|\bar{A}| > |\bar{B}| > |\bar{C}|$

B. $|\bar{A}| = |\bar{B}| \neq |\bar{C}|$

C. $|\bar{A}| = |\bar{B}| = |\bar{C}|$

D. $|\bar{A}| \neq |\bar{B}| \neq |\bar{C}|$

43.In a triangle ABC, if taken in order, consider the following statements :

1) $\overline{AB} + \overline{BC} + \overline{CA} = \overline{0}$

2) $\overline{AB} + \overline{BC} - \overline{CA} = \overline{0}$

3) $\overline{AB} - \overline{BC} + \overline{CA} = \overline{0}$

4) $\overline{BA} - \overline{BC} + \overline{CA} = \overline{0}$

How many of the above statements are correct?

A. One
B. Two
C. Three
D. Four


44.What is the radius of the circle passing through the point (2, 4) and having centre at the intersection of the lines $x - y = 4$ and $2x + 3y + 7 = 0$ ?

A. 3 units
B. 5 units
C. $3\sqrt{3}$ units
D. $5\sqrt{2}$ units


45.If the ellipse $9x^2 + 16y^2 = 144$ intercepts the line $3x + 4y = 12,$ then what is the length of the chord so formed?

A. 5 units
B. 6 units
C. 8 units
D. 10 units


###COMMON###46###47###**Direction:** Let Q be the image of the point P(-2, 1, -5) in the plane $3x - 2y + 2z + 1 = 0$. ###DONE###

46.

Consider the following :

1) The coordinates of Q are (4, -3, -1).

2) PQ is of length more than 8 units.

3) The point (1, -1, -3) is the mid-point of the line segment PQ and lies on the given plane.

Which of the above statements is/are correct?

A. 1 and 2 only
B. 2 and 3 only
C. 1 and 3 only
D. 1, 2 and 3

###COMMON###47###48###**Direction:** A line L, passes through the point P(5, -6, 7) and is parallel to the planes $x + y + z = 1$ and $2x - y - 2z = 3.$ ###DONE###

47.

What are the direction ratios of the line of intersection of the given planes?

A. <1, 4, 3>
B. <-1, -4, 3>
C. <1, -4, 3>
D. <1, -4, -3>

48.Find the equation of the ellipse which passes through the point (4, 1) and having its foci at (±3, 0).

A. $\dfrac{x^2}{27} - \dfrac{y^2}{9} = 1$

B. $\dfrac{x^2}{18} - \dfrac{y^2}{27} = 1$

C. $\dfrac{y^2}{18} + \dfrac{x^2}{9} = 1$

D. $\dfrac{x^2}{18} + \dfrac{y^2}{9} = 1$

49.A special dice with numbers 1, -1, 2, -2, 0 and 3 is thrown thrice. What is the probability that the sum of the numbers occurring on the upper face is zero?

A. 1/72
B. 1/8
C. 7/72
D. 25/216

50.There is 25% chance that it rains on any particular day. What is the probability that there is at least one rainy day within a period of 7 days?

A. $1-\left(\dfrac{1}{4}\right)^7$

B. $\left(\dfrac{1}{4}\right)^7$

C. $\left(\dfrac{3}{4}\right)^7$

D. $1-\left(\dfrac{3}{4}\right)^7$