QDR **QUARTERLY EXAMINATION - 2013**

XI – Std **MATHEMATICS** RATHNA

Time : 3.00 Hrs www.tnschools.co.in Marks : 200

PART - A

Note : 1) All questions are compulsory. 2) Choose the most suitable answer from the given four alternatives and write the option code and the corresponding answer. 40 X 1 = 40

1. If $A\begin{bmatrix} 2 & 1 & 4 \\ -3 & 2 & 1 \end{bmatrix}$ and $x + A = 0$ then matrix x is

a) $\begin{bmatrix} 2 & 1 & 4 \\ -3 & 2 & 1 \end{bmatrix}$ b) $\begin{bmatrix} -2 & -1 & -4 \\ 3 & -2 & -1 \end{bmatrix}$ c) $\begin{bmatrix} -2 & -1 & -4 \\ 3 & 2 & 1 \end{bmatrix}$ d) $\begin{bmatrix} 2 & 1 & 4 \\ 3 & -2 & -1 \end{bmatrix}$

2. Matrix A is of order 2 X 3 and B is of order 3 X 2 then order of matrix BA is
a) 3 x 3 b) 2 x 3 c) 2 x 2 d) 3 x 2

3. The cofactor of –7 in $\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$ is a) –18 b) 18 c) –7 d) 7

4. If A is a square matrix of order 3 then $|A|$ is
a) $k|A|$ b) $-k|A|$ c) $k^3|KA|$ d) $-k^3|A|$

5. Two rows of a determinant Δ are identical when $x = -a$ then the factor of Δ is
a) $x + a$ b) $x - a$ c) $(x + a)^2$ d) $(x - a)^2$

6. The value of the determinant $\begin{vmatrix} a & 0 & 0 \\ 0 & b & 0 \\ 0 & 0 & c \end{vmatrix}^2$ is a) abc b) 0 c) $a^2b^2c^2$ d) –abc

7. If $\begin{bmatrix} 2x & 3x-y \\ 2x+z & 3y-w \end{bmatrix} = \begin{bmatrix} 3 & 2 \\ 4 & 7 \end{bmatrix}$ then the value of x is a) 3 b) $\frac{3}{2}$ c) $\frac{2}{3}$ d) 2

8. If $A = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$ then $|A|$ is
a) 1 b) $\cos^2\theta + \sin^2\theta$ c) 0 d) $2\sin\theta\cos\theta$

9. If $\vec{a}$ is a non zero vector and k is a scalar such that $|k\vec{a}| = 1$ then k is equal to
a) $|\vec{a}|$ b) 1 c) $\frac{1}{|\vec{a}|}$ d) $\pm\frac{1}{|\vec{a}|}$

10. If $\overrightarrow{AB} = k\overrightarrow{AC}$ where k is a scalar then
a) ABC are collinear b) A, B, C are coplanar
c) $\overrightarrow{AB}$, $\overrightarrow{AC}$ have the same magnitude d) A, B, C are coincident

11. If $\vec{a}$, $\vec{b}$ position vector of A, B then position vector of midpoint of AB is
a) $\frac{\vec{a}-\vec{b}}{2}$ b) $\frac{\vec{a}+\vec{b}}{2}$ c) $\frac{\vec{a}+2\vec{b}}{2}$ d) $\frac{\vec{a}+\vec{b}}{3}$

12. If G is centroid of a triangle ABC and G^1 is centroid of a triangle $A^1B^1C^1$ then $\overrightarrow{AA^1} + \overrightarrow{BB^1} + \overrightarrow{CC^1} =$ a) $\overrightarrow{GG^1}$ b) $3\overrightarrow{GG^1}$ c) $2\overrightarrow{GG^1}$ d) $4\overrightarrow{GG^1}$

13. Which of the following vectors has the same direction as the vector $\vec{i} - 2\vec{j}$
a) $-\vec{i} + 2\vec{j}$ b) $2\vec{i} + 4\vec{j}$ c) $-3\vec{i} + 6\vec{j}$ d) $3\vec{i} - 6\vec{j}$

14. If $\vec{a} = 2\vec{i} + \vec{j} - 8\vec{k}$, $\vec{b} = \vec{i} + 3\vec{j} - 4\vec{k}$ then the magnitude of $\vec{a} + \vec{b}$
a) 13 b) 13/3 c) 3/13 d) 4/13

15. If α, β, γ are the angle made by any vector $\vec{r}$ with coordinate axes, then the value of $\cos^2\alpha + \cos^2\beta + \cos^2\gamma$ is
a) 0 b) 2 c) 1 d) -1

16. The position vector of A and B are $\vec{a}$ and $\vec{b}$. P divides AB in the ratio 3 : 1 is the mid point of AP. The position vector of Q.
a) $\frac{\vec{5a} + \vec{3b}}{8}$ b) $\frac{\vec{3a} + \vec{5b}}{8}$ c) $\frac{\vec{5a} + \vec{3b}}{4}$ d) $\frac{\vec{3a} + \vec{b}}{4}$

17. If nPr = 72 nCr then the value of r is
a) 6 b) 5 c) 7 d) 8

18. The number of 4 digit number, that can be formed by the digits 3, 4, 5, 6, 7, 8, 0 and no digit is being repeated, is
a) 720 b) 840 c) 280 d) 560

19. A polygon has 44 diagonals then the number of its sides is
a) 11 b) 7 c) 8 d) 12

20. The sum of the coefficient in the expansion $(1 - x)^{10}$ is
a) 0 b) 1 c) 10^2 d) 1024

21. The last term in the expansion of $\left(2+\sqrt{3}\right)^8$ is a) 81 b) 27 c) $\sqrt{3}$ d) 3

22. If a, b, c are in A.P. then $3^a, 3^b, 3^c$ are in
a) A.P. b) G.P. c) H.P. d) A.P. and G.P.

23. The sum of the first 25 terms of the series 1 + 2 + 3 . . . . is
a) 305 b) 325 c) 315 d) 335

24. The third term of a G.P is 5, the product of its first five terms is
a) 25 b) 625 c) 3125 d) 625 x 25

25. The possible outcomes when a coin is tossed for five times is
a) 5 b) 10 c) 5^2 d) 2^5

26. If a, b, c, are A.P. as well as in G.P. then
a) $a = b \neq c$ b) $a \neq b = c$ c) $a \neq b \neq c$ d) a = b = c

27. $e^{\log x}$ is equal to
a) x b) 1 c) e d) $\log e^x$

28. The number of circular permutation of n distinct object is
a) n^2 b) n! c) (n+1)! d) (n-1)!

29. The value of $5P_5$ is a) 5 b) 25 c) 120 d) 1

30. Expansion of $(1 + x)^{-1}$ a) $1 + x + x^2 + x^3 \ldots$.
b) $1 + 2x + 3x^2 + 4x^3 + \ldots$ c) $1 - x - x^2 - x^3 - \ldots$. d) $1 - x + x^2 - x^3 + \ldots$

31. If $a_n = (-1)^{n-1} 2^{n+1}$ then value of a_5
a) -32 b) 32 c) -64 d) 64

32. The intercept of the straight line 3x + 2y - 1 = 0 is
a) 2 b) 3 c) $\frac{1}{2}$ d) $-\frac{1}{2}$

33. The equation of straight line with slope 2 and y intercept 7 is
a) y = 2x - 7 b) y = 7x + 2 c) y = -2x + 7 d) y = 2x + 7

34. If the straight lines $a_1x + b_1y + c_1 = 0$, $a_2x + b_2y + c_2 = 0$ are perpendicular, then
a) $\frac{a_1}{a_2} = -\frac{b_1}{b_2}$ b) $\frac{a_1}{a_2} = \frac{b_1}{b_2}$ c) $a_1a_2 = -b_1b_2$ d) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

35. The equation of the straight line containing the point (-2, 1) and parallel to $4x - 2y = 3$ a) $y = 2x + 5$ b) $y = 2x - 1$ c) $y = x - 2$ d) $y = \frac{1}{2}x$

36. If the slope of a straight line is $\frac{2}{3}$, then the slope of the line perpendicular to it, is

a) $\frac{2}{3}$ b) $-\frac{2}{3}$ c) $\frac{3}{2}$ d) $-\frac{3}{2}$

37. If $2x^2 + kxy + 4y^2 = 0$ represents a pair or parallel lines then K =

a) ± 32 b) $\pm 2\sqrt{2}$ c) $\pm 4\sqrt{2}$ d) ± 8

38. The line of the diameter of a circle with center (2, 1) and passing through the point (-2, 1) is

a) 4 b) 8 c) $4\sqrt{5}$ d) 2

39. The center of the circle $x^2 + y^2 - 4x - 6y - 9 = 0$ is

a) (-2, 3) b) (2, 3) c) (-2, -3) d) (2, -3)

40. If two circle touch each other externally then the distance between their centres is

a) $r_1 - r_2$ b) $\frac{r_1}{r_2}$ c) $\frac{r_2}{r_1}$ d) $r_1 + r_2$

PART - B

Note : 1) Answer any ten questions. 2) Question No. 55 is compulsory and choose any nine questions from the remaining. 10 X 6 = 60

41. If $A = \begin{bmatrix} 3 & -2 \\ 4 & -2 \end{bmatrix}$ find k so that $A^2 = kA - 2I$.

42. Prove that $\begin{vmatrix} 0 & c & b \\ c & 0 & a \\ b & a & 0 \end{vmatrix}^2 = \begin{vmatrix} b^2+c^2 & ab & ac \\ ab & c^2+a^2 & bc \\ ac & bc & a^2+b^2 \end{vmatrix}$.

43. Find the cofactor of each element of the determinant $\begin{vmatrix} 3 & 4 & 1 \\ 0 & -1 & 2 \\ 5 & -2 & 6 \end{vmatrix}$.

44. Find the position vector of the points which divide the join of the points A and B whose position vectors $\vec{a} - 2\vec{b}$ and $2\vec{a} - \vec{b}$ internally and externally in the ratio 3 : 2.

45. Show that the points with position vectors $\vec{a} - 2\vec{b} + 3\vec{c}$, $\vec{a} + 3\vec{b} - \vec{c}$, $4\vec{a} - 7\vec{b} + 7\vec{c}$ are collinear.

46. Show that the vectors $2\vec{i} - \vec{j} + \vec{k}$, $3\vec{i} - 4\vec{j} - 4\vec{k}$, $\vec{i} - 3\vec{j} - 5\vec{k}$ form a right angled triangle.

47. If $nC_4 = nC_6$ find $12C_n$.

48. Find the middle term of the expansion $(3x - \frac{2}{3}x^2)^8$.

49. How many different section of 4 books can be made from 10 different books, if (i) there is no restriction (ii) two particular books are always selected. (iii) two particular books are never selected.

50. Find 5 geometric means between 576 and 9.

51. Evaluate by using binomial expansions $\sqrt[3]{1003}$ correct to 2 places of decimals.

52. Find the equation of the straight line passing through the point (1, 2) and making intercepts on the coordinate axes which are in the ratio 2 : 3.

53. Find the equation of the straight line joining (4, -2) and the intersection of the straight lines $2x - y + 7 = 0$, $x + y - 1 = 0$.

54. Find the equation of the circle if (2, -3) and (3, 1) are the extremities of a diameter.

55. a) Find the equation of the circle concentric with the circle $x^2 + y^2 - 2x - 6y + 4 = 0$ and having radius 7. ***(OR)*** b) If $A = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$ find $A^2 - 7A - 2I$.

PART - C

Note : 1) Answer any ten question. 2) Question No. 70 is compulsory and choose any nine questions froms the remaining. 10 X 10 = 100

56. If $A = \begin{bmatrix} 1 & -1 \\ 2 & -1 \end{bmatrix}$, $B = \begin{bmatrix} x & 1 \\ y & -1 \end{bmatrix}$ and $(A + B)^2 = A^2 + B^2$, find x and y.

57. Prove that $\begin{vmatrix} a^2+\lambda & ab & ac \\ ab & b^2+\lambda & bc \\ ac & bc & c^2+\lambda \end{vmatrix} = \lambda^2 (a^2 + b^2 + c^2 + \lambda)$.

58. Prove by factor method $\begin{vmatrix} 1 & a^2 & a^3 \\ 1 & b^2 & b^3 \\ 1 & c^2 & c^3 \end{vmatrix} = (a - b)(b - c)(c - a)(ab + bc + ca)$.

59. Prove that $\begin{vmatrix} 2bc-a^2 & c^2 & b^2 \\ c^2 & 2ca-b^2 & a^2 \\ b^2 & a^2 & 2ab-c^2 \end{vmatrix} = \begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}^2$.

60. Using vector method, prove that the line segments joining the mid points of the adjacent sides of a quadrilateral taken in order form a parallelogram.

61. If ABCD is a quadrilateral and E and F are the mid points of AC and BD respectively, prove that $\overrightarrow{AB} + \overrightarrow{AD} + \overrightarrow{CB} + \overrightarrow{CD} = 4\overrightarrow{EF}$.

62. Resolve into partial fractions $\frac{x^2 + x + 1}{x^2 - 5x + 6}$.

63. Prove by mathematical induction $2^{3n} - 1$ is divisible by 7, for all natural number.

64. In the expansion of $(1 + x)^{20}$, the coefficient of r^{th} and $(r + 1)^{th}$ terms are in the ratio 1 : 6, find the value of r.

65. If x is so large prove that $\sqrt[3]{x^2 + 6} - \sqrt[3]{x^3 + 3} = \frac{1}{x^2}$ nearly.

66. If a, b, c are in H.P, prove $\frac{b + a}{b - a} + \frac{b + c}{b - c} = 2$.

67. Find the co-ordinates of orthocenter of the triangle formed by the straight lines $x - y - 5 = 0$, $2x - y - 8 = 0$ and $3x - y - 9 = 0$.

68. Show that the equation $3x^2 + 7xy + 2y^2 + 5x + 5y + 2 = 0$ represents straight lines and also find the separate equation of the straight lines.

69. Find the equation the circle passing through the points (0, 1), (2, 3) and (-2, 5).

70. a) Show that the circle $x^2 + y^2 - 8x - 6y + 21 = 0$, is orthogonal to the circle $x^2 + y^2 - 2y - 15 = 0$. ***(OR)***
b) Show that the vectors $\vec{i} - 2\vec{j} + 3\vec{k}$, $-2\vec{i} + 3\vec{j} - 4\vec{k}$, $-\vec{j} + 2\vec{k}$ are coplanar.