10 - Mathematics Special Test – 1

Time: 3.00 Hrs] **Geometry, Graph, One mark (Unit – 1,2,3,4)** [Marks:100

I. Choose the most suitable answer. Answer all the 60 questions: (60 x 1 = 60)

1. If $n(A \times B) = 6$ and $A = \{1, 3\}$ then $n(B)$ is
   (1) 1 (2) 2 (3) 3 (4) 6
2. Euclid's division lemma states that for positive integers a and b, there exist unique integers q and r such that $a = bq + r$, where r must satisfy
   (1) $1 < r < b$ (2) $0 < r < b$ (3) $0 \leq r < b$ (4) $0 < r \leq b$
3. If $f(x) = x^2 + 5$, then $f(-4) =$
   (1) 26 (2) 21 (3) 20 (4) -20
4. If number of columns and rows are not equal in a matrix then it is said to be a
   (1) diagonal matrix (2) rectangular matrix
   (3) square matrix (4) identity matrix
5. $f(x) = (x+1)^3 - (x-1)^3$ represents a function which is
   (1) linear (2) cubic (3) reciprocal (4) quadratic
6. The number of points of intersection of the quadratic polynomial $x^2 + 4x + 4$ with the X axis is (1) 0 (2) 1 (3) 0 or 1 (4) 2
7. If in triangles ABC and EDF, $\frac{AB}{DE} = \frac{BC}{FD}$, then they will be similar, when
   (1) $\angle B = \angle E$ (2) $\angle A = \angle D$ (3) $\angle B = \angle D$ (4) $\angle A = \angle F$
8. $A = \{a, b, p\}$, $B = \{2, 3\}$, $C = \{p, q, r, s\}$ then $n[(A \cup C) \times B]$ is
   (1) 8 (2) 20 (3) 12 (4) 16
9. Using Euclid's division lemma, if the cube of any positive integer is divided by 9 then the possible remainders are (1) 0, 1, 8 (2) 1, 4, 8 (3) 0, 1, 3 (4) 1, 3, 5
10. In a triangle, the internal bisector of an angle bisects the opposite side. Find the nature of the triangle (1) right angle (2) equilateral (3) scalene (4) isosceles
11. If $A = \{1, 2\}$, $B = \{1, 2, 3, 4\}$, $C = \{5, 6\}$ and $D = \{5, 6, 7, 8\}$ then state which of the following statement is true. (1) $(A \times C) \subset (B \times D)$ (2) $(B \times D) \subset (A \times C)$
    (3) $(A \times B) \subset (A \times D)$ (4) $(D \times A) \subset (B \times A)$
12. If the HCF of 65 and 117 is expressible in the form of $65m - 117$, then the value of m is
    (1) 4 (2) 2 (3) 1 (4) 3
13. The values of a and b if $4x^4 - 24x^3 + 76x^2 + ax + b$ is a perfect square are
    (1) 100, 120 (2) 10, 12 (3) $-120, 100$ (4) 12, 10
14. If ΔABC is an isosceles triangle with $\angle C = 90°$ and $AC = 5$ cm, then AB is
    (1) 2.5 cm (2) 5 cm (3) 10 cm (4) $5\sqrt{2}$ cm
15. If there are 1024 relations from a set $A = \{1, 2, 3, 4, 5\}$ to a set B, then the number of elements in B is (1) 3 (2) 2 (3) 4 (4) 8
16. The sum of the exponents of the prime factors in the prime factorization of 1729 is
    (1) 1 (2) 2 (3) 3 (4) 4
17. Which one of the following is true for any two square matrices A and B of same order?
    (1) $(AB)^T = A^T B^T$ (2) $(A^T B)^T = A^T B^T$ (3) $(AB)^T = BA$ (4) $(AB)^T = B^T A^T$

18. The perimeters of two similar triangles ΔABC and ΔPQR are 36 cm and 24 cm respectively. If $PQ = 10\ cm$, then the length of AB is
(1) $6\frac{2}{3}\ cm$ (2) $\frac{10\sqrt{6}}{3}\ cm$ (3) $66\frac{2}{3}\ cm$ (4) $15\ cm$

19. The function $f: \mathbb{N} \to \mathbb{N}$ is defined by $f(x) = 2x$ then the function f is
(1) Not one-one but onto (2) one-one but not onto
(2) One-one and onto (4) not one-one and not onto

20. The least number that is divisible by all the numbers from 1 to 10 (both inclusive) is
(1) 2025 (2) 5220 (3) 5025 (4) 2520

21. If in ΔABC, DE ∥ BC. $AB = 3.6\ cm$, $AC = 2.4\ cm$ and $AD = 2.1\ cm$ then the length of AE is (1) 1.4 cm (2) 1.8 cm (3) 1.2 cm (4) 1.05 cm

22. If the ordered pairs $(a + 2, 4)$ and $(5, 2a + b)$ are equal then (a, b) is
(1) $(2, -2)$ (2) $(5, 1)$ (3) $(2, 3)$ (4) $(3, -2)$

23. If the roots of the equation $q^2x^2 + p^2x + r^2 = 0$ are the squares of the roots of the equation $qx^2 + px + r = 0$, then q, p, r are in _____
(1) $A.P$ (2) $G.P$ (3) Both $A.P$ and $G.P$ (4) none of these

24. In a ΔABC, AD is the bisector of $\angle BAC$. If $AB = 8$ cm, $BD = 6$ cm and $DC = 3$ cm. The length of the side AC is (1) 6 cm (2) 4 cm (3) 3 cm (4) 8 cm

25. If $t_n = 3 - 5n$ is the nth term of an A.P. sequence, then its first term and common difference is (1) $3, -5$ (2) $-3, -5$ (3) $-3, 5$ (4) $-2, -5$

26. Let $n(A) = m$ and $n(B) = n$ then the total number of non-empty relations that can be defined from A to B is (1) m^n (2) n^m (3) $2^{mn} - 1$ (4) 2^{mn}

27. Given $F_1 = 1$, $F_2 = 3$ and $F_n = F_{n-1} + F_{n-2}$ then F_5 is
(1) 3 (2) 5 (3) 8 (4) 11

28. Which of the following can be calculated from the given matrices $\mathrm{A} = \begin{pmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{pmatrix}$ and $\mathrm{B} = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$, (i) A^2 (ii) B^2 (iii) AB (iv) BA
(1) (i) and (ii) only (2) (ii) and (iii) only
(3) (ii) and (iv) only (4) all of these

29. Two poles of heights 6 m and 11 m stand vertically on a plane ground. If the distance between their feet is 12 m, what is the distance between their tops?
(1) 13 m (2) 14 m (3) 15 m (4) 12.8 m

30. If $\{(a, 8), (6, b)\}$ represents an identity function, then the value of a and b are respectively
(1) (8, 6) (2) (8, 8) (3) (6, 8) (4) (6, 6)

31. If the sequence $t_1, t_2, t_3, \ldots$ are in A.P. then the sequence $t_6, t_{12}, t_{18}, \ldots$ is
(1) a Geometric Progression (2) an Arithmetic Progression
(3) neither an A.P. nor a G.P. (4) a constant sequence

32. Which of the following should be added to make $x^4 + 64$ a perfect square
(1) $4x^2$ (2) $16x^2$ (3) $8x^2$ (4) $-8x^2$

33. Let $A = \{1, 2, 3, 4\}$ and $B = \{4, 8, 9, 10\}$. A function $f : A \dashrightarrow B$ given by $f = \{(1, 4), (2, 8), (3, 9), (4, 10)\}$ is a (1) Many-one function (2) Identity function
(3) One-to-one function (4) Into function

34. The value of $(1^3 + 2^3 + 3^3 + \cdots + 15^3) - (1 + 2 + 3 + \ldots + 15)$ is
(1) 14400 (2) 14200 (3) 14280 (4) 14520

35. A tangent is perpendicular to the radius at the
(1) centre (2) point of contact (3) infinity (4) chord

36. If $f(x) = \frac{1}{x}$ and $g(x) = \frac{1}{x^3}$, then $f \circ g \circ f(y)$ is
(1) $\frac{1}{y^8}$ (2) $\frac{1}{y^6}$ (3) $\frac{1}{y^4}$ (4) $\frac{1}{y^3}$

37. If A is a 2×3 matrix and B is a 3×4 matrix, how many columns does AB have
(1) 3 (2) 4 (3) 2 (4) 5

38. How many tangents can be drawn to the circle from an exterior point?
(1) one (2) two (3) infinite (4) zero

39. If $f : A \dashrightarrow B$ is a bijective function and if $n(B) = 7$, then $n(A)$ is equal to
(1) 7 (2) 49 (3) 1 (4) 14

40. If $A = 2^{65}$ and $B = 2^{64} + 2^{63} + 2^{62} + \ldots . + 2^0$ which of the following is true?
(1) B is 2^{64} more than A (2) A and B are equal
(3) B is larger than A by 1 (4) A is larger than B by 1

41. Which of the following are linear equation in three variables
$(i) 2x = z$ (ii) $2sinx + ycosy + ztanz = 2$ (iii) $x + 2y^2 + z = 3$ (iv) $x - y - z = 7$
(1) (i) and (iii) only (2) (i) and (iv) only (3) (iv) only (4) All

42. The two tangents from an external points P to a circle with centre at O are PA and PB. If $\angle APB = 70°$ then the value of $\angle AOB$ is
(1) 100° (2) 110° (3) 120° (4) 130°

43. Let f and g be two functions given by
$f = \{(0,1), (2,0), (3,-4), (4, 2), (5,7)\}$
$g = \{(0,2), (1,0), (2, 4), (-4,2), (7, 0)\}$ then the range of $f \circ g$ is
(1) {0, 2, 3, 4, 5} (2) {–4, 1, 0, 2, 7} (3) {1, 2, 3, 4, 5} (4) {0, 1, 2}

44. The next term of the sequence $\frac{3}{16}, \frac{1}{8}, \frac{1}{12}, \frac{1}{18}, \ldots$ is
(1) $\frac{1}{24}$ (2) $\frac{1}{27}$ (3) $\frac{2}{3}$ (4) $\frac{1}{81}$

45. $y^2 + \frac{1}{y^2}$ is not equal to
(1) $\frac{y^4+1}{y^2}$ (2) $\left[y + \frac{1}{y}\right]^2$ (3) $\left[y - \frac{1}{y}\right]^2 + 2$ (4) $\left[y + \frac{1}{y}\right]^2 - 2$

46. The s.quare root of $\frac{256\, x^8 y^4 z^{10}}{25 x^6 y^6 z^6}$ is equal to
(1) $\frac{16}{5}\left|\frac{x^2 z^4}{y^2}\right|$ (2) $\frac{16}{5}\left|\frac{y^2}{x^2 z^4}\right|$ (3) $\frac{16}{5}\left|\frac{y}{xz^2}\right|$ (4) $\frac{16}{5}\left|\frac{xz^2}{y}\right|$

47. The Pythagorean triplet constructed by using the consecutive odd numbers 3 and 5 is
(1) (8, 15, 17) (2) (3, 4, 5) (3) (5,12,13) (4) (9,12,15)

48. Let $f(x) = \sqrt{1 + x^2}$ then
(1) $f(xy) = f(x).f(y)$ (2) $f(xy) \geq f(x).f(y)$
(3) $f(xy) \leq f(x).f(y)$ (4) None of these

49. If 6 times of 6th term of an A.P. is equal to 7 times the 7th term, then the 13th term of the A.P. is (1) 0 (2) 6 (3) 7 (4) 13

50. For the given matrix $A = \begin{bmatrix} 1 & 3 & 5 & 7 \\ 2 & 4 & 6 & 8 \\ 9 & 11 & 13 & 15 \end{bmatrix}$ the order of the matrix A^T is

(1) 2×3 (2) 3×2 (3) 3×4 (4) 4×3

51. The first term of an A.P. whose 8^{th} and 12^{th} terms are 39 and 59 respectively is

(1) 5 (2) 6 (3) 4 (4) 3

52. If $(x - 6)$ is the HCF of $x^2 - 2x - 24$ and $x^2 - kx - 6$ then the value of k is

(1) 3 (2) 5 (3) 6 (4) 8

53. $\frac{3y-3}{y} \div \frac{7y-7}{3y^2}$ is (1) $\frac{9y}{7}$ (2) $\frac{9y^3}{(21y-21)}$ (3) $\frac{21y^2-42y+21}{3y^3}$ (4) $\frac{7(y^2-2y+1)}{y^2}$

54. If $g = \{(1,1),(2,3),(3,5),(4,7)\}$ is a function given by $g(x) = \alpha x + \beta$ then the values of α and β are (1) $(-1, 2)$ (2) $(2, -1)$ (3) $(-1, -2)$ (4) $(1, 2)$

55. An A.P. consists of 31 terms. If its 16^{th} term is m, then the sum of all the terms of this A.P. is (1) $16\,m$ (2) $62\,m$ (3) $31\,m$ (4) $\frac{31}{2}m$

56. If α and β are the roots of $ax^2 + bx + c = 0$, then one of the quadratic equations whose roots are $\frac{1}{\alpha}$ and $\frac{1}{\beta}$ is (1) $ax^2 + bx + c = 0$ (2) $bx^2 + ax + c = 0$
(3) $cx^2 + bx + a = 0$ (4) $cx^2 + ax + b = 0$

57. The first term of an arithmetic progression is unity and the common difference is 4. Which of the following will be a term of this A.P.

(1) 4551 (2) 10091 (3) 7881 (4) 13531

58. A system of three linear equations in three variables is inconsistent if their planes

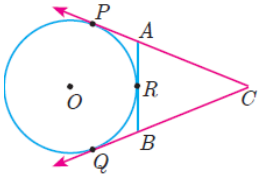
(1) intersect only at a point (2) intersect in a line
(3) coincides with each other (4) do not intersect

59. Find the matrix X if $2X + \begin{pmatrix} 1 & 3 \\ 5 & 7 \end{pmatrix} = \begin{pmatrix} 5 & 7 \\ 9 & 5 \end{pmatrix}$

(1) $\begin{pmatrix} -2 & -2 \\ 2 & -1 \end{pmatrix}$ (2) $\begin{pmatrix} 2 & 2 \\ 2 & -1 \end{pmatrix}$ (3) $\begin{pmatrix} 1 & 2 \\ 2 & 2 \end{pmatrix}$ (4) $\begin{pmatrix} 2 & 1 \\ 2 & 2 \end{pmatrix}$

60. In figure CP and CQ are tangents to a circle with centre at O. ARB is another tangent touching the circle at R. If $CP = 11$ cm and $BC = 7$ cm, then the length of BR is

(1) 6 cm (2) 5 cm (3) 8 cm (4) 4 cm



II. Answer ALL the questions: (5 x 8 = 40)

61. Construct a triangle similar to a given triangle LMN with its sides equal to $\frac{4}{5}$ of the corresponding sides of the triangle LMN (scale factor $\frac{4}{5}$)

62. Draw a triangle ABC of base $BC = 5.6$ cm, $\angle A = 40°$ and the bisector of $\angle A$ meets BC at D such that $CD = 4$ cm.

63. Draw a circle of radius 4.5 cm. Take a point on the circle. Draw the tangent at that point using the alternate – segment theorem.

64. Graph the quadratic equation for $x^2 - 4x + 4 = 0$ and state its nature of solution.

65. Draw the graph of $y = x^2 - 4$ and hence solve $x^2 - x - 12 = 0$.

All the Best!