

# 10 - Mathematics      Special Test – 2

Time: 3.00 Hrs]

Geometry, Graph, One mark (Unit – 5,6,7,8)

[Marks:100

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

1. If The area of triangle formed by the points  $(-5, 0)$  ,  $(0, -5)$  and  $(5, 0)$  is  
 (1) 0 sq.units                      (2) 25 sq.units                      (3) 5 sq.units                      (4) none of these
2. The value of  $\sin^2\theta + \frac{1}{1+\tan^2\theta}$  is equal to  
 (1)  $\tan^2\theta$                       (2) 1                      (3)  $\cot^2\theta$                       (4) 0
3. The total surface area of a cylinder whose radius is  $\frac{1}{3}$  of its height is  
 (1)  $\frac{9\pi h^2}{8}$  sq. units                      (2)  $24\pi h^2$  sq. units                      (3)  $\frac{8\pi h^2}{9}$  sq. units                      (4)  $\frac{56\pi h^2}{9}$  sq. units
4. Variance of first 20 natural numbers is  
 (1) 32.25                      (2) 44.25                      (3) 33.25                      (4) 30
5. A man walks near a wall, such that the distance between him and the wall is 10 units. Consider the wall to be the  $Y$  axis. The path travelled by the man is  
 (1)  $x = 10$                       (2)  $y = 10$                       (3)  $x = 0$                       (4)  $y = 0$
6.  $9\tan^2\theta - 9\sec^2\theta =$                       (1) 1                      (2) 0                      (3) 9                      (4) -9
7. The total surface area of a hemi-sphere is how much times the square of its radius.  
 (1)  $\pi$                       (2)  $4\pi$                       (3)  $3\pi$                       (4)  $2\pi$
8. The mean of 100 observations is 40 and their standard deviation is 3. The sum of squares of all deviations is  
 (1) 40000                      (2) 160900                      (3) 160000                      (4) 30000
9. The straight line given by the equation  $x = 11$  is  
 (1) parallel to  $X$  axis                      (2) parallel to  $Y$  axis  
 (3) passing through the origin                      (4) passing through the point  $(0, 11)$
10. If  $\sin\theta + \cos\theta = a$  and  $\sec\theta + \operatorname{cosec}\theta = b$ , then the value of  $b(a^2 - 1)$  is equal to  
 (1)  $2a$                       (2)  $3a$                       (3) 0                      (4)  $2ab$
11. A spherical ball of radius  $r_1$  units is melted to make 8 new identical balls each of radius  $r_2$  units. Then  $r_1 : r_2$  is                      (1)  $2 : 1$                       (2)  $1 : 2$                       (3)  $4 : 1$                       (4)  $1 : 4$
12. The height and radius of the cone of which the frustum is a part are  $h_1$  units and  $r_1$  units respectively. Height of the frustum is  $h_2$  units and radius of the smaller base is  $r_2$  units. If  $h_2 : h_1 = 1 : 2$  then  $r_2 : r_1$  is  
 (1)  $1 : 3$                       (2)  $1 : 2$                       (3)  $2 : 1$                       (4)  $3 : 1$
13. A page is selected at random from a book. The probability that the digit at units place of the page number chosen is less than 7 is                      (1)  $\frac{3}{10}$                       (2)  $\frac{7}{10}$                       (3)  $\frac{3}{9}$                       (4)  $\frac{7}{9}$
14. If the points  $(0, 0)$ ,  $(a, 0)$  and  $(0, b)$  are collinear then  
 (1)  $a = b$                       (2)  $a + b = 0$                       (3)  $ab = 0$                       (4)  $a \neq b$
15. If the ratio of the height of a tower and the length of its shadow is  $\sqrt{3} : 1$  , then the angle of elevation of the sun has measure  
 (1)  $45^\circ$                       (2)  $30^\circ$                       (3)  $90^\circ$                       (4)  $60^\circ$
16. A shuttle cock used for playing badminton has the shape of the combination of  
 (1) a cylinder and a sphere                      (2) a hemisphere and a cone  
 (3) a sphere and a cone                      (4) frustum of a cone and a hemisphere

17. If  $p$  is the probability of an event  $A$ , then  $p$  satisfies  
 (1)  $0 < p < 1$                       (2)  $0 \leq p \leq 1$                       (3)  $0 \leq p < 1$                       (4)  $0 < p \leq 1$
18. The point of intersection of  $3x - y = 4$  and  $x + y = 8$  is  
 (1) (5, 3)                                  (2) (2, 4)                                  (3) (3, 5)                                  (4) (4, 4)
19. If  $\sin\theta = \cos\theta$ , then  $2\tan^2\theta + \sin\theta - 1$  is equal to  
 (1)  $\frac{-3}{2}$                                       (2)  $\frac{3}{2}$                                       (3)  $\frac{2}{3}$                                       (4)  $\frac{-2}{3}$
20. The height of a right circular cone whose radius is 5 cm and slant height is 13 cm will be  
 (1) 12 cm                                      (2) 10 cm                                      (3) 13 cm                                      (4) 5 cm
21. A purse contains 10 notes of Rs.2000, 15 notes of Rs.500, and 25 notes of Rs.200. One note is drawn at random. What is the probability that the note is either a Rs.500 note or Rs.200 note?  
 (1)  $\frac{1}{5}$     (2)  $\frac{3}{10}$     (3)  $\frac{2}{3}$     (4)  $\frac{4}{5}$
22.  $a \cot\theta + b \operatorname{cosec}\theta = p$  and  $b \cot\theta + a \operatorname{cosec}\theta = q$  then  $p^2 - q^2$  is equal to  
 (1)  $a^2 - b^2$                                   (2)  $b^2 - a^2$                                   (3)  $a^2 + b^2$                                   (4)  $b - a$
23. The slope of the line joining (12, 3), (4,  $a$ ) is  $\frac{1}{8}$ . The value of ' $a$ ' is  
 (1) 1    (2) 4    (3) -5    (4) 2
24. A tower is 60 m high. Its shadow is  $x$  metres shorter when the sun's altitude is  $45^\circ$  than when it has been  $30^\circ$ , then  $x$  is equal to  
 (1) 41.92 m                                      (2) 43.92 m                                      (3) 43 m    (4) 45.6 m
25. The ratio of the volumes of a cylinder, a cone and a sphere, if each has the same diameter and same height is  
 (1) 1:2:3    (2) 2:1:3    (3) 1:3:2    (4) 3:1:2
26. If the mean and coefficient of variation of a data are 4 and 87.5% then the standard deviation is  
 (1) 3.5    (2) 3    (3) 4.5    (4) 2.5
27. The equation of a straight line having slope 3 and y-intercept -4 is  
 (1)  $3x - y - 4 = 0$                                   (2)  $3x + y - 4 = 0$                                   (3)  $3x - y + 4 = 0$                                   (4)  $3x + y + 4 = 0$
28. A frustum of a right circular cone is of height 16cm with radii of its ends as 8cm and 20cm. Then, the volume of the frustum is  
 (1)  $3328 \pi \text{ cm}^3$                                   (2)  $3228 \pi \text{ cm}^3$                                   (3)  $3240 \pi \text{ cm}^3$                                   (4)  $3340 \pi \text{ cm}^3$
29. The probability of getting a job for a person is  $\frac{x}{3}$ . If the probability of not getting the job is  $\frac{2}{3}$  then the value of  $x$  is  
 (1) 2    (2) 1    (3) 3    (4) 1.5
30. If  $(\sin\alpha + \operatorname{cosec}\alpha)^2 + (\cos\alpha + \sec\alpha)^2 = k + \tan^2\alpha + \cot^2\alpha$ , then the value of  $k$  is equal to  
 (1) 9    (2) 7    (3) 5    (4) 3
31. The volume (in  $\text{cm}^3$ ) of the greatest sphere that can be cut off from a cylindrical log of wood of base radius 1 cm and height 5 cm is  
 (1)  $\frac{4}{3} \pi$     (2)  $\frac{10}{3} \pi$     (3)  $5 \pi$     (4)  $\frac{20}{3} \pi$
32. If the standard deviation of  $x, y, z$  is  $p$  then the standard deviation of  $3x + 5, 3y + 5, 3z + 5$  is  
 (1)  $3p + 5$     (2)  $3p$     (3)  $p + 5$     (4)  $9p + 15$
33. If slope of the line  $PQ$  is  $\frac{1}{\sqrt{3}}$  then the slope of the perpendicular bisector of  $PQ$  is  
 (1)  $\sqrt{3}$     (2)  $-\sqrt{3}$     (3)  $\frac{1}{\sqrt{3}}$     (4) 0
34. The angle of elevation of a cloud from a point  $h$  metres above a lake is  $\beta$ . The angle of depression of its reflection in the lake is  $45^\circ$ . The height of location of the cloud from the lake is  
 (1)  $\frac{h(1+\tan\beta)}{1-\tan\beta}$                                   (2)  $\frac{h(1-\tan\beta)}{1+\tan\beta}$                                   (3)  $h \tan(45^\circ - \beta)$                                   (4) none of these
35. The curved surface area of a cylinder is  $264\text{m}^2$  and its volume is  $924\text{m}^2$ . The ratio of diameter to its height is  
 (1) 3:7    (2) 7:3    (3) 6:7    (4) 7:6

36. If  $A$  is a point on the  $Y$  axis whose ordinate is 8 and  $B$  is a point on the  $X$  axis whose abscissae is 5 then the equation of the line  $AB$  is  
 (1)  $8x + 5y = 40$                       (2)  $8x - 5y = 40$                       (3)  $x = 8$                       (4)  $y = 5$
37. If  $5x = \sec\theta$  and  $\frac{5}{x} = \tan\theta$ , then  $x^2 - \frac{1}{x^2}$  is equal to  
 (1) 25                      (2)  $\frac{1}{25}$                       (3) 5                      (4) 1
38. If the radius of the base of a right circular cylinder is halved keeping the same height, then the ratio of the volume of the cylinder thus obtained to the volume of original cylinder is                      (1) 1:2                      (2) 1:4                      (3) 1:6                      (4) 1:8
39. If a letter is chosen at random from the English alphabets  $\{a, b, \dots, z\}$ , then the probability that the letter chosen precedes  $x$   
 (1)  $\frac{12}{13}$                       (2)  $\frac{1}{13}$                       (3)  $\frac{23}{26}$                       (4)  $\frac{3}{26}$
40. The equation of a line passing through the origin and perpendicular to the line  $7x - 3y + 4 = 0$  is  
 (1)  $7x - 3y + 4 = 0$                       (2)  $3x - 7y + 4 = 0$                       (3)  $3x + 7y = 0$                       (4)  $7x - 3y = 0$
41. The electric pole subtends an angle of  $30^\circ$  at a point on the same level as its foot. At a second point 'b' metres above the first, the depression of the foot of the pole is  $60^\circ$ . The height of the pole (in metres) is equal to  
 (1)  $\sqrt{3}b$                       (2)  $\frac{b}{3}$                       (3)  $\frac{b}{2}$                       (4)  $\frac{b}{\sqrt{3}}$
42. Curved surface area of solid sphere is  $24 \text{ cm}^2$ . If the sphere is divided into two hemispheres, then the total surface area of one of the hemispheres is  
 (1)  $12 \text{ cm}^2$                       (2)  $8 \text{ cm}^2$                       (3)  $16 \text{ cm}^2$                       (4)  $18 \text{ cm}^2$
43. Kamalam went to play a lucky draw contest. 135 tickets of the lucky draw were sold. If the probability of Kamalam winning is  $\frac{1}{9}$ , then the number of tickets bought by Kamalam is                      (1) 5                      (2) 10                      (3) 15                      (4) 20
44. Consider four straight lines  
 (i)  $l_1 : 3y = 4x + 5$                       (ii)  $l_2 : 4y = 3x - 1$                       (iii)  $l_3 : 4y + 3x = 7$                       (iv)  $l_4 : 4x + 3y = 2$   
 Which of the following statement is true ?  
 (1)  $l_1$  and  $l_2$  are perpendicular                      (2)  $l_1$  and  $l_4$  are parallel  
 (3)  $l_2$  and  $l_4$  are perpendicular                      (4)  $l_2$  and  $l_3$  are parallel
45. A ladder of length  $14 \text{ m}$  just reaches the top of a wall. If the ladder makes an angle of  $60^\circ$  with the horizontal, then the height of the wall is  
 (1)  $14\sqrt{3} \text{ m}$                       (2)  $28\sqrt{3} \text{ m}$                       (3)  $7\sqrt{3} \text{ m}$                       (4)  $35\sqrt{3} \text{ m}$
46.  $(1 + \tan\theta + \sec\theta)(1 + \cot\theta - \operatorname{cosec}\theta)$  is equal to  
 (1) 0                      (2) 1                      (3) 2                      (4) -1
47. The curved surface area of a right circular cone of height  $15 \text{ cm}$  and base diameter  $16 \text{ cm}$  is                      (1)  $60\pi \text{ cm}^2$                       (2)  $68\pi \text{ cm}^2$                       (3)  $120\pi \text{ cm}^2$                       (4)  $136\pi \text{ cm}^2$
48. The probability of a red marble selected at random from a jar containing  $p$  red,  $q$  blue and  $r$  green marbles is                      (1)  $\frac{q}{p+q+r}$                       (2)  $\frac{p}{p+q+r}$                       (3)  $\frac{p+q}{p+q+r}$                       (4)  $\frac{p+r}{p+q+r}$
49. A straight line has equation  $8y = 4x + 21$ . Which of the following is true  
 (1) The slope is 0.5 and the  $y$  intercept is 2.6  
 (2) The slope is 5 and the  $y$  intercept is 1.6  
 (3) The slope is 0.5 and the  $y$  intercept is 1.6  
 (4) The slope is 5 and the  $y$  intercept is 2.6

50. The angle of depression of the top and bottom of 20 m tall building from the top of a multistoried building are  $30^\circ$  and  $60^\circ$  respectively. The height of the multistoried building and the distance between two buildings (in metres) is  
 (1) 20,  $10\sqrt{3}$                       (2) 30,  $5\sqrt{3}$                       (3) 20, 10                      (4) 30,  $10\sqrt{3}$
51. If the radius of the base of a cone is tripled and the height is doubled then the volume is  
 (1) made 6 times                      (2) made 18 times                      (3) made 12 times                      (4) unchanged
52. Find the value of  $p$ , given that the line  $\frac{y}{2} = x - p$  passess through the point  $(-4, 4)$  is  
 (1)  $-4$                       (2)  $-6$                       (3) 0                      (4) 8
53. When proving that a quadrilateral is a trapezium, it is necessary to show  
 (1) Two sides are parallel.                      (2) Two parallel and two non-parallel sides.  
 (3) Opposite sides are parallel.                      (4) All sides are of equal length.
54. If  $x = a \tan \theta$  and  $y = b \sec \theta$  then  
 (1)  $\frac{y^2}{b^2} - \frac{x^2}{a^2} = 1$                       (2)  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$                       (3)  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$                       (4)  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 0$
55. The range of the data 8, 8, 8, 8, 8... 8 is  
 (1) 0                      (2) 1                      (3) 8                      (4) 3
56. If  $t$  is the standard deviation of  $x, y, z$ , then the standard deviation of  $x + 5, y + 5, z + 5$  is  
 (1)  $\frac{t}{3}$                       (2)  $t + 5$                       (3)  $t$                       (4)  $xyz$
57.  $(2, 1)$  is the point of intersection of two lines.  
 (1)  $x - y - 3 = 0; 3x - y - 7 = 0$                       (2)  $x + y = 3; 3x + y = 7$   
 (3)  $3x + y = 3; x + y = 7$                       (4)  $x + 3y - 3 = 0; x - y - 7 = 0$
58. The standard deviation of a data is 3. If each value is multiplied by 5 then the new variance is  
 (1) 3                      (2) 15                      (3) 5                      (4) 225
59. If two solid hemispheres of same base radius  $r$  units are joined together along their bases, then curved surface area of this new solid is  
 (1)  $4\pi r^2$  sq.units                      (2)  $6\pi r^2$  sq.units                      (3)  $3\pi r^2$  sq.units                      (4)  $8\pi r^2$  sq.units
60. If the standard deviation of a variable  $x$  is 4 and if  $y = \frac{3x+5}{4}$ , then the standard deviation of  $y$  is  
 (1) 4                      (2) 3.5                      (3) 3                      (4) 2.5

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

61. Construct a triangle similar to a given triangle  $ABC$  with its sides equal to  $\frac{6}{5}$  of the corresponding sides of the triangle  $ABC$  ( scale factor  $\frac{6}{5}$  )
62. Construct a  $\Delta PQR$  in which the base  $PQ = 4.5$  cm,  $\angle R = 35^\circ$  and the median from  $R$  to  $PQ$  is 6 cm.
63. Draw a tangent to the circle from the point  $P$  having radius 3.6 cm, and centre at  $O$  point  $P$  is at a distance 7.2 cm from the centre.
64. Graph the equation  $x^2 - 9x + 20 = 0$  and state its nature of solution.
65. Draw the graph of  $y = x^2 - 5x - 6$  and hence solve  $x^2 - 5x - 14 = 0$ .

*All the Best!*