

HSL

HALF YEARLY EXAMINATION - 2022

MATHS

X - Std

Time : 3.15 Hrs

Marks : 100

PART - I

Choose the correct answer from the four alternatives and write the option code and the corresponding answer :-

14 X 1 = 14

- 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
 - m^n
 - n^n
 - $2^{mn} - 1$
 - 2^{mn}
- If $f(x) + f(1-x) = 2$ then $f(1/2) = ?$
 - 1
 - 1
 - 5
 - 9
- The least number that is divisible by all the numbers from 1 to 10 (both inclusive) is
 - 2025
 - 5220
 - 5025
 - 2520
- Sum of the series $2 + 2 + 2 + \dots$ upto n terms is
 - 2^n
 - $2n$
 - n^2
 - $n + 2$
- If $(x-6)$ is the HCF of $x^2 - 2x - 24$ and $x^2 - kx - 6$ then the value of K is
 - 3
 - 5
 - 6
 - 8
- If A is 2×3 matrix and B is 3×4 matrix, how many columns does AB have
 - 3
 - 4
 - 2
 - 5
- If in triangle ABC and EDF, $\frac{AB}{\Delta E} = \frac{BC}{FD}$ then they will be similar, when
 - $\angle B = \angle E$
 - $\angle A = \angle D$
 - $\angle B = \angle D$
 - $\angle A = \angle F$
- When proving that a quadrilateral is a trapezium it is necessary to show.
 - Two sides are parallel
 - Two parallel and two non-parallel sides
 - Opposite sides are parallel
 - All sides are of equal length
- Find the slope of the line $2y = x + 8$
 - $1/2$
 - 1
 - 8
 - 2
- If $5x = \sec \theta$, $\frac{5}{x} = \tan \theta$, then $x^2 - \frac{1}{x^2}$ is equal to
 - 25
 - $1/25$
 - 5
 - 1
- A shuttle cock used for playing badminton has the shape of the combination of
 - a cylinder and a sphere
 - a hemisphere and a cone
 - a sphere and a cone
 - frustum of a cone and a hemisphere
- The ratio of volumes of a cylinder, a cone and a sphere, if each has the same diameter and same height is
 - 1 : 2 : 3
 - 2 : 1 : 3
 - 1 : 3 : 2
 - 3 : 1 : 2
- The standard deviation of a data is 3. If each value is multiplied by 5 then the new variance is
 - 3
 - 15
 - 5
 - 225
- An English month is selected at random in a year. The probability that it contains 31 days is.
 - $\frac{6}{12}$
 - $\frac{7}{12}$
 - $\frac{5}{12}$
 - $\frac{1}{12}$

PART - II

Answer any 10 questions. Q.No. 28 is compulsory :-

10 X 2 = 20

- If $A \times B = \{(3, 2), (3, 4), (5, 2), (5, 4)\}$ then find A and B.
- 'a' and 'b' are two positive integers such that $a^b \times b^a = 800$. Find a and b.
- Find the sum of the series $1 + 4 + 9 + 16 + \dots + 225$.
- Reduce to its lowest form : $\frac{x^2 - 16}{x^2 + 8x + 16}$
- If the difference between a number and its reciprocal is $\frac{24}{5}$, find the number.
- If $A = \begin{pmatrix} 0 & 4 & 9 \\ 8 & 3 & 7 \end{pmatrix}$, $B = \begin{pmatrix} 7 & 3 & 8 \\ 1 & 4 & 9 \end{pmatrix}$ then find the value of $B - 5A$.
- The length of the tangent to a circle from a point p, which is 25cm away from the center is 24cm. What is the radius of the circle?
- Find the value of a if the line through $(-2, 3)$ and $(8, 5)$ is perpendicular to $y = ax + 2$.
- Prove the identity $\sqrt{\frac{1 + \sin \theta}{1 - \sin \theta}} = \sec \theta + \tan \theta$.

24. If the total surface area of a cone of radius 7cm is 704cm^2 , then find its slant height.
25. A hemi-spherical hollow bowl has material of volume $\frac{436\pi}{3}$ cubic cm. Its external diameter is 14cm. Find its thickness.
26. If the range and coefficient of range of a data are 20 and 0.2 respectively, then find the largest and smallest values of data.
27. Two coins are tossed together, what is the probability of getting different faces on the coins?
28. Let $A = \{1, 2, 3\}$ and $B = \{a, b\}$. Write any two functions from A to B in the form of set of ordered pairs.

PART - III

Answer any 10 questions. Q.No. 42 is compulsory:-

10 X 5 = 50

29. The function 't' which maps temperature in celsius (C) into temperature in Fahrenheit is defined by $t(C) = F$, where $F = \frac{9}{5}C + 32$. Find (i) $t(0)$. (ii) $t(28)$ (iii) $t(-10)$ (iv) the value of C when $t(C) = 212$ (v) the temperature when the celsius value is equal to the Fahrenheit value.
30. Find x if $gf f(x) = fg g(x)$, given $f(x) = 3x + 1$, and $g(x) = x + 3$.
31. The sum of first n, 2n and 3n terms of an A.P. are S_1, S_2 and S_3 respectively. Prove that $S_3 = 3(S_2 - S_1)$.
32. Find the sum to n terms of the series $3 + 33 + 333 + \dots$ upto n terms.
33. Find the square root of $37x^2 - 28x^3 + 4x^4 + 42x + 9$.
34. If α, β are roots of the equation $3x^2 + 7x - 2 = 0$, find the values of (i) $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$ (ii) $\frac{\alpha^2}{\beta} + \frac{\beta^2}{\alpha}$
35. State and prove Thales Theorem.
36. Find the equation of the straight line through the intersection of the lines $7x + 3y = 10$, $5x - 4y = 1$ and parallel to the line $13x + 5y + 12 = 0$.
37. If $\frac{\cos \theta}{1 + \sin \theta} = \frac{1}{a}$ then prove that $\frac{a^2 - 1}{a^2 + 1} = \sin \theta$.
38. Two ships are sailing in the sea on either side of the lighthouse. The angles of depression of two ships as observed from the top of the light house are 60° and 45° respectively. If the distance between the ships is $200 \left(\frac{\sqrt{3} + 1}{\sqrt{3}} \right)$ metres, find the height of the light house.
39. A capsule is in the shape of a cylinder with two hemisphere stuck to each of its ends. If the length of the entire capsule is 12mm and the diameter of the capsule is 3mm, how much medicine it can hold?
40. Find the coefficient of variation of 20, 22, 19, 23, 16.
41. Two dices are rolled. Find the probability of getting an even number on the first die or a total of face sum 8.
42. If $A = \begin{pmatrix} 2 & -4 & 6 \\ 3 & -6 & 9 \\ 1 & -2 & 3 \end{pmatrix}$ then find (i) the order of the matrix A. (ii) the elements of the matrix A.

PART - IV

Answer both the questions choosing either of the alternatives:-

2 X 8 = 16

43. a) Construct a ΔPQR with the base $PQ = 4.5\text{cm}$, $\angle R = 35^\circ$ and the median from R to RG is 6cm. (OR)
b) Draw a circle of diameter 6cm from a point P, which is 8cm away from its centre. Draw the two tangents PA and PB to the circle and measure their lengths.
44. a) Discuss the nature of solutions of the quadratic equation $x^2 + x - 12 = 0$. (OR)
b) A School announces that for a certain competitions, the cash prize will be distributed for all the participants equally as shown below.

No. of Participants (x)	2	4	6	8	10
Amount for each participant (y)	180	90	60	45	36

- (i) Find the constant of variation.
(ii) Graph the above data and hence, find how much will each participant get if the number of participants are 12.