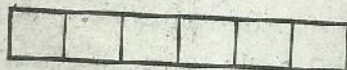# HALF YEARLY EXAMINATION - 2018

X - Std

MATHS

Time : 2.30 Hrs

Marks : 100

Instructions : 1. Check the question paper for fairness of printing, If there is any lack of fairness, inform the Hall supervisor immediately.
2. Use Blue or Black ink to write and underlined and pencil to draw diagrams.

Note : This question paper contains four sections.

Section - 1

Note : i. Answer all the 15 questions. ii. Choose the correct answer from the given four alternatives and write the option code and the corresponding answer :-

$15 \times 1 = 15$

1. Which one of the following is not true?
   a) $A \times B = A \cap B^l$
   b) $A \times B = A \cap B$
   c) $A \times B = (A \cup B) \cap B^l$
   d) $A \times B = (A \cup B) \backslash B$

2. If a, b, c are in A.P. then $\dfrac{a-b}{b-c}$ is equal to
   a) $\dfrac{a}{b}$
   b) $\dfrac{b}{c}$
   c) $\dfrac{a}{c}$
   d) 1

3. In an G.P. $t_2 = \dfrac{3}{5}$ and $t_3 = \dfrac{1}{5}$. Then the common ratio is
   a) $\dfrac{1}{5}$
   b) $\dfrac{1}{3}$
   c) 1
   d) 5

4. The system of equations $x - 4y = 8$, $3x - 12y = 24$.
   a) has infinitely many solutions
   b) has no solution
   c) has a unique solution
   d) may or may not have a solution

5. If $x^2 + 5kx + 16 = 0$ has no real roots, then
   a) $k > \dfrac{8}{5}$
   b) $k > -\dfrac{8}{5}$
   c) $-\dfrac{8}{5} < k < \dfrac{8}{5}$
   d) $0 < k < \dfrac{8}{5}$

6. If $A = (1, -2, 3)$ and $B = \begin{pmatrix} -1 \\ 2 \\ -3 \end{pmatrix}$ then $A + B =$
   a) $(0, 0, 0)$
   b) $\begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$
   c) (-14)
   d) not defined

7. The point P which divides the line segment joining the points A $(1, -3)$ and B $(-3, 9)$ internally in the ratio $1 : 3$ is
   a) $(2, 1)$
   b) $(0, 0)$
   c) $\left(\dfrac{5}{3}, 2\right)$
   d) $(1, -2)$

8. The equation of a straight line passing through the point $(2, -7)$ and parallel to x-axis is   a) $x = 2$ b) $x = -7$ d) $y = -7$ d) $y = 2$

9. In $\triangle ABC$, DE is $\parallel$ to BC, meeting AB and AC at D and E. If AD = 3cm, DB = 2cm and AE = 2.7cm then AC is equal to .
      a) 6.5 cm   b) 4.5 cm   c) 3.5 cm   d) 5.5cm

10. $\triangle ABC$ is a right angled triangle, where $\lfloor B = 90^0$ and $BD \perp AC$. If BD = 8cm, AD = 4cm then CD is
       a) 24 cm   b) 16 cm   c) 32 cm   d) 8 cm

11. $(1 - \cos 2\theta)(1 + \cot^2 \theta) =$ a) $\sin^2 \theta$ b) 0   c) 1   d) $\tan^2 \theta$

12. $(1 + \tan^2 \theta)(1 - \sin \theta)(1 + \sin \theta) =$
       a) $\cos^2 \theta - \sin^2 \theta$ b) $\sin^2 \theta - \cos^2 \theta$ c) $\sin^2 \theta + \cos^2 \theta$.   d) 0

13. The curved surface area of a right circular cylinder whose radius is a units and height is b units, is equal to
       a) $\pi a^2 b$ b) $2 \pi ab$ c) 2π d) 2

14. For any collection of n items, $(\Sigma x) - \bar{x} =$
       a) $n \bar{x}$ b) $(n-2) \bar{x}$ c) $(n-1) \bar{x}$ d) 0

15. If A and B are two events such that $P(A) = 0.25$, $P(B) = 0.05$ and $P(A \cap B) = 0.14$ then $P(A \cup B) =$
       a) 0.61   b) 0.16   c) 0.14   d) 0.6

Section - II

Note : i. Answer 10 questions. ii. question number 30 is compulsory. Select any 9 question from the first 14 questions :- $10 \times 2 = 20$

16. Define the cardinality of a finite set.

17. Verify the following graph represents a function or not. Justify your answer.
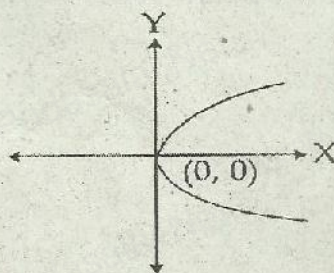
18. Find the 13th and 16th terms of the sequence defined by :

$$b_n = \begin{cases} n^2 & , \text{ if } n \in N \text{ and } n \text{ is even} \\ n(n+2) & , \text{ if } n \in N \text{ and } n \text{ is odd} \end{cases}$$

19. Solve : $2x + 7y - 5 = 0; \quad -3x + 8y = -11$

20. Form a quadratic equation whose roots are : $3 + \sqrt{7}$, $3 - \sqrt{7}$.

21. Define transpose of a matrix.

22. Find the product of the matrices $\begin{pmatrix} 3 & -2 \\ 5 & 1 \end{pmatrix}\begin{pmatrix} 4 & 1 \\ 2 & 7 \end{pmatrix}$

23. Find the area of the triangle formed by the points $(0, 0)$ $(3, 0)$ and $(0, 2)$.

24. AB and CD are two chords of a circle which intersect each other internally at P. If $CP = 4cm$, $AP = 8cm$, $PB = 2cm$ then find PD.

25. A kite is flying with a string of length 200m. If the thread makes an angle 30° with the ground, find the distance of the kite from the ground level. (Here, assume that the string is along a straight line).

26. Prove : $\sec^2\theta + \csc^2\theta = \sec^2\theta \csc^2\theta$.

27. The outer and the inner radii of a hollow sphere are 12cm and 10cm. Find its volume.

28. Calculate the standard deviation of the first 13 natural numbers.

29. A ticket is drawn from a bag containing 100 tickets. The tickets are numbered from one to hundred. What is the probability of getting a ticket with a number divisible by 10?

30. a) Find the equation of straight line whose angle of inclination is 45° and y - intercept is $\frac{2}{5}$. *(OR)* b) A solid right circular cylinder has radius 7cm and height 20cm, Find its curved surface area.

Section - III

Note : 1. Answer 9 questions. 2. Question number 45 is compulsory. Select any 8 questions from the first 14 questions :- $9 \times 5 = 45$

31. A function $f:[-3,7) \rightarrow R$ is defined as follows.

$$f(x) = \begin{vmatrix} 4x^2 - 1 & ; & -3 \le x < 2 \\ 3x - 2 & 2 \le x \le 4 \\ 2x - 3 & 4 < x < 7 \end{vmatrix}$$ Find $\dfrac{f(3) + f(-1)}{2f(6) - f(1)}$.

32. Let $A = \{a, b, c, d\}$ $B = \{a, c, e\}$ and $C = \{a, e\}$. Show that $A \cap (B \cap C) = (A \cap B) \cap C$ by using venn diagram.

33. Find the sum of the series $16^2 + 17^2 + 18^2 + \ldots + 25^2$.

34. An amount Rs. 500 is deposited in a bank which pays annual interest at the rate of 10% compounded annually. What will be the value of this deposit at the end of 10th year?

35. Show that the roots of the equation $3p^2x^2 - 2pqx + q^2 = 0$ are not real.

36. Find the square root of the following polynomial by division method. $x^4 - 4x^3 + 10x^2 - 12x + 9$.

37. Find the G.C.D. of the polynomials $3x^4 + 6x^3 - 12x^2 - 24x$ and $4x^4 + 14x^3 + 8x^2 - 8x$.

38. Find X and Y if $2X + 3Y = \begin{pmatrix} 2 & 3 \\ 4 & 0 \end{pmatrix}$ and $3X + 2Y = \begin{pmatrix} 2 & -2 \\ -1 & 5 \end{pmatrix}$.

39. The vertices of $\triangle ABC$ are A(–5, 7), B(–4, –5) and C(4, 5). Find the slopes of the altitudes of the triangle.

40. Find the equation of the straight line each passing through the point (6, –2) and whose sum of the intercept is 5.

41. A girl of height 120cm is walking away from the base of a lamp - post at a speed of 0.6m/sec. If the lamp is 3.6m above the ground level, then find the length of her shadow after 4 seconds.

42. A spherical solid material of radius 18cm is melted and recast into three small solid spherical spheres of different sizes. If the radii of two spheres are 2cm and 12cm. Find the radius of the third sphere.

43. The internal and external radii of a hollow cylinder are 12cm and 18cm respectively. If its height is 14cm, then find its curved surface area and total surface area (take $\pi = \dfrac{22}{7}$)

44. The mean of 30 items is 18 and their standard deviation is 3. Find the sum of all the items and also the sum of the squares of all the items.

45. (a) A person in an helicopter flying at a height of 700m observes two objects lying opposite to each other on either bank of a river. The angles of depression of the objects are 30° and 45°. Find the width of the river $\left[\sqrt{3} = 1.732 \right]$ *(OR)*
(b) The probability that a new car will get an award for its design is 0.25, the probability that it will get an award for efficient use of fuel is 0.35 and the probability that it will get both the awards is 0.15. Find the probability that 1. It will get atleast one of the two awards. 2. It will get only one of the awards.

<center>Section - IV   2 X 10 = 20</center>

Note : Answer both the questions choosing either of the alternatives :-

46. (a) Draw the two tangents from a point which is 10cm away from the centre of a circle of radius 6cm. Also measure the length of the tangents. *(OR)*
(b) Construct a cyclic quadrilateral ABCD in which AB = 6cm, AC = 7cm, BC = 6cm and AD = 4.2cm.

47. (a) Solve the equation $x^2 - 2x - 3 = 0$ graphically. *(OR)*

(b)

x	1	3	5	7	8
y	2	6	10	14	16

Draw the graph for the above table and hence find :

(i) the value of y is x = 4. (ii) the value of x is y = 12.