Time:3 hours.   **SUBJECT: MATHEMATICS (SET-A)**   Name: …………………..
M.M: 80   Roll No. ………………..

General instructions:
1. This question paper contains two parts A and B.
2. Both Part A and Part B have internal choices.
Part – A:
1. It consists two sections- I and II.
2. Section I has 16 questions of 1 mark each. Internal choice is provided in 5 questions.
3. Section II has 4 questions on case study. Each case study has 5 case-based sub-parts. An examinee is to attempt any 4 out of 5 sub-parts.
Part – B:
1. Question No 21 to 26 are Very short answer Type questions of 2 marks each.
2. Question No 27 to 33 are Short Answer Type questions of 3 marks each
3. Question No 34 to 36 are Long Answer Type questions of 5 marks each.
4. Inter~~nal choice is provided in 2 questions of 2 marks, 2 questions of 3 marks and 1 question of 5 marks.~~

PART – A
SECTION – I

1. What is the exponent of 3 in prime factorization of 864?   1
    OR
    What will be the product of HCF and LCM of the smallest prime number and the smallest composite number.

2. Check the consistency of the following pair of the linear equations: 1
    $$x + 2y - 8 = 0 \; ; \quad 2x + 4y = 16$$

3. Find the 10th term of the A.P. 2,7,12, ……………   1

4. Find the number of terms of an A.P. in which the first term is -2, the common difference is   1
    -3 and last term is -17.

5. Find the discriminant of the quadratic equation $3x^2 - 4\sqrt{3}x + 4 = 0$.   1

6. If in ΔABC, DE ∥ BC , AD = x ,DB = x – 2, AE = x + 2 and EC = x – 1 then find the value of x.   1

7. If TP and TQ are two tangents drawn to a circle with centre O from an external point T, so that   1
    $\angle POQ = 110°$ then find $\angle PTQ$.

8. For which value(s) of p, will the lines represented by the following pair of linear equations be   1
    parallel? $3x - y - 5 = 0 \; ; \; 6x - 2y - p = 0$

9. In a right angled triangle ABC , if tanA = $\frac{4}{3}$, then find the value of secA.   1

10. If cosecθ – cotθ = $\frac{1}{3}$, then find the value of (cosecθ + cotθ).   1
    OR
    If cosA= $\frac{7}{15}$ then find the value of $\sec^2 A$.

11. If two tangents inclined at an angle of 60° are drawn to a circle of radius 3cm, then find the   1
    length of each of the tangent.
    OR
    If the radii of two concentric circles are 5cm and 13cm, then find the length of the chord of one circle which is tangent to the other circle.

12. To divide a line segment AB in the ratio 5:7, first a ray AX is drawn so that ∠BAX is an acute   1
    angle and then at equal distances points are marked on the ray AX. What is the minimum number of these points?

13. The angle of elevation of the top of a 78m high tower from a point A on the ground is 30°. Find   1
    the distance of the point A from the foot of the tower.

14. A letter of English alphabets is chosen at random. Determine the probability that chosen letter is a consonant. 1

15. Find the value of a, for which $-\frac{1}{2}$ is a root of the quadratic equation $5x^2 - \frac{7}{2}x + 2a = 0$ 1

OR

Find the positive root of $\sqrt{3x^2 + 6} = 9$

16. Volume and surface area of a solid hemisphere are numerically equal. What is the diameter of the hemisphere? 1

OR

The volume of the vessel of the form of a right circular cylinder is 448π cm^3 and its height is 7cm. find the radius of its base.

SECTION – II

Case study based questions are compulsory. Attempt any four sub parts of each question. Each subpart carries 1 mark.

17. The figure shows a bridge with hanging wires showing a mathematical shape. Answer the questions given below- 4

(i) Name the shape of the hanging wire
   (a) Linear   (b) Spiral
   (c) Parabola   (d) None of these

(ii) The hanging wires on the bridge is represented graphically. Zeroes of a polynomial can be expressed graphically. Number of zeroes of polynomial is equal to number of points where the graph of polynomial-
   (a) Intersects x-axis   (b) Intersects y-axis
   (c) Intersects y-axis or x-axis   (d)None of the above

(iii) The representation of Hanging wires on the bridge whose sum of the zeroes is -3 and product of the zeroes is 5 is
   (a) $x^2 - 3x - 5$ (b) $x^2 - 3x + 5$
   (c) $x^2 + 3x - 5$ (d) $x^2 + 3x + 5$

(iv) Graph of a quadratic polynomial is -
   (a) straight line   (b) circle
   (c) parabola   (d) zig-zag

(v) If the hanging wire touches the bridge at one point, then the equation representing hanging wire will have
   (a) no zero   (b) one zero
   (c) Two zeroes   (d) Three zeroes

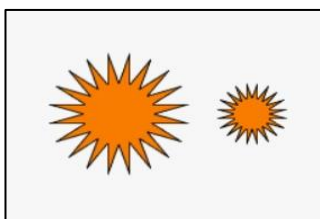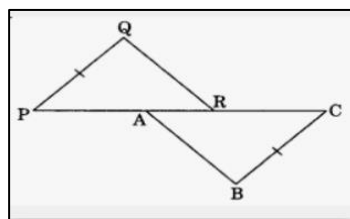18. Observe the below given figures carefully and answer the questions- 4

      Figure-A   **Figure-B**   **Figure-C**

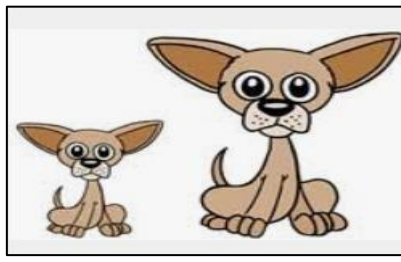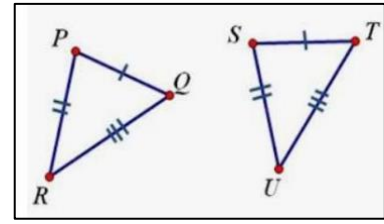|		
Figure-D	**Figure-E**	**Figure-F**

(i)   Which among the above shown figures are congruent figures ?
      (a) A and C   (b) E and F
      (c) D and F   (d) B and F

(ii)   Choose the correct statement-
      (a) All similar figures are congruent.
      (b) All congruent figures are similar .
      (c) The criterian for similarity and congruency is same.
      (d) Similar figures have same size and shape.

(iii)   If a line divides any two sides of the triangle in the same ratio, then the line is parallel to the third side. The statement depicts which theorem-
      (a) Pythagoras   (b) Thales Theorem
      (c) Converse of Thales theorem   (d) Converse of Pythagoras theorem.

(iv)   Using the concept of similarity ,the height of the tree is
      (a) 7 ft   (b) 10 ft
      (c) 12 ft   (d) 15 ft
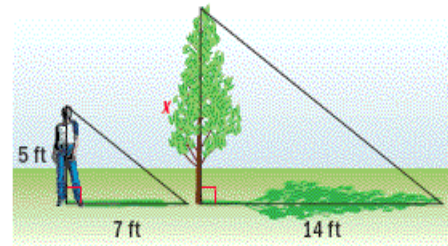
(v)   The similar ΔABC and ΔDEF will be congruent to each other when
      (a) $2ar(ABC) = ar(DEF)$ (b) $ar(ABC) = 2ar(DEF)$
      (c) $ar(ABC) = ar(DEF)$ (d) $3ar(ABC) = ar(DEF)$

19.   Class X students appeared for a test and the Marks obtained   4
      are formulated in a table as follows (out of 100)

Marks	0-20	20-40	40-60	60-80	80-100
No. of students	8	12	20	30	10

(i)   How many students secured less than 60 marks?
      (a) 20   (b) 32
      (c) 40   (d) 70

(ii)   What is the upper limit of the modal class?
      (a) 20   (b) 40
      (c) 60   (d) 80

(iii)   What is the lower limit of the median class?
      (a) 20   (b) 40
      (c) 60   (d) 80

(iv)   Cumulative frequency table is constructed to determine
      (a) Mean   (b) Median
      (c) Mode   (d) All of these

(v)   The empirical relationship among Mean, Median and Mode is
      (a) 3Median – 2Mean = Mode   (b) 3Median – Mean = 2Mode
      (c) 2Median – 3Mean = Mode   (d) Median + 2Mean = 3Mode

20.   To conduct Sports Day activities, in your rectangular shaped school ground ABCD, lines have been drawn with chalk powder at a distance of 1 m each. 100 flower pots have been placed at a distance of 1 m from each other along AD, as shown in the following figure. Niharika runs one fourth of the distance AD on the 2nd line and posts a green flag. Preet runs one fifth of the distance AD on the eighth line and posts a red flag.   **4**
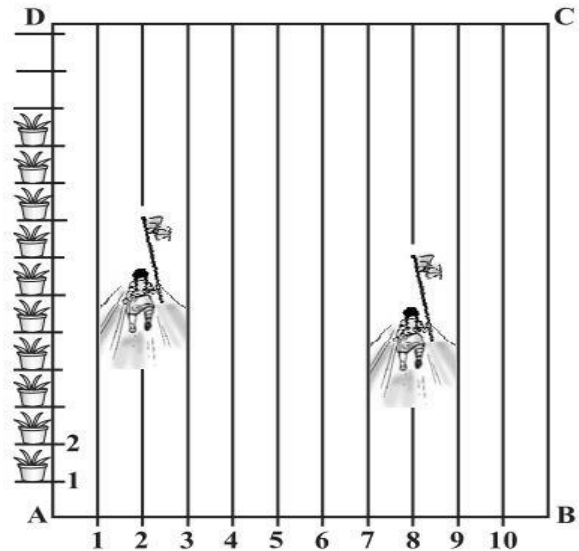
(i)   What are the coordinates of the Flag posted by Preet?
      (a) (2, 25)   (b) (8, 25)
      (c) (2, 20)   (d) (8, 20)

(ii)   If Rashmi has to post a blue flag exactly halfway between the line segment joining the two flags, where should she post her flag?
      (a) (5, 45)   (b) (5, 50)
      (c) (5, 22.5)   (d) (5, 25.2)

(iii)   What is the distance between Green flag and Red flag?
      (a) $\sqrt{51}$m   (b) $\sqrt{61}$m
      (c) $\sqrt{71}$m   (d) $\sqrt{81}$m

(iv)   Consider AB as x-axis and AD as y-axis, then what will be the distance of Red flag from the Y-axis?
      (a) 5 units   (b) 22.5 units
      (c) 8 units   (d) 2 units

(v)   The flag posted by Rashmi divides the line segment by joining the Green flag and Red flag in ratio
      (a) 1 : 2   (b) 1 : 1
      (c) 2 : 1   (d) 1 : 3

PART- B
SECTION- III

21.   Using FTA find the L.C.M and H.C.F of 510 and 92.   **2**

22.   Find the ratio in which line segment joining the points (-3, 10) and (6, -8) is divided by (-1, 6).   **2**

OR

Find the fourth vertex D of a parallelogram ABCD whose three vertices are A(-2, 3) , B(6, 7) and C(8, 3).

23.   Find the roots of the quadratic equation $3x^2 - 2\sqrt{6}x+, 2 = 0$ by quadratic formula.   **2**

24.   Prove that: $\frac{cotA-cosA}{cotA+cosA} = \frac{cosecA-1}{cosecA+1}$ **2**

OR

If 5 tanA = 4, find the value of $\frac{5\sin A - 3\cos A}{5\sin A + 2\cos A}$

25. Prove that the tangents drawn from an external point to the circle are equal in length. 2

26. Mayank made a bird-bath for his garden in the shape of a cylinder with a hemispherical depression at one end, as shown in the figure. The height of the cylinder is 1.45 m, and its radius is 30 cm. Find the total surface area of the bird-bath. (Take $\pi = 22/7$) 2
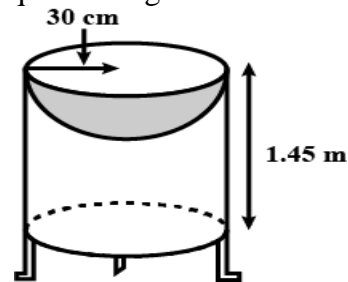
SECTION IV

27. Given that $\sqrt{6}$ is irrational, and then prove that $5 + 2\sqrt{6}$ is also irrational. 3

28. How many terms of an A.P. 9, 17, 25, ……….. must be taken to give a sum of 636 ? 3

OR

If p^{th} term of an A.P. is $\frac{1}{q}$ and q^{th} term is $\frac{1}{p}$, then prove that its $(pq)^{th}$ term is 1.

29. Prove the identity $\frac{\cos A - \sin A + 1}{\cos A + \sin A - 1} = \text{cosecA} + \cot A$ 3

30. Daw a pair of tangents to a circle of radius 4cm which are inclined to each other at an angle of 75°. 3

31. A box contains cards numbered 6 to 50. A card is drawn at random from the box. Calculate the probability that (i) The drawn card has a number which is a perfect square.
(ii) The drawn card bears a prime number.
(iii) The drawn card bears multiples of 5. 3

32. A 20 m deep well with diameter 7m is dug and the earth from digging is evenly spread out to form a platform 22m by 14m. find the height of the platform. 3

33. Find the mean using assumed mean method for the following data 3

Marks	30-40	40-50	50-60	60-70	70-80	80-90	90-100
No. of students	14	6	10	20	30	8	12

OR

Mode of the following frequency distribution is 65 and the sum of the frequencies is 70. Find the missing frequencies *x* and *y*.

Class	0-20	20-40	40-60	60-80	80-100	100-120	120-140	140-160
frequency	8	11	*x*	12	*y*	9	9	5

SECTION V

34. A bird sitting on the top of a tree, which is 80m high. From a point on the ground the angle of elevation of the bird is 45°. The bird flies away from the point of observation horizontally and remains at a constant height from the ground. After 2 seconds, the angle of elevation of the bird from the point of observation becomes 30°. Find the sped of the flying bird. (Use $\sqrt{3} = 1.732$) 5

OR

A man standing on the deck of a ship, which is 10 m above water level, observes the angle of elevation of the top of a hill as 60° and the angle of depression of the base of hill as 30°. Find the distance of the hill from the ship and the height of the hill.

35. Draw the graph of the following pair of linear equations: 5
$$x + 3y = 6 \; ; \; 2x - 3y = 12$$
Hence, find the area of the region bounded by $x = 0, \; y = 0$ and $2x - 3y = 12$.

36 State and prove Pythagoras theorem. 5