INDIAN SCHOOL DARSAIT

SAMPLE PAPER – TERM I, SEPTEMBER 2017

MATHEMATICS

Class: XI Max. Marks: 100

Date: Time: 3 hrs

General Instructions:

(i) All questions are compulsory.

(ii) Section A has 4 questions of 1mark each, section B has 8 questions of 2 marks each, section C has 11 questions of 4 marks each and section D has 6 questions of 6 marks .

Section A :

1. Find the domain and range of the following real valued function

$$f(x) = \frac{x^2}{1+x^2}$$

2. Solve $\frac{5-2x}{3} \leq \frac{x}{6} - 5$
3. Write the power set of { a, b, c}
4. Reduce $\sqrt{3}\,x + y + 2 = 0$ to slope – intercept form.
Find slope and y – intercept.

Section B :

5. In a group of 70 people, 37 like coffee, 52 like tea and each person likes at least one of the two drinks. How many people like both tea and coffee?
6. Let V = $\{a, e, i, o, u\}$ and B = $\{a, i, k, u\}$. Find V-B and B –V.
7. Prove that : $\cos^2\frac{\pi}{6} + \cos\frac{5\pi}{6} + 3\tan^2\frac{\pi}{6} = 6$
8. If the arcs of the same length in two circles subtend angles 65° and 110° at the centre, find the ratio of their radii.
9. Find the equation of the line which cuts off equal and positive intercepts from the axes and passes through the point (α, β).
10. Find the distance between the line 12x – 5y + 9=0 and the point (2, 1).
11. Find equation of set of points P such that $PA^2 + PB^2 = 2k^2$, where A and B are the points (3 , 4, 5) and (-1 , 3 , -7) respectively.
12. A point C with z-coordinate 8 lies on the line segment joining the points A (2, -3, 4) and B (8, 0, 10). Find its y-coordinate.

Section C:

13. If U = $\{1, 2, 3, 4, 5, 6, 7\}$, A = $\{2, 4, 6\}$ and B = $\{3, 5\}$ and C = $\{1, 2, 4, 7\}$ determine the following sets:
    i) $A' \cup (B \cap C')$ ii) $(B - A) \cup (A - C)$
14. If f(x) = $[x]$ where g(x)=$|x|$ where [x] is greater integer function and $|x|$ is modulus function then find (fg) $\left[\frac{7}{2}\right]$ - (gf) $\left[\frac{-7}{2}\right]$
15. Let R be the relation on the set N of natural numbers defined by
    R = { (a , b): a + 3b, a $\in$ N, b $\in$ N}
    Find i) R ii) Domain of R iii) Range of R.
16. Solve :
    sin 2x – sin 4x + sin 6x = 0
17. i) Find x from the following equation :
    cosec $(90° + \theta)$ + x cos θ. cot $(90° + \theta)$ = sin $(90° + \theta)$
    ii) Find cos (-1125)
18. Prove by the principle of Mathematical Induction that $x^{2n} - y^{2n}$ is divisible by x + y for all n $\in$ N.
19. In the first four papers each of 100 marks, Rishi got 95, 72, 73, 83 marks. If he wants an average of greater than or equal to 75marks and less than 80 marks, find the range of marks he should score in the fifth paper.
20. Using section formula prove that the points are collinear.
    (-4, 6, 10), (2, 4, 6), (14, 0, -2)
21. Find the co- ordinates of the foot of perpendicular from the point (-1, 3) to the line 3x – 4y – 16 =0
22. Find the equation of the lines through the point (3, 2) which make an angle of 45° with the line x – 2y = 3.
23. Centroid of a triangle with vertices (a, 1, 3), (-2,b,-5) and (4, 7, c) is origin. Find the values of a, b and c.

Section D:

24. Prove that :
$$\frac{\cos 8A \quad 5A - c \quad 12A \quad 9A}{\sin 8A \quad 5A + \cos 12A \, s \quad 9A} = \tan 4A$$
25. In any triangle ABC , prove that:
    i) $\frac{b-c}{b+c} = \frac{t \frac{B-C}{2}}{t \frac{B+C}{2}}$
    ii) $\sin\frac{B-C}{2} = (\frac{b-c}{a}) \cos\frac{A}{2}$
26. A college awarded 38 medals in Football, 15 in Basket Ball, 20 to Cricket. If these medals went to a total of 58 Men and only 3 Men got medals in all the three sports. How many received medals in exactly two of the three sports? What is the value depicted by awarding these medals?
27. Prove by the principle of mathematical induction that for all n $\in$ N:
$$\frac{1}{1.3} + \frac{1}{3.5} + \frac{1}{5.7} + \cdots + \frac{1}{(2n-1)(2n+1)} = \frac{n}{2n+1}$$
28. Solve the following system of inequations graphically:
    12x +12y $\leq$ 840, 3x + 6y $\leq$ 300, 8 x +4y $\leq$ 480, x$\geq$ 0, y $\geq$ 0.
29. Show that the area of triangle formed by the lines : $y = m_1 x + c_1, y = m_2 x + c_2$ a $x = 0$ i: $\frac{(c_1-c_2)^2}{2|m_1-m_2|}$