Thamarassery (Cluster)
First year Higher Secondary Examination
Mathematics (Science)

Time-$2_{1/2}$ hrs
Cool off time : 15 mts
Maximum : 80 score

1. Let U={x/x is an integer, -4 <x<4} be the universal set., A={x/x is an integer, $0 \leq x \leq 3$} and
   B={x/x is an integer, -3 < x <1} be subset of U

   a) Write A in the roster form (1)
   b) Verify that (AUB)' (2)
   c) Write the power set of AUB (2)

2. The cartesian product PxP has 9 elements, among which are found (-a,o) and (o,a). A relation from P to P is defined as R= {x,y) : x+y=0}

   a) Find P (2)
   b) Depict the relation using an arrow diagram (2)
   c) Write the domain and range of R (1)
   d) How many relations are possible from P to P (1)

3. a) Chose the possible value of Cosec x from the bracket.
   {-3/5, 3/5, 5/3, -5/3 } (1)

   b) Evaluate tan x – sec x for the x in part a (2)

4. Show that $\frac{\text{CosA.Cos5A} - \text{cos12A . Cos9A}}{\text{Sin 8A. Cos 5A + Cos 12 A.Sin 9A}} = \tan 4A$ (3)

5. A statement P(n) for a natural number 'n' is given as ;
   $\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \ldots\ldots\ldots + \frac{1}{n(n+1)} = \frac{n}{n+1}$

   a) Verify that P(1) is true (1)

   b) By assuming that P(k) is true for a natural number K, verify that P(k+1) is true (3)

6. If $x+y = \frac{a+ib}{a-b}$, prove that $x^2 + y^2 = 1$ (4)

7. Ffind the sum $i^2 + i^3 + i + i + \ldots\ldots\ldots i^{99}$ (1)

8. a) Solve $1 \leq \frac{2x+3}{5} \leq 4$ (2)

   b) Solve graphically the inequalities,
   $x \geq 0$, $y \geq 0$, $5x+y \leq 5$, $x+3y \geq 5$ (3)

9. a) If the letters of the word EQUATION are arranged , find the number of arrangements in which no two consonants are adjacent. (3)

b) How many values of 'r' will satisfy (1)
$22\,C_{r+2} = 22C_{2r-1}$

c) In how many ways can a committee of 3 men and 2 women be formed from a group of 5 men and 4 women if Mr.A is always included and Mr.B is never included. (2)

OR

a) If $4\,P_r = 6x\,5\,P_{r-1}$ find r (2)

b) How many 3 digit numbers can be formed with the digits 0, 1, 2, 3, and 4. (2)

c) In a Panchayat there are 10 panchayat members. Ladies contested only in the 50% reserved constituency. If the post of president and vice president are reserved for ladies, in how many ways both the president and vice president can be selected (2)

10. Consider the expansion of $(x^2 - \frac{1}{3x})^9$

a) find the coefficient of x^9 (2)

b) Find the term independent of x (2)

11. a) The first three terms of a sequence are 1/3, 1/2, 3/4. (1)
i)identify the type of sequence.
ii) Find the 6^{th} term of the sequence (2)
b) Find the sum of multiples of 8 between 300 and 500 (3)

12. a) Find the slope of the line $5x - 3y + 6 = 0$ (1)

b) If the lines joining the points (0, 0), (1, 1) and (2, 2) , (4, y) are perpendicular, find y (2)

13. Consider the line $3x - 4y + 2 = 0$ and the point (2, -3).
a) Find the distance of the point from the line (1)
b) Find the image of the point about the line (2)

14. Consider the conic $9y^2 - 4x^2 = 36$. Find

a) the foci (2)
b) Eccentricity (1)
c) Length of the latus rectum (1)

15 a) Determine a point on the x – axis which is equidistant from the points (- 2,3,5) and (1,2,3). (2)

b) If the centroid of a triangle with vertices (a,2,5), (1, b, 0) and (-3, -1, c). Then find a, b and c. (2)

16. Diffrentiate $\frac{x^2 \tan x}{1+x}$ (3)

OR

Differentiate $\frac{x+2\cos x}{3x+4\sin x}$ (3)

17. a) Find the derivate of 1/x from first principle (2)

b) Evaluate $\lim_{x \to -1} \frac{(x+1)^5}{(x+1)}$ (1)

18. Consider the statement " if 3n+2 is an odd natural number, then 'n' is an odd natural number"

a) Write its contrapositive (1)

b) Prove the contrapositive (3)

19) The scores of two batsman A and B in 5 innings during a certain match are as follows,

A	10	15	80	70	25
B	8	9	7	10	6

Find

a) Mean score of each batsman (2)

b) Standard deviation of the scores of each batsman (2)

c) Which of the batsman is more consistent (1)

20. A bag contains 3 white, 4 black and 2 yellow balls. Two balls are drawn at random.

a) Find the probability that the two balls drawn are of the same colour (2)

b) Find the probability that none of the balls drawn are yellow in colour.(2)

x----------x---------x---------x

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St.Sebastian's HSS
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