MATHEMATICS TEACHERS ASSOCIATION MALAPPURAM (MAM)

MATHEMATICS TEST SERIES – III
MAY 2022

CLASS : XI **Time : 2 Hrs**

Max. score : 60 **Cool off time : 15 min**

(Sequence and Series, Straight lines, Conic sections & Introduction to Three Dimensional Geometry)

General Instructions to Candidates :

- There is a 'cool-off time' of 15 minutes in addition to the writing time.
- Use the 'cool-off time' to get familiar with questions and to plan your answers.
- Read questions carefully before answering.
- Read the instructions carefully.
- Calculations, figures and graphs should be shown in the answer sheet itself.
- Give equations wherever necessary.
- Electronic devices except non-programmable calculators are not allowed in the Examination.

വിദ്യാർത്ഥികൾക്കുള്ള പൊതു നിർദേശങ്ങൾ :

- നിർദിഷ്ട സമയത്തിനു പുറമെ 15 മിനുറ്റ് "കൂൾ ഓഫ് ടൈം " ഉണ്ടായിരിക്കും
- ഉത്തരങ്ങൾ എഴുതുന്നതിനു മുൻപ് ചോദ്യങ്ങൾ ശ്രദ്ധാപൂർവം വായിക്കണം
- എല്ലാ ചോദ്യങ്ങൾക്കും ഉത്തരം എഴുതണം.
- കണക്കു കൂട്ടലുകൾ , ചിത്രങ്ങൾ , ഗ്രാഫുകൾ എന്നിവ ഉത്തരപ്പേപ്പറിൽ തന്നെ ഉണ്ടായിരിക്കണം.
- ആവശ്യമുള്ള സ്ഥലത്തു സമവാക്യങ്ങൾ കൊടുക്കണം.
- പ്രോഗ്രാമുകൾ ചെയ്യാനാകാത്ത കാല്കുലേറ്ററുകൾ ഒഴികെയുള്ള ഒരു ഇലക്ട്രോണിക് ഉപകരണവും ഉപയോഗിക്കാൻ പാടില്ല.

UNIT I

(Answer any SIX, each question carries 3 marks)

1. **(a)** The n^{th} term of an AP is $a_n = 3n - 2$. Then the common difference is ..... (1)
   (b) If n^{th} term of a sequence is $\frac{n(n^2+5)}{4}$, then find first four terms. (2)

2. Consider the A.P $-6, \frac{-11}{2}, -5, \ldots\ldots$
   (a) Find the n^{th} term (1)
   (b) Find the 10^{th} term (2)

3. Equation of a line is $3x - 2y - 6 = 0$. Find its
   (a) Slope. (1)
   (b) x and y intercepts. (2)

4. **(a)** If two lines are perpendicular then product of their slopes is ..... (1)
   (b) Line passing through the points $(-2, 6)$ and $(4,8)$ is perpendicular to the line through $(8,12)$ and $(x,24)$. Find x. (2)

5. Find the equation of the hyperbola with foci $(\pm 8,0)$ and vertex $(\pm 6,0)$ (3)

6. **(a)** Find the equation of a circle with centre at origin and radius r (1)
   (b) Find the centre and radius of the circle $x^2 + y^2 - 4x + 6y - 12 = 0$. (2)

7. **(a)** The x-axis and z-axis taken together determine a plane known as .... (1)
   (b) Find the distance between the points $(-2,3,5)$ and $(1, 2, 3)$. (2)

8. Verify that the points $(0,7,10)$, $(-1,6,6)$ and $(-4,9,6)$ are the vertices of a right angled triangle. (3)

UNIT II

(Answer any SIX, each question carries 4 marks)

9. **(a)** Find the sum of multiples of 8 between 300 and 500. (2)
   (b) Find the sum to n terms of the sequence $1 \times 2 + 2 \times 3 + 3 \times 4 + \ldots$ (2)

10. **(a)** Geometric mean of 16 and 4 is..... (1)

(i)20 (ii) 4 (iii) 10 (iv) 8

(b) Insert three numbers between 1 and 256 so that the resulting sequence is a G.P. (3)

11. If the angle between two lines is $\frac{\pi}{4}$ and slope of one of the lines is $\frac{1}{2}$. Find the slope of the other line. (4)

12. **(a)** The slope of the line passing through the points $(3, -2)$ and $(7, -2)$ is (1)

(i) -1 (ii) 2 (iii)0 (iv) 1

(b) Find the distance of the point $(-1,1)$ from the line $12x - 5y + 82 = 0$ (3)

13. **(a)** Find the coordinates of focus and length of latus rectum of the parabola $y^2 = 8x$ (2)

(b) Find the equation of the parabola with focus (6,0) directrix $x = -6$. (2)

14. Consider the hyperbola $\frac{y^2}{9} - \frac{x^2}{27} = 1$

(a) Find length of latus rectum (3)

(b) Find eccentricity (1)

15. **(a)** z-coordinate of any point on XY plane in space is ..... (1)

(b) Find the ratio in which the YZ plane divides the line segment joining the points $(-2, 4,7)$ and $(3, -5,8)$. (3)

16. **(a)** Show that the points A(1,2,3), B(−1,−2,−1), C(2,3,2) and D(4,7,6) are the vertices of a parallelogram. (2)

(b) Show that ABCD is not a rectangle (2)

UNIT III

(Answer any THREE, each question carries 6 marks)

17. **(a)** In an A.P, if the m^{th} term is n and n^{th} term is m, where $m \neq n$. Find the p^{th} term. (3)

(b) Find the sum of the sequence, 7, 77, 777, ... to n terms. (3)

18. **(a)** The sum of first three terms of a G.P is $\frac{13}{12}$ and their product is -1.
Find the common ratio and the terms. (3)

(b) How many terms of GP 3, $\frac{3}{2}, \frac{3}{4}$..... are needed to give the sum $\frac{3069}{512}$? (3)

19. **(a)** Find the equation of the line joining the points (2, 2) and (5, 3) (2)

(b) Convert the equation of the line $\sqrt{3}x + y - 8 = 0$ into normal form. (2)

(c) Find the angle between the lines $y - \sqrt{3}x - 5 = 0$ and $\sqrt{3}y - x + 6 = 0$. (2)

20. Consider the ellipse $4x^2 + 9y^2 = 36$

(a) Find the coordinates of foci and vertices (2)

(b) Find the length of major axis and minor axis (2)

(c) Find the length of latus rectum and eccentricity. (2)

21. **(a)** Which of the following points lies in the sixth octant (1)

(i) $(-4,2,-5)$ (ii) $(-4,-2,-5)$

(iii) $(4,-2,-5)$ (iv) $(4,2,5)$

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

(c) The centroid of the triangle ABC is at the point $(1,2,3)$. If the coordinates of A and B are $(3,-5,7)$ and $(-1,7,-6)$ respectively. Find the coordinates of the point C. (3)