MATHEMATICS TEACHERS ASSOCIATION MALAPPURAM (MAM)

MATHEMATICS TEST SERIES – IV
MAY 2022

CLASS : XI **Time : 2 Hrs**

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

(Limits and Derivatives, Mathematical Reasoning, Statistics, Probability)

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)** $\lim_{x \to 3}(x^2 + 1) = \ldots\ldots$ (1)
   (b) Find $\lim_{x \to 0} \frac{\sin 3x}{x}$ (2)

2. **(a)** $\lim_{x \to a} \frac{x^n - a^n}{x - a} = \ldots\ldots\ldots$ (1)
   (b) Evaluate $\lim_{x \to 2} \frac{x^3 - 8}{x - 2}$ (2)

3. **(a)** $\frac{d}{dx}(x^n)$ =…… (1)
   (b) If $f(x) = x^2 + 2$, then find $f'(5)$. (2)

4. Find the derivative of $x^2 \sin x$ with respect to x. (3)

5. Consider the statement
   "All living things have two legs and two eyes"
   (a) Write the connecting word using the above statement. (1)
   (b) Write the components of the above statement. (2)

6. Consider the observations 2, 4, 6, 8 and 10.
   (a) Find Mean. (1)
   (b) Find Mean deviation about mean. (2)

7. A coin is tossed twice
   (a) Write the sample space (1)
   (b) Find the probability of getting
   (i) Exactly one head (1)
   (ii) At least one head. (1)

8. In a random experiment, two dice are thrown simultaneously.
   (a) Write the number of sample points in the sample space. (1)
   (i) 6^2 (ii) 12 (iii) 6^6 (iv) 6
   (b) Find the probability of getting a doublet (Same number on the dice) (2)

UNIT II

(Answer any SIX, each question carries 4 marks)

9. **(a)** Find the derivative of $\frac{1}{x^3} + x^3$ with respect to x. (1)

   (b) Find $\lim_{x \to 0} \frac{\sqrt{x+1}-1}{x}$ (3)

10. If $f(x) = \begin{cases} 2x+3; & x \leq 0 \\ 3(x+1); & x > 0 \end{cases}$, then find

   (a) $\lim_{x \to 1} f(x)$ (1)

   (b) $\lim_{x \to 0} f(x)$ (3)

11. **(a)** $\lim_{x \to 0} \frac{\log(1+x)}{x} =$ …… (1)

   (b) $\lim_{x \to 0} \left(\frac{e^x-1}{x}\right)$ = ……. (1)

   (c) Evaluate $\lim_{x \to 0} \left(\frac{e^{4x}-1}{3x}\right)$ (2)

12. Find the derivative of $y = sinx$ from first principle. (4)

13. **(a)** Write the contrapositive of the statement, (1)

   "If x and y are odd, then xy is odd"

   (b) Prove by contrapositive method, (3)

   "If x and y are odd, then xy is odd"

14. Find the mean , variance and standard deviation for the following data (4)

x_i	5	10	15	20	25
f_i	7	4	6	3	5

15. Given that $P(A) = 0.5, P(B) = 0.6, P(A \cup B) = 0.8$. Find

   (a) $P(A')$ (1)

   (b) $P(A \cap B)$ (2)

   (c) $P(A' \cup B')$. (1)

16. A bag contains 5 white, 6 black and 6 yellow balls. 3 balls are drawn at random. Find the probability that the drawn balls

(a) All are black (1)

(b) Exactly 2 yellow balls are present (1)

(c) Atleast 2 yellow balls are present (2)

UNIT III

(Answer any THREE, each question carries 6 marks)

17. **(a)** If $f(x) = \frac{x^{100}}{100} + \frac{x^{99}}{99} + \cdots + \frac{x^2}{2} + x + 1$, then prove that $f'(1) = 100f'(0)$ (3)

(b) Find $\frac{dy}{dx}$ if $y = \frac{4+5\sin x}{3+7\cos x}$ (3)

18. **(a)** Write the negation of the statement,

"$\sqrt{2}$ is irrational" (1)

(b) Write the converse of the statement, (1)

"If a number is divisible by 9, then it is divisible by 3"

(c) Verify by the method of contradiction that "$\sqrt{2}$ is irrational" . (4)

19. From the following table.

Class	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequency	3	7	12	15	8	3	2

(a) Find Mean. (3)

(b) Find Variance. (3)

20. **(a)** One card is drawn at random from a pack of 52 playing cards. Find the probability that the card drawn is an ace. (2)

(b) A committee of 2 persons is selected from 2 men and 2 women. What is the probability that the committee will have

(i) One man (2)

(ii) Two men (2)

21. In a class of 60 students, 30 opted for NCC, 32 opted for NSS and 24 opted for both NCC and NSS. If one of these students is selected at random, find the probability that
    (a) The student opted for NCC or NSS. (2)
    (b) The student has opted neither NCC nor NSS. (2)
    (c) The student has opted for exactly one of NCC or NSS. (2)