


FIRST YEAR HIGHER SECONDARY EXAMINATION, MARCH 2025

Part – III

Time : 2 Hours

MATHEMATICS (SCIENCE) Cool-off time : 15 Minutes

Maximum : 60 Scores

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.
- Malayalam version of the questions is also provided.
- Give equations wherever necessary.
- Electronic devices except non-programmable calculators are not allowed in the Examination Hall.

വിദ്യാർത്ഥികൾക്കുള്ള പൊതുനിർദ്ദേശങ്ങൾ :

- നിർദ്ദിഷ്ട സമയത്തിന് പുറമെ 15 മിനിറ്റ് 'കൂൾ ഓഫ് ടൈം' ഉണ്ടായിരിക്കും.
- 'കൂൾ ഓഫ് ടൈം' ചോദ്യങ്ങൾ പരിചയപ്പെടാനും ഉത്തരങ്ങൾ ആസൂത്രണം ചെയ്യാനും ഉപയോഗിക്കുക.
- ഉത്തരങ്ങൾ എഴുതുന്നതിന് മുമ്പ് ചോദ്യങ്ങൾ ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- നിർദ്ദേശങ്ങൾ മുഴുവനും ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- കണക്ക് കൂട്ടലുകൾ, ചിത്രങ്ങൾ, ഗ്രാഫുകൾ, എന്നിവ ഉത്തരപേപ്പറിൽ തന്നെ ഉണ്ടായിരിക്കണം.
- ചോദ്യങ്ങൾ മലയാളത്തിലും നൽകിയിട്ടുണ്ട്.
- ആവശ്യമുള്ള സ്ഥലത്ത് സമവാക്യങ്ങൾ കൊടുക്കണം.
- പ്രോഗ്രാമുകൾ ചെയ്യാനാകാത്ത കാൽക്കുലേറ്ററുകൾ ഒഴികെയുള്ള ഒരു ഇലക്ട്രോണിക് ഉപകരണവും പരീക്ഷാഹാളിൽ ഉപയോഗിക്കുവാൻ പാടില്ല.

Answer any 6 questions from 1 to 8. Each carries 3 scores.

(6 × 3 = 18)

1. (a) Write the set $A = \{1, 4, 9, 16, \dots, 100\}$ in set builder form. (1)
(b) Write all subsets of the set $\{1, 2, 3\}$. (2)
2. (a) The degree measure of $\frac{4\pi}{3} =$ _____. (1)
(b) If $\cos x = -\frac{3}{5}$, x lies in third quadrant. Find the values of the trigonometric functions $\sin x$ and $\tan x$. (2)
3. (a) Solve the inequality $3(x - 1) \leq 2(x - 3)$; $x \in \mathbb{R}$. (2)
(b) Mark the solution obtained in part(a) to the real line \mathbb{R} . (1)
4. (a) How many 4 digit numbers can be formed by using the digits 1 to 9, the repetition not allowed ? (1)
(b) Evaluate $\frac{n!}{(n-r)!}$ for the case $n = 9$, $r = 5$. (2)
5. (a) Which of the following is a point in the 7th octant ? (1)
(A) $(2, -2, 2)$ (B) $(2, 2, 2)$
(C) $(2, 2, -2)$ (D) $(-2, -2, -2)$
(b) Find the distance between the points $(-2, 3, 5)$ and $(7, 0, -1)$. (2)
6. Find the centre and radius of the circle $x^2 + y^2 - 4x - 8y - 45 = 0$.
7. (a) Evaluate $\lim_{x \rightarrow 0} \frac{\tan 2x}{x}$ (1)
(b) Prove that $\lim_{x \rightarrow 0} \frac{1 - \cos x}{x} = 0$ (2)
8. (a) Write the equation of y-axis. (1)
(b) Find the slope of a line which passes through the origin and the midpoint of the line segment joining the points $P(0, -4)$ and $Q(8, 0)$. (2)

Answer any 6 questions from 9 to 16. Each carries 4 scores.

(6 × 4 = 24)

9. (a) Write the set-builder form of the subset $(-1, 2)$ of \mathbb{R} . (1)
- (b) Let $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ be the universal set having subsets $A = \{1, 3, 5, 7, 9\}$ and $B = \{5, 6, 7, 8, 9, 10\}$, then find (3)
- (i) $A \cup B$
- (ii) A' and B'
- (iii) Verify that $(A \cup B)' = A' \cap B'$
10. (a) Draw the graph of the function $f(x) = 2 - |x|$. (2)
- (b) Write the domain and range of $f(x)$ in part (a). (2)
11. (a) Express $z = \left(3 + \frac{i}{3}\right)^3$ into $a + ib$ form. (2)
- (b) Find the multiplicative inverse of $4 - 3i$. (2)
12. (a) Determine the number of 5 card combinations out of a pack of 52 playing cards if there is exactly one ace in each combination. (2)
- (b) If ${}^nC_9 = {}^nC_8$, then find ${}^nC_{17}$. (2)
13. (a) Find the equation of a line passing through the point $(-2, 3)$ with slope $\frac{1}{4}$. (2)
- (b) Find the distance of the point $(3, -5)$ from the line $3x - 4y - 26 = 0$. (2)
14. Find the equation of the ellipse whose length of the major axis is 26 and foci are $(\pm 5, 0)$.
15. (a) Simplify $(a + b)^4 - (a - b)^4$ using binomial theorem. (2)
- (b) Using part (a), evaluate $(\sqrt{3} + \sqrt{2})^4 - (\sqrt{3} - \sqrt{2})^4$. (2)
16. If A and B are two events such that $P(A) = 0.42$, $P(B) = 0.48$ and $P(A \text{ and } B) = 0.16$, then find the following :
- (i) $P(\text{not } A)$ (1)
- (ii) $P(\text{not } B)$ (1)
- (iii) $P(A \text{ or } B)$ (2)

Answer any 3 questions from 17 to 20. Each carries 6 scores.

(3 × 6 = 18)

17. (a) $\sin(765^\circ) = \underline{\hspace{2cm}}$.

(1)

(A) 0

(B) 1

(C) $\frac{1}{\sqrt{2}}$

(D) $-\frac{1}{\sqrt{2}}$

(b) Find the value of $\cos(75^\circ)$.

(2)

(c) Show that $\tan 3x \tan 2x \tan x = \tan 3x - \tan 2x - \tan x$.

(3)

18. (a) Which term of the Geometric Progression 2, 8, 32, is 8192 ?

(2)

(b) Find the sum to n terms of the sequence 8, 88, 888, ...

(2)

(c) Insert three numbers between 1 and 256 so that the resulting sequence is a Geometric Progression.

(2)

19. (a) Find the derivative of $\tan x$ using first principle.

(4)

(b) Find $\frac{dy}{dx}$, if $y = \sin x \cos x$.

(2)

20. Find Mean, Variance and Standard Deviation of the following data :

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