



Reg. No. :

ME 627

Name :

**FIRST YEAR HIGHER SECONDARY MODEL
EXAMINATION, JUNE 2022
Part - III
MATHEMATICS (SCIENCE)
Maximum : 60 Scores**

Time : 2 Hours

Cool-off Time : 15 Minutes

General Instructions to Candidates :

- There is a 'Cool off time' of 15 minutes in addition to the writing time.
- Read questions carefully before answering.
- 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 മിനിട്ട് 'കൂൾ ഓഫ് ടൈം' ഉണ്ടായിരിക്കും.
- ഉത്തരങ്ങൾ എഴുതുന്നതിന് മുമ്പ് ചോദ്യങ്ങൾ ശ്രദ്ധാപൂർവ്വം വായിക്കണം.
- കണക്ക് കൂട്ടലുകൾ, ചിത്രങ്ങൾ, ഗ്രാഫുകൾ, എന്നിവ ഉത്തരപേപ്പറിൽ തന്നെ ഉണ്ടായിരിക്കണം.
- ചോദ്യങ്ങൾ മലയാളത്തിലും നൽകിയിട്ടുണ്ട്
- ആവശ്യമുള്ള സ്ഥലത്ത് സമവാക്യങ്ങൾ കൊടുക്കണം.
- പ്രോഗ്രാമുകൾ ചെയ്യാനാകാത്ത കൺക്രൂബ്ലേറ്ററുകൾ ഒഴികെയുള്ള ഒരു ഇലക്ട്രോണിക് ഉപകരണവും പരീക്ഷാഘാട്ടിൽ ഉപയോഗിക്കുവാൻ പാടില്ല.



Score

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

(6×3=18)

1. a) If a set A has 2 elements, then the number of subsets of A is _____

i) 2

ii) 4

iii) 6

iv) 8

(1)

b) Write all subsets of {1, 2}. $\phi, 1, 2, 1, 2$

(1)

c) Write the interval (6, 12] in set-builder form. $x \in (6, 12]$

(1)

2. a) $\frac{\pi}{4}$ radian = $\frac{180}{\pi}$ degree.

(1)

b) If $\sin x = \frac{3}{5}$, x lies in the second quadrant, find the values of $\cos x$ and $\tan x$.

(2)

3. a) Write the first four terms of the sequence whose n^{th} term is $a_n = 5n + 1$.

(1)

b) Find the sum of the first n terms of the above sequence.

(2)

4. a) Find the slope of the line passing through the points (2, 1) and (4, 5).

(1)

b) Find the value of x for which the points (x, -1), (2, 1) and (4, 5) are collinear.

(2)



Score

5. Find the equation of the circles with radius 5 whose centres lie on the x-axis and passing through the point (2, 3). (3)

6. a) Coordinate planes divide the space into _____ octants. (1)

b) Find the distance between the points (-1, 3, -4) and (1, -3, 4). (2)

7. Evaluate :

a) $\lim_{x \rightarrow 4} \frac{4x+3}{x-2}$ (1)

b) $\lim_{x \rightarrow 1} \frac{x^3-1}{x^2-1}$ (2)

8. a) Write the negation of the statement ' $\sqrt{7}$ is rational'. (1)

b) Write the contrapositive and converse of the statement 'if a number n is even, then n^2 is even'. (2)

Answer any 6 questions from 9 to 17. Each carries 4 scores. (6×4=24)

9. a) If A and B are two sets such that $A \subset B$, then $A \cup B =$ _____ (1)

b) If $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, $A = \{2, 4, 6, 8\}$ and $B = \{2, 3, 5, 7\}$, find :

i) A' and B' (1)

ii) $A \cup B$ and (1)

iii) Verify that $(A \cup B)' = A' \cap B'$ (1)



10. a) Let $A = \{1, 2, 3, 4, \dots, 14\}$, define a relation R from A to A by $R = \{(x, y) : y = 3x, \text{ where } x, y \in A\}$. Write R in roster form. Write down the domain and range of R . (3)

b) A function f is defined by $f(x) = 2x - 5$. Find the value of $f(0)$. (1)

11. Consider the statement

$$P(n) : 1 + 3 + 3^2 + \dots + 3^{(n-1)} = \frac{3^n - 1}{2}$$

a) Show that $P(1)$ is true. (1)

b) Prove by the principle of Mathematical Induction that $P(n)$ is true for all $n \in \mathbb{N}$. (3)

12. a) Evaluate $\frac{7!}{5!}$. (1)

b) How many 4 digit numbers can be formed by using the digits 1 to 9 if repetition of digits is not allowed? (2)

c) ${}^{17}C_{17} =$ _____ (1)

13. a) The number of terms in the expansion of $(a + b)^4$ is _____ (1)

b) Expand $\left(x^2 + \frac{3}{x}\right)^4$, $x \neq 0$. (3)



Score

14. The sum of first three terms of a Geometric Progression is $\frac{39}{10}$ and their product is 1.
Find the common ratio and the terms of the Geometric Progression. (4)

15. a) Write the equation of the x-axis. (1)

b) Equation of a line is $3x + 2y - 12 = 0$. Find its
i) slope and (1)

ii) x and y intercepts. (2)

16. Find the coordinates of the foci. The eccentricity and the length of the latus rectum of the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$. (4)

17. One card is drawn from a well shuffled deck of 52 cards. If each outcome is equally likely, calculate the probability that the card will be
i) a diamond (1)

ii) not an ace (2)

iii) a black card (1)

Answer any 3 questions from 18 to 22. Each carries 6 scores. (3×6=18)

18. a) Prove that,

$$\frac{\tan\left(\frac{\pi}{4} + x\right)}{\tan\left(\frac{\pi}{4} - x\right)} = \left(\frac{1 + \tan x}{1 - \tan x}\right)^2 \quad (3)$$

b) Find the general solution for the equation $\cos 3x + \cos x - \cos 2x = 0$. (3)



Score

19. a) The value of i^4 is 1

(1)

b) Find the multiplicative inverse of $1 - i$ in $a + ib$ form.

(2)

c) Find the polar form of $1 - i$.

(3)

20. Solve the system of inequalities graphically.

$$x + 2y \leq 8$$

$$2x + y \leq 8$$

$$x \geq 0, y \geq 0.$$

(6)

21. a) Find the derivative of $\sin x$ from first principle.

(3)

b) Find the derivative of $5 \sin x - 6 \cos x + 7$.

(3)

22. Consider the following data :

Classes : 0 - 10 10 - 20 20 - 30 30 - 40 40 - 50

Frequency : 5 8 15 16 6

Find :

i) mean

(2)

ii) Variance and standard deviation.

(4)