FY-427

FIRST YEAR HIGHER SECONDARY EXAMINATION, MARCH 2023

Part – III

MATHEMATICS

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.
- 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 നല്കിയിട്ടുണ്ട്.
- ആവശ്യമുള്ള സ്ഥലത്ത് സമവാക്യങ്ങൾ കൊടുക്കണം.
- പ്രോഗ്രാമുകൾ ചെയ്യാനാകാത്ത കാൽക്കുലേറ്ററുകൾ ഒഴികെയുള്ള ഒരു ഇലക്ട്രോണിക് ഉപകരണവും പരീക്ഷാഹാളിൽ ഉപയോഗിക്കുവാൻ പാടില്ല.

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

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

   (ii) Write the set $\{ x : x \text{ is a positive integer and } x^2 < 40 \}$ in the Roster form. (1)

   (iii) Write all the subsets of $\{ 2 \}$. (1)

2. Solve : $3(1 - x) < 2(x + 4)$. Also represent the solutions on number line. (3)

3. (i) If $(x + 1, y - 4) = (3, 7)$, then find the values of x and y. (1)

   (ii) The Cartesian product $A \times A$ has 9 elements among which 2 elements are $(-a, 0)$ and $(0, a)$. Write A. Also find $A \times A$. (2)

4. Find the number of arrangements of the letters of the word 'INSTITUTE'. How many of them begin with N ? (3)

5. If $f : R \to R$ defined by

$$f(x) = \begin{cases} 2x + 3 \text{ if } x \leq 0 \\ 3(x + 1) \text{ if } x > 0 \end{cases}$$

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

6. (i) The point (0, 5, 7) lies in (1)

   (a) XY-Plane (b) YZ-Plane

   (c) XZ-Plane (d) X-axis

   (ii) Find the distance between (2, –3, –1) and (–2, 4, 3). (2)

7. If $P(A) = 0.35$, $P(A \cap B) = 0.25$, $P(A \cup B) = 0.6$, then find P(B) and P(not – B). (3)

8. Find the centre and radius of the circle $x^2 + y^2 + 8x + 10y - 8 = 0$. (3)

Answer any six questions from 9 to 16. Each carries 4 scores. **(6 × 4 = 24)**

9 Let U = {1, 2, 3, 4, 5, 6}, A = {2, 3}, B = {3, 4, 5}

(i) Find $A \cup B$ **(1)**

(ii) Find A' and B' **(1)**

(iii) Verify $(A \cup B)' = A' \cap B'$ **(2)**

10. (i) Let $f : R \to R$, $g : R \to R$ defined by $f(x) = x + 1$, $g(x) = 2x - 3$. Find $(f + g)(x)$ and $(f \cdot g)(x)$. **(1)**

(ii) The function $h : R \to R$ defined by $h(x) = |x|$. Draw the graph of $h(x)$. Also write its domain and range. **(3)**

11. (i) $i^{-35} =$ _____. **(1)**

(ii) Find the multiplicative inverse and conjugate of $\frac{1+i}{1-i}$. **(3)**

12. 4 cards are drawn from a pack of 52 playing cards.

(i) In how many ways it can be done ? **(1)**

(ii) In how many ways these 4 cards contain 2 red and 2 black ? **(3)**

13. (i) Number of terms in the expansion of $\left(x - \frac{1}{x}\right)^4$ **(1)**

(ii) Write the expansion of $\left(x - \frac{1}{x}\right)^4$ **(3)**

14. Insert 3 numbers between 1 and 256 so that the resulting sequence is a G.P. **(4)**

15 Find the co-ordinates of foci, vertices, eccentricity and length of latus rectum of the hyperbola $\frac{x^2}{9} - \frac{y^2}{16} = 1$. **(4)**

16 A bag contains 9 discs of which 4 are red, 3 are blue and 2 are yellow. The discs are similar in shape and size. A disc is drawn at random from the bag. Calculate the probability that it will be

(i) red (1)

(ii) yellow (1)

(iii) blue (1)

(iv) not blue (1)

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

(3 × 6 = 18)

17. (i) $25° =$ _____ radian. (1)

(ii) Find the value of sin 15°. (2)

(iii) Prove that $\frac{\sin 3x+\sin x}{\cos 3x+\cos x} = \tan 2x$. (3)

18 (i) Find the equation of a line passing through the point (–4, 3) with slope $\frac{1}{2}$. (2)

(ii) Write the equation of the line passing through the points (1, –1) and (3, 5). (2)

(iii) Find the angle between the lines obtained in (i) and (ii). (2)

19 (i) Find the derivative of tan x using 1st principles. (4)

(ii) If $y = x \cdot \sin x$, find $\frac{dy}{dx}$. (2)

20 Consider the following table :

Class	0-10	10-20	20-30	30-40	40-50
Frequency	5	8	15	16	6

(i) Find mean. (2)

(ii) Find variance. (3)

(iii) Find standard deviation (1)