Reg. No. : .....

Name : .....

FY 527

FIRST YEAR HIGHER SECONDARY MODEL EXAMINATION, FEBRUARY 2025
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.*
- *Use 'cool off time' to get familiar with questions and plan your answers.*
- *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.
- 'കൂൾ ഓഫ് ടൈം' ചോദ്യങ്ങൾ പരിചയപ്പെടാനും ഉത്തരങ്ങൾ ആസൂത്രണം ചെയ്യാനും ഉപയോഗിക്കുക.
- ഉത്തരങ്ങൾ എഴുതുന്നതിന് മുമ്പ് ചോദ്യങ്ങൾ 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.

Score

Answer any 6 questions from 1 to 8. Each carries 3 scores. **(6×3=18)**

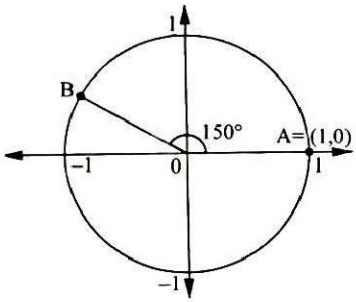
1. Consider the relation, $R = \{(x, y): x, y \in \mathbb{Z}, xy = 4\}$ defined on integers, find

i) Domain. **(1)**

ii) Range. **(1)**

iii) Number of elements. **(1)**

2. Consider the following figure.



i) Write the radian measure of $\angle AOB$. **(1)**

ii) Write the coordinate of B. **(2)**

3. Consider the word ASSOCIATION, then

i) How many different ways can the letters of the word be arranged ? **(1)**

ii) How many of these words have all vowels together ? **(2)**

4. i) Expand $\left(x + \frac{1}{x}\right)^6$. **(2)**

ii) From part (i), write the term independent of x. **(1)**

Score

5. i) Write the equation of a line passing through (2, 0) and parallel to y-axis. (1)

ii) Find the distance of the point (–1, 1) from the line $12(x + 6) = 5(y - 2)$. (2)

6. From the ellipse $\frac{x^2}{36} + \frac{y^2}{16} = 1$, find

i) Coordinate of foci and vertices. (1)

ii) Length of the latus rectum. (1)

iii) Eccentricity. (1)

7. i) Find the distance of the point (3, 6, 4) from xy-plane. (1)

ii) Show that (0, 7, –10), (1, 6, –6) and (4, 9, –6) are the vertices of an isosceles triangle. (2)

8. i) If $\lim_{x \to 2} \frac{x^n - 2^n}{x - 2} = 80$, find n. (1)

ii) $\lim_{x \to 0} \left[\frac{\sin \pi x}{x \cos 2x} \right] =$ _____. (2)

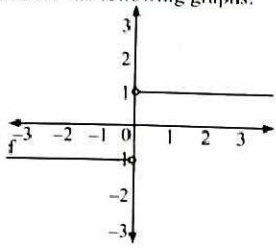
Answer any 6 questions from 9 to 16. Each carries 4 scores. **(6×4=24)**

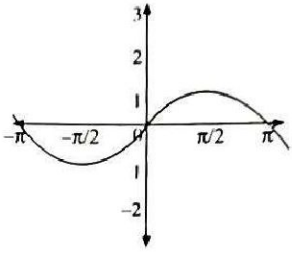
9. i) Number of proper subset of a set with 4 element is _____ (1)

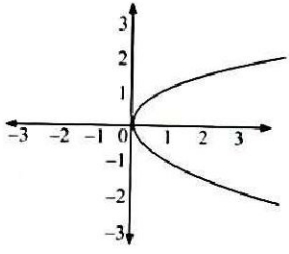
ii) Consider the sets A = {x : x is a letter in the word MATHEMATICS}, and B = {y : y is a letter in the word PHYSICS}. Then find (a) $A \cup B$, (b) $A \cap B$, (c) $A - B$. (3)

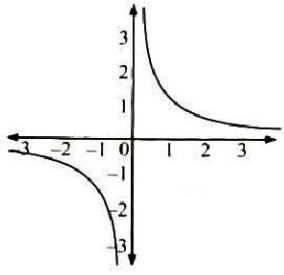
Score

10. Consider the following graphs.

a) 

b) 

c) 

d) 

i) Which among doesn't represent a function in $\mathbb{R}$. **(1)**

ii) Find domain and range of the graph in (a). **(2)**

iii) Write the equation in which the graph (b) represent. **(1)**

11. i) If $z = 1 + 2i$, then $|z|^2 =$ **(1)**

ii) If $z = \dfrac{1+i}{1-i}$ is a complex number

a) Write the real part of z. **(2)**

b) Verify that $|z| = |\bar{z}|$. **(1)**

12. i) Which of the following is the solution of the inequality $4x + 3 < 5x + 7$, $x \in \mathbb{R}$.

a) $(-\infty, -4)$ b) $(-4, \infty)$ c) $(4, \infty)$ d) $(-\infty, 4)$ **(1)**

ii) Solve $\dfrac{3(x-2)}{5} \leq \dfrac{5(2-x)}{3}$. **(2)**

iii) Mark the solution of part (ii) in the real line. **(1)**

Score

13. i) If ${}^nC_7 = {}^nC_5$, then find n. (1)

ii) 4 cards are drawn from a deck of 52 cards, find the number of ways of choosing

a) 3 red and 1 black cards (1)

b) exactly three ace cards. (2)

14. In a class of 60 students, 30 opted for NCC, 32 opted for SPC and 24 opted for both NCC and SPC. If one of these students is selected at random, find the probability that

i) The student opted for NCC or SPC. (1)

ii) The student has opted for neither NCC nor SPC. (2)

iii) The student has opted for SPC but not NCC. (1)

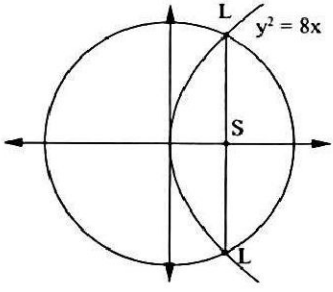
15. Consider the straight line $x - 3y + 4 = 0$.

i) Find the slope of the line perpendicular to the given line. (1)

ii) Find the equation of a line perpendicular to the above line and passing through (1, 2) (2)

iii) Find the coordinates of point of intersection of the given line and the line obtained in part (ii). (1)

16. Equation of the parabola given in the figure is $y^2 = 8x$.



i) Find the focus S and length of latus rectum LL' of the parabola. (2)

ii) The latus rectum LL' of the parabola is a chord to the circle centered at origin as shown in the figure. Write the equation of the circle. (2)

Score

Answer any 3 questions from 17 to 20. Each carries 6 scores. **(3×6=18)**

17. i) Which term of the sequence 2, $2\sqrt{2}$, 4, ... is 128 ? **(2)**

ii) The sum of first three terms of a geometric progression is 16 and the sum of next three terms is 128. Determine

a) common ratio. **(2)**

b) first term. **(1)**

c) sum of first four terms. **(1)**

18. i) Find the derivative of cosx using first principle. **(3)**

ii) Find the derivative of $\frac{\sin x + \cos x}{\sin x - \cos x}$. **(3)**

19. i) Find the value of tan1°.tan2°.tan3° ..... tan88°.tan89°. **(1)**

ii) Prove that $\cot^2 \frac{\pi}{6} + \operatorname{cosec} \frac{5\pi}{6} + 3\tan^2 \frac{\pi}{6} = 6$. **(2)**

iii) Show that $\frac{\cos 2x + \cos 3x + \cos 4x}{\sin 2x + \sin 3x + \sin 4x} = \cot 3x$. **(3)**

20. Consider the statistical data of the table :

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

i) Evaluate mean. **(2)**

ii) Calculate variance and standard deviation. **(4)**