Reg. No. : .....
Name : .....

SECOND YEAR HIGHER SECONDARY EXAMINATION,
SAMPLE QUESTION PAPER

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.*

PART - I

Answer any 6 questions from 1 to 8. Each carries 3 score. (6x3=18 Marks)

1. Show the function f:N→N defined by f(x)=2x is one-one but not onto. (3Marks)

2. Write the matrix $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ as the sum of a symmetric and skew symmetric matrices (3Marks)

3. Find the area of triangle with vertices at the point A(1,0), B(6,0) and C(4,3). (3 Marks)

4. Find the intervals in which the function given by f(x)=$2x^3 - 3x^2 - 36x + 7$ is

   a) increasing b) decreasing. (3 Marks)

5. A Stone is dropped in to a quiet lake and waves move in circles at the speed of 5 cm/sec. At an instant when the radius of the circular wave is 8 cm, how fast is the enclosed area increasing?

6. Show that the points A, B and C with position vectors $\vec{a}$=3i-4j-4k, $\vec{b}$=-2i-j+k , $\vec{c}$=i-3j-5k respectively form the vertices of a right angled triangle.

7. Find the angle between pair or lines $\vec{r} = (2i + j + k) + \lambda(i - j - k)$ and $\vec{r} = (i + j + k) + \mu(i - j - k)$.

8. Different balls are distributed in 3 boxes as shown in the table

Box	Red	Black
I	2	0
II	0	2
III	1	1

A box is selected at random and a ball is taken out. If the first ball is or red color. What is the probability that both balls are red?

PART - II

Answer any 6 questions from 9 to 16. Each carries 4 score. (6x4=24 Marks)

9.Consider Z, the set of integers, define the relation R defined on Z defined by R={(x,y)/ x-y is integer x,y$\in$Z}. Show that R is an equivalence relation. (4 Marks)

10. a) $\sin^{-1}\left(\frac{1}{2}\right)$=…… (1 Marks)

b) Prove that $\sin^{-1}\left[2x\left(\sqrt{1-x^2}\right)\right] = 2\sin^{-1}x;\ \frac{-1}{\sqrt{2}} \le x \le \frac{1}{\sqrt{2}}$ (3 Marks)

11. a) If A is a 3x3 non singular matrix the what is |Adj(A)|

a) $|A|^3$ b) |A| c) $|A|^2$ d) $3|A|$ (1 Marks)

b) Construct a 2x2 matrix $A = [a_{ij}]$ whose elements are given by $a_{ij} = 2i + 3j$.

Also find A^2. (3 Marks)

12. a) $\int \sqrt{a^2 - x^2}dx$=…… (1Mark)

b) Find area enclosed by the circle $x^2 + y^2 = 9$ (3 Marks)

13. a)Find the degree of $\left(\frac{d^2y}{dx^2}\right)^3 + \sin\left(\frac{dy}{dx}\right) = 0$ (1 Mark)

b) Consider the differential equation $\frac{dy}{dx} + \frac{y}{x} = x^2$ (3 Marks)

14. a)Find the shortest distance between pair of lines

$\frac{x-2}{2} = \frac{y-1}{5} = \frac{z+3}{-3}$ and $\frac{x+2}{-1} = \frac{y-4}{8} = \frac{z-5}{4}$ (4 Marks)

15. Let $\vec{a}$=2i+λj+4k, $\vec{b}$=4i+4j+8k a) Find λ if $\vec{a}$ and $\vec{b}$ are parallel. (1 Mark)

Find a unit vector perpendicular to both $\vec{a}$ and $\vec{b}$ where $\vec{a}$=2i-j+2k, $\vec{b}$=-i+j-k. (3 Marks)

16. If p(A)=0.8,p(B)=0.5, p(B/A)=0.4 a) Find i) p(A∩B) ii)$p(A \cup B)$ (2 Marks)

b) Given that the events A & B are such that p(A)=1/2, p($A \cup B$)=3/5 and p(B)=p. Find p if they are independent. (2 Marks)

PART – III

Answer any 3 questions from 17 to 20. Each carries 6 score. (3x6=18 Marks)

17. Solve the system of linear equations using matrix method

2x+3y+3z =5

x-2y+z = -4

3x-y-2z =3 (6 Marks)

18. a)Find $\lim_{x\to 2}(x-2) =$…… (1 Mark)

b) Find the value of k so that the function f is continuous

$$f(x) = \begin{cases} kx+1 & if\ x \le 5 \\ 3x-5 & if\ x > 5 \end{cases}$$

(2 Marks)

c) Find $\frac{dy}{dx}$ if x= sint, y= cos2t (3 Marks)

19. Integrate the following

a)$\int e^{2x}dx$ (1 Mark), b) $\int \frac{x}{(x+1)(x-2)}dx$ (2 Marks) c) $\int_0^{\pi/2} \frac{sin^2x}{sin^2x+cos^2x}dx$.(3 Marks)

20. Maximise Z=3x+4y subject to constraints

$$x + 2y \le 8,$$

$$3x + 2y \le 12,$$

$$x, y \ge 0$$ (6 Marks)

Question Paper prepared by

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