

(c) State True or False. If false, give the correct answer :

(i) Emil Astin was the student of Hilbert. (2)

(ii) Emmy Noether's mother came from a Wealthy Jewish family of Cologne. (2)

(iii) Young Newton was more interested in academic studies. (2)

(iv) Riemann matriculated at the Georgia Augusta in the faculty of theology. (1)

(d) (i) What did Riemann introduce in the only single paper he published on Number Theory ? (2)

(ii) What was the outstanding achievement of Newton during his Lucasian professorship ? (2)

(iii) What was Ramanujan's contribution to Mathematics ? (2)

(iv) Name the city where Euclid used to teach. (1)

2. (a) Do any two parts : (10×2+5=25)

I. (i) Find the HCF (16,25). Are 16 and 25 prime ? Are they relatively prime ? (5)

(ii) State Pythagorean number theorem. Write any five basic Pythagorean triplets less than 100. (5)

II. (i) Give recursive formula for Fibonacci sequence and show that the ratio of one Fibonacci number to the one preceding it tends to the golden number. (5)

(ii) Find the number of ways in which the letters of the word 'UNIVERSITY' can be arranged such that the two 'I' come together. (5)

III. (i) Using RSA algorithm encrypt the word "CAGE". (5)

(ii) What is Sieve of Ertosthenes ? Find prime numbers from 1 to 50 using it. (5)

- (b) Write a note on casing out nine method. (5)

SECTION III

3. Do any **three** parts : (10×3=30)

- (a) (i) Explain the Konigsberg Bridge Problem in the historical context. Give its network adaptation. (5)
- (ii) Give differences between any **two** of the following : (5)
1. Mobius storip and Klein Bottle
 2. Snowflakes curves and anti snowflake curves
 3. Rotational Symmetry and reflection Symmetry
- (b) (i) Does the function $f(x) = x^2$ has an absolute maximum? Give reasons using graph of the function. (4)
- (ii) State the Four color Map Problem. What is a chromatic number? Give chromatic numbers for a sphere and Torus. (6)
- (c) (i) Write short notes on any **two** of the following : (4)
1. Basic Tilings
 2. Golden Ratio
 3. Fire Altars
- (ii) What is perspective? What role does it play in buildings, monuments and paintings? (4)
- (iii) What are the possible set of symmetries on an Isosceles triangle? (2)
- (d) (i) Define the snowflake curve. What can you say about its perimeter and area. (4)
- (ii) Explain the relation between the golden ratio and the golden rectangle. For each of them, give two examples where they have been extensively used. (6)

P.T.O.

4. Attempt any two parts :

(12×2=24)

(a) (i) Convert the following into an ordinary frequency distribution :

5 students get less than 3 marks:

12 students get less than 6 marks:

25 students get less than 9 marks:

33 students get less than 12 marks: (4)

(ii) Solve the following linear programming problem using graphical method :

Minimize $Z = 2x + 8y$ Subject to $5x + 10y = 15$

$$x \leq 20$$

$$y \geq 14$$

$$x, y \geq 0. \quad (8)$$

(b) (i) Compute the arithmetic mean from the following frequency distribution :

Marks : 0-10 10-20 20-30 30-40 40-50 50-60

No. of students : 5 7 8 14 10 6

(6)

(ii) In a group of students, there are 3 boys and 3 girls. Four students are to be selected at random from the group. Find the probability that either 3 boys and 1 girls or 3 girls and 1 boys are selected. (6)

(c) (i) Give an example of two events that are

I. Independent, but not mutually exclusive.

II. Not independent, but mutually exclusive. (4)

(ii) Solve the following linear programming problem using graphical method :

Max $Z = 6x_1 + x_2$ Subject to $2x_1 + x_2 \leq 104$

$$x_1 + 2x_2 \leq 76, \quad x_1, x_2 \geq 0 \quad (8)$$

(100)