

This question paper contains 4+1 printed pages]

Roll No.

--	--	--	--	--	--	--	--	--	--	--

S. No. of Question Paper : 617

Unique Paper Code : 235154

G

Name of the Paper : Mathematical Awareness

Name of the Course : B.A. (Hons.) Concurrent Course : Qualifying Course

Semester : I

Duration : 3 Hours

Maximum Marks : 100

(Write your Roll No. on the top immediately on receipt of this question paper.)

1. Do any *three* parts :

(a) Fill in the following blanks :

6

(i) The first five axioms of Euclid are known as and the remaining five axioms are termed as

(ii) Newton had been in controversy with and till the end of his life.

(iii) and recognized that they had a diamond in the form of Ramanujan, though unpolished, while he was serving as a clerk at Madras Port Trust.

(b) State whether the following statements are true or false. If false, then give the correct answer :

6

(i) David Hilbert managed to let Emmy Noether to lecture at Göttingen University with a handsome salary.

P.T.O.

- (ii) Euclid is best remembered for his development of non-Euclidean Geometry which is used today in physics and relativity theory.
- (iii) The book 'Elements' written by Newton : thousands of its editions had been published.
- (c) (i) Name two areas in which Newton made significant contributions.
- (ii) Name two of the greatest mathematicians who influenced Riemann.
- (iii) 'The man who knew Infinity', a book written by Robert Kanigel, mentioned which mathematician. 6
- (d) (i) Who said, "If I were to awaken after having slept for 100 years, my first question would be : Has the Riemann Hypothesis been proven ?"
- (ii) Why did Ramanujan failed his F.A. Exams, lost his scholarship and eventually had to discontinue his studies ?
- (iii) Name two books written by Newton. 6

2. Do any *three* parts :

- (a) (i) Write a brief history of "Quest for π ". 5
- (ii) Show that ;

$$2^{2^n} \equiv -5 \pmod{3};$$

you may used induction.

5

(b) (i) Let

$$f(n) = n^2 + n + 41.$$

Does this polynomial generate prime numbers ? What is the smallest value of n , for which it doesn't do so ? 5

(ii) What are twin primes ? Write all the twin primes between 10 and 80. 5

(c) (i) State Fermat's last theorem. Why is it called impossibility theorem ? 5

(ii) Write $\frac{2951}{1711}$ as continued fraction. 5

(d) (i) Write on magic square, each of order 5. What is its sum ? How will the sum change, if each entry is increased by 3 ? 5

(ii) Define Pythagorean triplets. Write three basic pythagorean triplets less than or equal to 100. 5

3. Do any *three* parts :

(a) Briefly explain any *three* :

(i) Fractals in Nature

(ii) Symmetry Groups

(iii) Four Colour map problem

(iv) Basic Tilings.

10

P.T.O.

- (b) (i) What is Perspective ? What role does it play in buildings, monuments and paintings ? 5
- (ii) Discuss all the possible symmetries of an equilateral triangle. 5
- (c) (i) Sketch the graph of the function $f(x) = \cos x$ in the interval $[0, 2\pi]$. Indicate its points of inflection, maxima and minima. 5
- (ii) Define a Chromatic number. What are the Chromatic number for the Mobius Strip and Klein bottle. 5
- (d) (i) What is Koch snowflake curve ? How is it different from anti-snowflake curve ? 5
- (ii) Name any *four* types of fire altars used in Ancient India. 5
4. Do any *two* parts :
- (a) (i) Find *two* numbers whose arithmetic mean is 10 and geometric mean is 8.
- (ii) A and B toss a coin alternatively on the understanding that the first to obtain a head wins the toss. Show that their respective chances of winning are $2/3$ and $1/3$. 6+5
- (b) (i) Why range is a crude measure of dispersion ?
- (ii) How are standard deviation and variance the same and how are they different ? 6+5

- (c) Define Optimal Solution of a Linear Programming Problem. Solve the following Linear Programming Problem : 11

Max

$$z = x - y$$

Subject to

$$3x + 2y \leq 6$$

$$x - y \leq 2$$

$$x, y \geq 0.$$