1110

Concurrent Courses for B.A. (Hons.)   **C**

Programme

(Credit Course)

MATHEMATICAL AWARENESS

Time : 2 Hours   *Maximum Marks : 38*

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

Attempt *All* questions as per directed questionwise.

1. Do any *two* parts :

    (*a*)   (*i*)   Name the great philosopher who taught Euclid.

            (*ii*)   What was the title of doctoral thesis of Riemann ?

            (*iii*)   In which year did Emmy Noether flee Germany ?

            (*iv*)   In which city of India was Ramanujan born ? 2

(*b*) (*i*) Which property given by Riemann remains an open question to this day ?

(*ii*) Why was Emmy Noether not allowed to join the faculty at Gottingen University ?

(*iii*) Differential Geometry grew from Newton's which idea ?

(*iv*) What was Ramanujan's area of research ?   2

(*c*) State whether the following statements are True or False. If False, then give the correct answer :

(*i*) Newton's father died three months before Newton was born.

(*ii*) Riemann was deeply attached to his family.

(*iii*) Emmy Noether shared a great relationship with her students.

(*iv*) Ramanujan said "There is no Royal Road to Geometry".   2

2.　Do any *three* parts :

(a)　(i)　Define basic Pythagorean Triples. Given an even

positive number 'm', write Pythagorean Triples in

terms of 'm'.　　　　　　　　　　　　　　2

(ii)　State the Euclidean Algorithm. Using it write

$\dfrac{221}{41}$ as a continued fraction.　　　　2½

(b)　(i)　Construct a Magic Square of order 5. What is its

magic sum ?　　　　　　　　　　　　2½

(ii)　In how many ways can the word "DAUGHTER"

be arranged so that :

(a)　All the vowels come together

(b)　Vowels occupy odd places.　　　　2

(c)　(i)　Define Cryptology. What is a RSA system ?　2½

(ii)　Write Binet's formula for Fibonacci numbers.　2

(d)　(i)　What are perfect and amicable numbers ? Are perfect numbers amicable with themselves ?　　　2½

　　(ii)　State the Prime Testing Method of Fermat. Is the converse true ? Justify.　　　2

3.　Do any *three* parts :

　(a)　Write short notes on any *two* of the following :

　　(i)　Four-color map problem

　　(ii)　Platonic Solids

　　(iii)　Mobius Strip.　　　4½

　(b)　(i)　Define Reflection Symmetry. What are the reflection and rotational symmetries of a square and isosceles triangle ?　　　2½

　　(ii)　Name any *four* types of Fire-Altars used in Ancient India.　　　2

(c) (i) What is the relation between Golden Ratio and Golden Rectangle ? What is their significance in the context of ancient Greek history ? 2½

(ii) What is a Snowflake curve ? What can you say about its perimeter and area ? 2

(d) (i) Sketch the graph of the function :

$$g(x) = 1 - x^2$$

What are its domain and range ? 2½

(ii) What is Basic Tilings ? Discuss. 2

4. Do any *two* parts :

(a) The Arithmetic mean and Geometric mean of two numbers are 30 and 6 respectively. Find Harmonic mean of two numbers. 3½

(b) Define optimal solution of a Linear Programming problem.

Solve the following LPP :

Max $Z = x_1 - x_2$

Subject to constraints

$$3x_1 + 2x_2 \leq 6$$

$$x_1 - x_2 \leq 2$$

$$x_1, x_2 \geq 0.$$ 3½

(c) (i) Why range is a crude measure of Dispersion ?

(ii) Explain the meaning of Skewness. 3½