

This question paper contains **6** printed pages]

Roll No.

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

S. No. of Question Paper : **470**

Unique Paper Code : **A-645**

F

Name of the Paper : **Mathematical Awareness (In Lieu of
Qualifying Course)**

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

Semester : **Part I**

Duration : **2 Hours**

Maximum Marks : **50**

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

Attempt *All* the questions as per directions questionwise.

1. Do any *two* parts :

2×4

(a) Answer briefly :

(i) What is Phaenomena ?

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

P.T.O.

(iii) State the Inverse Square Law.

(iv) What puzzling decision did Newton make in 1696 ?

(b) State whether the following statements are True or False.

If false, then give the *correct* answer :

(i) Euclid's "Elements" mainly deals with the postulates and axioms of Graph theory.

(ii) Ramanujan discovered the series of $\log(1 + x)$.

(iii) Newton was born on Christmas Day in the year 1742.

(iv) Riemann's theory was a great advance on Newton's work.

(c) Fill in the blanks :

(i) is an excellent recent biography of Newton.

- (ii) Newton's early studies were in
- (iii) Principia owes its existence to a visit by
to Cambridge in 1684.
- (iv) In the early 1690's Newton worked on
classification of

2. Do any *three* parts :

3×5

- (a) Use Euclidean Algorithm to obtain integers x , y and z
satisfying :

$$\text{GCD}(1092, 1155, 2002) = 1092x + 1155y + 2002z.$$

- (b) (i) Write 8128 as the sum of cubes.
- (ii) Find the rational number determined by the
following continued fraction $[-2; 2, 4, 6, 8]$.
- (c) Construct a composite 9th order magic square and write
its magic sum.

P.T.O.

- (d) State the Prime Testing method of Fermat. Using it and the Theory of Congruences verify that 33 is a composite number.

3. Do any *three* parts : 3×5

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

(i) Basic Tilings

(ii) Regular Polyhedra

(iii) Four colour map problem.

- (b) (i) Explain how the Königsberg Bridge Problem led to the discovery of Euler's formula.

(ii) Name any *four* types of Fire—Altars used in ancient India.

- (c) (i) Trace the graph of the function

$$f(x) = \cos x$$

in the interval $[0, 2\pi]$. Indicate its inflection points and the points of absolute maximum and minimum.

(ii) Write Euler characteristic formula and verify it for tetrahedron and octahedron.

(d) (i) Define golden ratio and golden rectangle.

(ii) Explain the difference in the paintings before and after the development of perspective geometry.

4. Do any *three* parts : 3×4

(a) Two unbiased dice are thrown. Find the probability that neither a double nor a total of 10 will appear.

(b) Explain the meaning of the skewness. What are the objectives of measuring it ?

P.T.O.

- (c) Use the graphical method to solve the following linear programming problem :

$$\text{Max } Z = 2x + y$$

Subject to

$$5x + 10y \leq 50$$

$$x + y \geq 1$$

$$x - y \leq 0$$

$$x, y \geq 0.$$

- (d) Find the mean of the first n odd natural numbers.