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Your Roll No.

Concurrent Courses for B.A. (Hons.) Prog. F

(A Subject in Lieu of Language Credit Course)

Paper Code : A-637

MATHEMATICAL AWARENESS

Time : 2 Hours

Maximum Marks : 50

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

Attempt all questions as per directed questionwise.

Note:- The maximum marks printed on the question paper are applicable for the candidates registered with the School of Open Learning for the B.A. (Hons). These marks will, however, be scaled down proportionately in respect of the students of regular colleges, at the time of posting of awards for compilation of result.

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P.T.O.

1. Do any **two** parts. (2×4)

(a) Answer in one or two words

(i) What work does the Book II of Elements contain.

(ii) Which work on conic sections is attributed to Euclid

(iii) When was Riemann appointed as a professor at Georgia Augusta.

(iv) Which American President nearly mastered six books of Euclid.

(b) State whether the following statements are **true** or **false**. If **false** then give the **correct** Statement.

(i) Book IV of Euclid's Elements deals with Euclidean Algorithm and Elementary Number Theory.

(ii) In 1912, Ramanujan got a post as an accounts clerk at the Madras Port Trust

(iii) The Theory of Gravitation is based on Newton's inverse square law.

(iv) Riemann investigated the mechanism of the human ear.

(c) Answer briefly

- (i) What was the greatest honour that Ramanujan received in Cambridge.
- (ii) Name the first two Cambridge Professors who returned Ramanujan's work.
- (iii) What did Riemann introduce in the only single paper he published on Number Theory?
- (iv) Name one work of Euclid on Mathematical astronomy.

2. Do any **three** parts. (3 x 5)

- (a) (i) State Vinogradov's Theorem and give examples in support of the theorem.
- (ii) Find the quotient q and the remainder r when dividend $a = 61$ and divisor $b = -7$.
- (b) (i) Find the exponent of 3 in the prime factorization of $100!$.
- (ii) State Prime testing method given by Fermat. Is the converse true?
- (c) (i) Find the rational number determined by the following continued fraction $[-3; 3, 6, 9, 6, 3]$

P.T.O.

(ii) Explain Durer's magic square.

(d) (i) Use the Euclidean algorithm to express $\gcd(4076, 1024)$ as a linear combination of 4076 and 1024.

(ii) If $a^2 \equiv b^2 \pmod{n}$ then is $a \equiv b \pmod{n}$ always true. Justify.

3. Do any three parts.

(3×5)

(a) (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.

(b) (i) Draw the graph of the function $f(x) = |x|$, $x \in [-1, 1]$. Find the regions of $[-1, 1]$ in which the function f is increasing or decreasing. Give the points of maxima and minima.

(ii) Give any two difference between the Mobius Strip and the Klein Bottle.

(c) (i) How did perspective geometry bring a change in the paintings after the Renaissance Period?

(ii) Show that the set of symmetries of an isosceles triangle forms a group.

(d) Define with examples. Do any **two**.

(i) Platonic Solids

(ii) Basic Tilings

(iii) Regular polyhedra

4. Do any **three** parts. (3×4)

(a) In a moderately asymmetrical distribution, the mean and median are 20 and 25 respectively. Find the value of mode.

(b) Find two numbers whose arithmetic mean is 10 and geometric mean is 8.

(c) A bag contains 8 white and 4 red balls. Five balls are drawn at random. What is the probability that 2 of them are red and 3 white ?

(d) Use the graphical method to solve the following linear programming problem

$$\text{Min } Z = 4x + 6y$$

Subject to the constraints

$$2x + y = 6$$

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$$x \geq 1$$

$$y \leq 4$$

$$x, y \geq 0.$$