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Your Roll No.....

712

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

(Credit Course)

**MATHEMATICAL AWARENESS**

*Time : 2 Hours*

*Maximum Marks : 50*

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

*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.

Attempt *All* questions as per

directed questionwise.

P.T.O.

1. Do any *two* parts :

(a) Answer in *one* or *two* words :

(i) Name *two* contemporary mathematicians who deeply influenced Riemann's work.

(ii) Name the branch of mathematics that was Ramanujan's area of research.

(iii) Name the book written by Newton that explained the theory of gravitation.

(iv) For which mathematician, the phrase—'warm like a loaf of bread' was used by Weyl. 4

(b) (i) What is the full name of Ramanujan ? Name the disease from which Ramanujan was suffering.

(ii) What are the famous words of Euclid about geometry, said to King Ptolemy I ?

(iii) What was the topic of Emmy Noether's dissertation ?

(iv) When and where was Euclid born ? 4

(c) Answer the following briefly :

(i) State Newton's 'Inverse Square Law'.

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

(iii) State any *two* significant contributions of Euclid to arithmetic.

(iv) What role did Hilbert play in promoting the career of Emmy Noether ? 4

2. Do any *three* parts :

(a) Briefly explain the following :

(i) Algebraic numbers;

(ii) Transcendental numbers;

(iii) Mersenne numbers;

(iv) Fractions;

(v) Irrational numbers.

(b) (i) State the rule of divisibility by 7 and by using it, check the divisibility of 39529 by 7.

(ii) Give *four* characteristics of William Beverley's 8th order magic square.

(iii) Write the recursion formula for the Fibonacci numbers. 2+2+1

(c) (i) Show that :

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

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

(iii) Why was Fermat's Last theorem also called an impossibility theorem ? 2+2+1

(d) (i) Using 'Russian Peasant' method, multiply 53 by 36.

(ii) What is the 'Quest for  $\pi$ ' ?

(iii) What are Goldback conjectures ? 2+2+1

3. Do any *three* parts :

(a) Briefly explain :

(i) Perspective and projection;

(ii) Types of Fire Altars.

$2\frac{1}{2}, 2\frac{1}{2}$

(b) (i) Make a comparative study between the Möbius Strip and Klein Bottle.

(ii) Define golden ratio and golden rectangle.

$2\frac{1}{2}, 2\frac{1}{2}$

(c) (i) Define a regular polyhedron. Describe the types of regular polyhedra.

(ii) Sketch the graph of the function

$f(x) = x^2$  for  $x \geq 0$ . What are its domain and

range ?

3,2

(d) (i) Explain how a snowflake is formed ?

(ii) What are the set of symmetries of an isosceles

triangle ? Show that it forms a group.  $2\frac{1}{2}, 2\frac{1}{2}$

4. Do any *three* parts :

(a) (i) In a moderately asymmetrical distribution, the mean and median are 20 and 25 respectively.

Find the value of mode. 2

(ii) If the scores on a set of answer paper in an examination are changed by increasing all the scores by 10 percent. What effect will these changes have on the mean and the standard deviation ? 2

(b) (i) Though the average is an important characteristic of a distribution, however it cannot be of any help to study the distribution in all its aspects. Why ? 3

(ii) Briefly explain the meaning of skewness. 1

(c) A die is loaded so that :

$$P(1) = P(2) = P(3) = \frac{1}{4}$$

$$P(4) = P(5) = P(6) = \frac{1}{12}$$

If :

$$E = \{1, 2\}, F = \{2, 3\}$$

show that E and F are independent but not mutually exclusive. 4

(d) Use graphical method to solve the following Linear Programming Problem :

$$\text{Minimize : } Z = x - 7y$$

Subject to :

$$x + y \leq 8$$

$$x \leq 5$$

$$y \leq 5$$

$$x + y \geq 4$$

$$\text{and } x \geq 0, y \geq 0.$$

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