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Your Roll No..... .....

1112

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

MATHEMATICAL AWARENESS

(Qualifying)

Time : 2 *Hours* *Maximum Marks* : 38

(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 students of the regular colleges. These marks will, however, be scaled up proportionately in respect of candidates registered with the school of open learning at the time of posting of awards for compilation of result.

Attempt *all* questions as per directions questionwise.

P.T.O.

1. Do any *two* parts. Each part carries *three* marks :

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

(*i*) Which Book of Euclid's Elements deals with infinitude of prime numbers, perfect numbers and the sum of geometric series ?

(*ii*) Which is the earliest surviving Greek treatise on perspective ?

(*iii*) Euclid taught in which Greek city ?

(*iv*) When did Emmy Noether die ?

(*v*) When was Riemann appointed as a professor at Georgia Augusta ?

(*vi*) What is the branch of Algebra named after Emmy Noether called ?

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

(*i*) Book V of Euclid's Elements deals with Proportion to Geometry, Thales theorem and similar figures.

(*ii*) Euclid created the geometry called elliptical geometry.

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

(*c*) Answer briefly :

(*i*) What was the greatest honour that Ramanujan received in Cambridge ?

(*ii*) What is Catoptrics ?

(*iii*) Who said these words and to whom, "Give him a coin if he must profit from what he learns".

2. Do any *three* parts. Each part carries *four* marks :

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

(*ii*) Find the quotient q and the remainder r when dividend $a = 51$ and divisor $b = 9$.

(*b*) (*i*) Find the exponent of 2 in the prime factorization of 80 !

(*ii*) Write *two* similarities and *two* dissimilarities of Benjamin Franklin's and William Beverley's 8th order magic square.

(*c*) (*i*) Find the rational number determined by the following continued fraction :

$$[-3, 2, 4, 6, 8].$$

(*ii*) State the Prime Testing Method of Fermat.

(*d*) (*i*) Using the digits 0, 2, 4, 6, 8 find the maximum number of positive integer numbers composed of one, two, three, four or five digits that can be formed when the same digit may be repeated 5 times in each number.

(*ii*) If $16^{106} \equiv x \pmod 7$, then find x.

3. Do any *three* parts. Each part carries *four* marks :

(*a*) Define with examples :

(*i*) Platonic solids

(*ii*) Fire Altars

(*iii*) Basic Tilings

(*iv*) Perspective Geometry.

(*b*) (*i*) Explain how the snowflake curve is formed. What can be said about its perimeter and area.

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

(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) Describe the logarithmic spiral in a Golden Triangle.

(d) (i) State the Four Color Map Problem.

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

4. Do any *two* parts. Each part carries *four* marks :

(a) (i) Find the median of the first ten prime numbers.

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

(b) Two dice are thrown simultaneously. Find the probability that the difference of numbers shown on the dice is 1.

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

Minimize :

$$Z = 3x + 5y$$

Subject to :

$$2x + y \leq 4,\ x + y \geq 3,\ x + 2y \leq 2,$$

$$x \geq 0,\ y \geq 0.$$