Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 07

B.Sc.(Computer Science) (2013 & Onwards) (Sem.–4)

NUMBER THEORY

Subject Code : BCS-401

Paper ID : [72317]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains SIX questions carrying TEN marks each and students has to attempt any FOUR questions.**

SECTION-A

1. Write briefly :

a) Express 2875 as sums of four square.

b) State Division Algorithm. Show that $3n^2 - 1$ is not a perfect square.

c) Find all primitive Pythagorean triples for $x = 60$.

d) Show that any two consecutive Fibonacci numbers are relatively primes.

e) State fundamental Theorem of Arithmetic.

f) Prove that $[2x] - 2[x]$ is either 0 or 1.

g) Find all solutions of $x^5 - x \equiv 0 \pmod 5$.

h) State Chinese Remainder Theorem.

i) Prove that $\phi(n)$ is even for $n \geq 3$.

j) If $mn \neq 0$ then show that $(m, n)\,[m,n] = |mn|$.

SECTION-B

2. State Euclidean Algorithm. Find gcd of 710 and 68 using it and then find integers x and y satisfying $(710, 68) = 710x + 68y$.

3. Prove that the product of any n consecutive integers is divisible by $n!$. Also show that $n^3 - n$ is divisible by 6.

4. Define Linear Congruence. Show that $89/2^{44}$–l and $97/2^{48}$-l using the theory of congruence.

5. State and prove Mobius inversion formula. Also find all integers n such that $(\phi)(n) = \phi(2n)$ where ϕ is an Euler's ϕ – function.

6. State and prove Fermat's Theorem. Also verify that 17 divides $11^{104} + 1$ using it.

7. State Wilson's Theorem. Show that $\left[\frac{(n-1)!}{n}\right]$ is even for $n > 4$ using it.