Class –T.Y.B.Sc
Semester-VI
Paper-IV –Number theory and its applications –II

	SAMPLE QUESTIONS
1	The number of quadratic residue modulo 71 are (a) 30 (b) 35 (c) 40 (d) 45
2	$\left(\frac{2}{p}\right) = -\left(\frac{2}{p}\right)$ (a) $p \equiv 1(\ mod\ 4)$ (b) $p \equiv 3(\ mod\ 4)$ (c) $p \equiv 3(\ mod\ 5)$ (d) $p \equiv 1(\ mod\ 5)$
3	If $\left(\frac{a}{p}\right) = 1$ then $\left(\frac{p-a}{p}\right) = 1$ if (a) $p \equiv 1(\ mod\ 4)$ (b) $p \equiv 3(\ mod\ 4)$ (c) $p \equiv 3(\ mod\ 5)$ (d) $p \equiv 1(\ mod\ 5)$
4	$\left(\frac{71}{73}\right) =$ (a) $\left(\frac{2}{71}\right)$ (b) $\left(\frac{1}{71}\right)$ (c) $\left(\frac{3}{71}\right)$ (d) $\left(\frac{-1}{71}\right)$
5	$\left(\frac{7}{45}\right) =$ (a) $\left(\frac{7}{3}\right)$ (b) $\left(\frac{7}{9}\right)$ (c) $\left(\frac{2}{5}\right)$ (d) $\left(\frac{2}{7}\right)$
6	If a and b are two quadratic non residues modulo an odd prime p Then (a) ab is quadratic non residue modulo p (b) ab is quadratic residue modulo p (c) ab is quadratic non residue modulo any power of p (d) None of these
7	If p is an odd prime and a and b are relatively prime to p then $\left(\frac{a}{p}\right) \equiv r\ mod\ p$ Then, (a) $r = a^{\frac{p^2+1}{2}}$ (b) $r = a^{\frac{p^2-1}{2}}$ (c) $r = a^{\frac{p+1}{2}}$ (d) $r = a^{\frac{p-1}{2}}$
8	$\frac{61}{48}$ represents (a) [1,4,3,3,2] (b) [1,4,1,3,2] (c) [1,2,1,3,4] (d) [1,3,1,2,4]

9	Which of the following is a correct statement? (a) The convergents with odd subscripts form a strictly increasing sequence. (b) The convergents with even subscripts form a strictly decreasing sequence. (c) Every convergent with an even subscripts is greater than every convergent with an odd subscript. (d) A rational number can be written as a finite simple continued fraction
10	If $\gcd(a, b) = 1$ and $\frac{a}{b} = [a_0, a_1, \dots \dots \dots, a_n]$ where n is odd Then, (a) $x = aq_{n-1}$ & $y = -bP_{n-1}$ gives a solution of $ax + by = c$ (b) $x = -aq_{n-1}$ & $y = bP_{n-1}$ gives a solution of $ax + by = c$ (c) $x = -cq_{n-1}$ & $y = cP_{n-1}$ gives a solution of $ax + by = c$ (d) $x = cq_{n-1}$ & $y = -cP_{n-1}$ gives a solution of $ax + by = c$
11	The congruence $x^2 \equiv 5\ (mod\ 227)$ has (a) Only 1 solution (b) Two solutions (c) Three solutions (d) No solutions
12	For SCF [0,3,2,1,1,4] convergents C_2 and $C_3$is given by (a) $C_2 = 0, C_3 = 2$ (b) $C_2 = 3/10, C_3 = 2/7$ (c) $C_2 = 2/7, C_3 = 3/10$ (d) $C_2 = 10/3, C_3 = 7/2$
13	If $C_k = \frac{p_k}{q_k}$ is the k^{th} convergent of SICF $[a_0, a_1, a_2 \dots \dots \dots,]$ then for $k \geq 2$ then, (a) $q_k > (2)^{\frac{k-1}{2}}$ (b) $q_k \leq (2)^{\frac{k-1}{2}}$ (c) $q_k \geq (2)^{\frac{k-1}{2}}$ (d) $q_k < (2)^{\frac{k-1}{2}}$
14	For $n \geq 3$, $\sum_{k=1}^{n} \mu(k!) =$ (a) 0 (b) -1 (c) 1 (d) None of these

15	$\sigma(145)$ is (a) 120 (b) 130 (c) 140 (d) 145
16	$\mu(162) =$ -1 (b) 1 (c) 0 (d) none of these
17	$\sigma(n)$ is odd (a) n =15 (b) n =11 (c) n = 8 (d) n = 21
18	Which of the following are perfect numbers
19	If $2^k - 1$ is prime $(k > 1)$, then $n = 2^{k-1}(2^k - 1)$ is a (a) Perfect number (b) Pell's number (c) Fermat's prime (d) Mersenne Prime
20	If $2^k - 1$ is prime then (a) k is even (b) power of 2 (c) k is prime (d) k is an odd prime