



**GEETHANJALI INSTITUTE OF SCIENCE & TECHNOLOGY**  
**(AN AUTONOMOUS INSTITUTION)**  
 (Approved by AICTE, New Delhi & Affiliated to JNTUA, Ananthapuramu)  
 (Accredited by NAAC with "A" Grade, NBA (EEE, ECE & ME) &  
 ISO 9001:2008 Certified Institution)

**QUESTION BANK (DESCRIPTIVE)**

**Subject Name with Code:** NUMBER THEORY AND ITS APPLICATION

**Course & Branch:** B. Tech & CSE (CS)

**Year & Semester:** II B. Tech II Semester

**Regulation:** RG23

**UNIT-I**

S. No	Question	[BT Level] [CO] [Marks]
<b>2 Marks Questions (Short)</b>		
1.	State the well-ordering property.	L1, CO1, 2M
2.	Find the values i) $\sum_{j=1}^{10} 4^j$ and ii) $\prod_{j=1}^6 j^2$	L1, CO1, 2M
3.	Convert $(1894)_{10}$ from decimal to binary notation	L1, CO1, 2M
4.	State the division theorem.	L2, CO1, 2M
5.	Add $(101111011)_2$ and $(1100111011)_2$	L2, CO1, 2M
6.	Subtract $(101110101)_2$ from $(1101101100)_2$	L2, CO1, 2M
7.	Convert $(A35B0F)_{16}$ to decimal notation	L1, CO1, 2M
8.	Convert $(2FB3)_{16}$ to binary notation.	L2, CO1, 2M
9.		L1, CO1, 2M
10.		
<b>Descriptive Questions (Long)</b>		
1.	Use mathematical induction to prove $\sum_{j=1}^n j = 1+2+3+\dots+n = (n(n+1))/2$	L2, CO1, 10M
2.	Use mathematical induction to prove that $\sum_{j=1}^n j^2 = 1^2+2^2+3^2+\dots+n^2 = (n(n+1)(2n+1))/6$	L2, CO1, 10M
3.	Let n and k be positive integers with $n \geq k$ . Prove that $(nc_k) + (nc_{k-1}) = (n+1)c_k$ b) Find the values of i) $\sum_{j=1}^{10} j^2$ ii) $\prod_{j=1}^5 2^j$ iii) $10c_4$ iv) $12c_5$	L2, CO1, 10M
4.	a) State and prove the division theorem. b) Find the quotient and remainder in the division algorithm with divisor 17 and dividend 100	L2, CO1, 10M
5.	a) Convert $(1864)_{10}$ and $(2FB3)_{16}$ to binary notation. b) Convert $(A35B0F)_{16}$ and $(6105)_7$ to decimal notation	L2, CO1, 10M
6.	a) Find gcd of 28 and 49, express it as linear combination of 28 and 49. b) Find the gcd (4340, 2821) by Euclidean algorithm and also express as GCD $(4340, 2821) = 2821x + 4340y$ .	L2, CO1, 10M
7.	Show that every +ve integer can be written as the sum of distinct Fibonacci number	L2, CO1, 10M
8.	Find factor 6077 by using the method of Fermat factorization.	L2, CO1, 10M
9.	Find all integer solutions of linear Diophantine equation $2x+3y+4z=5$ .	L2, CO1, 10M
10.	Find all integer solutions of systems of linear Diophantine equation $x+y+z=100$ , $x+8y+50z=156$ .	L2, CO1, 10M

S.No .	Question	[BTLevel][CO][ Marks]
<b>2MarksQuestions (Short)</b>		
1.	Write the first five Fibonacci numbers.	L1,CO2,2M
2.	State the fundamental theorem of arithmetic	L1,CO2,2M
3.	Find the prime factorization of the positive integers 222 and 5040	L2,CO2,2M
4.	Find $\gcd(45,75,25)$	L1,CO2,2M
5.	Define linear Diophantine equation in two variables with example	L1,CO2,2M
<b>DescriptiveQuestions(Long)</b>		
11.	a)find the least positive residue of $2^{644} \bmod 645$ b) find the least positive residue of $3^{10} \bmod 11$	L2, CO2, 10M
12.	find the all solutions $9x \equiv 12 \pmod{15}$ find the values of x, $2x \equiv 3 \pmod{8}$	L2,CO2,10M
13.	solve the systems of linear congruence's $x \equiv 1 \pmod{3}$ , $x \equiv 2 \pmod{5}$ , $x \equiv 3 \pmod{7}$	L2, CO2,10M
14.	solve the systems of linear congruence's $x \equiv 2 \pmod{3}$ , $x \equiv 3 \pmod{5}$ , $x \equiv 2 \pmod{7}$	L2, CO2,10M
15.	solve $2x \equiv 1 \pmod{3}$ , $2x \equiv 2 \pmod{4}$ , $x \equiv 3 \pmod{5}$ using c.r.t	L2, CO2,10M
16.	find the solutions of the congruence's $x \equiv 4 \pmod{11}$ , $x \equiv 3 \pmod{17}$ solve the system of congruences $x \equiv 1 \pmod{3}$ , $x \equiv 2 \pmod{6}$ , $x \equiv 3 \pmod{7}$ by iterative method	L2, CO2,10M
17.	system of congruences $x \equiv 3 \pmod{7}$ , $x \equiv 4 \pmod{11}$ , $x \equiv 5 \pmod{13}$ to solve of congruences using c. r. t . method	L2, CO2,10M
18.	solve the system of liner congruences $3x+4y \equiv 5 \pmod{13}$ , $2x+5y \equiv \pmod{13}$	L2, CO2,10M
19.	Find the solution of the system of linear congruence's $2x+3y \equiv 5 \pmod{7}$ , $x+5y \equiv 6 \pmod{7}$ .	L2,CO2,10M
20.	Find all the solution of the following system of congruence's $x \equiv 4 \pmod{11}$ , $x \equiv 3 \pmod{17}$ .	L2,CO2,10M
21.	Find all the solutions of the system of congruence's $x+y \equiv 1 \pmod{7}$ , $x+z \equiv 2 \pmod{7}$ , $y+z \equiv 3 \pmod{7}$ .	L2,CO2,10M
22.	Find a multiple of 11 that leaves a remainder of 1 when divided by of the integers 2,3,5,and7	L2,CO2,10M
23.	Find the solutions of $3x \equiv 2 \pmod{7}$ .	L2,CO2,10M