Seat No.: \_\_\_\_\_

## Enrolment No.\_\_\_\_\_ GUJARAT TECHNOLOGICAL UNIVERSITY

		M.E –II <sup>st</sup> SEMESTER–EXAMINATION – JULY- 2012	
Subject code: 1722302 Date: 09/07/2012			
Sub	ject	Name: Advance Cryptography and Information Security	
Time: 10:30 am – 13:00 pm Total Marks: 70			
Inst	ruct	tions:	
1	. At	tempt all questions.	
2	. Ma	ake suitable assumptions wherever necessary.	
3	. Flį	gures to the right indicate full marks.	
Q.1	<b>(a)</b>		07
C		(i) Which four types of transformations are needed in AES(Advance encryption standard)?	04
		(ii) Determine how many of the following integers pass the Miller Rabin primality test: 109,271.	03
	<b>(b)</b>		07
		(i) How do attackers spoof e-mail?	04
		(ii) Distinguish between packet filtering firewalls and stateful packet filtering.	03
Q.2	(a)	For the group $G = \langle Z_6, *, x \rangle$ :	07
	()	a. Is it an abelian group?	
		b. Show the result of $5x1$ and $1\frac{1}{5}$	
		c. Show that why division by zero in this group is not a problem.	
	<b>(b)</b>		07
		(1) Are all stream ciphers monoalphabetic? Are all block ciphers	04
		(ii) Compare the permutations in DES and AES Why expansion and	03
		compression permutations in DES and TES. (Thy expansion and compression permutations are needed in DES, but not in AES?	00
	<b>(b)</b>		07
		(i) The encryption key in a transposition cipher is (3,2,6,1,5,4). Find the decryption key.	04
		(ii) Explain pattern matching.	03
03	(a)		07
Q.S	(a)	(i) Find the multiplicative inverse of 38 in $Z_{180}$ using the extended Euclidean algorithm.	07 04
		(ii) Distinguish between Z and $Z_n$ . Which set can have negative integers? How can an integer in Z be mapped to an integer in $Z_n$ ?	03
	(b)	What is password attack in domain controller threats? Write the countermeasures for this.	07
		OR	

Q.3 (a)

- (i) Find all solutions to each of the following linear equations. a.  $3x\equiv 4 \pmod{5}$ b.  $0x\equiv 12 \pmod{7}$
- b.  $9x\equiv12 \pmod{7}$ (ii) Use a Hill Cipher to encipher the message "world". Use the key  $\begin{bmatrix} 03 & 02 \\ 05 & 07 \end{bmatrix}$  03
- (b) What is diffusion and confusion? Explain Fiestel encryption and decryption. 07
- Q.4 (a) Which two criteria are used to validate that a sequence of number is random. 07 Distinguish between Psuedorandom Number generators and cryptographically generated random numbers. Give example.
  - (b) Explain the following two issues of the complexity of the computation required 07 to use RSA.
    - a. Encryption/decryption
    - b. Key generation.

## OR

- Q.4 (a) Prove Fermat's and Euler's theorem. Explain Euler's totient function.
- Q.4 (b) Write the properties needed for a hash function H to be useful for message 07 authentication. Is hash function resistant against birthday attack?
- Q.5 (a)
  (i) What are some threats associated with a direct digital signature scheme?
  (ii) Write a snort rule that will generate an alert when there is NOP instruction in the content. The limit of content matches for NOP instructions is between bytes 40 and 75 of the data portion of a packet.
  - (b) Explain how S-box is constructed in AES? Describe MixColumns and 07 AddRoundKey in AES.
    - OR

- Q.5 (a)
- (i) What is the interpretation of following domain query response in **04** wireshark?
- Domain Name System (response) Benain Name System (response) Ifrequest\_In: 271 [Time: 0.445659000 seconds] Transaction ID: 0x0002 B Flags: 0x8180 (Standard query response, No error) Questions: 1 Answer RRs: 1 Authority RRs: 3 Queries G www.mit.edu: type A, class IN Name: www.mit.edu Type: A (host address) Class: IN (0x0001) Answers @ www.mit.edu: type A, class IN, addr 18.9.22.169 Authoritative nameservers @ mit.edu: type NS, class IN, ns W20NS.mit.edu mit.edu: type NS, class IN, ns STRAWB.mit.edu mit.edu: type NS, class IN, ns STRAWB.mit.edu @ mit.edu: type A, class IN, addr 18.72.0.3 @ W20NS.mit.edu: type A, class IN, addr 18.72.0.3 W STRAWB.mit.edu: type A, class IN, addr 18.71.0.151 STRAWB.mit.edu: type A, class IN, addr 18.71.0.151
- (ii) Write a snort rule that this rule will detect when the SYN and FIN flags **03** are set at the same time.
- (b) What are some approaches to produce message authentication?

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