ROLL NO. ___________________

Code: AC76/AT76   Subject: CRYPTOGRAPHY & NETWORK SECURITY

AMIETE – CS/IT

Time: 3 Hours   **JUNE 2013**   **Max. Marks: 100**

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE: There are 9 Questions in all.

- **Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.**
- **The answer sheet for the Q.1 will be collected by the invigilator after 45 Minutes of the commencement of the examination.**
- **Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

Q.1 Choose the correct or the best alternative in the following: **(2×10)**

a. The residue class is

(A) the set of integers congruent modulo n
(B) the set of all integers such that x = a (mod n).
(C) both **(A)** and **(B)**
(D) none of these

b. What will be the value of -18 mod 14?

(A) -4   **(B)** 10
(C) 4   **(D)** None of these

c. What is the value of $\phi(240)$?

(A) 4   **(B)** 64
(C) 6   **(D)** 16

d. Viruses and ___________ are two examples of software attacks

(A) Bacteria   **(B)** Worms
(C) Bugs   **(D)** Germs

e. Which of the following is not a security goal?

(A) Confidentiality   **(B)** Integrity
(C) Availability   **(D)** Accessibility

f. Expansion for SKEME is:

(A) Software Key Exchange Mechanism
(B) Secure Kernal Exchange Mechanism
(C) Secure Key Extended Mechanism
(D) none of these

g. ______ is the simplest and least efficient algorithm to find the factors of a positive integer in which all positive integers, starting with 2, are tried to find one that divides n

(A) Trial division factorization method
(B) Bruteforce
(C) 3DES
(D) SHA

h. MIME stands for

(A) Multipurpose Internet Mail Extensions
(B) Multiple Internet Merge Extensions
(C) Multipurpose Internal Mail Extensions
(D) None of these

i. SSL provides services such as

(A) fragmentation and compression **(B)** message integrity and confidentiality
(C) framing **(D)** all of these

j. Needham-Schroeder protocol is an example of

(A) Public-key distribution **(B)** Symmetric key distribution
(C) KERBEROS **(D)** none of these

Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

Q.2 a. What are Passive Attacks? Why are they difficult to detect? Name some passive attacks. **(8)**

b. Distinguish between cryptography and steganography. **(4)**

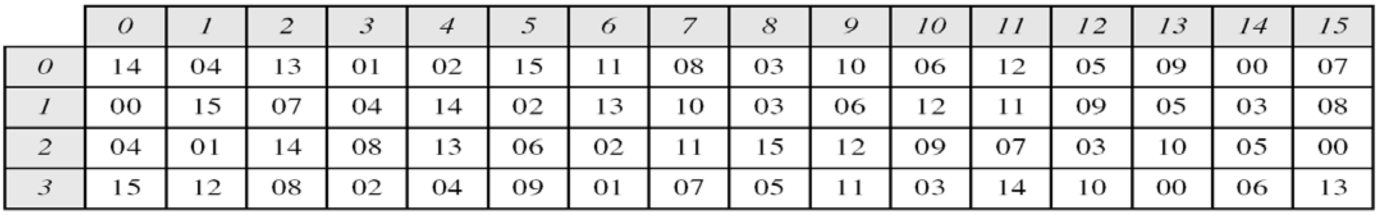
c. Is 97 a prime? How do you check for primeness of a number? **(4)**

Q.3 a. Draw a diagram for depicting general idea of a symmetric-key cipher. **(5)**

b. Write a note on Multiplicative Ciphers. What is the key domain for any multiplicative cipher? **(5)**

c. Suppose that we have a block cipher where n = 64. If there are 10 1's in the ciphertext, how many trial-and-error tests does Eve need to do to recover the plaintext from the intercepted ciphertext in each of the following cases? **(6)**
(i) The cipher is designed as a substitution cipher.
(ii) The cipher is designed as a transposition cipher.

Q.4 a. The input to S-box 1 (the table below) is 100011. What is the output? **(4)**



	0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*
0	14	04	13	01	02	15	11	08	03	10	06	12	05	09	00	07
1	00	15	07	04	14	02	13	10	03	06	12	11	09	05	03	08
2	04	01	14	08	13	06	02	11	15	12	09	07	03	10	05	00
3	15	12	08	02	04	09	01	07	05	11	03	14	10	00	06	13

b. Mention any eight properties of S-boxes. **(8)**

c. What is the probability of randomly selecting a weak, a semi-weak or a possible weak key in DES? **(4)**

Q.5 a. What are the different modes of operation designed to be used with modern block ciphers? Describe any four. **(8)**

b. Draw a diagram to depict encryption, decryption and key generation in RSA, cryptosystem. Describe the security of this system. **(8)**

Q.6 a. Explain the meaning of "Document & Finger print" and "Message & Message Digest". What's the difference between the 2 pairs? **(6)**

b. Explain Davies Meyer scheme with diagram. **(5)**

c. What kind of compression function is used in SHA-512? Explain. **(5)**

Q.7 a. What are the differences between conventional signatures and digital signatures? Write a note on "Attacks on digital signature". **(8)**

b. What is Public-Key Infrastructures (PKI)? List some duties of a PKI. **(8)**

Q.8 a. If e-mail is one-time activity, how can the sender and receiver agree on a cryptographic algorithm to use for e-mail security? If there is no session and no handshaking to negotiate the algorithms for encryption/decryption and hashing, how can the receiver know which algorithm the sender has chosen for each purpose? **(8)**

b. Let us assume that Alice has only two user IDs, alice@some.com and alice@anet.net. We also assume that Alice has two sets of private/public keys, one for each user ID. Please draw the private key ring table for Alice. **(4)**

c. Explain the need for Key Revocation. How it is done? **(4)**

Q.9 a. "SSL differentiates a connection from a session". Elaborate through a diagram. **(8)**

b. What are the four phases in a handshake protocol? Draw a diagram to elaborate four cases in phase II. **(8)**