SIDDAGANGA INSTITUTE OF TECHNOLOGY, TUMKUR-572103

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CRYPTOGRAPHY AND NETWORK SECURITY LAB (7CSL02)

Student Name:	USN:	Date:	Batch No:

Evaluation:

Write Up (10 marks)	Clarity in concepts (10 marks)	Implementation and execution of the algorithms (10 marks)	Viva (05 marks)	Total (35 marks)

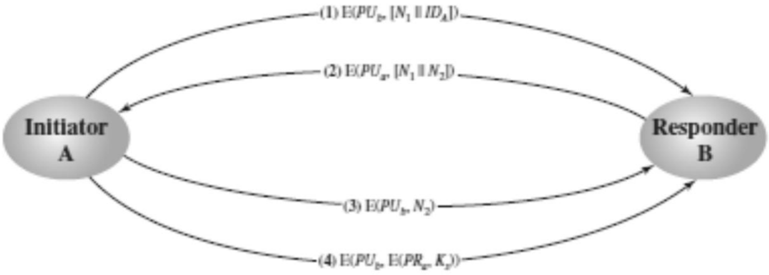
Sl.No	Name of the Faculty In-Charge	Signature
1.		
2.		

Question No: 12

Implement RSA algorithm using client-server concept. Using this illustrate secret key distribution scenario with confidentiality and authentication. The program should support the following :

i. Both client and server generate {PU, PR} and distribute PU to each other.

ii. Establish a secret key K between client and server by exchanging the messages as shown in below figure.

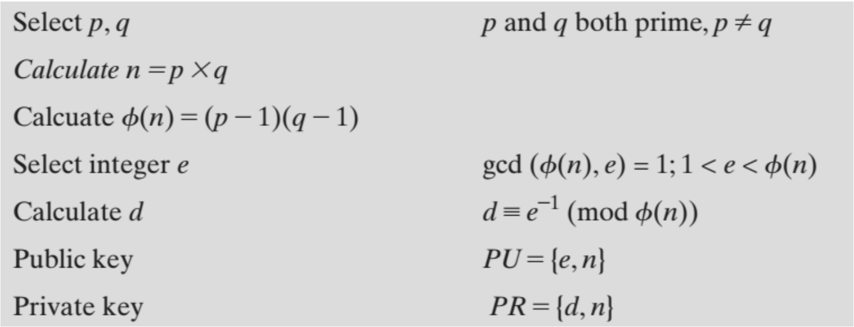


(1) $E(PU_b, [N_1 \| ID_A])$
(2) $E(PU_a, [N_1 \| N_2])$
Initiator A
Responder B
(3) $E(PU_b, N_2)$
(4) $E(PU_b, E(PR_a, K_s))$

[CO4,PO1 to PO4,PO9]

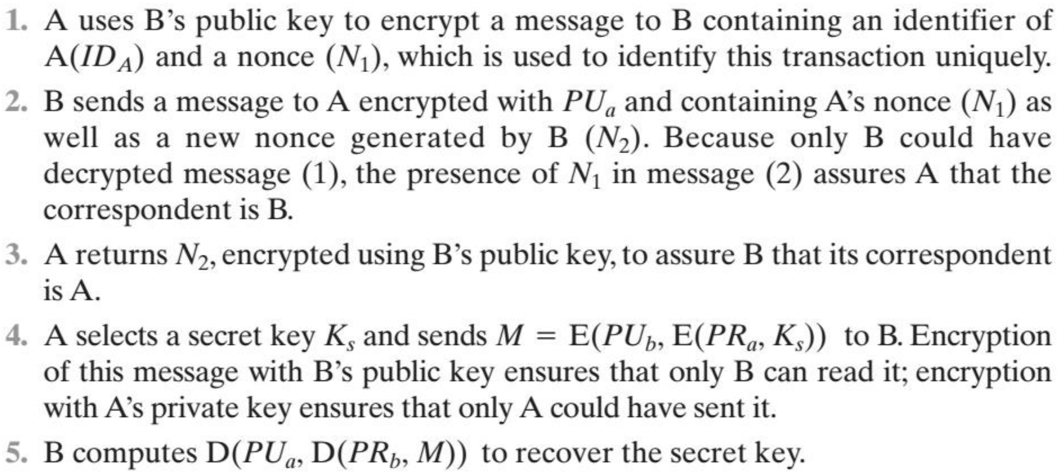
Algorithm:

i. Both client and server generate {PU, PR} and distribute PU to each other.



Select p, q	p and q both prime, $p \neq q$
Calculate $n = p \times q$	
Calcuate $\phi(n) = (p-1)(q-1)$	
Select integer e	$\gcd(\phi(n), e) = 1; 1 < e < \phi(n)$
Calculate d	$d \equiv e^{-1} \pmod{\phi(n)}$
Public key	$PU = \{e, n\}$
Private key	$PR = \{d, n\}$

ii. Establish a secret key K between client and server by exchanging the messages as shown in below figure.



1. A uses B's public key to encrypt a message to B containing an identifier of A(ID_A) and a nonce (N_1), which is used to identify this transaction uniquely.
2. B sends a message to A encrypted with PU_a and containing A's nonce (N_1) as well as a new nonce generated by B (N_2). Because only B could have decrypted message (1), the presence of N_1 in message (2) assures A that the correspondent is B.
3. A returns N_2, encrypted using B's public key, to assure B that its correspondent is A.
4. A selects a secret key K_s and sends $M = \mathrm{E}(PU_b, \mathrm{E}(PR_a, K_s))$ to B. Encryption of this message with B's public key ensures that only B can read it; encryption with A's private key ensures that only A could have sent it.
5. B computes $\mathrm{D}(PU_a, \mathrm{D}(PR_b, M))$ to recover the secret key.