

Course code	Course Name	L-T-P Credits	Year of Introduction
CS409	CRYPTOGRAPHY AND NETWORK SECURITY	3-0-0-3	2016
<b>Course Objectives:</b> <ul style="list-style-type: none"> <li>To introduce fundamental concepts of symmetric and asymmetric cipher models.</li> <li>To introduce fundamental concepts of authentication.</li> <li>To introduce network security and web security protocols.</li> </ul>			
<b>Syllabus:</b> Symmetric Cipher Models - Differential and linear Cryptanalysis- Block Cipher Design principles- Primitive operations- Key expansions- Inverse Cipher- Principles of Public key Cryptography Systems - Authentication functions- Message authentication codes- Hash functions- Digital signatures- Authentication protocols- Network security - Web Security - secure Socket Layer and Transport layer Security- Secure electronic transaction –Firewalls.			
<b>Expected Outcome:</b> The Students will be able to : <ol style="list-style-type: none"> <li>summarize different classical encryption techniques</li> <li>identify mathematical concepts for different cryptographic algorithms</li> <li>demonstrate cryptographic algorithms for encryption/key exchange</li> <li>summarize different authentication and digital signature schemes</li> <li>identify security issues in network, transport and application layers and outline appropriate security protocols</li> </ol>			
<b>Text Books:</b> <ol style="list-style-type: none"> <li>Behrouz A. Forouzan, Cryptography and Network Security, Tata McGraw-Hill. 2010</li> <li>William Stallings, Cryptography and Network Security, Pearson Education, 2014</li> </ol>			
<b>References:</b> <ol style="list-style-type: none"> <li>B. Schneier , Applied Cryptography, Protocols, Algorithms, and Source Code in C, 2 nd Edn, Wiley, 1995.</li> <li>Charlie Kaufman, Radia Perlman, Mike Speciner, Network Security, PHI, 2002</li> </ol>			
<b>Course Plan</b>			
Module	Contents	Hours	End Sem. Exam Marks
I	Symmetric Cipher Models- Substitution techniques- Transposition techniques- Rotor machines-Steganography. Simplified DES- Block Cipher principles- The Data Encryption Standard, Strength of DES- Differential and linear Cryptanalysis. Block Cipher Design principles- Block Cipher modes of operations.	7	15 %
II	IDEA: Primitive operations- Key expansions- One round, Odd round, Even Round- Inverse keys for decryption. AES: Basic Structure- Primitive operation- Inverse Cipher- Key Expansion, Rounds, Inverse Rounds. Stream Cipher –RC4.	7	15 %
<b>FIRST INTERNAL EXAM</b>			

<b>III</b>	Public key Cryptography: - Principles of Public key Cryptography Systems, Number theory- Fundamental Theorem of arithmetic, Fermat's Theorem, Euler's Theorem, Euler's Totient Function, Extended Euclid's Algorithm, Modular arithmetic. RSA algorithm- Key Management - Diffie-Hellman Key Exchange, Elliptic curve cryptography	7	15 %
<b>IV</b>	Authentication requirements- Authentication functions- Message authentication codes- Hash functions- SHA -1, MD5, Security of Hash functions and MACs- Authentication protocols-Digital signatures-Digital signature standards.	7	15 %
<b>SECOND INTERNAL EXAM</b>			
<b>V</b>	Network security: Electronic Mail Security: Pretty good privacy-S/MIME. IP Security: Architecture- authentication Header- Encapsulating Security payload- Combining Security associations- Key management.	7	20 %
<b>VI</b>	Web Security: Web Security considerations- secure Socket Layer and Transport layer Security- Secure electronic transaction. Firewalls-Packet filters- Application Level Gateway- Encrypted tunnels.	7	20 %
<b>END SEMESTER EXAM</b>			

**Question Paper Pattern (End semester exam)**

1. There will be **FOUR** parts in the question paper – **A, B, C, D**
2. **Part A**
  - a. **Total marks : 40**
  - b. **TEN** questions, each have **4 marks**, covering **all the SIX modules (THREE** questions from **modules I & II; THREE** questions from **modules III & IV; FOUR** questions from **modules V & VI)**. **All** questions have to be answered.
3. **Part B**
  - a. **Total marks : 18**
  - b. **THREE** questions, each having **9 marks**. One question is from **module I**; one question is from **module II**; one question **uniformly** covers **modules I & II**.
  - c. **Any TWO** questions have to be answered.
  - d. Each question can have **maximum THREE** subparts.
4. **Part C**
  - a. **Total marks : 18**
  - b. **THREE** questions, each having **9 marks**. One question is from **module III**; one question is from **module IV**; one question **uniformly** covers **modules III & IV**.
  - c. **Any TWO** questions have to be answered.
  - d. Each question can have **maximum THREE** subparts.
5. **Part D**
  - a. **Total marks : 24**
  - b. **THREE** questions, each having **12 marks**. One question is from **module V**; one question is from **module VI**; one question **uniformly** covers **modules V & VI**.
  - c. **Any TWO** questions have to be answered.
  - d. Each question can have **maximum THREE** subparts.
6. There will be **AT LEAST 60%** analytical/numerical questions in all possible combinations of question choices.