SCHEME OF EXAMINATION

&

SYLLABI

for

Master of Technology
(Information Security)
Regular Programme

GURU GOBIND SINGH
INDRAPRASTHA
UNIVERSITY

Guru Gobind Singh Indraprastha University
Dwarka, Delhi – 110075 [INDIA]
www.ipu.ac.in

SCHEME OF EXAMINATION

M.Tech. (Information Security)

Regular Programme

FIRST SEMESTER EXAMINATION

Code No.	Paper	L	T/P	Credits
Theory Papers				
MEIS-601	Advance Computer Network	4	-	4
MEIT-603	Introduction to Computer Security	4	-	4
MEIS 605	Cryptography Foundation and its Applications	4	-	4
Electives (Choose any TWO)				
MECS 607	Advanced Operating System	4	-	4
MEIS 609	Decision Support Systems & Methods	4		4
MEIS 611	Internet Technologies & Applications	4	-	4
MEIS 613	Game Theory & Its Applications	4	-	4
MEIS 615	Network security and applications	4		4
MEEC-613	Mathematical Statistics and Data Analysis	4		4
Practical's / Viva Voce				
MEIS 651	Security Lab-I	-	2	1
MEIS 653	Security Lab-II	-	2	1
MEIS 655	Security Lab-III	-	2	1
MEIS-657*	Term Paper - I			2
	Total	**20**	**6**	**25**

*** NUES: Non University Examination**

SCHEME OF EXAMINATION

M.Tech. - (Information Security)

Regular Programme

SECOND SEMESTER EXAMINATION

Code No.	Paper	L	T/P	Credits
Theory Papers				
MECS-604	Advanced Database Management System	4	-	4
MECS-602	Object Oriented Analysis and Design	4	-	4
MEIS 604	Security Testing	4	-	4
Electives (Choose any TWO)				
MEIS 606	Information Security and Risk Management	4	-	4
MEIS 608	Technical Foundation for E - Commerce	4	-	4
MEIS 612	Intrusion Detection and Information Warfare	4	-	4
MEIT 604	Advanced Software Project Management	4		4
MEIS 618	Real Time Systems	4		4
Practicals/Viva Voce				
MEIS 652	Security Lab-IV		2	1
MEIS 654	Security Lab-V	-	2	1
MEIS-656	Security Lab-VI	-	2	1
MEIS-658*	Term Paper II			2
Total		**20**	**6**	**25**

***Non University Exam System**

SCHEME OF EXAMINATION

M.Tech. (Information Security)

Regular Programme

THIRD SEMESTER EXAMINATION

Code No.	Paper	L	T/P	Credits
Theory Papers				
MEIS 701	Mobile & Wireless Network Security	4	-	4
MECS 717	Cyber Crime Investigation & Cyber Forensics	4	-	4
Electives (Choose any Three)				
MECS 701	Data Warehouse and Data Mining	4		4
MEIS 705	Biometric Security	4	-	4
MEIS 707	Strategic Computing & Communication Technology	4	-	4
MEIS 709	Quantum Information processing	4	-	4
MEIS 711	Digital Defense: Issues in Security	4	-	4
MEIS 713	Cyber laws	4	-	4
MEIS 715	Financial Mathematics	4	-	4
MECS 705	Cloud Computing	4		4
MEIS 719	Security issues in Information Systems	4		4
Practical's/Viva Voce				
MEIS 751	Security Lab-VII		2	1
MEIS 753	Security Lab-VIII	-	2	1
MEIS-755*	Term Paper-III	-	2	2
MEIS-757	Minor Project		-	4
MEIS-759	Lab based on Electives		-	1
Total		**20**	**6**	**29**

***Non University Exam System**

SCHEME OF EXAMINATION

M.Tech. - (Information Security)

Regular Programme

FOURTH SEMESTER EXAMINATION

Code No.	Paper	L	T/ P	Credits
MEIS-752	Dissertation	-	-	24
MEIS-754*	Seminar	-	-	4
MEIS-756*	Term Paper -IV	-	-	2
Total		-	-	**30**

***Non University Exam System**

NOTE:

1. The total number of credits of the Programme M. Tech. = 108.
2. Each student shall be required to appear for examination in all courses, But for the award of the degree a student shall be required to earn the minimum of 100 credits out of 108. However only Elective Courses and Term papers may be dropped towards counting for total credits of 100 to award M. Tech. Degree.

INSTRUCTIONS TO PAPER SETTERS:	Maximum Marks : 60
1. Question No. 1 should be compulsory and cover the entire syllabus and will be of 20 marks. 2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks	

Detailed Syllabus

Semester-I

Paper code: MEIS-601 L T P
Paper: Advance Computer Network 3 1 0

UNIT-I

Introduction to Network models-ISO-OSI, SNA, Appletalk and TCP/IP models. Review Of Physical layer and Data link layers. Review of LAN (IEEE 802.3, 802.5, 802.11b/a/g, FDDI) and WAN (Frame Relay, ATM, ISDN) standards.

UNIT-II

Network layer
ARP, RARP, Internet architecture and addressing, internetworking, IPv4, overview of IPv6, ICMP, Routing Protocols- RIP, OSPF, BGP, IP over ATM.
Transport layer
Design issues, Connection management, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), Finite state machine model.

UNIT-III

Application layer
WWW, DNS, e-mail, SNMP, RMON
Network Security: Cryptography, Firewalls, Secure Socket Layer (SSL) and Virtual Private Networks (VPN).

UNIT- IV

Case study
Study of various network simulators, Network performance analysis using NS2

Text Books/ References:

1. Behrouz A. Forouzan, "TCP/IP Protocol Suit", TMH, 2000.
2. Tananbaum A. S., "Computer Networks", 3rd Ed., PHI, 1999.
4. Black U, "Computer Networks-Protocols, Standards and Interfaces", PHI, 1996.
5. Stallings W., "Data and Computer Communications", 6th Ed., PHI, 2002.
6 Stallings W., "SNMP, SNMPv2, SNMPv3, RMON 1 & 2", 3rd Ed., Addison Wesley, 1999.
7. Laurra Chappell (Ed), "Introduction to Cisco Router Configuration", Techmedia, 1999.

Paper code: MEIT-603 L T P
Paper: Introduction to Computer Security 3 1 0

UNIT-I

Overview of computer security: threats, vulnerabilities, controls, risk, confidentiality, integrity, availability, security policies, security mechanisms, prevention, detection, deterrence, Malicious code, viruses, Trojan horses, worms

UNIT-II

Basic Cryptography: Stream and block ciphers, Encryption, Classical cryptosystems, symmetric cryptography, asymmetric cryptography, Digital Signature, Digital certificates, Message digests and authentication codes

UNIT-III

Database Security: Security and privacy requirements, reliability, integrity, and privacy, inference data mining, k-anonymity.
Security in conventional operating systems: Memory, time, file, object protection requirements and techniques, Protection in contemporary operating systems

UNIT-IV

Network security: eavesdropping, spoofing, modification, denial of service attacks, network security techniques: firewalls, virtual private networks, Intrusion detection, techniques to provide privacy in Internet applications and protecting digital content from unintended use.
Management of security: Security policies, Risk analysis, Physical threats and controls
Legal aspects of security, Privacy and ethics

Text Books/ References:

1. William Stallings, "Cryptography and Network Security: Principles and Practice" (5th Edition), Pearson,2011
2. Atul kahate, "Cryptography and Network Security" , Tata McGraw Hill,2004
3. Tulloch, M, "Microsoft Encyclopedia of Networking" , Prentice Hall of India, 2001
4. Matt Bishop, "Introduction to Computer Security", Addison-Wesley, 2005
5. Michael T. Goodrich and Roberto Tamassia ,"Introduction to Computer Security", Addison Wesley, 2010

Paper code: MEIS-605 L T P
Paper: Cryptography foundations and its Applications 3 1 0

UNIT-I

Theory, foundations, and applications of modern cryptography. Steganography. One-way functions; pseudo-randomness and random number generators

UNIT-II

Encryption; authentication; symmetric cryptography, asymmetric cryptography; public-key cryptosystems; digital signatures, message authentication codes

UNIT-III

Remote user authentication, notions of security; zero knowledge/ interactive proofs, multi-party cryptographic protocols, key exchange and applications.

UNIT-IV

Cryptanalysis of cryptographic primitives and protocols, such as by side-channel attacks, differential cryptanalysis, or replay attacks; and cryptanalytic techniques on deployed systems etc.

Text Books/References:

1. Kahate, Atul, "Cryptography and Network Security." Tata McGraw Hill, 2007.
2. Delfs, Hans, "Introduction to cryptography." Springer, 2004.
3. Cryptography and Network Security by Stalling, PHI
4. Cryptography by Behrouz A. Forouzan,TMH
5. Cryptography & security services, Mechanism & application by Mogollon, Manuel, Cyber tech. Pub.
6. Cryptography and hardware security By Stalling, W PHI.

Paper code: MECS-607 L T P

Paper: Advanced Operating System 3 1 0

UNIT-I

Comparative study of OS; UNIX, Multics

UNIT-II

Unix File System – Measurements, The Log – Structured File System, Server less Network File systems The Coda File system

UNIT-III

AFS, Virtual Memory, User-Level Virtual Memory, Software Fault Isolation, On-Demand Distillation, X-Kernel, Active Messages, Global Network Scheduling, Network Optimization, Synchronization, Scheduling

UNIT-IV

Extensible Operating Systems, Issues of Security in OS, Cryptographic file systems.

Text Books/References:

1. A. S. Tannenbaum, "Operating System Concept", Addition Wesley, 2002
2. Silbershatz and Galvin, "Operating System Concept", Addition Wesley, 2002.
3. Charles Crowley, "Operating Systems", Tata McGraw-Hill Edition
4. Branch Hansen, P., Operating Systems Principles, Prentice-Hall, 1973
5. Tannenbaum, A.S., "Modern Operating System" ,Pearson, 2007

Paper code: MEIS-609 L T P
Paper: Decision Support Systems and Methods 3 1 0

Unit-I

Introduction to decision support systems (DSS), decisions and decision makers, decisions in the organization, modeling decisions processes.

Unit-II

Group decision support systems and groupware technologies, DSS architecture, hardware and operating system platforms

Unit-III

Expert systems and artificial intelligence, Introduction to data warehousing.

Unit-IV

Introduction to Data Mining, DSS software tools, building and implementing DSS.

Text Books/ References

1. Adelman, L. Evaluating Decision Support and Expert Systems. New York, NY: John Wiley & Sons, 1992.
2. Alter, S. Decision Support Systems: Current Practice and Continuing Challenges. Reading, Mass.: Addison-Wesley Pub., 1980.
3. Bigdoli, H. Decision Support Systems: Principles and Practices. St.Paul, MN: West Publishing, 1989
4. Mallach, E.G., Decision Support and Data Warehouse Systems", Tata McGraw Hill, 2006
5. Markas, G.M., "Decision Support Systems in the 21st Century", Pearson, 2005.
6. Burstein, Frada; Holsapple, Clyde W., Handbook on Decision Support System, Springer, 2008

Paper code: MEIS-611 L T P
Paper: Internet Technologies & Applications 3 1 0

UNIT-I

Web 2.0: search, content networks, user-generated content, blogging, social networking, social media, tagging, social bookmarking, rich Internet applications, web services, location-based services. Web 2.0 monetization and business models. Evaluation of web applications, future of the Web.

UNIT-II

Extensible Hypertext Markup Language (XHTML): XHTML syntax, headings, linking, images, special characters and horizontal rules, lists, tables, forms, internal linking, meta elements.

UNIT-III

Cascading Style Sheets (CSS): separation of content and presentation, inline styles, embedded style sheets, conflMEing styles, kinking external style sheets, positioning elements, backgrounds, element dimensions, box model and text flow, media types, building a CSS drop-down menu, user style sheets.

UNIT-IV

JavaScript: client side scripting, control statements, functions, arrays, objects, events.
Document object model: objects and collections. Extensible Mark up Language (XML) and RSS: Advantages and applications, structuring data, XML namespaces, Document Type Definitions (DTDs), XML vocabularies, RSS.

Text Books/References:

1. Deitel H.M. and P. J. Deitel, Internet & World Wide Web. How to Program, 4/e, Prentice Hall, ISBN 0131752421, 2008
2. Freire.M., "Internet Technology & Applications" ,CRC Press-2008
3. Chris Bates, "Web Programing Building Internet Applications", 2nd Edition, WILEY, Dreamtech

Paper code: MEIS-613 L T P

Paper: Game theory and its applications 3 1 0

UNIT-I

Simple Decision Models: Optimization, making decisions, Modeling Rational Behavior, Modeling Natural Selection, Optimal Behavior. Simple Decision Process: Decision Trees, Strategic Behavior, Randomizing Strategies, Optimal Strategies, Markov

UNIT-II

Markov Decision Process, Static Games: Interactive decision Problems, Describing static Games, Solving Games using Dominance, Nash Equilibria, Existence of Nash Equilibria, Walsarian and other equilibria, Analysis of optimal strategies

UNIT-III

Finite Dynamic Games: Game trees, Information sets, Behavior Strategies, Sub Game perfection, Nash Game Equilibrium Refinements

UNIT-IV

Games with continuous strategies Sets: Infinite strategy sets, The Cournot Duopoly Model, Infinite Dynamic Games: Repeated Games, Iterated Prisoners Dilemma, Folk Theorems

Text Books/References:

1) James N. Webb, "Game Theory: Decision, Interaction and Evolution", Springer International Edition-2007, London
2) Andrew M. Colman, "Game theory and its applications " .
3) Eric Rasmusen, "Games and information: an introduction to game theory ,"Mathematics - 2001
4) William F. Lucas, "Game theory and its applications", American Mathematical Society - Mathematics – 1981
5) Elliott Mendelson, "Introducing game theory and its applications", Mathematics - 2004

Paper code: MEIS-615 L T P
Paper: Network Security and Applications 3 1 0

Unit-I

Fundamentals and Building Security: Overview of networking security, ITU's Recommendation, X.800, OSI model, Symmetric cryptography, Public-key cryptography, Model of network security process, Defining security zones, Secure Routing, Secure LAN switching.

Unit-II

Network Security Applications: Authentication applications, E-mail security, IP security, Web security, Network Management security, System Security, Device security, Intruders, Malicious software.

Unit-III

Optical Network Security: Firewalls, VPN, IEEE 802.1x protocol, NAT and security, Opto-electronic networks, Components: fibers, amplifiers, Couplers, Isolators & Circulators, Switches, Wavelength selective switches (WSSs).

Unit-IV

QoS, Security architectures, Physical security, Vulnerabilities and attacks, Service disruption (SD), Tapping, Jamming, Reaction to attacks.

Text Books/References:

1) William Stallings, Network Security Essentials (2nd edition), Prentice Hall, 2003, (ISBN: 0130351288)
2) Saadat Malik, Saadat Malik, Network Security Principles and Practices (CCIE Professional Development), Pearson Education, 2002, (ISBN: 1587050250)
3) Sivcalingam, Kirshna, M, "Emerging Optical Network Technologies", Springer -2004
4) Rama Sawamai, Rajeev, "Optical Networks" , Elesvier -2006
5) Senior J., optical fiber communications, principles & practice, PHI.
6) William B. Jones jr., Introduction to optical fiber communication systems, Holt, Rinehart and Winston, Inc.

Paper code: MEEC-613 L T P

Paper: Mathematical Statistics and Data Analysis 3 1 0

Unit-I

Introduction
The basic goal of statistics: draw conclusions based on data. Various aspects of statistics ranging from formulating the question, designing experiments to address the question, collecting the data, and analyzing the data. Random sample drawn from a parameterized family of distributions. Review of Probability: Sample spaces and events, Kolmogorov's axioms, principles of combinatorics including permutations and combinations, conditional probability and independence, Bayes' theorem, random variables, probability mass functions for discrete random variables, probability density functions for continuous random variables, cumulative distribution functions, expected value, mean and variance of a distribution, selected discrete and continuous distributions.

Unit-II

Collecting Data: Types of statistical studies, observational studies, basic sampling designs, Summarizing and Exploring Data, Sampling Distributions of Statistics: Sampling Distribution of the Sample Mean, Sampling Distribution of the Sample Variance, Student's t-distribution, Snedecor-Fisher's F-distribution

Unit-III

Basic Concepts of Inference: Point Estimation, Maximum Likelihood Estimation, Confidence Interval Estimation, Hypothesis Testing, Likelihood Ratio Tests; Inferences for Single Samples: Inferences on Mean (Large Samples), Inferences on Mean (Small Samples), Inferences on Variance (if time permits)

Unit-IV

Simple linear regression and correlation: The least squares method, The model for simple linear regression, Fitting a line, goodness of fit, Statistical inference with the simple linear regression model, predMEion and confidence intervals, Regression diagnostics. Multiple linear regression, The model for multiple linear regression, Goodness of fit, multiple correlation coefficient, Arrays, matrices, and linear algebra for multiple linear regression, Statistical inference for multiple regression, ANOVA tables , Introduction to Bayesian Inference, Principles of Bayesian statistics, The Bernoulli process, The Poisson process, The normal process.

Textbook:

1. *Statistics and Data Analysis* by Ajit C. Tamhane and Dorothy D. Dunlop, Prentice-Hall, 2000, ISBN 0-13-744426-5.

Paper code: MEIS-651	**L T P**
Paper: Security Lab –I	**0 0 4**

40 marks: internal evaluation	60 marks: external evaluation

Lab will be according to the course of Advance Computer Network

Paper code: MEIS-653	L T P
Paper: Security Lab –II	0 0 4

40 marks: internal evaluation	60 marks: external evaluation

Lab will be according to the course of Introduction to Computer Security.

PRACTICALS

Paper: Code MEIS-655 Paper: Security Lab –III	L T P 0 0 4

40 marks: internal evaluation	60 marks: external evaluation

Lab will be according to the course of Cryptography foundations and its Applications

Paper code: MEIS-657*
Paper: Term paper-I

Total credit
2

100 marks: internal evaluation