PANJAB UNIVERSITY
CHANDIGARH

SCHEME AND SYLLABUS
FOR
MASTER OF ENGINEERING
REGULAR PROGRAMME
IN
INFORMATION TECHNOLOGY
FROM
1st TO 4th SEMESTER

Examination 2017-18
## Scheme of Evaluation (Semester-wise) 2017-18
### M.E. (INFORMATION TECHNOLOGY)

Scheme of Examination for M.E. in Information Technology for examination 2017-18.

### First Semester:

<table>
<thead>
<tr>
<th>S. No</th>
<th>Subject Code</th>
<th>Subject Name</th>
<th>L-T-P</th>
<th>Contact hrs/wee k</th>
<th>Credits</th>
<th>Marks</th>
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<td>Theory</td>
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<td>Internal Assessment</td>
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<tr>
<td>1</td>
<td>MEIT 111</td>
<td>Advanced Algorithm Analysis</td>
<td>3-0-2</td>
<td>5</td>
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<td>2</td>
<td>MEIT 112</td>
<td>Object Oriented Analysis And Design</td>
<td>4-0-0</td>
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<td>3</td>
<td>MEIT 113</td>
<td>Advanced Digital Signal Processing</td>
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<td>4</td>
<td>MEIT 114</td>
<td>Wireless &amp; Mobile Comm.</td>
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<td>5</td>
<td>MEIT 115</td>
<td>Information Security</td>
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<tr>
<td>6</td>
<td>MEIT 116</td>
<td>Research Seminar-I</td>
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* Practical marks are for continuous and end semester evaluation

**Total Marks:** 750  
**Total Credits:** 21

### Second Semester:

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<tr>
<th>S. No</th>
<th>Subject Code</th>
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<td>Internal Assessment</td>
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<tr>
<td>1</td>
<td>MEIT 211</td>
<td>Agile Software Development</td>
<td>3-0-2</td>
<td>5</td>
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<td>MEIT 212</td>
<td>Multimedia Systems</td>
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<td>3+1</td>
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<td>Research Seminar-II</td>
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* Practical marks are for continuous and end semester evaluation

**Total Marks:** 750  
**Total Credits:** 21
Elective-I
(MEIT 214) Research Methodology
(MEIT 215) Advances in Soft Computing
(MEIT 216) Theory of Computation

Elective -II
(MEIT 217) Software Testing and Quality Management
(MEIT 218) HRD and Training Methods
(MEIT 219) Advanced Digital Image Processing

Third Semester:

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<th>S. No.</th>
<th>Subject Code</th>
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<th>Marks</th>
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<td>Project-based Thesis Work –I</td>
<td>0-0-20</td>
<td>20</td>
<td>10</td>
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</tbody>
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* Practical marks are for continuous and end semester evaluation

Total Marks: 300
Total Credits = 18

Elective-III
(MEIT 311) Network Management and Security
(MEIT 312) User Interface Design
(MEIT 313) Cloud Computing

Elective-IV
(MEIT 314) Big Data and Analytics
(MEIT 315) Advanced Data Mining
(MEIT 316) Advanced Computer Networks

Fourth Semester:

<table>
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<tr>
<th>S. No.</th>
<th>Subject Code</th>
<th>Subject Name</th>
<th>L-T-P</th>
<th>Credits</th>
<th>Practical Marks</th>
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<td>Internal Assessment</td>
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<td>MEIT 411</td>
<td>Thesis Work – II</td>
<td>0-0-30</td>
<td>15</td>
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Total marks: 200
Credits = 15
**Guidelines for thesis grading in internal assessment:**

<table>
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<tr>
<th>S.No.</th>
<th>Grade</th>
<th>Condition</th>
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<td>1.</td>
<td>A+</td>
<td>Publication from Thesis in SCI indexed journal.</td>
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Total marks: 2000  
Credits = 75
MASTER OF ENGINEERING IN INFORMATION TECHNOLOGY

First Semester

Subject Name: Advanced Algorithm Analysis  
Subject Code: MEIT 111  Max. Marks: 50  Time: 3 hours  
Course Duration: 45 lectures of one hour each.

Note: The examiner shall set seven questions of equal marks. First question is compulsory and shall cover the whole syllabus by including questions of conceptual nature. Rest of the syllabus will be divided into A and B parts having three questions each.

Part A

Algorithms Complexity and Analysis:  

Divide and Conquer algorithms and Greedy Algorithms  
Introduction, Quick sort, Strassen’s multiplication, Knapsack problem, Minimum spanning tree, Single source shortest path algorithm and their performance analysis.

Dynamic Programming  
Introduction, 0/1 Knapsack problem, Multistage graph problem, All pair shortest paths.

Part B

Linear Programming  
Standard and Slack forms, Formulating problems as linear programs, simplex algorithm, representation of polynomials, DFT and FFT.

Probabilistic Analysis  

Online Algorithms  
Introduction, Online Paging Problem, k-server Problem.

Approximation algorithms  
Need of approximation algorithms: Introduction to P, NP, NP-Hard and NP-Complete; Deterministic, non-Deterministic Polynomial time algorithms.

Text Books
1. Cormen, Leiserson, Rivest and Stein,” Introduction to Algorithms”, PHI.

References

Practical Task: Internal Assessment Marks: 50
Practical based on theory

Subject Name: Object Oriented Analysis And Design
Subject Code: MEIT 112
Max. Marks: 50
Time: 3 hours
Course Duration: 45 lecturers of one hour duration each

Note: The examiner shall set seven questions of equal marks. First question is compulsory and shall cover the whole syllabus by including questions of conceptual nature. Rest of the syllabus will be divided into A and B parts having three questions each.

Part A
Object Modeling (5)
Objects and classes, Links and Associations, Generalisation and Inheritance, Aggregation, Abstract Classes, Metadata, Candidate Key, Constraints.

Dynamic Modeling (5)
Events and States, Operations, Concurrency, Advanced dynamic modeling concepts,

Functional Modeling (5)
Functional Models, Data Flow Diagrams

Design Methodology: Analysis (5)

System Design (5)
Layers, Partitions, Identifying Concurrency, allocating subsystems to processors and tasks, management of data stores, handling global resources, choosing software control implementation, handling boundary conditions, setting trade off priorities

Part - B
Object Design (5)
Steps in Object Design, designing algorithm, design optimization, implementation of control, adjustment of inheritance, design of associations, object representation, physical packaging

Object Oriented Languages (5)
Class definitions, Creating Objects, Calling Operations, using Inheritance, implementing Associations, Object Oriented Language features
Non Object Oriented Languages  (5)

Relational Databases  (5)
DBMS concepts, Relational DBMS concepts, Relational Database Design, Advanced Relational DBMS

Recommended Books

Subject Name: Advanced Digital Signal Processing
Subject Code: MEIT 113  Max. Marks: 50  Time: 3 hours

Course Duration: 45 lectures of one hour each.
Note: The examiner shall set seven questions of equal marks. First question is compulsory and shall cover the whole syllabus by including questions of conceptual nature. Rest of the syllabus will be divided into A and B parts having three questions each.

Part A

Transformations:  (12)

Design of Digital Filters:  (12)
(a) Finite Impulse Response (FIR) filter-Basic design steps, advantages and disadvantages-Design Techniques: Windowing & Frequency sampling.

Part B

Digital Filter Structures:  (06)
Structure of digital filter realizations-Basic FIR & IIR structures (Direct Form I and II), Cascade form, Parallel form.
Introduction of Multi-rate Digital Signal Processing: (07)
Sampling rate conversion, decimation and interpolation, Digital Filter Banks, Implementation of narrowband lowpass filters, Subband Coding of speech signals.

Introduction of Adaptive Filters: (08)
System modeling, Adaptive direct form FIR filters, LMS algorithm, Overview of adaptive filter applications, Active noise control using adaptive filters.

Recommended Books:
1. Digital Signal Processing by Proakis & Manolakis (PHI)
3. Digital Signal Processing by S.K.Mitra (TMH)
4. Modern Filter Theory by Johnson & Johnson
5. Theory and Applications of Digital Signal Processing by Rabiner & Gold

Practical Task: Internal Assessment Marks: 50
Practical based on theory

Subject Name: Wireless & Mobile Communication
Subject code: MEIT 114 Max. Marks: 50 Time: 3 Hours
Course Duration: 45 lecturers of one hour duration each

Note: The examiner shall set seven questions of equal marks. First question is compulsory and shall cover the whole syllabus by including questions of conceptual nature. Rest of the syllabus will be divided into A and B parts having three questions each.

Part A

Introduction (06)

Cellular Concepts (10)
Frequency Reuse, Handoff Strategies, Interference and System Capacity, Mechanisms for capacity and coverage improvement-cell splitting, cell sectoring and microcell zone concept

GSM: (06)
Services and Features, System Architecture, Radio Aspects, GSM channels and Security Aspects

Part B

Multiple Access Techniques (05)
Introduction to Multiple Access, FDMA, TDMA, SSMA: types, SDMA, Packet Radio, and CSMA Protocols.
CDMA (IS-95): (05)
Service Aspects, Radio Aspects, Key Features

Mobile Radio Propagation: (08)
Fading, Types of fading, small scale fading, Equalization, Diversity Techniques: Space Diversity types, Frequency Diversity, Time Diversity, Rake receiver, Interleaving.

Migration to Advanced Technologies: (05)
Features, Specifications, Applications and Comparison between: WiFi, WiMax, EDGE, Bluetooth and cdma-2000 Standards.

Books Recommended:

Practical Task:
Practical based on theory
Internal Assessment Marks: 50

Subject Name: Information Security
Subject Code: MEIT 115
Max. Marks: 50
Time: 3 hours
Course Duration: 45 lectures of one hour each.

Note: The examiner shall set seven questions of equal marks. First question is compulsory and shall cover the whole syllabus by including questions of conceptual nature. Rest of the syllabus will be divided into A and B parts having three questions each.

Part A

Foundation of Cryptography (07)
Introduction to Cryptography, Types of Threats-Passive threats, Active threats, Monoalphabetic Substitution Cipher, Polyalphabetic Substitution Cipher, Transposition Cipher.

Cipher (04)
Block and Stream ciphers, Secret key block ciphers, Stream ciphers

Symmetric Key Ciphers (06)
DES Algorithm, Triple DES, Cryptanalysis of DES, Differential and Linear cryptanalysis.

Asymmetric Key Ciphers (06)
Principles of Public Key Cryptosystems, RSA Systems, Knapsack Systems.
Part B

**Message Authentication and Hash Functions**  (06)
Authentication Requirements, Authentication Functions, Message Authentication codes, Hash Functions, Hash Algorithms (MD-5 and SHA-1), Key Management Algo.

**Digital Signatures And Authentication Protocols**  (04)
Digital Signatures and Digital Signature Standard.

**IP Security**  (06)
Overview, Architecture, Authentication Header, Encapsulating Security Payload (Tunnel and Transport mode)

**Firewalls**  (06)
Design Principles, Characteristics, Capabilities, Limitations, Controls, Types of Firewall, and Trusted systems, Reference monitor concepts.

**Recommended Books**
4. Firewalls and Internet Security, Bill Cheswick and Steve Bellovin, Addision-Wesley. 2nd Ed

**Practical Task:**  
Practical based on theory

**Internal Assessment Marks: 50**
SECOND SEMESTER

Subject Name: Agile Software Development
Subject Code: MEIT 21
Max. Marks: 50
Course Duration: 45 lectures of one hour each.

Note: The examiner shall set seven questions of equal marks. First question is compulsory and shall cover the whole syllabus by including questions of conceptual nature. Rest of the syllabus will be divided into A and B parts having three questions each.

Part A

Fundamentals of Agile

Agile Scrum Framework:
Introduction to Scrum, Project phases, Agile Estimation, Planning game, Product backlog, Sprint backlog, Iteration planning, User story definition, Characteristics and content of user stories, Acceptance tests and Verifying stories, Project velocity, Burn down chart, Sprint planning and retrospective, Daily scrum, Scrum roles – Product Owner, Scrum Master, Scrum Team, Scrum case study, Tools for Agile project management

Agile Testing:
The Agile lifecycle and its impact on testing, Test-Driven Development (TDD), xUnit framework and tools for TDD, Testing user stories - acceptance tests and scenarios, Planning and managing testing cycle, Exploratory testing, Risk based testing, Regression tests, Test Automation, Tools to support the Agile tester

Part B

Agile Software Design and Development:

Industry Trends:
Market scenario and adoption of Agile, Agile ALM, Roles in an Agile project, Agile applicability, Agile in Distributed teams, Business benefits, Challenges in Agile, Risks and Mitigation, Agile projects on Cloud, Balancing Agility with Discipline, Agile rapid development technologies

Text Books:

**Reference Books:**

5. Agile Software Development with Scrum By Ken Schwaber, Mike Be, Pearson, 2008.

**Practical Task:**

Students should implement (and learn to use the tools to accomplish this task) the following during Practical hours: (illustrative only)

1. Understand a given business scenario and identify product backlog, user stories and sprint tasks
2. Define user stories for a given feature
3. Fill user stories, sprint schedule and sprint tasks in an Agile tool such as AgileFant
4. Write unit tests aligned to xUnit framework for TDD
5. Refactor a given design for next sprint requirements
6. Execute continuous integration using a tool such as Jenkins
   - Automate a set of given tests using Test automation tool

**Subject Name:** Multimedia Systems
**Subject Code:** ME IT 212
**Max. Marks:** 50
**Time:** 3 hours

Course Duration: 45 lecturers of one hour duration each

Note: The examiner shall set seven questions of equal marks. First question is compulsory and shall cover the whole syllabus by including questions of conceptual nature. Rest of the syllabus will be divided into A and B parts having three questions each.

**Part A**

**Media & Data Streams** (05)
Types of media, Properties of Multimedia system, Traditional Data Stream Characteristics, Data stream characteristics for Continuous Media,

**Sound & Audio** (05)

**Images and Graphics** (05)

**Video & Animation** (06)
Video Signal Representation, Conventional Television Systems, EDTV, HDTV, Basic Concepts of Computer based Animation.

**Part B**

**Data Compression** (05)
Source, Entropy & Hybrid Coding; Basic Compression Techniques, JPEG; H.261, MPEG, DVI

**Multimedia Operating System** (06)
Real time, Resource Management, Process Management, Files Systems, System Architecture

**Multimedia Communication Systems** (06)
Application Subsystems, Transport Subsystem, Quality of Service & Resource Management

**Database Systems** (07)
Multimedia DBMS, Characteristics of MDBMS, Data Analysis, Data Structure, Operation on Data, Integration in Database Model.

**Recommended Books**
Basic Book: Multimedia :Computing, Communications & Applications by Ralf Steinmetz, Klara Nahrstedt

3. Multimedia Technology and Application by David Hillman, Galgotia Publication 2001 Ed

**Practical Task:**
Practical based on theory

**Subject Name:** Embedded System Design
**Subject Code:** MEIT 213
**Max. Marks:** 50
**Time:** 3 hours

**Course Duration:** 45 lectures of one hour each.

Note: The examiner shall set seven questions of equal marks. First question is compulsory and shall cover the whole syllabus by including questions of conceptual nature. Rest of the syllabus will be divided into A and B parts having three questions each.

**Part A**

**Introduction to Embedded System:** (03)
Comparison of Microprocessors and Microcontrollers. Comparison between RISC and CISC Processors, Harvard and Von Neuman Architectures. Embedded System classification and characteristics,
Overview of 8051: 
Architecture, addressing modes and instructions. Interrupts, Timer/Counters, Serial Communication and applications. Interfacing, Overview of Atmel 89C51 microcontroller.

PIC Microcontrollers 
Introduction and features, PIC 16C6X/7X: Architecture, Registers, Reset actions, Memory Organization, Instructions, Addressing Modes, I/O Ports, Interrupts, Timers, ADC. Input Capture, Output Compare, Frequency Measurement, Serial I/O Device

Part B
Embedded Core based Design: 
System on chip trends, Overview of Embedded processors like ARM Intel MMX series, Architecture, Organization and Instruction set, Memory management. Data parallel issues e.g. SIMD and other high performance approaches.

Software Development & Tools
Embedded System Evolution Trends, Round Robin, Round Robin with Interrupts, Function Scheduling architecture, Real Time scheduling: their development, applications and examples.

Real Time Operating Systems
RTOS Architecture, Task and Task States, Tasks and Data, Semaphores and shared data, Operating System Services: message queues, timer function, events, memory management, interrupt Routines in an RTOS environment, Basic Design Using RTOS

Books:
2. An Embedded Software Primer by David E Simon
3. Embedded System Design by Steve Heath (Newnes Publishers, 2nd Ed)
4. ARM system architecture by Steve Furber (Addison Wesley) 1st Ed
5. Programming Embedded System in C/C++ by M.Barr (O'Reilly)2nd Ed

Practical Task: 
Internal Assessment Marks: 50
Practical based on theory

ELECTIVE - I

Subject Name: Research Methodology
Subject Code:MEIT 214 Max. Marks: 50 Time: 3 hours
Course Duration: 45 lecturers of one hour duration each

Note: The examiner shall set seven questions of equal marks. First question is compulsory and
shall cover the whole syllabus by including questions of conceptual nature. Rest of the syllabus will be divided into A and B parts having three questions each.

**Part A**

**Introduction to Educational Research** (02)
Concept, types-basic, applied and action, Need for educational research

**Reviewing Literature** (02)
Need, Sources-Primary and Secondary, Purposes of Review, Scope of Review, Steps in conducting review

**Identifying and defining research problem** (05)
Locating. Analyzing stating and evaluating problem, Generating different types of hypotheses and evaluating them.

**Method of Research** (08)
Descriptive research design-survey, case study, content analysis, Ex-post Facto Research, Corelational and Experimental Research

**Sampling Techniques** (06)
Concept of population and sample’ sampling techniques-simple random sampling, stratified random sampling, systematic sampling and cluster sampling, snow ball sampling, purposive sampling, quota sampling techniques determining size of sample

**Part – B**

**Design and development of measuring instruments, Tests, questionnaires, checklists, observation schedules, evaluating research instruments, selecting a standardized test.** (08)

**Procedure of data collection** (03)
Aspects of data collection, coding data for analysis

**Statistical Methods of Analysis** (07)
Descriptive statistics: Meaning, graphical representations, mean, range and standard deviation, characteristics and uses of normal curve.
Inferential statistics: t-test. Chi-square tests. Correlation (rank difference and product moment), ANOVA (one way)

**Procedure for writing a research proposal** (02)
Purpose, types and components of research proposal

**Procedure for writing a research report** (02)
Audiences and types of research reports, Format of Research report and journal Strategies for evaluating, research, disseminating and utilizing research- An Overview

**Recommended Books**
3. CPSC: Developing Skills in Technician Education Research Modules 1 to 11 Singapore, Colombo Plan Staff College for Technician Education

Subject Name: Advances in Soft Computing
Subject Code: MEIT 215 Max. Marks: 50 Time: 3 hours
Course Duration: 45 lectures of one hour each.

Note: The examiner shall set seven questions of equal marks. First question is compulsory and shall cover the whole syllabus by including questions of conceptual nature. Rest of the syllabus will be divided into A and B parts having three questions each.

**Part A**

**ISSUES IN EXPERT SYSTEMS**
(8)
Knowledge representation, planning and acting in real world, semantic networks, predicate calculus, structural/casual networks, inference control, theorem proving, deduction, truth maintenance, planning, case study of one or more examples from Natural Language Processing, question answering, vision, expert systems

**ARTIFICIAL NEURAL NETWORKS**
(12)
Concepts of Artificial Neural Networks and its basic mathematical model, simple perceptron, Feed-Forward Multilayer perceptron, Hopfield network, Self organizing network and recurrent network.

**FUZZY LOGIC SYSTEM**
(8)
Fuzzy logic, Fuzzification, Inferencing and defuzzification, Fuzzy Knowledge and rule bases, Fuzzy modeling and Control schemes

**Part B**

**GENETIC ALGORITHM**
(10)
Genetic algorithm and detail algorithmic steps, Adjustment of free parameters, Search techniques like tabu search and ant-colony for solving optimization problems, Optimization techniques: PSO (Particle Swarm Optimization), ACO(Ant-colony Optimization), BVO(Binary Vector Optimization).

**APPLICATIONS OF GA**
(7)
Application to power system optimization problem, Identification and control of linear and nonlinear dynamic systems, stability analysis of Fuzzy control systems.

Recommended Books

2. Artificial Intelligence by Elaine Rich, Kevin Knight, Mc-Raw Hill.
5. Neural Networks and fuzzy systems by Bar Kosko, PHI, 1st Ed.

Subject Name: Theory Of Computation
Subject Code: MEIT 216
Max. Marks: 50
Time: 3 hours
Course Duration: 45 lectures of one hour each.

Note: The examiner shall set seven questions of equal marks. First question is compulsory and shall cover the whole syllabus by including questions of conceptual nature. Rest of the syllabus will be divided into A and B parts having three questions each.

Part A

Finite Automata (10)
Finite state machine & its limitation, Regular expressions, Transition Graph, Kleene's Theorem, Equivalence Theorem.

Turing Machine (11)
Turing machine, Post machines, Finite machines with pushdown store, non-determinism, turning machines as acceptors, formal language, primitive recursive function, halting problem, solvability of class, post correspondence problems, partial solvability.

Part B

Predicate calculus (14)

Verification of programs (10)
Flow chart program, partial correctness, inductive assertion methods, termination

Recommendation Books


**Elective -II**

**Subject Name:** Software Testing and Quality Management  
**Subject Code:** MEET 217  
Max. Marks: 50  
Time: 3 hours

**Course Duration:** 45 lectures of one hour each.

Note: The examiner shall set seven questions of equal marks. First question is compulsory and shall cover the whole syllabus by including questions of conceptual nature. Rest of the syllabus will be divided into A and B parts having three questions each.

**Part A**

**Software Quality**  

**Software Development**  

**Improving quality with methodologies**  
Quality tools, Object-Oriented Software, Reverse Engineering, Measuring Customer Satisfaction, Reliability Models, Reliability Growth Models.

**Part B**

**Software Quality Engineering**  
Defining Quality Requirements, Requirement Management, Complexity Metrics And Models, Use Of CASE Tool Technology, Role Of Groupware, Data Quality Control

**Project Configuration Management**  

**Software Testing**  
Introduction to software testing, verification and validation, testing techniques: Dynamic testing and static testing, Validation activities: Unit, Integration, function & System testing, Regression testing.

**Risk Management**  
Risk Identification, Risk Projection, risk refinement, Risk mitigation, Monitoring and Management, The RMMM plan
**Recommended Books**


**Practical Task:**

Practical based on theory

**Internal Assessment Marks: 50**

**Subject Name:** Human Resource Development & Training Methods

**Subject Code:** MEIT 218

Max. Marks: 50

Time: 3 hours

Course Duration: 45 lectures of one hour each.

Note: The examiner shall set seven questions of equal marks. First question is compulsory and shall cover the whole syllabus by including questions of conceptual nature. Rest of the syllabus will be divided into A and B parts having three questions each.

**Part A**

**Introduction to Human Resource Development**

Evolution, Mission and Purpose, Components of HRD, HRD problems and issues related to Indian Industry and technical, education, HRD in the context of new Industrial policy.

**Staff Development, Professional Development and Career Development**

Stages Of HRD, Initial Or Induction Training, Training For Job-Related/Professional Development, Training For Horizontal And Vertical Mobility Of Employees.

**Concept of Training**

Assumptions for prevailing and alternative concept of training; action through training or action through force.

**Training Strategy**

Strategic issue; basic phases; modalities in training; formulating a coherent strategy.

**Part B**

**Training Methods**

Learning on the job – Training in the field, simulating real life – role playing and games, incidents and cases – individualized training, seminars and syndicates; lecture method.
Developing Group and the Climate
The social process; indicators of group development; training climate.

Evaluation of Training
Issues for evaluations; role of the training system with evaluators from other constituencies.

Systems Approach to HRD

Recommended Books
3. HRD Training and Development by RF Mayer and Peter Pipe.

Practical Task: Practical based on theory

Subject Name: Advanced Digital Image Processing
Subject Code: MEIT 219
Max. Marks: 50
Time: 3 hours
Course Duration: 45 lectures of one hour each.

Note: The examiner shall set seven questions of equal marks. First question is compulsory and shall cover the whole syllabus by including questions of conceptual nature. Rest of the syllabus will be divided into A and B parts having three questions each.

Section A

Image fundamentals and Transforms:

Image Enhancement Techniques:
Spatial Domain and frequency domain approaches, Image subtraction, image average, Low-pass spatial filters, Median filters, High-pass spatial filters, derivative filters, Frequency domain ideal low-pass filters, Butterworth Low pass filters, high pass filters, homomorphic filters

Image Restoration:

(05)
(05)
(08)
(06)
(10)
(06)
Image degradation and restoration process, Noise models, Noise filters, Estimation of degradation function, Inverse filtering, Least Mean Square filter, interactive restoration, constrained least square restorations

Section B

Color Image Processing: (05)
Color image representation, Color Models, Pseudocolor image processing, color transformations, noise removal in color images.

Image Compression: (06)
Coding redundancy, Inter-pixel redundancy, Psycho-visual redundancy, image compression models, Huffman coding, Lossy compression techniques, Threshold coding, Vector quantization, JPEG compression

Image Segmentation: (06)
Detection of isolated points, line detection, edge detections using gradient operator & laplacian operator, edge linking and boundary detection, region oriented segmentation, segmentation using threshold, Hough transformation

Image Representation & Object Recognition: (06)
Boundary representation: chain codes, polygon approximation, Boundary segments, Boundary descriptors; Simple descriptor, Fourier descriptor, Regional descriptors: Simple descriptor & Texture descriptor. Introduction to Object Recognition methods.

Text Book:

Reference Books:
1. Anil K. Jain : Fundamentals of digital image processing, PHI.

Practical Task: Internal Assessment Marks: 50
Practical based on theory.
THIRD SEMESTER

Elective-III

Subject Name: Network Management and Security
Subject Code: MEIT 311
Max. Marks: 50
Time: 3 hours

Course Duration: 45 lectures of one hour each.

Note: The examiner shall set seven questions of equal marks. First question is compulsory and shall cover the whole syllabus by including questions of conceptual nature. Rest of the syllabus will be divided into A and B parts having three questions each.

PART – A

Introduction (5)

Secure Networking Threats (6)

Encryption Techniques (6)

Designing Secure Networks (8)

PART – B

Network Security Platform Options (6)

IPsec VPN Design Considerations (6)
Secure Network Management and Network Security Management (8)

Text:
2. William Stalling “Cryptography and Network Security” Pearson Education

References:
2. Jeff Crume “Inside Internet Security” Addison Wesley

Subject Name: User Interface Design
Subject Code: MEIT 312
Max. Marks: 50
Time: 3 hours
Course Duration: 45 lectures of one hour each.

Note: The examiner shall set seven questions of equal marks. First question is compulsory and shall cover the whole syllabus by including questions of conceptual nature. Rest of the syllabus will be divided into A and B parts having three questions each.

Part A

User Interface: An introduction and overview (06)
Importance of user interface, goals of user interface design, characteristics of graphical and web user interfaces

The User Interface Design Process (05)
Obstacles And Pitfalls In The Development Path, Usability, The Design Team, Managing Design Process.

Human Computer Interaction (08)
Importance Human Characteristics In Design, Cognitive Engineering, Mental Models, User Psychology, Interaction Styles And Hypermedia.

Visual C++ Basics (06)
Introduction to Visual C++, building a basic applications, Visual C++ resources.

Part B

Graphical User Interface (08)
Creating menus, working of menus, dialog boxes, combo box, child windows, buttons, check boxes, radio buttons.

Visual C++ and Database Management (08)
Open Database Connectivity, Data Access Objects, OLE-DB, building a database application using ODBC.

Application Development in Visual C++ (04)
Designing application with security, building a help file, packaging the application.

**Recommended Books**

**Subject Name:** Cloud Computing  
**Subject code:** MEIT 313  
Max. Marks: 50  
Time: 3 hours  
Course Duration 45 lectures of one hour each.

Note: The examiner shall set seven questions of equal marks. First question is compulsory and shall cover the whole syllabus by including questions of conceptual nature. Rest of the syllabus will be divided into A and B parts having three questions each.

### Part A
**Overview of Cloud Computing** (4)

**Working with Private Cloud** (11)

**Working with Public Clouds** (11)
What is Public Cloud, Why Public Cloud, When to opt for Public Cloud, Public Cloud Service Models, and Public Cloud Players. Infrastructure as a Service Offerings, IaaS Vendors, PaaS offerings, PaaS vendors, Software as a Service. Implementing public cloud (one out of AWS, Windows Azure, IBM or Rackspace)

### Part B
**Overview of Cloud Security** (6)
Overview of Multi-Cloud Management Systems (4)
Explain concept of multi-cloud management, Challenges in managing heterogeneous clouds, benefits and advantages of multi-cloud management systems. Implementing Multi-Cloud Management System (e.g. RightScale Cloud Management System)

Business Clouds (5)
Cloud Computing in Business, Various Biz Clouds focused on industry domains (Retail, Banking and Financial sector, Life Sciences, Social networking, Telecom, Education). Cloud Enablers (Business Intelligence on cloud, Big Data Analytics on Cloud)

Future directions in Cloud Computing (4)
Future technology trends in Cloud Computing with a focus on Cloud service models, deployment models, cloud applications, and cloud security. Migration paths for cloud, Selection criteria for cloud deployment. Current issues in cloud computing leading to future research directions.

Recommended Books


Reference Books

1. Cloud computing: Implementation, management and security By Rittinghouse, John, W.

Elective IV

Subject Name: Big Data and Analytics
Paper Code: MEIT 314
Max. Marks: 50
Time: 3 hours
Course Duration: 45 lectures of one hour each.

Note: The examiner shall set seven questions of equal marks. First question is compulsory and shall cover the whole syllabus by including questions of conceptual nature. Rest of the syllabus will be divided into A and B parts having three questions each.

Part A

Digital Data: (5)
Types of Digital Data: Structured (Sources of structured data, Ease with Structured data), Semi-Structured (Sources of semi-structured data), Unstructured (Sources of unstructured data, Issues with terminology, Dealing with unstructured data).

**Introduction to Big Data:**
What is big data?, Why big data? , Other characteristics of data but not definitional for big data, Challenges with big data, Big data stack

**Technology Landscape:**
Big Data Analytics, Analytics 1.0, Analytics 2.0, Analytics 3.0, Traditional BI vs. Big Data Environment, Big Data technology Landscape, NoSQL Databases, NoSQL Vs. RDBMS, New SQL, Hadoop, Hadoop 1.0 vs. Hadoop 2.0, Data Science is multi-disciplinary, Data Scientist - Your new best friend

**Introduction to Hadoop:**

**Mongo DB:**
Recap of NoSQL databases, MongoDB – CRUD, MongoDB- Arrays, Java Scripts, Cursors, Map Reduce Programming, Aggregations

**Cassandra:**
Cassandra- CQLSH - CRUD, Counter, List, Set, Map, Tracing

**Part B**

**Introduction to Hive:**

**Introduction to Pig:**
Introducing Pig, History and Anatomy of Pig, Pig on Hadoop, Pig Features, Pig Philosophy, Word count example using Pig, Use Case for Pig, Pig Primitive Data Types, Collection Types and NULL, Pig Latin Overview, Pig Latin Grammar - Comments, Keywords, Identifiers, Case sensitivity in Pig, Common Operators in Pig, Pig Statements- LOAD, STORE, DUMP, Interactive Shell – GRUNT, FILTER, SORT, GROUP BY, ORDER BY, JOIN, LIMIT, Pig
Latin Script, Local Mode, Map Reduce Mode, Running Pig Script, Working with, Field, Tuple, Bag, User Defined Function, Parameters in Pig

Introduction to Jasper Report: (2)
Introduction to Jasper Report using Jasper Soft Studio, Reporting using MongoDB, Reporting using Cassandra

Recommended Books:
2. Data Science and Big Data Analytics by EMC Education Services, 2015

Subject Name: Advanced Data Mining
Paper Code: MEIT 315
Max. Marks: 50
Time: 3 hours
Course Duration: 45 lectures of one hour each.

Note: The examiner shall set seven questions of equal marks. First question is compulsory and shall cover the whole syllabus by including questions of conceptual nature. Rest of the syllabus will be divided into A and B parts having three questions each.

Part A

Introduction to Data Warehousing (02)
Data Warehousing Definition and characteristics, need for data warehousing, DBMS vs. data warehouse, OLAP

Data Warehousing Components (04)
Overall Architecture, Data Warehouse Database, Sourcing Acquisition, Cleanup and Transformation Tools, Metadata Access Tools, Data Marts, Data Warehouse Administration and Management, Information Delivery Systems.

Mapping the Data Warehouse to a Multiprocessor Architecture (04)
Relational Database Technology for Data warehouse, Database Architectures for Parallel Processing, Parallel RDBMS features, Alternative Technologies, Parallel DBMS Vendors.

Introduction to Data Mining (04)
Functionalities, classification data mining systems, Multidimensional data model, data cubes, Schemas for multidimensional databases, OLAP operations, Data Marts, Metadata.

Data Preprocessing (03)
Data cleaning, integration and transformation, Data reduction, Discretization and Concept Hierarchy Generation.

Concept Description (04)
Data Mining techniques-Concept description, attribute oriented induction, analytical characterization, mining class comparisons, mining descriptive statistical measures.
Part B

**Association Rule Mining** (05)
Mining single dimension rules from transactional databases, Apriori algorithm, efficiency, mining rules without candidate generation.

**Applications and Trends In Data Mining** (02)
Commercial Importance of DW, applications of data mining, data mining in business process, Embedded data mining.

**Introduction to Business Intelligence:** (03)

**Basics of Data Integration (Extraction Transformation Loading)** (04)
Concepts of data integration, need and advantages of using data integration, introduction to common data integration approaches, introduction to ETL, Introduction to data quality, data profiling concepts and applications.

**Introduction to Multi-Dimensional Data Modeling,** (03)
Introduction to data and dimension modeling, multidimensional data model, ER Modeling vs. multi dimensional modeling, concepts of dimensions, facts, cubes, attribute, hierarchies, star and snowflake schema.

**Basics of Enterprise Reporting** (02)
Introduction to enterprise reporting, concepts of dashboards, balanced scorecards, and overall architecture.

**Data Mining Functionalities:** (05)
Association rules mining, Mining Association rules from single level, multilevel transaction databases, Classification and prediction, Decision tree induction, Bayesian classification, k-nearest neighbor classification

**Recommended Books**
1. Data Mining –Concepts & Techniques; Jiawei Han &MichelineKamber, Morgan Kaufmann Publishers.
2. Data Warehousing in the Real World; Sam Anahory& Dennis Murray; Pearson Education
4. Data Warehousing, Data Mining and OLTP; Alex Berson, 1997, McGraw Hill.
8. Fundamentals of Business Analytics by R N Prasad and SeemaAcharya, Wiley India.

Subject Name: Advanced Computer Networks
Paper Code: MEIT 316
Course Duration: 45 lectures of one hour each.

Max. Marks: 50
Time: 3 hours

Note: The examiner shall set seven questions of equal marks. First question is compulsory and shall cover the whole syllabus by including questions of conceptual nature. Rest of the syllabus will be divided into A and B parts having three questions each.

Part A

INTRODUCTION
Overview of computer networks, seven-layer architecture, TCP/IP suite of protocols, etc.

MEDIUM ACCESS
MAC protocols for high-speed LANS, MANs, and wireless LANs. (For example, FDDI, DQDB, HIPPI, Gigabit Ethernet, Wireless ethernet, etc.)

INTERNET WORKING AND ROUTING

RESOURCE MANAGEMENT

Part B

QUALITY OF SERVICE (QOS)

GROUP COMMUNICATION
Multicast Routing and Transport, IP Multicasting: Multicast routing protocols, address assignments, session discovery etc., Multicasting in mobile networks.

TRANSPORT LAYER PROTOCOL
TCP protocol dynamics, TCP extensions for high-speed networks, transaction-oriented applications. Other new options in TCP.

**WIRELESS NETWORKS**
Wireless LAN architecture, Mobile IP, Broadcast file system, Agent technology, Satellite technology.

**SECURITY**
Network security at various layers. Secure-HTTP, SSL, ESP, Authentication header, Key distribution protocols. Digital signatures, digital certificates.

**BOOKS:**
Andrew Tanenbaum. Computer Networks, PHI

**REFERENCES:**