**KURUKSHETRA UNIVERSITY, KURUKSHETRA**

(‘A+’ Grade, NAAC Accredited)

**SCHEME OF EXAMINATIONS FOR**

**MASTER OF TECHNOLOGY IN**

**Information Technology (IT)**

**(W. E. F. SESSION: 2018-19)**

**SEMESTER-I**

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| **S. No.** | **Course Code** | **Subject** | **Teaching Schedule** | **Hours/****Week** | **Examination Schedule &****Percentage Distribution** | **Duration of Exam (Hrs.)** | **Credit** |
| **L** | **T** | **P** |  | **Major Test** | **Minor Test** | **Practical** | **Total** |  |  |
| 1 | MTIT-101A | Parallel Computer Architecture | 3 | 0 | 0 | 3 | 60 | 40 | -- | 100 | 3 | **3** |
| 2 | MTIT-103 A | Mobile computing | 3 | 0 | 0 | 3 | 60 | 40 | -- | 100 | 3 | **3** |
| 3 | \* | Program Elective -I | 3 | 0 | 0 | 3 | 60 | 40 | -- | 100 | 3 | **3** |
| 4 | \*\* | Program Elective -II | 3 | 0 | 0 | 3 | 60 | 40 | -- | 100 | 3 | **3** |
| 5 | MTIT-117 A | Software Lab I – Mobile computing lab | 0 | 0 | 4 | 4 | -- | 40 | 60 | 100 | 3 | **2** |
| 6 | MTIT-119 A | Software Lab II - Signal and system | 0 | 0 | 4 | 4 | -- | 40 | 60 | 100 | 3 | **2** |
| 7 | MTRM-111 A | Research Methodology and IPR | 2 | 0 | 0 | 2 | 60 | 40 | -- | 100 | 3 | **2** |
| 8 | \*\*\* | Audit Course-I | 2 | 0 | 0 | 2 | -- | 100 | -- | 100 | 3 | **0** |
| **Total** | **24** | **300** | **240** | **120** | **700** | **-** | **18** |

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| **\*Program Elective –I** | **\*\*Program Elective -II** |
| **Course No.** | **Subject** | **Course No.** | **Subject** |
| MTIT-105 A | Signals and System | MTIT-111 A | Information Storage management |
| MTIT-107 A | Advanced computer architecture | MTIT-113 A | Soft Computing |
| MTIT-109 A | Number Theory and Cryptography | MTIT-115 A | Advanced Computer Networks |

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| **\*\*\* Audit Course-I**  |
| **Course No.** | **Subject** |
| MTAD-101 A | English for Research Paper Writing  |
| MTAD-103 A | Disaster Management  |
| MTAD-105 A | Sanskrit for Technical Knowledge  |
| MTAD-107 A | Value Education  |

**Note:** 1.The course of program elective will be offered at 1/3rd or 6 numbers of students (whichever is smaller) strength of the class.

2. \*\*\* Along with the credit course, a student may normally be permitted to take audit course, however for auditing a course; prior consent of the course coordinator of the course is required. These courses shall not be mentioned for any award/calculation of SGPA/CGPA in the DMC. A certificate of successful completion of the audit course will be issued by the Director/Head of institution.

**SEMESTER-II**

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| **S. No.** | **Course Code** | **Subject** | **Teaching Schedule** | **Hours/Week** | **Examination Schedule &****Percentage Distribution** | **Duration of Exam (Hrs.)** | **Credit** |
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| **L** | **T** | **P** |  | **Major Test** | **Minor Test** | **Practical** | **Total** |  |  |
| 1 | MTIT-102 A | Digital Signal Processing | 3 | 0 | 0 | 3 | 60 | 40 | -- | 100 | 3 | **3** |
| 2 | MTIT-104 A | Stochastic Processes & Queueing Theory | 3 | 0 | 0 | 3 | 60 | 40 | -- | 100 | 3 | **3** |
| 3 | \* | Program Elective-III | 3 | 0 | 0 | 3 | 60 | 40 | -- | 100 | 3 | **3** |
| 4 | \*\* | Program Elective-IV | 3 | 0 | 0 | 3 | 60 | 40 | -- | 100 | 3 | **3** |
| 5 | MTIT-118 A | Software Lab I | 0 | 0 | 4 | 4 | -- | 40 | 60 | 100 | 3 | **2** |
| 6 | MTIT-120 A | Software Lab II – Information theory and coding | 0 | 0 | 4 | 4 | -- | 40 | 60 | 100 | 3 | **2** |
| 7 | MTIT-122 A | Mini Project with Seminar | 2  | 0  | 0  | 2  | - | 100 | -- | 100 | 3 | **2** |
| 8 | \*\*\* | Audit Course-II | 2 | 0 | 0 | 2 | -- | 100 | -- | 100 | 3 | **0** |
| **Total** | **24** | **240** | **340** | **120** | **700** | **-** | **18** |

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| **\*Program Elective –III** | **\*\*Program Elective -IV** |
| **Course No.** | **Subject** | **Course No.** | **Subject** |
| MTIT-106 A | Design Patterns | MTIT-112 A |  Enterprise Resource Planning |
| MTIT-108 A | Information Theory and Coding | MTIT-114 A | Algorithm Analysis and Design |
| MTIT-110 A | Security In Computing | MTIT-116 A | Data Mining |

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| **\*\*\*Audit Course-II**  |
| **Course No.** | **Subject** |
| MTAD-102 A | Constitution of India  |
| MTAD-104 A | Pedagogy Studies  |
| MTAD-106 A | Stress Management by Yoga  |
| MTAD-108 A | Personality Development through Life Enlightenment Skills |

**Note 1:** After the second semester exams, the students are encouraged to go to Industrial Training/Internship for at least 6-8 weeks during the summer break with a specific objective for Dissertation Part–I (MTIT-207 A). The industrial Training/Internship would be evaluated as the part of the Dissertation–I (with the marks distribution as 40 marks for Industrial Training/Internship and 60 marks for Dissertation Part–I).

**Note 2:** The course of program elective will be offered at 1/3rd or 6 numbers of students (whichever is smaller) strength of the class.

**\*\*\*Note 3:** Along with the credit course, a student may normally be permitted to take audit course, however for auditing a course; prior consent of the course coordinator of the course is required. These courses shall not be mentioned for any award/calculation of SGPA/CGPA in the DMC. A certificate of successful completion of the audit course will be issued by the Director/Head of institution.

**SEMESTER-III**

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| **S. No.** | **Course Code** | **Subject** | **Teaching Schedule** | **Hours/Week** | **Examination Schedule &****Percentage Distribution** | **Duration of Exam (Hrs.)** | **Credit** |
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| **L** | **T** | **P** |  | **Major Test** | **Minor Test** | **Practical** | **Total** |  |  |
| 1 | \* | Program Elective -V | 3  | 0  | 0  | 03  | 60 | 40 | -- | 100 | 3 | **3** |
| 2 | \*\* | Open Elective | 3  | 0  | 0  | 03  | 60 | 40 | -- | 100 | 3 | **3** |
| 3 | MTIT-207 A | Dissertation Part-I | 0  | 0  | 20  | 10  | -- | 100 |  | 100 | -- | **10** |
| **Total** |  | **120** | **180** | **0** | **300** |  | **16** |

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| **\*Program Elective-V** |
| **Course No.** | **Subject** |
| MTIT-201 A | Mobile Ad-hoc and Wireless Sensor Networks |
| MTIT-203 A | Advances in algorithms |
| MTIT-205 A | Genetic Algorithm  |

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| **\*\*Open Elective** |
| 1. | MTOE-201 A | Business Analytics |
| 2. | MTOE-203 A | Industrial Safety |
| 3. | MTOE-205 A | Operations Research |
| 4. | MTOE-207 A | Cost Management of Engineering Projects |
| 5. | MTOE-209 A | Composite Materials |
| 6. | MTOE-211 A | Waste to Energy |

**SEMESTER: IV**

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| **S. No.** | **Course Code** | **Subject** | **Teaching Schedule** | **Hours/Week** | **Examination Schedule &****Percentage Distribution** | **Duration of Exam (Hrs.)** | **Credit** |
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| **L** | **T** | **P** |  | **Major Test** | **Minor Test** | **Practical** | **Total** |  |  |
| 1 | MTIT-202 A | Dissertation Part-II  | 0  | 0  | 32  | 16  | -- | 100 | 200 | 300 | -- | 16 |
| **Total** | **16** |  | **100** | **200** | **300** |  | 16 |

**Total Credits – 68**

**Note 1**:At the end of the second semester each student is required to do his/her Dissertation work in the identified area in consent of the Guide/Supervisor. Synopsis for the Dissertation Part-I (MTIT-207 A) is to be submitted within three weeks of the beginning of the Third Semester.

**Note 2**: Each admitted student is required to submit the report of his/her Dissertation Part-I (MTIT-207 A) as per the schedule mentioned in Academic calendar for the corresponding academic session otherwise the Dissertation Part-II (MTIT-202 A) cannot be continued at any level.

**Note 3**: Each admitted student is required to submit his/her final Dissertation Part-II (MTIT-202 A) as per the schedule mentioned in Academic calendar for the corresponding academic session only after the publication of two papers in a journal/International/National conference of repute like IEEE, Springer, Elsevier, ACM etc.

**Note 4:** The course of program/open elective will be offered at 1/3rd or 6 numbers of students (whichever is smaller) strength of the class.

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| **MTIT – 101** A | **Parallel Computer Architecture** |
| **Lecture** | **Tutorial** | **Practical** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **4** | **1** | **--** | **75** | **25** | **100** |  **3** |
| **Purpose** | **To learn the advanced concepts of Computer Architecture**  |
|  |  |
| **CO 1** | To learn the parallel models and processors  |
| **CO 2** | Pipelining and scalable architectures |
| **CO 3** | Memory organization |
| **CO 4** | To learn the multithreaded and data flow architecture |

**Unit -I**

**Introduction to parallel processing**

Basic concepts – types and level of parallelism - classification of parallel architecture – basic parallel techniques - shared memory multiprocessors – distributed memory multicomputer – parallel Random access machine – VLSI complexity model .

**Unit -II**

**Processors and memory hierarchy**

Advanced processor technology – Super scalar and vector processors – Memory hierarchy technology, virtual memory technology – cache memory organization – shared – memory organization.

**Unit -III**

**Pipelining and superscalar techniques**

Linear pipeline processors – Nonlinear pipeline processors – Instruction pipeline design –Arithmetic pipeline design – Superscalar pipeline design

**Unit -IV**

**Parallel and scalable architecture**

Cache coherence and synchronization mechanisms – coherence problem – snoopy bus and directory based protocol - Vector processing principle Vector instruction types – vector access memory schemes - SIMD computer organization - Implementation models - CM2 – architecture latency hiding techniques

Principles of Multithreading – issues and solutions – multiple context processors - Scalable and Multithreaded architectures- Stanford Dash multiprocessor - KSR1 - Dataflow computer-static data flow computer -Dynamic data flow computer

**Text books**

1. Kai Hwang, “*Advanced Computer Architecture”, Parallelism, Scalability, Programmability*”, McGraw Hill, 1993.
2. Hwang Briggs, “*Computer Architecture and parallel processing*”, McGraw Hill, 1984.

**Reference books**

1. Dezso sima, Terence Fountain ,Peter Karsuk , “ *Advanced Computer Architectures : A design space approach*” , Addison Wesley, 1997.
2. David Culler , Jaswinder Pal Singh , Anoop Gupta , “*Parallel Computer Architecture*

 *A Hardware/Software Approach” ,* Elsevier

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| **MTIT- 103** A | **Mobile Computing** |
| **Lecture** | **Tutorial** | **Practical** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **4** | **1** | **-** | **75** | **25** | **100** | **3** |
| **Purpose** |  **The course aims to provide basic understanding about Mobile Communication , Mobile Hardware, Mobile Software** |
| **Course Outcomes** |
| **CO 1** |  To understand about the architecture for Mobile Computing |
| **CO 2** |  To get an idea about the mobile computing through telephony and GPRS,WAP |
| **CO 3** |  To understand the WAP and Symbian OS, Windows CE with wireless devicesand their security issues |
| **CO 4** |  To understand mobile computing through Java |

**UNIT – 1**

**Introduction and mobile computing architecture**

Mobility of bits and bytes-Mobile computing-Networks- Middleware and gateways-Applications and services- Developing mobile computing applications- Security in mobile computing- Architecture for mobile computing- Design considerations for mobile computing

**UNIT – I1**

**Mobile computing through telephony and gprs**

Multiple Access procedures-mobile computing through telephone- Voice XMLTelephony Application Programming Interface- GPRS and packet data network- GPRS Network Architecture-GPRS Network Operations-Data Services in GPRSApplications and limitations of GPRS

**UNIT – 1**

**Wap and wireless devices with symbian os**

Wireless Application protocol-MMS-GPRS Applications-Client Programming: Mobile phones-PDA-Design constraints in applications for handheld devices- Wireless devices with Symbian OS-Symbian OS Architecture-Applications for Symbian-Controls and Compound controls- Security on the Symbian OS

**UNIT – 1**

**J2ME**

J2ME Technology-CDC-CLDC-Programming for CLDC-MIDlet event handling-GUI in MIDP-UI Design issues-Record Management System-communication in MIDPSecurity considerations in MIDP

18 IT2013 SRM(E&T) ; Framework for voice over IP-Session Initiation Protocol-Real time protocols- Convergence technologies-Call routing-Voice over IP applications-IMS-Mobile VoIP-Security Protocols-Security framework for mobile environment

**Text Books**

1. Asoke K Talukder, Roopa R Yavagal “*Mobile Computing Technology, Applications and Service Creation*” Tata McGraw Hill, 2005.
2. Yu-Kwong Ricky Kwok, Vincent K.N. Lau, ”*Wireless Internet and Mobile Computing: Interoperability and Performance* “, Wiley-IEEE Press,

**Reference Book**

1. Frank Adelstein, Sandeep KS Gupta , Golden Richard III,Loren Schwiebert, “F*undamentals of Mobile and Pervasive Computing”,*  McGraw-Hill Professional;

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| **MTIT-105** A | **Signal and system** |
| **Lecture** | **Tutorial** | **Practical** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **4** | **1** | **-** | **75** | **25** | **100** | **3** |
| **Purpose** |  **To familiarize the students with the basic concepts of signals and systems** |
| **Course Outcomes** |
| **CO 1** |  Introduction and classification of signals and systems based on their properties. |
| **CO 2** | To understand the basic concepts of random variables and LTI systems. |
| **CO 3** |  Familiarization with the sampling process and spectral analysis of signals using Fourier Series. |
| **CO 4** | Apply transform techniques to analyze continuous-time and discrete-time signals and systems |

**Unit-I**

**Introduction to Signals:** Continuous and discrete time signals, deterministic and stochastic signals, periodic and a periodic signals, even and odd signals, energy and power signals, exponential , sinusoidal signals and singular functions. Signal representation in terms of singular functions, orthogonal functions and their use in signal representation

**Introduction to Systems:** Linear and non-linear systems, time invariant and time varying systems, lumped and distributed systems,deterministic and stochastic systems, casual and non-causal systems, analog and discrete / digital memory and memory less systems.

**Unit-II**

**Random Variables:** Introduction to Random Variables, pdf, cdf, moments, distributions, correlation functions.

**Linear Time Invariant Systems:** Introduction to linear time invariant (LTI) systems, properties of LTI systems, convolution integral, convolution sum, causal LTI systems described by differential and difference equations. Concept of impulse response

**Unit-III**

**Discretisation of Analog Signals:** Introduction to sampling, sampling theorem and its proof. Effect of under sampling, reconstruction of a signal from sampled signal.

**Fourier Series :** Continuous time Fourier series (CTFS), Properties of CTFS, Convergence of Fourier series, Discrete time Fourier Series (DTFS), Properties of DTFS , Fourier series and LTI system, Filtering.

**Unit-IV**

**Fourier Transform:** Continuous Time Fourier Transform (CTFT), Properties of CTFT, Systems characterized by linear constant- coefficient differential equations.

Discrete time Fourier transform (DTFT), Properties of DTFT, Duality, Systems characterized by Linear constant coefficient difference equations.

**Laplace Transform:** Introduction to Laplace transform, Region of convergence for laplace transform, Inverse laplace transform, Properties oflaplace transform, Analysis and characterization of LTI systems using laplace transform, System function algebra and block diagram representations, Unilateral laplace transform.

**Text Books:**

1. Alan V. Oppenheim, Alan S. Willsky, S. Hamid Nawab, Signals and Systems, Prentice Hall

India, 2nd Edition, 2009

**Reference Books:**

1. Simon Haykins – “Signal & Systems”, Wiley Eastern

2. Tarun Kumar Rawat , Signals and Systems , Oxford University Press.

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| **MTIT-107** A | **Advanced Computer Architecture**  |  |
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **3** | **0** | **0** | **3** | **60** | **40** | **100** | **3 Hrs.** |
| **Program Objective (PO)** | To enable students to describe and compare different parallel computers, processor architectures and various techniques to improve processor performance.  |
| **Course Outcomes (CO)** |  |
| **CO1** | Classify parallel computers based on different criteria and compare various program flow mechanisms. |  |
| **CO2** | Contrast various processor architectures and solve problems of routing in various interconnection networks. |  |
| **CO3** | Explain various instruction pipeline design techniques, memory hierarchy concepts and identify ways to reduce miss penalty and miss rate. |  |
| **CO4** | Describe and distinguish various cache coherence protocols used in various shared memory architectures. |  |

**Unit 1**

**Parallel computer models:** The state of computing, Classification of parallel computers, Multiprocessors and multicomputer, Multivector and SIMD computers.

**Program and network properties:** Conditions of parallelism, Data and resource Dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain Size and latency, Program flow mechanisms, Control flow versus data flow, Data flow Architecture, Demand driven mechanisms, Comparisons of flow mechanisms

**Unit 2**

 **System Interconnect Architectures:** Network properties and routing, Static interconnection Networks, Dynamic interconnection Networks, Multiprocessor system Interconnects, Hierarchical bus systems, Crossbar switch and multiport memory, Multistage and combining network.

**Advanced processors:** Advanced processor technology, Instruction-set Architectures, CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors, VLIW Architectures, Vector and Symbolic processors

**Unit 3**

**Pipelining:** Linear pipeline processor, nonlinear pipeline processor, Instruction pipeline Design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch Handling techniques, branch prediction, Arithmetic Pipeline Design, Computer arithmetic principles, Static Arithmetic pipeline, Multifunctional arithmetic pipelines

**Memory Hierarchy Design:** Cache basics & cache performance, reducing miss rate and miss penalty, multilevel cache hierarchies, main memory organizations, design of memory hierarchies.

**Unit 4**

**Multiprocessor Architectures:** Symmetric shared memory architectures, distributed shared memory architectures, models of memory consistency, cache coherence protocols (MSI, MESI, MOESI), scalable cache coherence, overview of directory based approaches, design challenges of directory protocols, memory based directory protocols, cache based directory protocols, protocol design trade-offs, synchronization,

**Enterprise Memory subsystem Architecture:** Enterprise RAS Feature set: Machine check, hot add/remove, domain partitioning, memory mirroring/migration, patrol scrubbing, fault tolerant system.

**Text Books:**

1. Kai Hwang, “Advanced computer architecture”; TMH. 2000
2. D. A. Patterson and J. L. Hennessey, “Computer organization and design”, Morgan Kaufmann, 2nd Ed. 2002

**Reference Books:**

1. Harvey G.Cragon,”Memory System and Pipelined processors”; Narosa Publication. 1998.
2. V.Rajaranam&C.S.R.Murthy, “Parallel computer”; PHI. 2002.
3. R.K.Ghose, RajanMoona&Phalguni Gupta, “Foundation of Parallel Processing”, Narosa Publications, 2003
4. Stalling W, “Computer Organisation & Architecture”, PHI. 2000
5. D.Sima, T.Fountain, P.Kasuk, “Advanced Computer Architecture-A Design space Approach,”Addison Wesley,1997.
6. M.J Flynn, “Computer Architecture, Pipelined and Parallel Processor Design”; Narosa Publishing. 1998
7. D.A.Patterson, J.L.Hennessy, “Computer Architecture: A quantitative approach”; Morgan Kauffmann, February, 2002.
8. Hwan and Briggs, “Computer Architecture and Parallel Processing”; MGH. 1999.

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| **MTIT-109** A | **Number Theory and Cryptography** |
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **4** | **0** | **0** | **4** | **60** | **40** | **100** | **3Hrs.** |
| **Program Objective (PO)** | To introduce the concepts and methodology used in the Number Theory and Cryptography. |
| **Course Outcomes (CO)** |
| **CO1** | To introduce the mathematical fundamentals involve in cryptography. |
| **CO2** | To describe the process of primality testing and factorization |
| **CO2** | To understand the strength and weakness of cryptosystems |
| **CO3** | To introduce the elliptic curve cryptography. |

**Unit I**

Elementary Number Theory: Divisibility, Division Algorithm, Euclidean Algorithm; Congruences, Complete Residue systems, Reduced Residue systems; Fermat's little theorem, Euler's Generalization, Wilson's Theorem; Chinese Remainder Theorem, Generalized Chinese Remainder Theorem-Euler Phi-function, multiplicative property; Finite Fields, Primitive Roots; Quadratic Residues, Legendre Symbol, Jacobi Symbol; Gauss's lemma, Quadratic Reciprocity Law.

**Unit II**

Primality Testing and Factorization: Primality Tests; Pseudo primes, Carmichael Numbers; Fermat’s pseudoprimes, Euler pseudo primes; Factorization by Pollard’s Rho method; Simple Continued Fraction, simple infinite continued fractions; Approximation to irrational numbers using continued fractions; Continued Fraction method for factorization.

**Unit III**

Public Key Cryptosystems: Traditional Cryptosystem, limitations; Public Key Cryptography; Diffie Hellmann key exchange; Discrete Logarithm problem; One-way functions, Trapdoor functions; RSA cryptosystem; Digital signature schemes; Digital signature standards; RSA signature schemes; Knapsack problem; El Gamal Public Key Cryptosystem; Attacks on RSA cryptosystem: Common modulus attack; Homomorphism attack, timing attack; Forging of digital signatures; Strong primes, Safe primes, Gordon's algorithm for generating strong primes.

**Unit IV**

Elliptic Curve Cryptography: Cubic Curves, Singular points, Discriminant; Introduction to Elliptic Curves, Geometry of elliptic curves over reals; Weier strass normal form, point at infinity; Addition of two points; Bezout's theorem, associativity; Group structure, Points of finite order; Elliptic Curves over finite fields, Discrete Log problem for Elliptic curves; Elliptic Curve Cryptography; Factorization using Elliptic Curve; Lenstra's algorithm; ElGamal Public Key Cryptosystem for elliptic curves.

**Reference Books**:

1. A Course in Number Theory and Cryptography, Neal Koblitz, (Springer 2006).

2. An Introduction to Mathematical Cryptography, Jill Pipher, Jeffrey Hoffstein, Joseph H.Silverman (Springer, 2008).

3. An Introduction to theory of numbers, Niven, Zuckerman and Montgomery, (Wiley 2006).

4. Elliptic curves: Number theory and cryptography, Lawrence C. Washington, (Chapman & Hall/CRC 2003).

5. An Introduction to Cryptography, R.A. Mollin (Chapman & Hall, 2001).

6. Rational Points on Elliptic Curves, Silverman and Tate (Springer 2005).

7. Guide to elliptic curve cryptography Hankerson, Menezes, Vanstone (Springer, 2004).

8. Elementary Number Theory, Jones and Jones (Springer, 1998).

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| **MTIT- 111** A | **Information Storage Management** |
| **Lecture** | **Tutorial** | **Practical** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **4** | **1** | **-** | **75** | **25** | **100** | **3** |
| **Purpose** |  **The course aims to provide basic understanding about Information Storage and Management**  |
| **Course Outcomes** |
| **CO 1** |  Identify the components of managing the data center and Understand logical andphysical components of a storage infrastructure. |
| **CO 2** |  Evaluate storage architectures, including storage subsystems SAN, NAS,IPSAN,CAS |
| **CO 3** |  Understand the business continuity, backup and recovery methods. |
| **CO 4** | Idea about managing storage infrastructure |

**UNIT – 1**

**Introduction to storage and management**

Introduction to Information Storage Management - Data Center Environment– Database Management System (DBMS) - Host - Connectivity –Storage-Disk Drive Components- Intelligent Storage System -Components of an Intelligent Storage System- Storage Provisioning- Types of Intelligent Storage Systems

**UNIT – 1I**

**Storage networking**

Fibre Channel: Overview - SAN and Its Evolution -Components of FC SAN –FC Connectivity-FC Architecture- IPSAN-FCOE-FCIP-Network-Attached Storage- General-Purpose Servers versus NAS Devices - Benefits of NAS- File Systems and Network File Sharing-Components of NAS - NAS I/O Operation -NAS

Implementations -NAS File-Sharing Protocols-Object-Based Storage Devices- Content-Addressed Storage -CAS Use Cases.

**UNIT – 1II**

**Backup and recovery**

Business Continuity -Information Availability -BC Terminology-BC Planning Life Cycle - Failure Analysis -Business Impact Analysis-Backup and Archive – Backup Purpose -Backup Considerations -Backup Granularity - Recovery Considerations - Backup Methods -Backup Architecture - Backup and Restore Operations.

**UNIT – 1V**

**Securing and managing storage infrastructure**

Information Security Framework -Storage Security Domains-Security Implementations in Storage Networking - Monitoring the Storage Infrastructure - Storage Infrastructure Management Activities -Storage Infrastructure Management Challenges.

**Text Book**

* 1. **EMC Corporation**, “*Information Storage and Management”*, Wiley India, 2nd Edition, 2011.
	2. **Robert Spalding,** “*Storage Networks: The Complete Reference”*, Tata McGraw Hill, Osborne, 2003.

**Reference Book**

1. **Marc Farley,** *“Building Storage Networks”*, Tata McGraw Hill, Osborne,2nd Edition, 2001.
2. **Meeta Gupta,** *“Storage Area Network Fundamentals”*, Pearson Education Limited, 2002.

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| **MTIT-113** A | **Soft Computing** |
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **4** | **0** | **0** | **4** | **60** | **40** | **100** | **3 Hrs.** |
| **Program Objective (PO)** | To introduce the detailed study on Soft Computing with Neural Networks, Fuzzy Logic, Optimization & Regression and Genetic algorithms approaches. |
| **Course Outcomes (CO)** |
| **CO1** | Understand various types of Neural Networks. |
| **CO2** | Understand the detailed explanation of Fuzzy Logic with fuzzy sets. |
| **CO3** | Description of optimization, regression methods and Genetic Algorithms for solving engineering problems |
| **CO4** | Understanding all concepts of Soft Computing for problem solving. |

**Unit 1**

**Neural Networks:** History, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.

**Unit 2**

**Fuzzy Logic:** Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation, Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations, Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations, Introduction of Neuro-Fuzzy Systems, Architecture of Neuro Fuzzy Networks, Applications.

**Unit 3**

**Regression and Optimization:** Least-Squares Methods for System Identification -System Identification: An Introduction, Basics of Matrix Manipulation and Calculus, Least-Squares Estimator, Geometric Interpretation of LSE, Recursive Least-Squares Estimator, Recursive LSE for Time-Varying Systems, An introduction to LSE for Nonlinear Models, Derivative-based Optimization-Descent Methods, The Method of Steepest Descent, Newton's Methods, Step Size Determination, Conjugate Gradient Methods, Analysis of Quadratic Case, Nonlinear Least-squares Problems, Incorporation of Stochastic Mechanisms, Derivative-Free Optimization.

**Unit 4**

**Genetic Algorithm:** An Overview of GA, GA operators, GA in problem solving, Implementation of GA.

**Text Books:**

1. “Introduction to the Theory of Neural Computation”, Hertz J. Krogh, R.G. Palmer, Addison-Wesley, California, 1991.

2. “Fuzzy Sets & Fuzzy Logic”, G.J. Klir& B. Yuan, PHI, 1995.

3. “Neuro-fuzzy and Soft Computing”, by J.-S.R. Jang, C.-T. Sun, and E. Mizutani, PHI.

4. “An Introduction to Genetic Algorithm”, Melanie Mitchell, PHI, 1998.

5. “Soft computing and Intelligent System Design”, F. O. Karray and C. de Silva, Pearson, 2009.

**Reference Books:**

1. “Neural Networks-A Comprehensive Foundations”, Prentice-Hall International, New Jersey, 1999.

2. “Neural Networks: Algorithms, Applications and Programming Techniques”, Freeman J.A. & D.M. Skapura, Addison Wesley, Reading, Mass, (1992).

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| **MTIT-115** A | **Advanced Computer Networks** |  |
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Major Test** | **Minor Test** | **Practical** | **Total** | **Time** |
| **3** | **0** | **0** | **3** | **60** | **40** | **-** | **100** | **3 Hrs.** |
| **Program Objective (PO)** | To enable students to describe and deal with computer communication and networking, various reference models and architectures along with implemented wireless communication techniques and various security and privacy parameters are also studied. |
| **Course Outcomes (CO)** |  |
| **CO1** | To classify traditional networks and discuss various wireless networking standards, compare and contrast various IEEE wireless LAN and Ethernet standards. |
| **CO2** | To describe cellular architecture and IPv4 and IPv6 header formats has to be discussed along with mobile IP. |
| **CO3** | To deploy high performance computing standards, VPN and routing protocols. |
| **CO4** | To get familiar with various security and privacy standards/tools. |  |

**Unit 1**

MAC Protocols for high speed and wireless networks -IEEE 802.3 standards for fast Ethernet, gigabit Ethernet, 10G, and 100VG-AnyLAN, IEEE 802.11, 802.15, and 802.16 standards for Wireless PAN, LAN, and MAN

**Unit 2**

IPv6: IPv4 versus IPv6, basic protocol, Header-extensions and options, support for QoS, security, etc., neighbour discovery, auto-configuration, DHCPv6, IPv6 Routers and Routing.

Mobility in networks – Mobility Management: Cellular architecture, Mobility: handoff, types of handoffs; location management, HLR-VLR scheme, Mobile IP and IPv6.

**Unit 3**

IP Multicasting. Multicast routing protocols, address assignments, session discovery, etc. IPsec protected channel service, virtual private network service, multiprotocol label switching, MPLS VPN

Traffic Types, TCP extensions for high-speed networks, transaction-oriented applications. Other improvements in TCP, Performance issues, TCP Congestion Control – fairness, scheduling and Delay modeling, QoS issues, differentiated services.

**Unit 4**

Network security at various layers. Security related issues in mobility. Secure-HTTP, SSL, Message digests, Key distribution protocols. Digital signatures and digital certificates.

**Books and References**:

1. W. R. Stevens. TCP/IP Illustrated, Volume 1: The protocols, Addison Wesley, 1994.
2. G. R. Wright. TCP/IP Illustrated, Volume 2: The Implementation, Addison Wesley, 1995.
3. W. R. Stevens. TCP/IP Illustrated, Volume 3: TCP for Transactions, HTTP, NNTP, and the Unix Domain Protocols, Addison Wesley, 1996.
4. W. Stallings. Cryptography and Network Security: Principles and Practice, 2nd Edition, Prentice Hall, 1998.
5. C. E. Perkins, B. Woolf, and S. R. Alpert.Mobile IP: Design Principles and Practices, Addison Wesley, 1997.
6. J.F. Kurose and K.W. Ross, Computer Networking – A Top-down Approach Featuring the Internet, Pearson Education, New Delhi, 2004.
7. N. Olifer& V. Olifer, Computer Networks: Principles, Technologies, and Protocols for network Design, Wiley-Dreamtech Low Price, New Delhi

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| **MTRM-111** A | **Research Methodology and IPR** |  |
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **2** | **0** | **0** | **2** | **60** | **40** | **100** | **3 Hrs.** |
| **Program Objective (PO)** | *To enable students to Research Methodology and IPR for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.*  |
| **Course Outcomes (CO)** |  |
| **CO1** | Understand research problem formulation. |
| **CO2** | Analyze research related information |
| **CO3** | Understand that today’s world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity. |
| **CO4** | Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular. |  |

**Unit 1**

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

**Unit 2**

Effective literature studies approaches, analysis, Plagiarism, Research ethics, Effective technical writing, how to write report, Paper.Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

**Unit 3**

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

**Unit 4**

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

**References**:

1. Stuart Melville and Wayne Goddard, “Research methodology: an introduction for science & engineering students’.
2. C.R. Kothari, “Research Methodology: Methods & Techniques, 2nd edition or above, New Age Publishers.

2. Wayne Goddard and Stuart Melville, “Research Methodology: An Introduction”

3. Ranjit Kumar, 2 nd Edition , “Research Methodology: A Step by Step Guide for beginners”

4. Halbert, “Resisting Intellectual Property”, Taylor & Francis Ltd ,2007.

5. Mayall , “Industrial Design”, McGraw Hill, 1992.

6. Niebel , “Product Design”, McGraw Hill, 1974.

7. Asimov , “Introduction to Design”, Prentice Hall, 1962.

8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, “ Intellectual Property in New Technological Age”, 2016.

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| **MTIT-117** A | **Software Lab I – Mobile computing lab** |
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **--** | **--** | **4** | **2** | **60** | **40** | **100** |  **3** |
| **Purpose** | **To familiarize the students with the basic concepts of mobile computing** |
|  | **Course outcomes** |
| **CO 1** | To familiarize the students with J2ME |
| **CO 2** | To study and implement implement mobile network using NS2 |
| **CO 3** | To familiarize the students with Wireless Markup Language |
| **CO 4** | To study basic concepts of WAP , WAP architecture , applications etc  |

**List of experiments**

1. To study basic concept of J2ME.
2. Set up and configuration of access point
3. To study various classes (such as TextBox, ChoiceGroup , Drop Down menus etc. ) and their implementation in J2ME
4. To install NS2 or NS3.
5. To implement mobile network using NS2.
6. To study basic tags of WML
7. Develop a mobile calculator application that performs addition, subtraction, multiplication, division, etc operations on mobile by using either Android or IBM Worklight
8. Simulate the Distance Vector Routing Algorithm and Analyze the performance metrics such as throughput, packet drop rate etc
9. To study basic concepts of WAP , WAP architecture , applications etc.

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| **MTIT-119** A | **Software Lab II - Signal and system** |
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **--** | **--** | **4** | **2** | **60** | **40** | **100** |  **3** |
| **Purpose** | **To familiarize the students with the basic concepts of signals and systems** |
|  | **Course outcomes** |
| **CO 1** | Introduction and classification of signals and systems based on their properties |
| **CO 2** | To understand the basic concepts of random variables and LTI systems. |
| **CO 3** |  Familiarization with the sampling process and spectral analysis of signals using Fourier Series. |
| **CO 4** | Apply transform techniques to analyze continuous-time and discrete-time signals and systems |

**List of Experiments:**

1. To explore the effect of transformation of signal parameters (amplitude-scaling, time-scaling and time-shifting).
2. To explore the various properties of the impulse signals.
3. WAP to explore the time variance and time invariance property of a given system.
4. To explore causality and non-causality property of a system.
5. To visualize the relationship between the continuous-time Fourier series and Fourier transform of a signal.
6. To visualize the relationship between continuous-time and discrete-time Fourier transform of a signals.
7. WAP to demonstrate the time domain sampling of bandlimited signals (Nyquist theorem).
8. To demonstrate the time domain sampling of non-bandlimited signals and antialiasing filter.
9. To demonstrate the sampling in frequency domain (Discrete Fourier Transform).
10. To demonstrate the spectral analysis using Discrete Fourier Transform.
11. To demonstrate the convolution and correlation of two continuous-time signals.

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| **MTIT – 102** A | **Digital Signal Processing** |
| **Lecture** | **Tutorial** | **Practical** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **4** | **1** | **--** | **75** | **25** | **100** |  **3** |
| **Purpose** | **To familiarize the students with the basic concepts of Digital Signal Processing** |
|  |  |
| **CO 1** | Introduce to Z-Transform, Fourier Transform and their properties.  |
| **CO 2** | To understand the basic concepts of Frequency Domain sampling and implementationof Discrete Time Systems.  |
| **CO 3** | Familiarization with the Design of FIR Filters.  |
| **CO 4** | Familiarization with the Design of IIR Filters. |

**Unit-I**

**Discrete Transforms**: Z- transform and its properties, Inversion of Z-transform, One sided Z-transform and

solution of differential equations. Analysis of LTI systems in Z-domain, causality, stability, schur-cohn stability

test, relationship between Z-transform and Fourier transform.

**Frequency Selective Filters**: All pass filters, minimum-phase, maximum-phase and mixed-phase systems,

Goertzel algorithm, Chirp Z-transform, applications of Z-Transform.

**Unit-II**

**Frequency Domain Sampling and DFT**: Properties of DFT, Linear filtering using DFT, Frequency analysis of signals using DFT, radix 2, radix-4, computation of DFT of real sequences.

**Implementation of Discrete Time Systems**: Direct form, cascade form, frequency sampling and lattice structures for FIR systems. Direct forms, transposed form, cascade form parallel form. Lattice and lattice

ladder structures for IIR systems.

**Unit-III**

**Design of FIR Filters** : Characteristics of practical frequency selective filters. Filters design specifications

peak pass band ripple, minimum stop band attenuation. Four types of FIR filters, alternation theorem.

Design of FIR filters using windows, Kaiser window method comparison of design methods for FIR filters, Gibbs phenomenon, design of FIR filters by frequency sampling method, design of optimum equiripple FIR filters.

**Unit-IV**

**Design of IIR Filters**: Design of IIR filters from analog filters, Design by approximation of derivatives, Impulse Invariance Method, Bilinear Transformation Method, Least Square Methods.

Characteristics of Butterworth, Chebyshev and Elliptical analog filters, Design of IIR filters,

Frequency transformation, , design of IIR filters in frequency domain.

**Text Books:**

1. John G. Proakis, Digital Signal Processing, PHI.
2. Digital Signal Processing: Alon V. Oppenhelm;PHI

**Reference Books:**

1. S. K. Mitra, Digital Signal Processing , TMH
2. Rabiner and Gold, Digital Signal Processing, PHI
3. Salivahan, Digital Signal Processing , TMH

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| **MTIT - 104** A | **Stochastic Processes & Queueing Theory** |
| **Lecture** | **Tutorial** | **Practical** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **4** | **1** | **-** | **75** | **25** | **100** | **3** |
| **Purpose** | **To impart knowledge on probability concepts to study their applications in stochastic processes & queuing theory.**  |
| **Course Outcomes** |
| **CO 1** | Compute the characteristics of the random variable given the probabilities |
| **CO 2** | Understand and apply various distribution |
| **CO 3** | Solve cases of different Stochastic processes along with their properties.  |
| **CO 4** | Gain sufficient knowledge in principles of Markov chains and queueing theory |

**Unit-I**

**Probability & Random variables**

Introduction ; Basics of probability; Probability space , Conditional probability ; One dimensional and two dimensional Random Variables – Characteristics of Random Variables : Expectation, Moments.

**Unit-II**

**Theoretical distributions**

Discrete : Binomial, Poisson, Negative Binomial, Geometric, Uniform Distributions. Continuous: Uniform, Exponential, Erlang and Gamma, Weibull Distributions.

**Unit-III**

**Stochastic processes**

Classification of Stochastic Processes – Bernoulli process – Poisson process – Pure birth process – Birth and Death process.

**Unit-IV**

**Markov chains & Queuing theory**

Introduction – Discrete-Parameter Markov Chains – Transition Probability Matrix – Chapman Kolmogorov Theorem – State classification and limiting distributions.

Characteristics of Markovian Single server and Multi server queuing models; Queuing System – Pollaczek Khinchin formula.

**Text book**

1. Kishore.S.Trivedi, “*Probability & Statistics with Reliability, Queuing and Computer Science Applications*”, PHI, New Delhi, 1995.
2. Veerajan T, “*Probability, Statistics and Random Processes*”, 3rd Edition Tata McGraw Hill,2002.

**Reference Books**

1. Gupta S.C and Kapoor V.K, “*Fundamentals of Mathematical Statistics*”, 9th Ed, SChand & Co.
2. Gross.D and Harris.C.M. “*Fundementals of Queuing theory*”, John Wiley and Sons, 1985.
3. Allen.A.O., “*Probability, Statistics and Queuing Theory*”, Academic Press, 1981.

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| **MTIT-106** A | **Design Patterns** |
| **Lecture** | **Tutorial** | **Practical** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **4** | **1** | **-** | 75 | 25 | **100** | **3** |
| **Purpose** | **To familiarize students with advanced skills in object-oriented design and programming**  |
| **Course Outcomes** |
| **CO 1** | Understand common design patterns |
| **CO 2** | Be able to identify appropriate patterns for design problems |
| **CO 3** | Be able to evaluate the quality of software source code |
| **CO 4** | Be able to refactor badly designed program by properly using designpatterns |

**Unit-I**

**Introduction to design patterns**

Design Patterns Arose from Architecture and Anthropology - Architectural to Software Design Patterns - Advantages of Design Patterns - Adapter Pattern - Strategy Pattern - Bridge Pattern - Abstract Factory Pattern.

**Unit-II**

**New paradigm of design**

Principles and Strategies of Design Patterns - Open-Closed Principle – Designing from Context - Encapsulating Variation. Commonality and Variability Analysis - Analysis Matrix - Decorator Pattern.

**Unit-III**

**Values of patterns**

Observer Pattern - Categories of Patterns - Template Method Pattern – Applying the Template Method to the Case Study - Using Template Method Pattern to Reduce Redundancy.

**Unit-IV**

**Factories**

Design Patterns: Factories - Singleton Pattern and the Double-Checked Locking Pattern - Applying Singleton Pattern to Case Study. Object Pool Pattern - Management of Objects. Factory Method Pattern - Factory Method Pattern andObject-Oriented Languages.

**Text books**

1. Jason McC. Smith , *“Elemental design Patterns”*, Pearson, 2012.
2. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, *“Design Patterns: Elements of Reusable Object-Oriented Software”*, Addison-Wesley, 2003.

**Reference book**

1. Eric Freeman, Elisabeth Freeman, Kathy Sierra, Bert Bates, *“Head First Design Patterns”*, O'Reilly Media, Inc., 2004.

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| **MTIT-108** A | **Information Theory and Coding** |
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **3** | **0** | **0** | **3** | **60** | **40** | **100** | **3Hrs.** |
| **Program Objective (PO)** | The objective of this course is to introduce the basic concepts of information theory and coding, including information, source coding, channel model, channel capacity, channel coding in an exemplary way. |
| **Course Outcomes (CO)** |
| **CO1** | To understand and explain the basic concepts of information theory, source coding, channel and channel capacity, channel coding and relation among them. |
| **CO2** | To describe the real life applications based on the fundamental theory and to apply convolution codes for performance analysis & cyclic codes for error detection and correction. |
| **CO3** | To calculate entropy, channel capacity, bit error rate, code rate and steady-state probability. |
| **CO4** | To implement the encoder and decoder of one block code or convolutional code using any program language. |

**Unit 1**

Overview; Basic Concepts - Entropy and Mutual information; Lossless Source Coding – Source entropy rate; Kraft inequality; Huffman code; Asymptotic equipartition property; Universal coding; Noisy Channel Coding - Channel capacity; Random channel codes; Noisy channel coding theorem for discrete memory-less channels; Typical sequences; Error exponents; Feedback; Continuous and Gaussian channels; Lossy Source Coding - Rate- Distortion functions; Random source codes; Joint source-channel coding and the separation theorem.

**Unit 2**

Source coding- Text, Audio and Speech: Adaptive Huffman Coding, Arithmetic Coding, LZW algorithm – Audio: Perceptual coding, Masking techniques, Psychoacoustic model, MEG Audio

layers I,II,III, Dolby AC3 - Speech: Channel V coder, Linear Predictive Coding Source coding- Image and Video: Image and Video Formats – GIF, TIFF, SIF, CIF, QCIF –Image compression: READ, JPEG – Video Compression: Principles-I,B,P frames, Motion estimation, Motion compensation, H.261, MPEG

**Unit 3**

Standard Error control coding- Block codes: Definitions and Principles: Hamming weight, Hamming distance, Minimum distance decoding - Single parity codes, Hamming codes, Repetition codes -Linear block codes,

**Unit 4**

Cyclic codes - Syndrome calculation, Encoder and decoder – CRC Error control coding- convolution codes: code tree, trellis, state diagram - Encoding – Decoding:

Sequential search and Viterbi algorithm – Principle of Turbo coding

**Text Books:**

1. Mark Kelbert(Author), Yuri Suhov, Information Theory and Coding by Example, Cambridge University Press, 2013.

**Reference Books:**

1. Simon Haykin and Michael Moher, Communication Systems, 5th Edition, Wiley, 2010

2. T.M. & Thomas, J.A. (2006). Elements of Information Theory. New York: Wiley.

3. Jiri Adamek, Foundations of coding, Wiley Interscience, 1991.

4. T. M. Cover and J. A. Thomas, Elements of information theory, Wiley, 1991.

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| **MTIT-110** A | **Security In Computing**  |
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **3** | **0** | **0** | **3** | **100** | **50** | **150** | **3 Hrs.** |
| **Program Objective (PO)** | To introduce the detailed study of Probability, Random Variables and Stochastic Processes. |
| **Course Outcomes (CO)** |
| **CO1** | To evaluate the risks and vulnerabilities in protocols/Standards. |
| **CO2** | To apply number theory and algebra required for designing cryptographic algorithms. |
| **CO3** | To Design symmetric key, asymmetric key encryption techniques, design authentication, message integrity and authenticated encryption protocols. |
| **CO4** | To design and security analysis of systems including distributed storage and Electronic voting**.** |

**UNIT – I**

Computer Security Concept, Threats, Attacks and Assets, Security Functional Requirements, Security Architecture for Open System, Scope of Computer Security, Computer Security Trends and Strategy.

Cryptography: Terminology and Background, Substitution Ciphers, Transpositions, Cryptanalysis, Data Encryption Standard, DES & AES Algorithms and comparison, Public Key Encryption, Possible Attacks on RSA Malicious Software: Types of Malicious Software, Viruses, Virus countermeasures, Worms, Bots, Rootkits.

**UNIT – II**

Protection in General-Purpose Operating Systems: Security Methods of Operating Systems, Memory and Address Protection.

Designing Trusted Operating Systems: Security Policies, Models of Security, Designing of Trusted Operating System. Linux Security: Linux Security Model, Linux Vulnerabilities, Linux System Hardening, Application Security, Mandatory Access Control

**UNIT – III**

Database Security: Relational Database, Database Access Control, Inference, Statistical Databases, Database Encryption. Data Mining Security: Security Requirements, Reliability and Integrity, Sensitive data, Multilevel Databases, Proposal for Multilevel Security, Data Mining - Privacy and Sensitivity, Data Correctness and Integrity, Data Availability.

Trusted Computing: Concept of Trusted System, Trusted Computing and Trusted Platform Module, Common Criteria for Information Technology Security Evaluation.

**UNIT – IV**

Security in Networks: Threats in networks, Network security controls, Firewall and Intrusion Prevention Systems: Need, Characteristics, Types of Firewalls, Firewall Basing, Intrusion Prevention Systems. Intrusion Detection Systems.

Internet Security Protocols and Standards: Secure Socket Layer (SSL) and Transport Layer Security (TLS), IP4 and IP6 Security, Secure Email. Legal and Ethical Aspects: Cybercrime and Computer Crime, Intellectual Property, Copyrights, Patents, Trade Secrets, Privacy and Ethical Issues.

**Text Books:**

1. Pfleeger C. &Pfleeger S.L., “Security in Computing”, 4th Ed., Pearson Education.

2. Stalling W., Brown L., “Computer Security Principles and Practice”, 3rd Ed., Pearson Education.

**Reference Books:**

1. Schneier B., “Applied Cryptography: Protocols, Algorithms and Source Code in C”, 2nd Ed., Wiley

India Pvt. Ltd.

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| **MTIT-112** A | **Enterprise resource planning** |
| **Lecture** | **Tutorial** | **Practical** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **4** | **1** | **-** | 75 | 25 | **100** | **3** |
| **Purpose** | To analyze, design and propose IT solutions for the integration of business process throughout the enterprise. |
| **Course Outcomes** |
| **CO 1** | Introduce to the concept of ERP |
| **CO 2** |  Propose reengineered enterprise processes that optimize the enterprise’s performance. |
| **CO 3** | Design integrated organizational structures and business processes thatoptimize the enterprise’s performance, overcome problems. |
| **CO 4** | ERP case studies in various fields. |

**Unit-I**

**Introduction**

ERP as integrated management information system - Evolution of ERP – Benefits of ERP. ERP vs Traditional Information systems.

**Unit-II**

**Business process reengineering**

Business Process Reengineering- need and challenges, - Management concerns about BPR. - BPR to build business Model for ERP. ERP & Competitive advantage, - Basic Constituents of ERP, Selection criteria for ERP Packages. Procurement process for ERP Package.

**Unit-III**

**ERP implementation**

ERP Implementation- issues, Role of Consultants, Vendors, Users, - Need for training, customization. ERP implementation methodology and post implementation issues and options.

**Unit-IV**

**ERP case studies**

ERP Case Studies In HRM, Finance, Production, Product Database, Materials, Sales & Distribution.

**Text Books**

1. Bret Wagner, Ellen Monk, “*Concepts in Enterprise Resource Planning”,* Cengage Learning , 2012.

2. Bret Wagner, Ellen Monk, *“Enterprise Resource Planning”,* Third Edition Cengage Learning, 2008.

**Reference Books**

1. Thomas F. Wallace , Michael H. Kremzar, “*ERP: Making It Happen” ,* John willey

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| **MTIT-114** A | **Algorithm Analysis and Design** |
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **3** | **0** | **0** | **3** | **60** | **40** | **100** | **3 Hrs.** |
| **Program Objective (PO)** | To Apply important Algorithmic design paradigms & methods of analysis & to Synthesize efficient Algorithms in common engineering design situations. |
| **Course Outcomes (CO)** |
| CO1 | To prove the correctness & analyse the asymptotic performance of Algorithms. |
| CO2 | To know various Number Theoretic Algorithms & Graph Algorithms. |
| CO3 | To Analyse various Geometric Algorithms. |
| CO4 | Understand NP-completeness & identify different NP-complete problems. |

**Unit 1**

**Introduction:**

Algorithm concepts, Analyzing and design, Pseudocode conventions, asymptotic efficiency of algorithms, asymptotic notations and their properties.

**Analysis Techniques:**

Growth Functions, Recurrences and Solution of Recurrence equation-, Amortized Analysis, Aggregate, Accounting and Potential Methods, Probabilistic analysis concepts, hiring problem and its probabilistic analysis, String Matching: naive string Matching, Rabin Karp, and String matching with finite Automata, KW and Boyer – Moore algorithm.

**Unit 2**

**Number Theoretic Algorithms:**

Elementary notions, GCD, Modular Arithmetic, Solving modular linear equations, The chines remainder theorem, Powers of an element, RSA cryptosystem, Primality testing, Integer factorization, Polynomials. Huffman Codes: Concepts, construction, correctness of Huffman’s algorithms; Representation of polynomials, DFT, FFT, Efficient implementation of FFT, Graph Algorithm, Bellman Ford Algorithm, Single source shortest paths in a DAG Johnson’s Algorithm for sparse graph, Flow networks & Ford fulkerson Algorithm, Maximum bipartite matching.

**Unit 3**

**Computational Geometry:**

Geometric structures using C++: Vectors, points, Polygons, Edges: Geometric Objects in space: Finding the intersection of a line & triangle, Finding star shaped polygons and convex hull using incremental insertion.

**Unit 4**

**NP-completeness Concepts:**

Polynomial time verification, NP-completeness and reducibility, showing problems to be NP-complete like Clique problem, vertex cover problem etc. Approximation algorithms of these problems.

**Reference Books**

1. T. H Cormen, C E Leiserson.R L Rivest& C Stein, “Introduction to algorithms”, 2ndEdition, PHI.
2. Michael J Laszio, “Computational Geometry and Computer Graphics in C++”, PHI. India 1996.
3. Brassard, Bratley, “Fundamentals of algorithms”, Prentice Hall of India.
4. Knuth, “The Art of Computer Programming”, Vol I-III, Pearson Education.

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| **MTIT-116** A | **Data Mining** |
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **4** | **0** | **0** |  | **60** | **40** | **100** | **3 Hrs.** |
| **Program Objective (PO)** | To introduce the detailed study on data mining methodology. |
| **Course Outcomes (CO)** |
| **CO1** | Understand the basics of data mining and data warehousing  |
| **CO2** | Understand the detailed explanation of data generalization and statistical measures |
| **CO3** | Description of mining associations, correlations, classification and prediction  |
| **CO4** | Description on cluster analysis and mining of complex type of data like world wide web and text data base |

**Unit 1**

**Introduction**

Data Mining, Functionalities, Data Mining Systems classification, Integration with Data Warehouse System, Data summarization, data cleaning, data integration and transformation, data reduction.

**Data Warehouse**

Need for Data Warehousing, Paradigm Shift, Business Problem Definition, Operational and Information Data Stores, Data Warehouse Definition and Characteristics, Data Warehouse Architecture and Implementation, OLAP.

**Unit 2**

Data Mining Primitives, Query Language and System Architecture, Concept Description, Data generalization, Analysis of attribute relevance, Mining descriptive statistical measures in large databases.

**Unit 3**

**Mining association rules in large databases:** Association rule mining, Mining single dimensional Boolean association rules from transactional databases, mining multilevel association rules from transaction databases, Relational databases and data warehouses, correlation analysis, classification and prediction.

**Unit 4**

Introduction to cluster analysis, Mining complex type of data: Multidimensional analysis and descriptive mining of complex data objects, Spatial databases, Multimedia databases, Mining time series and sequence data, Mining text databases, Mining the World Wide Web, Applications and trends in data mining.

**Books and References:**

1. Data Mining: Concepts and Techniques; Jiawei Han and Micheline Kamber; Elsevier.
2. “Mastering Data Mining: The Art and Science of Customer Relationship Management”, by Berry and Lin off, John Wiley and Sons, 2001.
3. “Data Ware housing: Concepts, Techniques, Products and Applications”, by C.S.R. Prabhu, Prentice Hall of India, 2001.
4. “Data Mining: Concepts and Techniques”, J.Han, M.Kamber, Academic Press, Morgan Kanfman Publishers, 2001.
5. “Data Mining”, by Pieter Adrians, DolfZantinge, Addison Wesley 2000.
6. “Data Mining with Microsoft SQL Server”, by Seidman, Prentice Hall of India,2001.

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| **MTIT-118** A | **Software Lab I** |
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **--** | **--** | **4** | **2** | **60** | **40** | **100** |  **3** |
| **Purpose** | **To familiarize the students with the basic concepts of DSP** |
|  | **Course outcomes** |
| **CO 1** | Study of different function and signals of DSP. |
| **CO 2** | To familiarize students with DFT and DTFT |
| **CO 3** | To demonstrate the concept of convolution |
| **CO 4** | To demonstrate Z transform  |

**List of Experiments:**

1. Write a program to plot the Sine wave, cosine wave and Tangent wave.
2. Write a program to plot the following functions: a)impulse function b)unit step c)unit ramp d)

 exponential e) sinusoidal

1. Write a program to plot the convolution and multiplication of two signals.
2. Define a function to compute DTFT of a finite length signal. Plot the magnitude and phase

 plots using subplots.

1. Verify the Symmetry, time shifting and modulating properties of DTFT with a rectangular pulse.
2. Study different window functions available in signal processing.
3. Verify the properties of Discrete Fourier Transform (DFT).
4. Write a program to find the convolution of two sequences using in built convolution function.
5. Write a program to study the frequency shift property of DTFT.
6. Write a program to study the sampling theorem of a continuous time signal.
7. Write a program to study the Z-Transform.

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| **MTIT-120** A | **Software Lab II – Information theory and coding** |
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **--** | **--** | **4** | **2** | **60** | **40** | **100** |  **3** |
| **Purpose** | **To familiarize the students with the basic concepts of DSP** |
|  | **Course outcomes** |
| **CO 1** | Study of different function and signals of DSP. |
| **CO 2** | To familiarize students with DFT and DTFT |
| **CO 3** | To demonstrate the concept of convolution |
| **CO 4** | To demonstrate Z transform  |

**List of Experiments:**

1. Write a program for determination of various entropies and mutual information of a given channel. Test various types of channel such as a) Noise free channel. b) Binary symmetric channel etc Compare channel capacity of above channels
2. Write a program for generation and evaluation of variable length source coding using C / MATLAB for Shannon – Fano coding and decoding
3. Write a program for generation and evaluation of variable length source coding using C / MATLAB for Huffman coding and decoding
4. Write a Program for coding & decoding of Linear block codes.
5. Write a Program for coding & decoding of Cyclic codes.
6. Write a program for coding and decoding of convolutional codes.
7. Write a program for coding and decoding of BCH and RS codes.
8. Write a program to study performance of a coded and uncoded communication system (Calculate the error probability).
9. Write a simulation program to implement source coding and channel coding for transmitting a text file.

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| **MTIT-201** A | **Mobile Ad-hoc and Wireless Sensor Networks** |  |
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Major Test** | **Minor Test** | **Practical** | **Total** | **Time** |
| **3** | **0** | **0** | **3** | **60** | **40** | **-** | **100** | **3 Hrs.** |
| **Program Objective (PO)** | To enable students to describe and deal with computer communication and networking, various reference models and architectures along with implemented wireless communication techniques and various security and privacy parameters are also studied. |
| **Course Outcomes (CO)** |  |
| **After completion of course students will be able to** |  |
| **CO1** | Classify traditional networks and discuss various wireless networking standards, compare and contrast various IEEE wireless LAN and Ethernet standards. |  |
| **CO2** | Describe cellular architecture and IPv4 and IPv6 header formats has to be discussed along with mobile IP. |  |
| **CO3** | Recently deployed high performance computing standards, VPN, routing protocols as to be gone through. |  |
| **CO4** | Various security and privacy standards/tools to be described. |  |

**Unit 1**

Mobile Ad hoc Networks (MANET) – Mobility Management, modeling distributed applications for MANET, MAC mechanisms and protocols.

**Unit 2**

MANET Routing Protocols: Ad hoc network routing protocols, destination sequenced distance vector algorithm, cluster based gateway switch routing, global state routing, fish-eye state routing, dynamic source routing, ad hoc on-demand routing, OLSR & TORA routing, location aided routing, zonal routing algorithm.

**Unit 3**

Ad hoc network security – Link layer, Network layer, Trust and key management.

Self policing MANET – Node Misbehaviour, secure routing, reputation systems.

Wireless Sensor Networks (WSN) – Design Issues, Clustering, Applications of WSN.

**Unit 4**

MAC layer and routing protocols in WSN

Data Retrieval Techniques in WSN – Sensor databases, distributed query processing, Data dissemination and aggregation schemes, Operating Systems for WSN, Security issues in WSN.

**Books and References:**

1. C. Siva Ram Murthy & B.S. Manoj, Mobile Ad hoc Networks – Architectures & Protocols, Pearson Education, New Delhi, 2004
2. C M Cordeiro& D.P. Agrawal, Adhoc & Sensor Networks – Theory and Applications, ISBN 981­256-682-1, World Scientific Singapore, 2006
3. C. S. Raghvendra, Wireless Sensor Networks, Springer-Verlag, 2006.

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| **MIT- 203** A | **Advances in Algorithms** |
| **Lecture** | **Tutorial** | **Practical** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **4** | **1** | **-** | 75 | 25 | **100** | **3** |
| **Purpose** | **The objective of this course is to provide in-depth coverage of advanced data structures and algorithm design techniques.** |
| **Course Outcomes** |
| **CO 1** | Introduction about algorithms |
| **CO 2** | To introduce students to advance data structures |
| **CO 3** | To introduce students to design and analysis |
| **CO 4** | To introduce students to some miscellaneous topics related to algorithms |

**UNIT – I**

**Algorithms:** Role of algorithms in computing, Asymptotic Notations, Standard notations and common functions.

Recurrence: The maximum-subarray problem, Strassen's algorithm for matrix multiplication substitution and recursion-tree method for solving recurrences, master method for solving recurrences, Proof of the master theorem, Probabilistic Analysis and Randomized Algorithms.

**UNIT – II**

**Sorting:** Bubble sort, Heap, Building and maintaining heap, Heapsort, Quicksort, Lower bounds for sorting, Counting sort, radix sort, bucket sort.

**Advanced Data Structures:** Splay Trees, Top-down splay trees, Red-black Trees, Deterministic skip lists, AA-Trees, Trie, Treaps, K-d Trees.

**UNIT – III**

**Advanced Design and Analysis:** Dynamic Programming: matrix-chain multiplication, Longest common subsequence, optimal binary search tree, Greedy algorithms: Huffman codes.

Graph Algorithms: Storage of graphs, traversing a graph, Topological sort, Minimum Spanning Trees, Shortest path problems: Single source and All-pairs shortest path, Maximum Flow networks, matching in bipartite graphs.

**UNIT – IV**

**Miscellaneous Topics:** Knapsack Problem and Memory functions, Approximate String Matching, Chinese remainder theorem, Integer factorization, naïve-string matching, Rabin-karp string matching, String matching with finite automata, Knuth-moris-pratt algorithm, finding convex hull, Polynomial time, verification and reducibility, NP-completeness and proofs.

**Text Books:**

1. Cormen, Thomos, Leiserson, *“Introduction to Algorithms”*, 3rd Ed., PHI Learning

2. Neapolitan R., Naimipour K., *“Foundations of Algorithms”*, 4th Ed., Jones and Bartlett Publishers.

**Reference Books:**

1. Anany Levitin, *“Introduction to Design and Analysis of Algorithms”*, 2nd Ed., Pearson Education.

2. Cooper A., *“Computability Theory”*, Chapman and Hall/ CRC Press.

3. Robert Sedgewick, *“Algorithms in C: Fundamentals, Data Structures, Sorting, Searching, Parts 1-4*”, 3rd

 Ed., Pearson Education India.

4. Steven Skiena, *“The Algorithm Design Manual”*, 2nd Ed., Springer India.

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| **MTIT-205** A | **Genetic Algorithms** |
| **Lecture** | **Tutorial** | **Practical** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **4** | **1** | **-** | 75 | 25 | **100** | **3** |
| **Purpose** | **To familiarize students with genetic algorithms** |
| **Course Outcomes** |
| **CO 1** | To introduce student to the concept of optimization |
| **CO 2** | Difference between GA and traditional methods |
| **CO 3** | To introduce student to implement GA on computer |
| **CO 4** | To introduce student to Advanced operators and techniques in Genetic Search |

**UNIT – I**

**Introduction:** Goal of optimization, local and global optima, Multi-objective optimization, Problems in global optimization like premature convergence to a local optimum, overfitting etc, A brief history of evolutionary computation, The appeal of evolution, Biological terminology, Search spaces and fitness landscapes, Conventional Optimization and Search Techniques - Gradient-Based Local Optimization Method, Random Search, Stochastic Hill Climbing, Simulated Annealing etc.

**UNIT – II**

**Genetic algorithms(GA), Evolution strategies**, Difference between Genetic Algorithm and traditional methods, Selection – elitism, rank selection, tournament selection, Boltzmann selection, steady state selection etc.; Crossover, mutation; Schema theorem – schemata and masks, Wildcards, Holland’s schema theorem and criticism; convergence.

.**UNIT – III**

**Computer Implementation of Genetic Algorithm:** Data Structures, Reproduction, Crossover, and mutation, Mapping objective functions to fitness form, Fitness scaling, Different types of encodings - Binary Encoding, Octal Encoding, Hexadecimal Encoding, Permutation Encoding, Value Encoding, Tree Encoding etc.

**UNIT – IV**

**Advanced operators and techniques in Genetic Search:** Dominance, Diploidy, and Abeyance, Inversion and other reordering operators like partially matched crossover, order crossover and cycle crossover, Niche and speciations, Micro-operators, Knowledge based techniques, Genetic algorithm and parallel processors.

**Classification of Genetic Algorithm:** Simple Genetic Algorithm(SGA), Parallel and Distributed Genetic Algorithm (PGA and DGA), Hybrid Genetic Algorithm (HGA), Adaptive Genetic Algorithm(AGA), Fast Messy Genetic Algorithm (FmGA), Independent Sampling Genetic Algorithm(ISGA).

**Text Books:**

1. Goldberg D. E., *Genetic Algorithms in Search, Optimization, and Machine Learning*, Pearson Education.
2. Sivanandam S. N. & Deepa S. N., *Introduction to Genetic Algorithms*, Springer.

**Reference Books:**

1. Mitchell M., *An Introduction to Genetic Algorithms*, Prentice-Hall.
2. Weise Thomas, *Global Optimization Algorithms– Theory and Application,* http://www.it-weise.de/ projects/book.pdf.

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| **MTOE-201** A | **Business Analytics** |  |
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **3** | **0** | **0** | **3** | **60** | **40** | **100** | **3 Hrs.** |
| **Program Objective (PO)** | The main objective of this course is to give the student a comprehensive understanding of business analytics methods. |
| **Course Outcomes (CO)** |  |
| **CO1** | *Able to have knowledge of various business analysis techniques.* |
| **CO2** | *Learn the requirement specification and transforming the requirement into different models.* |
| **CO3** | *Learn the requirement representation and managing requirement assests.* |
| **CO4** | *Learn the Recent Trends in Embedded and collaborative business* |  |

**Unit 1**

Business Analysis: Overview of Business Analysis, Overview of Requirements, Role of the Business Analyst.

Stakeholders: the project team, management, and the front line, Handling, Stakeholder Conflicts.

Life Cycles: Systems Development Life Cycles, Project Life Cycles, Product Life Cycles, Requirement Life Cycles.

**Unit 2**

Forming Requirements: Overview of Requirements Attributes of Good Requirements, Types of Requirements, Requirement Sources, Gathering Requirements from Stakeholders, Common Requirements Documents.

Transforming Requirements: Stakeholder Needs Analysis, Decomposition Analysis, Additive/Subtractive Analysis, Gap Analysis, Notations (UML & BPMN), Flowcharts, Swim Lane Flowcharts, Entity-Relationship Diagrams, State-Transition Diagrams, Data Flow Diagrams, Use Case Modeling, Business Process Modeling

**Unit 3**

Finalizing Requirements: Presenting Requirements, Socializing Requirements and Gaining Acceptance, Prioritizing Requirements.

Managing Requirements Assets: Change Control, Requirements Tools

**Unit 4**

Recent Trends in: Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data Journalism.

**References:**

1. Business Analysis by James Cadle et al.

2. Project Management: The Managerial Process by Erik Larson and, Clifford Gray

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| **MTOE-203** A | **Industrial Safety**  |  |
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **3** | **0** | **0** | **3** | **60** | **40** | **100** | **3 Hrs.** |
| **Program Objective (PO)** | *To enable students to aware about the industrial safety.* |
| **Course Outcomes (CO)** |  |
| **CO1** | *Understand the industrial safety.* |
| **CO2** | *Analyze fundamental of maintenance engineering.* |
| **CO3** | *Understand the wear and corrosion and fault tracing.* |
| **CO4** | *Understanding that when to do periodic inceptions and apply the preventing maintenance.*  |  |

**Unit-1**

Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, washrooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

**Unit-2**

Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

**Unit-3**

Fault tracing: Fault tracing-concept and importance, decision treeconcept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic,automotive, thermal and electrical equipment’s like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

**Unit-4**

Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

**Reference:**

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.
3. Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.
4. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.

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| **MTOE-205** A | **Operations Research**  |  |
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **3** | **0** | **0** | **3** | **60** | **40** | **100** | **3 Hrs.** |
| **Program Objective (PO)** | To enable students to aware about the dynamic programming to solve problems of discreet and continuous variables and model the real world problem and simulate it. |
| **Course Outcomes (CO)** |  |
| **CO1** | *Students should able to apply the dynamic programming to solve problems of discreet and continuous variables.* |
| **CO2** | *Students should able to apply the concept of non-linear programming* |
| **CO3** | *Students should able to carry out sensitivity analysis* |
| **CO4** | *Student should able to model the real world problem and simulate it.* |  |

**Unit -1**

Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models

**Unit -2**

Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming

Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT

**Unit- 3**

Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

**Unit -4**

Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

**References:**

1. H.A. Taha, Operations Research, An Introduction, PHI, 2008
2. H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.
3. J.C. Pant, Introduction to Optimisation: Operations Research, Jain Brothers, Delhi, 2008
4. Hitler Libermann Operations Research: McGraw Hill Pub. 2009
5. Pannerselvam, Operations Research: Prentice Hall of India 2010
6. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

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| **MTOE-207** A | **Cost Management of Engineering Projects**  |  |
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **3** | **0** | **0** | **3** | **60** | **40** | **100** | **3 Hrs.** |
| **Program Objective (PO)** | *To enable students to make aware about the cost management for the engineering project and apply cost models the real world projects.* |
| **Course Outcomes (CO)** |  |
| **CO1** | *Students should able to learn the strategic cost management process.* |
| **CO2** | *Students should able to types of project and project team types* |
| **CO3** | *Students should able to carry out Cost Behavior and Profit Planning analysis.* |
| **CO4** | *Student should able to learn the quantitative techniques for cost management.* |  |

**Unit-1**

Introduction and Overview of the Strategic Cost Management Process Cost concepts in decision-making; relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.

**Unit-2**

Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and nontechnical activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process

**Unit-3**

Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector. Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis. Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing.

**Unit-4**

Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

**References:**

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi
2. Charles T. Horngren and George Foster, Advanced Management Accounting
3. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting
4. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher
5. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd.

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| **MTOE-209** A | **Composite Materials**  |  |
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **3** | **0** | **0** | **3** | **60** | **40** | **100** | **3 Hrs.** |
| **Program Objective (PO)** | *To enable students to aware about the composite materials and their properties.* |
| **Course Outcomes (CO)** |  |
| **CO1** | *Students should able to learn the Classification and characteristics of Composite materials.* |
| **CO2** | *Students should able reinforcements Composite materials.* |
| **CO3** | *Students should able to carry out the preparation of compounds.* |
| **CO4** | *Student should able to do the analysis of the composite materials.* |  |

**UNIT–1**:

INTRODUCTION: Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix. Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.

REINFORCEMENTS: Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Iso-strain and Iso-stress conditions.

**UNIT – 2**

Manufacturing of Metal Matrix Composites: Casting – Solid State diffusion technique, Cladding – Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications.

**UNIT–3**

Manufacturing of Polymer Matrix Composites: Preparation of Moulding compounds and prepregs – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications.

**UNIT – 4**

Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure. Laminate first play failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.

**TEXT BOOKS:**

1. Material Science and Technology – Vol 13 – Composites by R.W.Cahn – VCH, West Germany.
2. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R.

3. Balasubramaniam, John Wiley & Sons, NY, Indian edition, 2007.

**References:**

1. Hand Book of Composite Materials-ed-Lubin.
2. Composite Materials – K.K.Chawla.
3. Composite Materials Science and Applications – Deborah D.L. Chung.
4. Composite Materials Design and Applications – Danial Gay, Suong V. Hoa, and Stephen W. Tasi.

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| **MTOE-211** A | **Waste to Energy** |  |
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **3** | **0** | **0** | **3** | **60** | **40** | **100** | **3 Hrs.** |
| **Program Objective (PO)** | *To enable students to aware about the generation of energy from the waste.* |
| **Course Outcomes (CO)** |  |
| **CO1** | *Students should able to learn the Classification of waste as a fuel.* |
| **CO2** | *Students should able to learn the Manufacture of charcoal.* |
| **CO3** | *Students should able to carry out the designing of gasifiers and biomass stoves.* |
| **CO4** | *Student should able to learn the Biogas plant technology.* |  |

**Unit-1**

Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors

Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

**Unit-2**

Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

**Unit-3**

 Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

**Unit-4**

Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

**References:**

1. Non Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.
3. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
4. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996.

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| **MTAD-101** A | **English For Research Paper Writing**  |  |
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **2** | **0** | **0** | **0** | **-** | **100** | **100** | **3 Hrs.** |
| **Program Objective (PO)** | *Student will able to understand the basic rules of research paper writing.* |
| **Course Outcomes (CO)** |  |
| **CO1** | *Understand that how to improve your writing skills and level of readability*  |
| **CO2** | *Learn about what to write in each section*  |
| **CO3** | *Understand the skills needed when writing a Title*  |
| **CO4** | *Ensure the good quality of paper at very first-time submission* |  |

**Unit 1**

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

**Unit 2**

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction

**Unit 3**

Review of the Literature, Methods, Results, Discussion, Conclusions, the Final Check. key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature,

**Unit 4**

Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission.

**References:**

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman’sbook.
4. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht

Heidelberg London, 2011

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| **MTAD-103** A | **Disaster Management**  |  |
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **2** | **0** | **0** | **0** | **-** | **100** | **100** | **3 Hrs.** |
| **Program Objective (PO)** | *Develop an understanding of disaster risk reduction and management* |
| **Course Outcomes (CO)** |  |
| **CO1** | *Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.*  |
| **CO2** | *Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.*  |
| **CO3** | *Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.*  |
| **CO4** | *critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in* |  |

**Unit 1**

Disaster: Definition, Factors and Significance; Difference between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

**Unit 2**

Repercussions of Disasters and Hazards: Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

**Unit 3**

Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.

**Unit 4**

Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People’s Participation in Risk Assessment. Strategies for Survival. Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends in Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs Of Disaster Mitigation in India.

**References:**

1. R. Nishith, Singh AK, “Disaster Management in India: Perspectives, issues and strategies “’New Royal book Company.
2. Sahni, PardeepEt.Al. (Eds.),” Disaster Mitigation Experiences And Reflections”, Prentice Hall Of India, New Delhi.
3. Goel S. L., Disaster Administration And Management Text And Case Studies”,Deep &Deep Publication Pvt. Ltd., New Delhi.

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| **MTAD-105** A | **Sanskrit for Technical Knowledge**  |  |
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **2** | **0** | **0** | **0** | **-** | **100** | **100** | **3 Hrs.** |
| **Program Objective (PO)** | *Students will be able to Understanding basic Sanskrit language and Ancient Sanskrit literature about science & technology can be understood and Being a logical language will help to develop logic in students*  |
| **Course Outcomes (CO)** |  |
| **CO1** | *To get a working knowledge in illustrious Sanskrit, the scientific language in the world*  |
| **CO2** | *Learning of Sanskrit to improve brain functioning*  |
| **CO3** | *Learning of Sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power*  |
| **CO4** | *The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature*  |  |

**Unit –1**

Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences.

**Unit – 2**

Order, Introduction of roots,Technical information about Sanskrit Literature

**Unit –3**

Technical concepts of Engineering: Electrical, Mechanical

**Unit –4**

Technical concepts of Engineering: Architecture, Mathematics

***References***

1. “Abhyaspustakam” – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi
2. “Teach Yourself Sanskrit” Prathama Deeksha-VempatiKutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. “India’s Glorious Scientific Tradition” Suresh Soni, Ocean books (P) Ltd., New Delhi.

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| **MTAD-107** A | **Value Education** |  |
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **2** | **0** | **0** | **0** | **-** | **100** | **100** | **3 Hrs.** |
| **Program Objective (PO)** | *Understand value of education and self- development, Imbibe good values in students and Let the should know about the importance of character*  |
| **Course Outcomes (CO)** |  |
| **CO1** | *Knowledge of self-development*  |
| **CO2** | *Learn the importance of Human values*  |
| **CO3** | *Developing the overall personality*  |
| **CO4** | *Know about the importance of character* |  |

**Unit 1**

Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgements.

**Unit 2**

Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism.Love for nature,Discipline

**Unit 3**

Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature

**Unit 4**

Character and Competence –Holy books vs Blind faith. Self-management and Good health. Science of reincarnation. Equality, Nonviolence,Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively

***References***

1.Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi

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| **MTAD-102** A | **Constitution of India**  |  |
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **2** | **0** | **0** | **0** | **-** | **100** | **100** | **3 Hrs.** |
| **Program Objective (PO)** | *Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective and to address the growth of Indian opinion regarding modern Indian intellectuals’ constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.*  |
| **Course Outcomes (CO)** |  |
| **CO1** | *Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.*  |
| **CO2** | *Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.*  |
| **CO3** | *Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.*  |
| **CO4** | *Discuss the passage of the Hindu Code Bill of 1956.*  |  |

**Unit I**

History of Making of the Indian Constitution: History, Drafting Committee, (Composition & Working) Philosophy of the Indian Constitution: Preamble, Salient Features

**Unit 2**

Contours of Constitutional Rights & Duties: Fundamental Rights , Right to Equality , Right to Freedom , Right against Exploitation , Right to Freedom of Religion, Cultural and Educational Rights , Right to Constitutional Remedies , Directive Principles of State Policy , Fundamental Duties.

Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive , President, Governor , Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications. Powers and Functions

**Unit 3**

Local Administration: District’s Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative CEO of Municipal Corporation, Panchayati raj: Introduction, PRI: ZilaPanchayat, Elected officials and their roles, CEO ZilaPanchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

**Unit 4**

Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

**References**

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

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| **MTAD-104** A | **Pedagogy Studies** |  |
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **2** | **0** | **0** | **0** | **-** | **100** | **100** | **3 Hrs.** |
| **Program Objective (PO)** | *Review existing evidence on the review topic to inform programme design and policy making undertaken by the DFID, other agencies and researchers and Identify critical evidence gaps to guide the development*. |
| **Course Outcomes (CO)** |  |
| **CO1** | *What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?*  |
| **CO2** | *What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?*  |
| **CO3** | *How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?*  |
| **CO4** | *What is the importance of identifying research gaps?* |  |

**Unit 1**

Introduction and Methodology: Aims and rationale, Policy background, Conceptual framework and terminology , Theories of learning, Curriculum, Teacher education., Conceptual framework, Research questions. Overview of methodology and Searching. Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. , Curriculum, Teacher education.

**Unit 2**

Evidence on the effectiveness of pedagogical practices, Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers’ attitudes and beliefs and Pedagogic strategies.

**Unit 3**

Professional development: alignment with classroom practices and follow-up support, Peer support from the head teacher and the community. Curriculum and assessment, Barriers to learning: limited resources and large class sizes,

**Unit 4**

Research gaps and future directions: Research design, Contexts , Pedagogy, Teacher education Curriculum and assessment, Dissemination and research impact.

**References**

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, ‘learning to read’ campaign.

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| **MTAD-106** A | **Stress Management by Yoga** |  |
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **2** | **0** | **0** | **0** | **-** | **100** | **100** | **3 Hrs.** |
| **Program Objective (PO)** | To achieve overall health of body and mind and to overcome stress |
| **Course Outcomes (CO)** |  |
| **CO1** | *Develop healthy mind in a healthy body thus improving social health.*  |
| **CO2** | *Improve efficiency*  |
| **CO3** |  *Learn the Yog asan* |
| **CO4** | *Learn the pranayama* |  |

**Unit – 1**

Definitions of Eight parts of yog (Ashtanga).

**Unit- 2**

Yam and Niyam, Do`s and Don’t’s in life; Ahinsa, satya, astheya, bramhacharya and aparigraha; Shaucha, santosh, tapa, swadhyay, ishwarpranidhan.

**Unit- 3**

Asan and Pranayam, Various yog poses and their benefits for mind & body,

**Unit- 4**

Regularization of breathing techniques and its effects-Types of pranayam.

**References**

1. ‘Yogic Asanas for Group Tarining-Part-I” :Janardan Swami Yogabhyasi Mandal, Nagpur
2. “Rajayoga or conquering the Internal Nature” by Swami Vivekananda, AdvaitaAshrama (Publication Department), Kolkata

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| **MTAD-108** A | **Personality Development through Life Enlightenment Skills** |  |
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Major Test** | **Minor Test** | **Total** | **Time** |
| **2** | **0** | **0** | **0** | **-** | **100** | **100** | **3 Hrs.** |
| **Program Objective (PO)** | To learn to achieve the highest goal happily To become a person with stable mind, pleasing personality and determination To awaken wisdom in students  |
| **Course Outcomes (CO)** |  |
| **CO1** | *Students become aware about leadership.* |
| **CO2** | *Students will learn how to perform his/her duties in day to day work.* |
| **CO3** | *Understand the team building and conflict* |
| **CO4** | *Student will learn how to become role model for the society.* |  |

**Unit – 1**

Neetisatakam-Holistic development of personality: Verses: 19, 20, 21, 22 (wisdom); Verses: 29, 31, 32 (pride & heroism); Verses: 26, 28, 63, 65 (virtue); Verses: 52, 53, 59 (don’s); Verses: 71, 73, 75, 78 (do’s).

**Unit – 2**

Approach to day to day work and duties; Shrimad Bhagwad Geeta: Chapter-2: Verses: 41, 47, 48; Chapter-3: Verses: 13, 21, 27, 35; Chapter-6: Verses: 5, 13, 17, 23, 35; Chapter-18: Verses: 45, 46, 48.

**Unit - 3**

Statements of basic knowledge; Shrimad Bhagwad Geeta: Chapter-2: Verses: 56, 62, 68; Chapter-12: Verses: 13, 14, 15, 16, 17, 18.

**Unit – 4**

Personality of Role model; Shrimad Bhagwad Geeta: Chapter-2: Verses: 17; Chapter-3: Verses: 36, 37, 42: Chapter-4: Verses: 18, 38, 39; Chapter-18: Verses: 37, 38, 63.

***References:***

1. Srimad Bhagavad Gita, Swami Swarupananda Advaita Ashram (Publication Department), Kolkata.
2. Bhartrihari’s Three Satakam (Niti-sringar-vairagya), P. Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.

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|  | **Dissertation Part-I (MTIT-207** **A) and Dissertation Part-II (MTIT-202** **A)** |  |
| **Course Outcomes (CO)** |  |
| **CO1** | Ability to synthesize knowledge and skills previously gained and applied to an in depth study and execution of new technical problem. |
| **CO2** | Capable to select from different methodologies, methods and forms of analysis to produce a suitable research design, and justify their design. |
| **CO3** | Ability to present the findings of their technical solution in a written report. |
| **CO4** | Presenting the work in International/ National conference or reputed journals. |  |

**Syllabus Contents:**

The dissertation / project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study. The dissertation should have the following:

Relevance to social needs of society

Relevance to value addition to existing facilities in the institute

Relevance to industry need

Problems of national importance

Research and development in various domain.

**The student should complete the following:**

Literature survey Problem Definition

Motivation for study and Objectives

Preliminary design / feasibility / modular approaches

Implementation and Verification

Report and presentation

The dissertation part- II is based on a report prepared by the students on dissertation allotted to them. It may be based on:

Experimental verification / Proof of concept.

The viva-voce examination will be based on the above report and work.

**Guidelines for Dissertation Part – I and II**

As per the AICTE directives, the dissertation is a yearlong activity, to be carried out and evaluated in two parts i.e. Part– I: July to December and Part– II: January to June.

The dissertation may be carried out preferably in-house i.e. department’s laboratories and centers OR in industry allotted through department’s T & P coordinator.

After multiple interactions with guide and based on comprehensive literature survey, the student shall identify the domain and define dissertation objectives.

The referred literature should preferably include IEEE/IET/IETE/Springer/Science Direct/ACM journals in the areas of Computing Engineering and any other related domain. In case of Industry sponsored projects, the relevant application notes, white papers, product catalogues should be referred and reported.

Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and phase wise work distribution, and submit the proposal within a month from the date of registration.

Part–I deliverables: A document report comprising of summary of literature survey, detailed objectives, project specifications, paper, proof of concept/functionality, part results, and record of continuous progress.

Part–I evaluation: A committee comprising of guides of respective specialization shall assess the progress/performance of the student based on report, presentation and Q & A. In case of unsatisfactory performance, committee may recommend repeating the Part-I work.

During Part– II, student is expected to exert on design, development and testing of the proposed work as per the schedule. Accomplished results/contributions/innovations should be published in terms of research papers in reputed journals and reviewed focused conferences OR IP/Patents.

Part–II deliverables: A dissertation report as per the specified format, developed system in the form of hardware and/or software, and record of continuous progress.

Part-II evaluation: Guide along with appointed external examiner shall assess the progress/performance of the student based on report, presentation and Q & A. In case of unsatisfactory performance, committee may recommend for extension or repeating the Part-I work.