Paper Code	Nomenclature of Paper	Scheme of Studies Per Week		Credits	External Marks		Internal Marks	Total Marks	
		L	P		Max.	Pass		Max.	Pass
Semester – II									
MT-CSE-18-21	Advance Algorithms	4	0	4	100	40	50	150	60
MT-CSE-18-22	Soft Computing	4	0	4	100	40	50	150	60
MT-CSE-18-23	Elective- III	4	0	4	100	40	50	150	60
MT-CSE-18-24	Elective- IV	4	0	4	100	40	50	150	60
MT-CSE-18-25	Laboratory- I (Advance Algorithms)	0	5	2.5	100	40	50	150	60
MT-CSE-18-26	Laboratory- II (Based on Electives)	0	5	2.5	100	40	50	150	60
MT-CSE-18-27	Mini Project with Seminar	2	0	2	100	40	50	150	60
MT-CSE-18-28	Audit Course	2	0	2	35	14	15	50	20
Total		**20**	**10**	**25**	**735**	**294**	**365**	**1100**	**440**

Elective III	**Elective IV**
MT-CSE-18-23(i): Data Preparation and Analysis MT-CSE-18-23(ii): Computer Vision MT-CSE-18-23(iii):Secure Software Design & Enterprise Computing	MT-CSE-18-24(i): Advanced Computer Architecture MT-CSE-18-24(ii): Human and Computer Interaction MT-CSE-18-24(iii): Digital Forensic

Audit Course: Students of affiliated Institutes/ Colleges are required to select any one paper out of option given below.

I. English for Research Paper Writing
II. Disaster Management
III. Sanskrit for Technical Knowledge
IV. Value Education
V. Constitution of India
VI. Pedagogy Studies
VII. Stress Management by Yoga VIII.Personality Development through Life Enlightenment Skills.

MT-CSE-18-21: Advance Algorithms

Maximum marks: 150 (External: 100, Internal: 50)

Time: 3 hours **Credits: 4**

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

Objectives:

- The student should be able to choose appropriate algorithms and use it for a specific problem.
- To familiarize students with basic paradigms and data structures used to solve advancedalgorithmic problems.
- Students should be able to understand different classes of problems concerning their computationdifficulties.
- To introduce the students to recent developments in the area of algorithmic design.

Learning Outcomes:

At the end of this course students should be able to:

- Analyze the complexity/performance of different algorithms.
- Determine the appropriate data structure for solving a particular set of problems. Categorizethe different problems in various classes according to their complexity.
- Students should have an insight of recent activities in the field of the advanced data structure.

Unit 1

Sorting: Review of various sorting algorithms, topological sorting

Graph: Definitions and Elementary Algorithms: Shortest path by BFS, shortest path in edge-weighted case (Dijkasra's), depth-first search and computation of strongly connected components, emphasis on correctness proof of the algorithm and time/space analysis, example of amortized analysis.

Unit 2

Flow-Networks: Maxflow-mincut theorem, Ford-Fulkerson Method to compute maximum flow, Edmond-Karp maximum-flow algorithm.

Graph Matching: Algorithm to compute maximum matching. Characterization of maximum matching by augmenting paths, Edmond's Blossom algorithm to compute augmenting path.

Unit 3

Shortest Path in Graphs: Floyd-Warshall algorithm and introduction to dynamic programming paradigm. More examples of dynamic programming.

Matrix Computations: Strassen's algorithm and introduction to divide and conquer paradigm, inverse of a triangular matrix, relation between the time complexities of basic matrix operations, UP-decomposition.

Unit 4

Linear Programming: Geometry of the feasibility region and Simplex algorithm NP-completeness: Examples, proof of NP-hardness and NP-completeness.

Modulo Representation of integers/polynomials: Chinese Remainder Theorem, Conversion between base-representation and modulo-representation.

Extension to polynomials. Application: Interpolation problem.

References

- Cormen, Leiserson, Rivest, Stein, "Introduction to Algorithms"
- Aho, Hopcroft, Ullman, "The Design and Analysis of Computer Algorithms"
- Kleinberg and Tardos, "Algorithm Design"

MT-CSE-18-22: Soft Computing

Maximum marks: 150 (External: 100, Internal: 50)

Time: 3 hours **Credits: 4**

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

Objectives:

- To introduce soft computing concepts and techniques and foster their abilities in designing appropriate technique for a given scenario.
- To implement soft computing based solutions for real-world problems.
- To give students knowledge of non-traditional technologies and fundamentals of artificial neural networks, fuzzy sets, fuzzy logic, genetic algorithms.
- To provide student an hand-on experience on MATLAB to implement various strategies.

Learning Outcomes:

At the end of this course students should be able to:

- Identify and describe soft computing techniques and their roles in building intelligent machines
- Apply fuzzy logic and reasoning to handle uncertainty and solve various engineering problems.
- Apply genetic algorithms to combinatorial optimization problems.
- Evaluate and compare solutions by various soft computing approaches for a given problem.

Unit 1

Introduction to Soft Computing and Neural Networks: Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computational Intelligence: Machine Learning Basics

Unit 2

Fuzzy Logic: Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making, Implementation using Python/Matlab

Unit 3

Neural Networks: Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks: Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance architectures, Advances in Neural networks, Implementation using Python/Matlab

Unit 4

Genetic Algorithms: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge Acquisition, Implementation using Python/Matlab

References

- Jyh:Shing Roger Jang, Chuen:Tsai Sun, EijiMizutani, "Neuro:Fuzzy and Soft Computing", Prentice:Hall of India, 2003.
- George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic:Theory and Applications", Prentice Hall, 1995.

MT-CSE-18-23(i): Data Preparation and Analysis

Maximum marks: 150 (External: 100, Internal: 50)

Time: 3 hours **Credits: 4**

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

Objectives:

- To prepare the data for analysis and develop meaningful Data Visualizations

Learning Outcomes:

At the end of this course students should be able to

- Extract the data for performing the Analysis.

Unit 1

Data Gathering and Preparation: High Cardinality Variable in Descriptive Stats, High Cardinality Variable in Predictive Modeling, Outliers, Type of outliers, Treatment of outliers Data formats, parsing and transformation, Scalability and real-time issues.

Unit 2

Data Cleaning: Consistency checking, Heterogeneous and missing data, Noisy Data, Data Cleaning as Process, Data Integration, Data Transformation and segmentation, Data Reduction, Data Cube Aggregation, Attribute Subset Selection, Concept hierarchy Generation.

Unit 3

Exploratory Analysis:Descriptive and comparative statistics, Clustering, Clustering Hierarchical and Partitioning methods, Constraint-Based Cluster Analysis, Association Mining Apriori Algorithm and Association to Correlations, Hypothesis Generation.

Unit 4

Visualization:Data Visualization techniques (for measurement and categorical data)-Interactive visualization techniques-Common misuses of data visualization- Techniques for Statistical Inference Time series, Geolocated data, Correlations and connections, Hierarchies and networks, interactivity.

References:

- Making sense of Data : A practical Guide to Exploratory Data Analysis and Data Mining, by Glenn J. Myatt
- J Hanes, M. Kamber, “Data Mining Concepts and Techniques”, Elsevier India.
- G.S. Linoff, M.J.A. Berry, “Data Mining Techniques”, Wiley India Pvt. Ltd.
- A. Berson, S.J. Smith, “Data Warehousing, Data Mining & OLAP”, Tata McGraw- Hill.

MT-CSE-18-23(ii): Computer Vision

Maximum marks: 150 (External: 100, Internal: 50)

Time: 3 hours **Credits: 4**

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

Objectives:

- Be familiar with both the theoretical and practical aspects of computing with images.
- Have described the foundation of image formation, measurement, and analysis
- Understand the geometric relationships between 2D images and the 3D world.
- Grasp the principles of state-of-the-art deep neural networks.

Learning Outcomes:

At the end of this course students should be able to:

- Developed the practical skills necessary to build computer vision applications
- To have gained exposure to object and scene recognition and categorization from images.

Unit 1

Overview, computer imaging systems, lenses, Image formation and sensing, Image analysis, pre-processing and Binary image analysis.

Unit 2

Edge detection, Edge detection performance, Hough transform, corner detection, Segmentation, Morphological filtering, Fourier transform.

Unit 3

Feature extraction, shape, histogram, color, spectral, texture, using CVIPtools, Feature analysis, feature vectors, distance /similarity measures, data pre-processing.

Unit 4

Pattern Analysis; Clustering: K-Means, K-Medoids, Mixture of Gaussians.

Classification: Discriminant Function, Supervised, Un-supervised, Semi-supervised.

Classifiers: Bayes, KNN, ANN models; Dimensionality Reduction: PCA, LDA, ICA, and Non-parametric methods.

References

- Richard Szeliski, "Computer Vision: Algorithms and Applications"
- Goodfellow, Bengio, and Courville, "Deep Learning"
- Fisher et al., "Dictionary of Computer Vision and Image Processing"

MT-CSE-18-23(iii): Secure Software Design & Enterprise Computing

Maximum marks: 150 (External: 100, Internal: 50)

Time: 3 hours **Credits: 4**

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

Objectives:

- To fix software flaws and bugs in various software and to make students aware of various issues like weak random number generation, information leakage, poor usability, and weak or no encryption on data traffic.
- To understand Methodologies and tools to design and develop secure software containing minimum vulnerabilities and flaws.

Learning Outcomes:

At the end of this course students should be able to:

- Differentiate between various software vulnerabilities.
- Understand software process vulnerabilities for an organization.
- Monitor resources consumption in a software.
- Interrelate security and software development process.

Unit 1

Secure Software Design:Identify software vulnerabilities,Software Design Threats and Mitigations, perform software security analysis, Perform security testing and quality assurance.

Unit 2

Enterprise Application Development:Describe the nature and scope of enterprise software applications, Design distributed N-tier software application, Research technologies available for the presentation, business and data tiers of an enterprise software application, Design and build a database using an enterprise database system, Develop components at the different tiers in an enterprise system.

Unit 3

Enterprise Systems Administration:Design, implement and maintain a directory-based server infrastructure in a heterogeneous systems environment, Monitor server resource utilization for system reliability and availability, Install and administer network services (DNS/DHCP/Terminal Services/Clustering/Web/Email).

Unit 4

Obtain the ability to manage and troubleshoot a network running multiple services. Handle insecure exceptions and command/SQL injection, SQL injection attack, Defend web and mobile applications against attackers.

References

- Theodor Richardson, Charles N Thies, Secure Software Design, Jones & Bartlett Kenneth R. van Wyk, Mark G. Graff, Dan S. Peters, Diana L. Burley, Enterprise Software Security, Addison Wesley.
- Engineering Safe and Secure Software Systems by C.Warren Axelrod
- Enterprise Software Security: A Confluence of Disciplines by Kenneth R. van Wyk, Mark G. Graff, Dan S. Peters and Diana L. Burley

MT-CSE-18-24(i): Advanced Computer Architecture

Maximum marks: 150 (External: 100, Internal: 50)

Time: 3 hours **Credits: 4**

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

Objectives:

- The objective of this course is to provide in-depth coverage of current and emerging trends in Advanced Computer Architectures with emphasis on system design and performance.
- It focuses on instruction, data & thread level parallelisms and improvements in performance of memory hierarchy.

Learning Outcomes

At the end of this course students should be able to:

- Know the classes of computers, and new trends and developments in computer architecture
- Understand the various techniques to enhance a processors ability to exploit Instruction-level parallelism (ILP), and its challenges.
- Understand exploiting ILP using dynamic scheduling, multiple issue, and speculation.
- Understand data-level parallelism in vector, SIMD and GPU architectures.
- Understand multithreading by using ILP and supporting thread-level parallelism (TLP).
- Understand warehouse scale computers to exploit request-level & data level parallelism.
- Understand multiprocessor cache coherence using the directory based and snooping class of protocols.
- Understand the several advanced optimizations to achieve cache performance.
- Understand virtual memory and virtual machines.

Unit 1

Instruction Level Parallelism (ILP): Concepts & Challenges, Data Dependences and Hazards, Control Dependences; Basic Compiler Techniques for Exposing ILP – Basic Pipeline Scheduling and Loop Unrolling, Reducing Branch Costs with Advanced Branch Prediction, Overcoming Data Hazardous with Dynamic Scheduling, Tomasulo's Approach, Hardware Based Speculation; Exploiting ILP Using Multiple Issue and Static Scheduling – VLIW & Superscalar Processors, Advanced Techniques For Instruction Delivery and Speculation.

Unit 2

Data Level Parallelism in Vector, SIMD & GPU Architectures: Vector Architecture – Working of Vector Processors, Vector Execution Time, Multiple Lanes, Vector Registers, Memory Banks, Stride, Gather Scatter; SIMD Instruction Set Extensions for Multimedia; Graphics Processing Units, Vector Architecture V/S GPUs, Multimedia SIMD V/S GPUs; Detecting and Enhancing Loop-Level Parallelism – Finding Dependences, Eliminating Dependent Computations.

Thread-Level Parallel Parallelism: Multiprocessor Architecture – Centralized Shared-Memory Architectures, Cache Coherence Problem, Schemes Enforcing Coherence, Snooping Coherence Protocol; Extensions to basic coherence protocol; Distributed Shared-Memory and Directory-Based Coherence

Unit 3

Warehouse-Scale Computers (WSC) to Exploit Request-Level and Data-Level Parallelism: WSC V/S Servers, Programming Models and Workloads for WSC, Architecture of Warehouse-Scale Computers, Physical Infrastructure and Costs of WSC.

Memory Hierarchy: Basics of Memory Hierarchy, Optimization of Cache Performance, Memory Technology & Optimizations, Virtual Memory – Fast Address Translation, Selecting Page Size, Protection of Virtual Memory

Unit 4

MIMD Architectures: Architectural Concepts of Distributed & Shared Memory MIMD Architectures (UMA, NUMA, COMA, CC-NUMA); Interconnection Networks – Direct Interconnection Networks (Linear Array, Ring, Star, 2D Mesh, Hyper Cubes), Switching Techniques; Dynamic Interconnection Networks (Shared Bus, Crossbar, Multistage Networks); Specifications of Top Three Super Computers of Top500 List.

References

- Hennessy J.D., Patterson D.A., "Computer Architecture: A Quantitative Approach", 5th Ed., MK, 2012.
- Sima D., Fountain T., Kasuk P., "Advanced Computer Architectures - A Design Space Approach," Pearson Education, 1997.
- Hesham El-Rewini, MostafaAbd-El-Barr, "Advanced Computer Architecture and Parallel Processing", Wiley India Pvt. Ltd.
- Kai Hwang, "Advanced computer architecture – Parallelism, Scalability, Programmability", Tata McGraw Hill, 2001.
- Rajaraman V. & Murthy C.S.R., "Parallel Computer: Architecture & Programming", PHI Learning.
- David Culler, "Parallel Computer Architecture", 1st Ed., Elsevier India.
- Stallings W., "Computer Organization and Architecture", 10th Ed., Pearson Education.

MT-CSE-18-24(ii): Human and Computer Interaction

Maximum marks: 150 (External: 100, Internal: 50)

Time: 3 hours **Credits: 4**

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

Objectives:

- Learn the foundations of Human Computer Interaction
- Be familiar with the design technologies for individuals and persons with disabilities
- Be aware of mobile Human Computer interaction.
- Learn the guidelines for user interface

Learning Outcomes:

At the end of this course students should be able to:

- Understand the structure of models and theories of human computer interaction and vision.
- Design an interactive web interface on the basis of models studied.

Unit 1

Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms.

Unit 2

Interactive Design basics – process – scenarios – navigation – screen design –Iteration and prototyping. HCI in software process – software life cycle –usability engineering – Prototyping in practice – design rationale. Design rules– principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.

Unit 3

Cognitive models –Socio-Organizational issues and stake holder requirements –Communication and collaboration models-Hypertext, Multimedia and WWW.

Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools.

Unit 4

Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow.Case Studies.

References

- Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, "Human Computer Interaction", 3rd Edition, Pearson Education, 2004 (UNIT I , II & III)
- Brian Fling, "Mobile Design and Development", First Edition , O Reilly Media Inc., 2009
- Bill Scott and Theresa Neil, "Designing Web Interfaces", First Edition, O Reilly, 2009.

MT-CSE-18-24(iii): Digital Forensic

Maximum marks: 150 (External: 100, Internal: 50)

Time: 3 hours **Credits: 4**

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting two from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit. All questions will carry equal marks.

Objectives:

- Provides an in-depth study of the rapidly changing and fascinating field of computer forensics.
- Combines both the technical expertise and the knowledge required to investigate, detect and prevent digital crimes.
- Knowledge on digital forensics legislations, digital crime, forensics processes and procedures, data acquisition and validation, e-discovery tools

Learning Outcomes:

At the end of this course students should be able to

- Understand relevant legislation and codes of ethics.
- Understand Computer forensics and digital detective and various processes, policies and procedures E-discovery, guidelines and standards, E-evidence, tools and environment.

Unit 1

Digital Forensics Science:Forensics science, computer forensics and digital forensics.

Computer Crime:Analysis of cyber-criminalistics area, holistic approach to cyber-forensics

Cyber Crime Scene Analysis:Discuss the various court orders etc., methods to search and seizure electronic evidence, retrieved and un-retrieved communications.

Unit 2

Evidence Management & Presentation:Discuss the importance of understanding what court documents would be required for a criminal investigation, Create and manage shared folders using operating system, importance of the forensic mindset, define the workload of law enforcement, Explain what the normal case would look like, Define who should be notified of a crime, parts of gathering evidence, Define and apply probable cause.

Unit 3

Computer Forensics:Prepare a case, Begin an investigation, Understand computer forensics workstations and software, Conduct an investigation, and complete a case, Critique a case,

Network Forensics:open-source security tools for network forensic analysis, Requirements for preservation of network data.

Unit 4

Mobile Forensics: mobile forensics techniques, mobile forensics tools.

Legal Aspects of Digital Forensics:IT Act 2000, amendment of IT Act 2008. Recent trends in mobile forensic technique and methods to search and seizure electronic evidence.

References

- John Sammons, The Basics of Digital Forensics, Elsevier
- John Vacca, Computer Forensics: Computer Crime Scene Investigation, Laxmi Publications

AUDIT COURSE: (i) English For Research Paper Writing

Maximum marks: 50 (External: 35, Internal: 15)

Time: 3 hours **Credits: 2**

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting four from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting two questions from each Unit. All questions will carry equal marks.

Objectives:

- Understand that how to improve your writing skills and level of readability
- Learn about what to write in each section
- Understand the skills needed when writing a Title
- Ensure the good quality of paper at very first-time submission

Learning Outcomes:

At the end of this course students will be able to:

- Write good quality papers.

Unit 1

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.

Unit 2

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, 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 4 first- time submission.

References:

- Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
- Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
- Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook .
- Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

AUDIT COURSE: (ii) Disaster Management

Maximum marks: 50 (External: 35, Internal: 15)

Time: 3 hours **Credits: 2**

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting four from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting two questions from each Unit. All questions will carry equal marks.

Objectives:

- Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- Critically understand the strengths and weaknesses of disaster management approaches.

Learning Outcomes:

At the end of this course students will be able to:

- Handle disaster situation in a better way.

Unit 1

Introduction:Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.

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.

Disaster Prone Areas In India: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.

Unit 2

Disaster Preparedness And Management: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.

Risk Assessment: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.

Disaster Mitigation:Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.

References:

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

AUDIT COURSE: (iii) Sanskrit For Technical Knowledge

Maximum marks: 50 (External: 35, Internal: 15)

Time: 3 hours **Credits: 2**

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting four from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting two questions from each Unit. All questions will carry equal marks.

Objectives:

- To get a working knowledge in illustrious Sanskrit, the scientific language in the world
- Learning of Sanskrit to improve brain functioning
- Learning of Sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power
- The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature

Learning Outcomes:

At the end of this course students will be able to:

- Understanding basic Sanskrit language
- Ancient Sanskrit literature about science & technology can be understood
- Being a logical language will help to develop logic in students

Unit 1

Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences Order, Introduction of roots

Unit 2

Technical information about Sanskrit Literature, Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics.

References:

- "Abhyaspustakam" – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi
- "Teach Yourself Sanskrit" PrathamaDeeksha-VempatiKutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
- "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

AUDIT COURSE: (iv) Value Education

Maximum marks: 50 (External: 35, Internal: 15)

Time: 3 hours **Credits: 2**

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting four from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting two questions from each Unit. All questions will carry equal marks.

Objectives:

- Understand value of education and self- development
- Imbibe good values in students
- Let the should know about the importance of character

Learning Outcomes:

At the end of this course students will be able to:

- Knowledge of self-development
- Learn the importance of Human values
- Developing the overall personality

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.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 2

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 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:

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

AUDIT COURSE: (v) Constitution Of India

Maximum marks: 50 (External: 35, Internal: 15)

Time: 3 hours **Credits: 2**

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting four from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting two questions from each Unit. All questions will carry equal marks.

Objectives:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- 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.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Learning Outcomes:

At the end of this course students will be able to:

- Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics. Discuss the passage of the Hindu Code Bill of 1956.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- 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.

Unit 1

History of Making of the Indian Constitution:History, Drafting Committee, (Composition & Working)
Philosophy of the Indian Constitution:Preamble, Salient Features
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 2

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

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

AUDIT COURSE: (vi) Pedagogy Studies

Maximum marks: 50 (External: 35, Internal: 15)

Time: 3 hours **Credits: 2**

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting four from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting two questions from each Unit. All questions will carry equal marks.

Objectives:

- Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers.
- Identify critical evidence gaps to guide the development.

Learning Outcomes:

At the end of this course students will be able to:

- Understand what pedagogical practices are being used by teachers in formal and informal classrooms in developing countries and what is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
- Understand how can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

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. 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?

Unit2

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

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

References:

- Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
- Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
- Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
- 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.
- Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
- Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.
- www.pratham.org/images/resource%20working%20paper%202.pdf.

AUDIT COURSE: (vii) Stress Management By Yoga

Maximum marks: 50 (External: 35, Internal: 15)

Time: 3 hours **Credits: 2**

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting four from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting two questions from each Unit. All questions will carry equal marks.

Objectives:

- To achieve overall health of body and mind
- To overcome stress

Learning Outcomes:

At the end of this course students will be able to:

- Develop healthy mind in a healthy body thus improving social health also
- Improve efficiency

Unit 1

Definitions of Eight parts of yog.(Ashtanga), Yam and Niyam. Do`s and Don't's in life. i) Ahinsa, satya, astheya, bramhacharya and aparigraha ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan

Unit 2

Asan and Pranayam, i) Various yog poses and their benefits for mind & body, ii)Regularization of breathing techniques and its effects-Types of Pranayam

References:

- 'Yogic Asanas for Group Tarining-Part-I" : Janardan Swami YogabhyasiMandal, Nagpur
- "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, AdvaitaAshrama (Publication Department), Kolkata

AUDIT COURSE: (viii) Personality Development Through Life Enlightenment Skills

Maximum marks: 50 (External: 35, Internal: 15)

Time: 3 hours **Credits: 2**

Note: Examiner will be required to set NINE questions in all. Question Number 1 will consist of objective type/short-answer type questions covering the entire syllabus. In addition to question no. 1, the examiner is required to set eight more questions selecting four from each unit. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting two questions from each Unit. All questions will carry equal marks.

Objectives:

- To learn to achieve the highest goal happily
- To become a person with stable mind, pleasing personality and determination
- To awaken wisdom in students

Learning Outcomes:

At the end of this course students will be able to:

- Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life
- The person who has studied Geeta will lead the nation and mankind to peace and prosperity
- Study of Neetishatakam will help in developing versatile personality of students.

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 (dont's), Verses- 71,73,75,78 (do's) Approach to day to day work and duties. ShrimadBhagwadGeeta : 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 2

Statements of basic knowledge.ShrimadBhagwadGeeta: Chapter2-Verses 56, 62, 68, Chapter 12 -Verses 13, 14, 15, 16,17, 18 Personality of Role model. ShrimadBhagwadGeeta: Chapter2-Verses 17, Chapter 3-Verses 36,37,42, Chapter 4-Verses 18, 38,39, Chapter18 – Verses 37,38,63.

References:

- "Srimad Bhagavad Gita" by Swami SwarupanandaAdvaita Ashram Publication Department), Kolkata
- Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath,
- Rashtriya Sanskrit Sansthanam, New Delhi.