

**ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS
(Choice Based Credit System)**



COMPUTER SCIENCE AND ENGINEERING

For
Master of Technology (M.Tech)

(Applicable for batches admitted from 2024-2025)



**SWARNANDHRA
COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)**

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1. INTRODUCTION

Swarnandhra College of Engineering & Technology (Subsequently referred to as SCET) will be followed the norms of Jawaharlal Nehru Technological University Kakinada and Govt. of Andhra Pradesh.

Academic Programmes of the institute are governed by rules and regulations approved by the Academic Council, which is the highest Academic body of the Institute. These rules and regulations are applicable for the students of M. Tech (Regular) Course from the Academic Year 2019-20 onwards.

2. ADMISSIONS:

2.1. Admission into first year of M. Tech Programme: Admissions in each M.Tech program in the Institution are classified into **CATEGORY - A** through convener, PGECET and **GATE**. **CATEGORY- B** seats are filled by the college management.

2.2. Admissions with advance standing: These may arise in the following cases:

- a) When a student seeks transfer from other colleges to SCET and desirous to pursue the study at SCET in an eligible branch of study.
- b) When students of SCET get transferred from one regulation to another regulation or from previous syllabus to revised syllabus.
- c) When a student after long discontinuity rejoins the college to complete his/her Program of study for the award of degree.

In all such cases for admission, when needed, permissions from the statutory bodies are to be obtained and the Programme of study at SCET will be governed by the transitory regulations.

3. DURATION OF THE PROGRAMME AND MEDIUM OF INSTRUCTION:

The duration of the M. Tech. Program is two academic years consisting of four semesters. Students, who fail to fulfill all the academic requirements for the award of the degree within minimum of four academic years, will forfeit their admission in M. Tech course. The medium of instruction and examinations are in English.

4. PROGRAMMES OF STUDY:

The following specializations are offered at present.

- i) M. Tech – Power Electronics
- ii) M. Tech – CAD/CAM
- iii) M. Tech – VLSI System Design
- iv) M. Tech – Communication Systems
- v) M. Tech – Computer Science & Engineering
- vi) M. Tech – Thermal Engineering

vii) M. Tech – Structural Engineering

5. AWARD OF M. TECH DEGREE

- The candidate pursues a course of study in not less than two and not more than four academic years.
- The student shall register for all 68 credits and secure the same.

6. ATTENDANCE

The minimum instruction days in each semester are 90.

- i. A student will be eligible to appear for end semester examinations, if he/she acquired a minimum of 75% of attendance in aggregate of all the courses.
- ii. Condonation of shortage of attendance in aggregate up to 10% on medical grounds (Above 65% and below 75%) in any semester may be granted by the College Academic Committee.
- iii. Shortage of Attendance below 65% in aggregate shall not be condoned
- iv. Students with less than 65% of attendance in any semester are not eligible to take up their end examination of that particular semester and their registration for examination shall be allowed.
- v. Attendance may also be condoned for those who participate in Intercollegiate/university sports, co- and extracurricular activities provided their attendance is in the minimum prescribed range for the purpose (>65%) and recommended by the concerned authority. He/ She shall pay the prescribed condonation fee.
- vi. Prescribed Condonation fee shall be payable by the student to appear for the end examination.
- vii. A Student will not be promoted to the next semester unless he/she satisfies the attendance requirement of the present semester as applicable. They may seek re-admission for that semester as and when offered consecutively by the Department.

7. EVALUATION

- The performance of the candidate in each semester shall be evaluated course-wise, with a maximum of 100 marks for both theory and practical, on the basis of Internal Evaluation and End Semester Examination.
- For the theory subjects 60 marks shall be awarded based on the performance in the End Semester Examination and 40 marks shall be awarded based on the Internal Evaluation.

7.1 Continuous Internal Evaluation: Theory

- (a) For theory subjects, during a semester, there shall be two mid-term examinations. Each midterm examination shall be conducted for a total duration of 120 minutes with 4 questions (without choice) each question for 10 marks.
- (b) The descriptive examination is set with 4 full questions from first two and half units (50% of the syllabus), the student has to answer all questions. In the similar lines, descriptive examination shall be conducted on the rest of the syllabus.
- (c) The first mid (Mid-1) marks shall be submitted to the examination section within one week after completion of first mid examination.
- (d) The mid marks submitted to the examination section shall be displayed in the concerned department notice boards for the benefit of the students.
- (e) If any discrepancy found in the submitted Mid-1 marks, it shall be brought to the notice of examination section within one week from the submission.
- (f) Second mid examination shall be conducted on the similar lines of mid-1 and its mid (Mid-2) marks shall also be submitted to examination section within one week after completion of second mid examination and it shall be displayed in the notice boards. If any discrepancy found in the submitted mid-2 marks, it shall be brought to the notice of examination section within one week from the submission.
- (g) The final marks are the sum of average of two mid-term examinations i.e. $\frac{\text{Mid1} + \text{Mid2}}{2}$

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7.2 End Semester Theory Examination Evaluation:

Theory:

- End semester examination is conducted for 60 marks. Question paper consists of five questions from five units with internal choice. Duration of exam is 180 minutes.

7.3 Laboratory Evaluation:

Internal Evaluation: The internal marks for laboratory are 40 marks and the marks shall be awarded based on the day to day work: 10 marks, Record: 5 marks and the remaining 25 marks to be awarded by conducting an internal laboratory test.

External Evaluation: For external marks for laboratory are 60 and marks shall be awarded based on the performance in the end laboratory examinations. Laboratory examination must be conducted with two Examiners, one of them being the Laboratory Class Teacher and the second examiner shall be appointed by the COE from the panel of examiners submitted by the respective college. Laboratory examination must be conducted with a breakup mark of Procedure-15, Experimentation-25, Results-10, Viva-voce-10.

- 7.4** For MOOCs Course, the student shall register for the course (Minimum of 12 weeks) offered by SWAYAM/NPTEL/JNTUK MOOCs through online with the approval of committee comprises of Head of the Department and two senior faculty. The Head of the Department shall appoint one mentor for each of the MOOC courses offered. The student needs to earn a certificate by passing the exam. The student will be awarded the credits given in curriculum only by submission of the certificate.
- 7.5** A candidate shall be deemed to have secured the minimum academic requirement in a course if he secures a minimum of 40% of marks in the End semester Examination and a minimum aggregate of 50% of the total marks in the end semester Examination and Internal.
- 7.6** A candidate shall be given one chance to re-register for each course provided the internal marks secured by a candidate are less than 50% and has failed in the end examination after completion of the third semester. The candidate's attendance in the re-registered course(s) shall be calculated separately to decide upon his/her eligibility for writing the end examination in those courses(s). In the event of the student taking another chance, his internal marks and end examination marks obtained in the previous attempt stand cancelled. For re-registration the candidates have to apply to the Institute by paying the requisite fees and get approval from the concern authorities before the start of the semester in which re-registration is required. In case the candidate secures less than the required attendance in any re-registered course(s), he/she shall not be permitted to write the End Examination in that course.
- 7.7** Laboratory external examination must be conducted with internal and external examiner. External examiner will be appointed by the COE from the approved panel of examiners.
- 7.8** For non-credit Audit Courses, "Satisfactory" or "Unsatisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA/Percentage
- 7.9** For Mini Project with Seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the department in a report form and shall make an oral presentation before the Project Review Committee consisting of Head of the Department, supervisor/mentor and two other senior faculty members of the department. For Mini Project with Seminar, there will be only internal evaluation of 50 marks. A candidate has to secure a minimum of 50% of marks to be declared successful.

8. EVALUATION OF PROJECT/DISSERTATION WORK

Every candidate shall be required to submit a thesis or dissertation on a topic approved by the Project Review Committee.

- i. A Project Review Committee (PRC) shall be constituted with Head of the Department and two other senior faculty members in the department.
- ii. Registration of Dissertation/Project Work: A candidate is permitted to register for the project work after satisfying the attendance requirement of all the subjects, both theory and practical.

- iii. After satisfying (ii), a candidate has to submit, in consultation with his project supervisor, the title, objective and plan of action of his project work for approval. The student can initiate the Project work, only after obtaining the approval from the Project Review Committee (PRC).
- iv. If a candidate wishes to change his supervisor or topic of the project, he can do so with the approval of the Project Review Committee (PRC). However, the PRC shall examine whether or not the change of topic/supervisor leads to a major change of his initial plans of project proposal. If yes, his date of registration for the project work starts from the date of change of Supervisor or topic as the case may be.
- v. Continuous assessment of Dissertation-I and Dissertation-II during the Semester(s) will be monitored by the PRC.
- vi. A candidate shall submit his status report in two stages to the PRC, at least with a gap of 3 months between them.
- vii. The work on the project shall be initiated at the beginning of the 3rd Semester and the duration of the project is two semesters. A candidate is permitted to submit Project Thesis only after successful completion of theory and practical course with the approval of PRC not earlier than 40 weeks from the date of registration of the project work. The candidate has to pass all the theory and practical subjects before submission of the Thesis.
- viii. Three copies of the Project Thesis certified by the supervisor shall be submitted to the College.
- ix. The thesis shall be adjudicated by one examiner from the approved panel of examiners, by the COE.
- x. Viva-Voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the examiner who adjudicated the Thesis. The Head of the Department shall coordinate and make arrangements for the conduct of Viva-Voce examination. The Board shall jointly report the candidate's work as one of the following:
 - A. Excellent
 - B. Good
 - C. Satisfactory
 - D. Unsatisfactory

If the report of the Viva-Voce is unsatisfactory, the candidate shall retake the Viva-Voce examination only after three months. If he fails to get a satisfactory report at the second Viva-Voce examination, the candidate has to re-register for the project and complete the project within the stipulated time after taking the approval from the Concern authorities.

9. GRADING SYSTEM:

9.1 Computation of SGPA

The following procedure is to be adopted to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.,

$$\text{SGPA (Si)} = \frac{\sum (C_i \times G_i)}{\sum C_i}$$

Where C_i is the number of credits of the i^{th} course and G_i is the grade point scored by the student in the i^{th} course.

9.2 Computation of CGPA

The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semester of a programme, i.e.,

$$\text{CGPA} = \frac{\sum (C_i \times S_i)}{\sum C_i}$$

Where S_i is the SGPA of the i^{th} semester and C_i is the total number of credits in that semester. The SGPA and CGPA shall be rounded off to TWO decimal points and reported in the transcripts.

9.3 Award of Grade in Each Semester:

- Based on the performance during a given semester, a final letter grade will be awarded at the end of the semester for each subject. The letter grades and the corresponding grade points are as given in the Table.

Marks Range(Max – 100)	Level	Letter Grade	Grade Point
≥ 90	Outstanding	A+	10
≥ 80 to < 90	Excellent	A	9
≥ 70 to < 80	Very Good	B	8
≥ 60 to < 70	Good	C	7
≥ 50 to < 60	Satisfactory	D	6
< 50	Fail	F	0
-	Absent	AB	0

- Grade Sheet: A grade sheet (memorandum) will be issued to each student indicating his performance in all courses taken in that semester and also indicating the Grades.

- c. Transcripts: After successful completion of the total program of study, a Transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued up to any point of study to any student on request and by paying the stipulated fee in force.
- d. Candidates shall be permitted to apply for revaluation within the stipulated period with payment of prescribed fee.

10. AWARD OF DEGREE AND CLASS

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of M.Tech Degree he shall be placed in one of the following four classes:

Class Awarded	CGPA to be secured	
First Class with Distinction	≥ 7.75 (Without any supplementary appearance)	From the CGPA secured from 68 Credits.
First Class	≥ 7.75 (With any supplementary appearance) ≥ 6.75 to < 7.75	
Second Class	≥ 6.0 to < 6.75	
Pass Class	≥ 5.0 to < 6.0	

11. CONDUCT AND DISCIPLINE:

Students admitted in SCET are to be followed the conduct and discipline of the college and which will be updated from time to time.

12. MALPRACTICES:

If any malpractices held in internal assessment tests or Semester-End Examinations, Principal constitute a Malpractice Enquiry Committee to enquire the case. The principal shall take necessary action based on the recommendations of the committee as per stipulated norms.

13. WITHHOLDING OF RESULTS

If the student has not paid the dues, if any, to the university or if any case of indiscipline is pending against him, the result of the student will be withheld. His degree will be withheld in such cases.

14. GENERAL

- Wherever the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.
- The academic regulation should be read as a whole for the purpose of any interpretation.
- In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Chairman, Academic Council is final.
- The College may change or amend the academic regulations or syllabi at any time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the College.

M.Tech CSE (R-24 COURSE STRUCTURE & SYLLABUS)**Semester-I**

S. No.	Course Code	Course Title	L	T	P	C	IM	EM	TM
1	24CM1T01	Discrete Mathematics	3	0	0	3	40	60	100
2	24CM1T02	Machine Learning	3	0	0	3	40	60	100
		Program Elective 1							
3	24CM1E01	Data Science	3	0	0	3	40	60	100
	24CM1E02	Data Intensive Computing	3	0	0				
	24CM1E03	Modern Computer Networks	3	0	0				
		Program Elective 2							
4	24CM1E04	Natural Language Processing	3	0	0	3	40	60	100
	24CM1E05	Advanced Operating Systems	3	0	0				
	24CM1E06	Computer Vision	0	0	0				
5	24CC1T01	Research Methodology & IPR	0	0	0	2	40	60	100
6		Audit Course-1	2	0	0	0	-	-	-
7	24CM1L01	Machine Learning lab	0	0	4	2	40	60	100
8	24CM1L02	Data Science Lab	0	0	4	2	40	60	100
		Total	23	0	8	18	280	420	600

Semester-II

S. No	Code	Course Title	L	T	P	C	IM	EM	TM
1	24CM2T01	Deep Learning	3	0	0	3	40	60	100
2	24CM2T02	Advanced Computer Organization	3	0	0	3	40	60	100
		Program Elective 3							
3	24CM2E01	Algorithms and Analysis	3	0	0	3	40	60	100
	24CM2E02	IoT and Its Applications							
	24CM2E03	Principles of Computer Security							
		Program Elective 4							
4	24CM2E04	Data Models and Query Languages	3	0	0	3	40	60	100
	24CM2E05	Blockchain Application Development							
	24CM2E06	Reinforcement Learning							
5		Audit Course-2	2	0	0	0	-	-	-
6	24CM2L01	Deep Learning Lab	0	0	4	2	40	60	100
7	24CM2L02	IoT Lab	0	0	4	2	40	60	100
8	24CM2P01	Mini Project with Seminar	2	0	0	2	50	-	50
		Total	26	0	8	18	290	420	650

Semester-III

S. No.	Code	Course Title	L	T	P	C	IM	EM	TM
1		Program Elective 5	3	0	0	3	40	60	100
	24CM3E07	Cloud Computing							
	24CM3E08	Social Network Analysis							
	24CM3E09	MOOCs 1(NPTEL/SWAYAM)							
2		Open Elective	3	0	0	3	40	60	100
	24CM3O01	Business Analytics							
	24CC3O02	Industrial Safety							
	24CC3O03	Operations Research							
	24MB3O04	Cost Management of Engineering Projects							
	24CC3O05	Composite Materials							
24PE3O06	Waste to Energy								
3	24CM3P01	Project work Part-I	0	0	20	10	-	-	-
Total			15	0	20	16	80	120	200

Semester-IV

S. No.	Category/Code	Course Title	L	T	P	C	IM	EM	TM
1	24CM4P01	Project work Part-II	0	0	32	16	80	120	200
Total			0	0	32	16	80	120	200

Audit Course 1 & 2

S.No	Subject Code	Subject
1	24ACXM01	English for Research Paper Writing
2	24ACXM02	Disaster Management
3	24ACXM03	Sanskrit for Technical Knowledge
4	24ACXM04	Value Education
5	24ACXM05	Constitution of India
6	24ACXM06	Pedagogy Studies
7	24ACXM07	Stress Management by yoga
8	24ACXM08	Personality Development Through Life Enlightenment Skills

- X" indicates semester number

I -SEMESTER	L	T	P	C
	3	0	0	3
DISCRETE MATHEMATICS – 24CM1T01				

UNIT-I

Mathematical Foundations: Introduction and Motivation. Linear Algebra: System of linear equations, Matrices, Solving Systems of Linear Equations–Gauss Elimination method,

Vector Spaces, Linear Independence, Basis and Rank, Linear Mappings.

Analytic Geometry: Norms, Inner Product, Lengths and Distances, Angles and Orthogonality, Orthonormal Basis, Orthogonal Complement.

UNIT-II

Matrix Decomposition: Determinant and Trace, Eigen values and Eigen vectors, Eigen decomposition and Diagonalization, Single Value Decomposition, Matrix Approximation.

Vector Calculus: Gradient-Directional derivative, Divergence – Solenoidal vector, Curl - Irrotational vector

UNIT-III

Correlation and Regression:

Correlation: Types of correlation, Correlation coefficient–Rank correlation.

Linear Regression: Straight line – Multiple Linear Regression - Regression coefficients and properties–

Curvilinear Regression: Parabola–Exponential–Power curves.

UNIT-IV

Discrete Mathematics:

Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications

Sets and Relations: Operations on Sets, Relations: - Properties, Operations, Transitive Closure, Equivalence, Compatibility and Partial Ordering, Hasse Diagrams.

Functions: Inverse and Composite functions.

UNIT-V

Graph theory : Basic Concepts, Graph Theory and its Applications, Sub graphs, Graph Representations: Adjacency and Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs. Multi graphs, Bipartite and Planar Graphs, Euler's Theorem, Graph Colouring and Covering, Chromatic Number,

Trees: Spanning Trees, Prim's and Kruskal's Algorithms, BFS and DFS Spanning Trees.

Text Books:

1. Marc Peter Deisenroth, A. Aldo Faisal, Cheng Soon Ong, Mathematics for Machine Learning, Cambridge University Press, 2020. (for topics other than Discrete Mathematics)
2. Joe L. Mott, Abraham Kandel, Theodore P. Baker, Discrete Mathematics for Computer Scientists and Mathematicians, Second Edition, PHI, 2001.
3. J. P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, MGH, 1997.
4. Kenneth H. Rosen, Discrete Mathematics and its Applications with Combinatorics and Graph Theory, Seventh Edition, MGH, 2011.

I SEMESTER	L	T	P	C
	3	0	0	3
MACHINE LEARNING – 24CM1T02				

COURSE OUTCOMES:

On completion of the course, the student will be able to

- CO1: Understand the concepts and types of models in machine learning
- CO2: Reduce the dimension of the dataset using machine learning techniques
- CO3: Implement a classification model for any real scenario
- CO4: Implement an unsupervised learning application using clustering techniques
- CO5: Implement the ensemble model

UNIT--I

INTRODUCTION TO MACHINE LEARNING:

What is machine learning, Problems Machine Learning Can Solve, Framework for developing Machine Learning Models, Examples of Machine Learning Applications - Learning Associations, Classification, Regression, Unsupervised Learning, and Reinforcement Learning

UNIT--II

DIMENSIONALITY REDUCTION:

Introduction, Feature Selection-Forward selection, Bidirectional Elimination, Principal Component analysis, L1 and L2 regularization, Linear Discriminant Analysis, Basics of t-SNE, Information value and Weight of evidence

UNIT--III

CLASSIFICATION: What is Classification, General Approach to Classification, Multi-class classification, multi-label classification, Binary Classification, , Logistic Regression, Decision Trees,k-Nearest Neighbor Algorithm, Naive Bayesian Classifier and SVM classifier

MODEL METRICS: ROC Curves, Confusion matrix, Holdout Method, Cross Validation, Bootstrap

UNIT--IV

CLUSTERING: Basic Clustering Methods: Partitional Clustering, Hierarchical Clustering, K-Means Clustering. Expectation-Maximization (EM) Algorithm and Gaussian Mixtures Clustering

INTRODUCTION TO NEURAL NETWORKS: Neural Network Representations, Appropriate Problems for Neural Network Learning, Perceptrons, Multilayer Networks and the Back propagation Algorithm, Remarks on Back Propagation Algorithm,

UNIT--V

ENSEMBLE METHODS:

Introduction-What is Ensembling methods, Why Ensembling methods, Applications of Ensemble methods, Boosting, Bagging, Combinational Methods-Benefits of combination, Averaging, Voting

TEXT BOOKS:

- 1.EthemAlpaydin, “Introduction to Machine Learning”, 3rd edition, PHI,2014
- 2.Tom M. Mitchell, 'Machine Learning', MGH

REFERENCE BOOKS:

- 1.Zhi-Hua Zhou, “Ensemble Methods: Foundations and Algorithms”, CRC Press, 2012
- 2.Andreas Muller, “Introduction to Machine Learning with Python: A Guide for Data Scientists”, 1st Edition, O’Reilly, 2016
- 3..Applied Machine Learning, M. Gopal, McGraw Hill Education,2019

I- SEMESTER	L	T	P	C
		3	0	0

DATA SCIENCE – 24CM1E01

COURSE OUTCOMES:

At the end of the course, the student should be able to

- CO1: gain knowledge in the basic concepts of Data Analysis
- CO2: Determine the relationship between data dependencies using statistics
- CO3: handle data using primary tools used for data science in Python
- CO4: Apply the skills of data inspecting and cleansing
- CO5: Apply statistical inference for Regression and Classification

UNIT--I

INTRODUCTION: Need for data science – benefits and uses – facets of data – data science process – setting the research goal – retrieving data – cleansing, integrating, and transforming data – exploratory data analysis – build the models – presenting and building applications

UNIT--II

EXPLORATORY ANALYSIS: Types of Variables: Nominal, Ordinal, Categorical and Interval data.

Central Tendency: Mean (Weighted, Trimmed, Interquartile, Truncated), Median, Mode

Measure of Statistical dispersions: Variance, Standard Deviation, IQR, Standard Error, Range, Absolute difference and deviation, Coefficient of variation.

DATA SAMPLING AND DISTRIBUTION

Normalization, Sampling Data-Simple Random sampling, Stratified, Cluster Sampling, Sampling Error/Bias. Bootstrapping, Central Limit Theorem, Confidence intervals, Normal distribution, Binomial distribution, Poisson distribution

UNIT--III

INTRODUCTION TO NUMPY: NumPy Basics: Arrays and Vectorized Computation- The NumPy ndarray- Creating ndarrays- Data Types for ndarrays- Arithmetic with NumPy Arrays- Basic Indexing and Slicing - Boolean Indexing-Transposing Arrays and Swapping Axes. Universal Functions: Fast Element-Wise Array Functions- Mathematical and Statistical Methods-Sorting Unique and Other Set Logic.

DATA MANIPULATION WITH PANDAS

Introduction to pandas Data Structures: Series, Data Frame, Essential Functionality: Dropping Entries, Indexing, Selection, and Filtering- Function Application and Mapping- Sorting and Ranking. Summarizing and Computing Descriptive Statistics- Unique Values, Value Counts, and Membership. Reading and Writing Data in Text Format.

UNIT--IV**DATA CLEANING, PREPARATION AND VISUALIZATION**

Data Cleaning and Preparation: Handling Missing Data - Data Transformation: Removing Duplicates, Transforming Data Using a Function or Mapping, Replacing Values, Detecting and Filtering Outliers- String Manipulation: Vectorized String Functions in pandas. Plotting with pandas: Line Plots, Bar Plots, Histograms and Density Plots, Scatter or Point Plots.

UNIT--V

REGRESSION AND PREDICTION

Simple Linear Regression, Multiple Linear Regression, Confidence and Prediction Intervals, Categorical Variables, Multi-collinearity, Polynomial Regression. Exploratory Data Analysis: Univariate and Bivariate analysis.

CLASSIFICATION

Naive Bayes, Discriminant Analysis, Logistic Regression, Evaluating Classification Models, Strategies for Imbalanced Data

Text Books:

1. Robert S. Witte and John S. Witte, "Statistics", Eleventh Edition, Wiley Publications, 2017.
2. David Cielen, Arno D. B. Meysman, and Mohamed Ali, "Introducing Data Science", 1st Edition, Manning Publications, 2016.
3. Jake VanderPlas, "Python Data Science Handbook", O'Reilly, 2016
4. Bruce, Peter, and Andrew Bruce. Practical statistics for data scientists: 50 essential concepts. " O'Reilly Media, Inc.", 2017.

SEMESTER-I	L	T	P	C
	3	0	0	3

DATA INTENSIVE COMPUTING – 24CM1E02

UNIT- I

Foundations of Data Intensive Computing. Introduction to Data Intensive Computing: Overview of data-intensive computing, Importance and applications. Big Data Characteristics and Challenges: The 4 Vs: Volume, Velocity, Variety, Veracity Challenges in data processing,

UNIT- II

Data Storage and Management: Data storage architectures, NoSQL databases (e.g., HBase, Cassandra)
 Data Processing Paradigms: Batch processing vs stream processing, Introduction to ETL processes
 Distributed Computing Frameworks: Distributed Computing Fundamentals, Concepts and architecture of distributed systems, Introduction to the MapReduce paradigm

UNIT- III

Apache Hadoop: Hadoop ecosystem overview, HDFS and MapReduce programming model. Apache Spark: Spark architecture and components, RDDs, Data Frames, and Spark SQL. Cloud Computing for Data Intensive Applications: Cloud Computing Basics: Cloud service models: IaaS, PaaS, SaaS. Cloud deployment models: Public, Private, Hybrid

UNIT- IV

Cloud Storage Solutions: Object storage, Block storage, File storage. Data lifecycle management. Cloud-based Data Processing, Using AWS, Azure, and Google Cloud for big data, Cloud Security and Compliance: Security concerns in cloud computing, Compliance and data governance

UNIT- V

Advanced Data Analytics and Algorithms: Data Mining and Machine Learning, Key data mining algorithms: Supervised vs unsupervised learning. Real-time Stream Processing: Concepts and tools (e.g., Apache Kafka, Apache Flink). Graph Processing: Introduction to graph databases, Tools for graph processing (e.g., Neo4j, Apache Giraph). Data Visualization: - Importance of data visualization, Tools and libraries (e.g., Tableau, D3.js)

Textbooks:

1. "Data-Intensive Text Processing with MapReduce" by Jimmy Lin and Chris Dyer
2. "Big Data: Principles and best practices of scalable realtime data systems" by Nathan Marz and James Warren

I SEMESTER	L	T	P	C
	3	0	0	3
MODERN COMPUTER NETWORKS -24CM1E03				

UNIT- I

Introduction to Computer Networks: Definition and Evolution of Computer Networks, - Types of Networks (LAN, WAN, MAN, PAN), Network Topologies (Bus, Star, Ring, Mesh, Hybrid), Network Models: OSI Model: Layers, Functions, Protocols, TCP/IP Model: Layers, Functions, Protocols. Comparison of OSI and TCP/IP Models, Physical Layer: Transmission Media (Wired and Wireless), Signal Encoding Techniques
Data Transmission (Analog, Digital)

UNIT- II

Data Link Layer and Network Layer

Data Link Layer: - Functions and Protocols, - Error Detection and Correction (Parity, CRC, Hamming Code), Flow Control (Stop-and-Wait, Sliding Window), - Medium Access Control (MAC) Protocols (CSMA/CD, CSMA/CA, Token Ring) Network Layer: Functions and Protocols, Routing Algorithms (Distance Vector, Link State, Path Vector), IP Addressing (IPv4, IPv6), Subnetting and Super netting, Network Address Translation (NAT). Quality of Service (QoS)

UNIT- III:

Transport Layer and Application Layer

Transport Layer: Functions and Protocols, Connection, Oriented vs Connectionless Services, TCP: Features, Header, Connection Establishment and Termination, Flow Control, Congestion Control, UDP: Features, Header. Application Layer: Protocols and Services (HTTP, FTP, SMTP, DNS, DHCP, SNMP) Web Services (REST, SOAP), Email Protocols (POP3, IMAP), Remote Access Protocols (SSH, Telnet)

UNIT- IV

Wireless and Mobile Networks

Wireless Networks: Wireless Communication Basics, Wireless LANs (Wi-Fi): Architecture, Protocols (IEEE 802.11), Bluetooth: Architecture, Protocols (IEEE 802.15), Mobile Networks: Cellular Networks: GSM, CDMA, LTE, 5G, Mobile IP: Concepts, Protocols, Handoff Mechanisms, Ad Hoc Networks: MANET, VANET Security in Wireless Networks: - Security Challenges, - Encryption and Authentication Protocols, Wireless Security Standards (WEP, WPA, WPA2, WPA3)

UNIT- V

Emerging Trends and Technologies in Computer Networks

Software-Defined Networking (SDN): - Concepts and Architecture, - OpenFlow Protocol, - SDN Controllers (Open Daylight, ONOS)

Network Function Virtualization (NFV): - Concepts and Architecture, - Virtual Network Functions (VNFs)
Internet of Things (IoT): IoT Architectures and Protocols (MQTT, CoAP), IoT Security and Privacy

Cloud and Edge Computing: - Cloud Networking: Concepts, Architectures, - Edge Computing: Concepts, Architectures, - Fog Computing Cybersecurity in Modern Networks:- Network Security Principles, - Intrusion Detection and Prevention Systems (IDS/IPS), - Firewalls and VPNs

Text Books:

1. "Computer Networking: A Top-Down Approach" by James F. Kurose and Keith W. Ross

2. "Data and Computer Communications" by William Stallings
3. "Computer Networks" by Andrew S. Tanenbaum and David J. Wetherall
4. "Wireless Communications & Networks" by William Stallings
5. "Cloud Networking: Understanding Cloud-based Data Center Networks" by Gary Lee

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NATURAL LANGUAGE PROCESSING – 24CM1E04

UNIT- I**Introduction to Natural Language Processing**

Overview of NLP: Definition and History, Applications of NLP, Challenges in NLP Linguistic Essentials: Syntax, Semantics, Pragmatics, Morphology, Phonology Basic Text Processing: Tokenization, Lemmatization, Stemming, Stop Words Removal, Regular Expressions for Text Processing, NLP Libraries: NLTK, SpaCy, Gensim

UNIT- II

Language Modeling and Sequence Labeling: Language Modeling: Definition and Applications, N-gram Models: Unigrams, Bigrams, Trigrams, Smoothing Techniques, Part-of-Speech Tagging: - POS Tags and Tag sets, Rule-based and Stochastic Tagging, Hidden Markov Models (HMMs) for POS Tagging

Named Entity Recognition (NER): Definition and Applications, Sequence Labeling Techniques, Conditional Random Fields (CRFs) Evaluation Metrics: Precision, Recall, F1-Score, Confusion Matrix

UNIT- III

Syntax and Parsing: Constituency and Dependency Parsing, Context-Free Grammars (CFGs) Parsing Algorithms: CYK, Earley, Chart Parsing, Dependency Parsing: Dependency Trees and Relations, Transition-based Parsing, Graph-based Parsing, Treebanks: Penn Treebank, Universal Dependencies, Applications and Use Cases Grammar Formalisms: Probabilistic Context-Free Grammars (PCFGs), Lexicalized Tree Adjoining Grammars (LTAG)

UNIT- IV

Semantics and Pragmatics: Word Sense Disambiguation (WSD): Homonymy, Polysemy, Lesk Algorithm, WordNet Semantic Role Labeling (SRL): Frame Semantics, Prop Bank and Frame Net Distributional Semantics: Vector Space Models, Word Embeddings: Word2Vec, GloVe, Fast Text, Contextual Embeddings: ELMo, BERT, Pragmatics: Discourse Analysis, Coreference Resolution, Anaphora Resolution

UNIT- V

Advanced Topics and Applications: Machine Translation: Rule-based, Statistical, and Neural Machine Translation (NMT), Sequence-to-Sequence Models, Attention Mechanisms, Text Classification and Sentiment Analysis: - Supervised and Unsupervised Approaches, Sentiment Analysis Techniques and Applications

Speech Recognition and Synthesis: - Automatic Speech Recognition (ASR), Text-to-Speech (TTS) Systems

Recent Trends in NLP: - Transformer Models: BERT, GPT, T5, Transfer Learning in NLP, Conversational AI and Dialogue Systems, Ethics and Bias in NLP: Bias and Fairness in Language Models, Ethical Considerations in NLP Applications

Text Books:

1. "Speech and Language Processing" by Daniel Jurafsky and James H. Martin
2. "Foundations of Statistical Natural Language Processing" by Christopher D. Manning and Hinrich Schütze
3. "Neural Network Methods for Natural Language Processing" by Yoav Goldberg
4. "Deep Learning for Natural Language Processing" by Palash Goyal, Sumit Pandey, and Karan Jain

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ADVANCED OPERATING SYSTEMS – 24CM1E05

UNIT- I

Overview of Operating Systems: Functions and Types of Operating Systems, Modern Operating Systems and Trends.

Distributed Systems: Definition and Examples, Distributed System Architectures, Challenges in Distributed Systems.

Realtime Operating Systems (RTOS): Characteristics and Applications, RTOS vs General-purpose OS.
Embedded Operating Systems: Characteristics and Use Cases, Design Issues in Embedded OS

UNIT- II

Advanced Process and Memory Management: Process Synchronization and Scheduling: Advanced Scheduling Algorithms, (Multilevel Queue, Multilevel Feedback Queue), Deadlock Detection, Prevention, and Recovery, Inter process Communication (IPC) Mechanisms

Concurrency Control: Concurrency Issues, Techniques for Ensuring Consistency (Locks, Semaphores, Monitors),

Advanced Memory Management: Virtual Memory Management (Paging, Segmentation), Memory Allocation Techniques (Buddy System, Slab Allocation) Memory Optimization Techniques

UNIT- III

Distributed Operating Systems: Architecture of Distributed Systems: Design and Implementation Issues, Middleware in Distributed Systems, Distributed File Systems: Design and Implementation (NFS, AFS), stateful and stateless service, File Replication

Distributed Coordination: Distributed Mutual Exclusion, Distributed Deadlock handling, Election Algorithms.

UNIT- IV

Security and Protection, Security Fundamentals: The Security Problem, Program Threats, System and Network Threats, Cryptographic Techniques (Symmetric and Asymmetric Encryption). Authentication and Authorization: Authentication Mechanisms, Access Control Models (Discretionary, Mandatory, Role Based). System Protection: Intrusion Detection Systems (IDS), Malware Protection and Mitigation. Secure Operating Systems: Design Principles,

UNIT- V

Advanced Topics and Emerging Trends: Virtualization: Concepts and Types (Full, Para, Hardware Assisted Virtualization). Virtual Machine Monitors (VMM) and Hypervisors. Containers vs Virtual Machines, Cloud Operating Systems: Cloud Computing Models (IaaS, PaaS, SaaS). Cloud OS Architecture. Resource Management in Cloud OS. Parallel and Distributed Computing: Parallel Processing and Multithreading.

Text Books:

1. "Distributed Systems: Principles and Paradigms" by Andrew S. Tanenbaum and Maarten Van Steen
2. "Operating System Concepts" by Abraham Silberschatz, Peter B. Galvin, and Greg Gagne
3. "Modern Operating Systems" by Andrew S. Tanenbaum
4. "RealTime Systems" by Jane W. S. Liu

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COMPUTER VISION – 24CM1E06

UNIT--I

Image Processing Foundations: Review of image processing techniques – classical filtering operations – thresholding techniques – edge detection techniques – corner and interest point detection – mathematical morphology – texture.

UNIT--II

Shapes And Regions: Binary shape analysis – connectedness – object labeling and counting – size filtering – distance functions – skeletons and thinning – deformable shape analysis – boundary tracking procedures – active contours – shape models and shape recognition – centroidal profiles – handling occlusion – boundary length measures – boundary descriptors – chain codes – Fourier descriptors – region descriptors – moments.

UNIT--III

Hough Transform: Line detection – Hough Transform (HT) for line detection – foot-of-normal method – line localization – line fitting – RANSAC for straight line detection – HT based circular object detection – accurate center location – speed problem – ellipse detection – Case study: Human Iris location – hole detection – generalized Hough Transform (GHT) – spatial matched filtering – GHT for ellipse detection – object location – GHT for feature collation.

UNIT--IV

3D Vision And Motion: Methods for 3D vision – projection schemes – shape from shading – photometric stereo – shape from texture – shape from focus – active range finding – surface representations – point-based representation – volumetric representations – 3D object recognition – 3D reconstruction – introduction to motion – triangulation – bundle adjustment – translational alignment – parametric motion – spline-based motion – optical flow – layered motion.

UNIT--V

Applications: Photo album – Face detection – Face recognition – Eigen faces – Active appearance and 3D shape models of faces Application: Surveillance – foreground-background separation – particle filters – Chamfer matching, tracking, and occlusion – combining views from multiple cameras – human gait analysis Application: In-vehicle vision system: locating roadway – road markings – identifying road signs – locating pedestrians.

Text Books:

1. D. L. Baggioal, —Mastering OpenCV with Practical Computer Vision Projects, Packt Publishing, 2012.
2. E. R. Davies, —Computer & Machine Vision, Fourth Edition, Academic Press, 2012.
3. Jan Erik Solem, —Programming Computer Vision with Python: Tools and algorithms for analyzing images, O'Reilly Media, 2012.

Reference Books:

1. Mark Nixon and Alberto S. Aquado, —Feature Extraction & Image Processing for Computer Vision, Third Edition, Academic Press, 2012.
2. R. Szeliski, —Computer Vision: Algorithms and Applications, Springer 2011.
3. Simon J. D. Prince, —Computer Vision: Models, Learning, and Inference, Cambridge University Press, 2012.

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RESEARCH METHODOLOGY & IPR – 24CC1T01

Course Outcomes:

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

1. Understand research problem formulation.
2. Analyze research related information
3. Follow research ethics
4. Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
5. Understanding that when IPR would take such important place in growth of individuals & nation

UNIT- I

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-- II

Effective literature studies approaches, analysis, Plagiarism, Research ethics

UNIT- III

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- IV

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--V

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.
R22 M.TECH. CSE/CS JNTUH

TEXT BOOKS:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students"
2. C.R. Kothari, Research Methodology, methods & techniques, 2nd edition, New age International publishers

REFERENCES:

1. Ranjit Kumar, 2nd Edition, "Research Methodology: A Step-by-Step Guide for beginners"

2. Halbert, “Resisting Intellectual Property”, Taylor & Francis Ltd ,2007.
3. Mayall, “Industrial Design”, McGraw Hill, 1992.
4. Niebel, “Product Design”, McGraw Hill, 1974.
5. Asimov, “Introduction to Design”, Prentice Hall, 1962.
6. Robert P. Merges, Peter S. Menell, Mark A. Lemley, “Intellectual Property in New Technological Age”, 2016.
7. T. Ramappa, “Intellectual Property Rights Under WTO”, S. Chand, 2008

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MACHINE LEARNING LAB - 24CM1L01				

COURSE OUTCOMES:

At the end of the course, the student will be able to,

1. Understand the implementation procedures for the Machine Learning algorithms.
2. Design python programs for various learning algorithms.
3. Apply appropriate data sets to the Machine Learning algorithms.
4. Identify and apply Machine Learning algorithms to solve real world problems.
5. Apply various clustering algorithms for various applications.

LIST OF EXPERIMENTS:

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
2. Implement Simple Linear Regression
3. Implement Multi Linear Regression
4. Implement Logistic Regression
5. Data preprocessing for classification
6. Confusion matrix for a binary classifier.
7. Implement Support Vector Machines.
8. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
9. Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions.
10. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set.
11. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
12. Implement k-Mean's algorithm to cluster a set of data stored in a .CSV file.
13. Implement Random Forest models for automatic classification
14. Implement Ensemble Model to perform classification.

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DATA SCIENCE LAB – 24CM1L02				

Course Outcomes: Upon completion of the course, the students will be able to

1. Develop relevant programming abilities.
2. Demonstrate knowledge of statistical data analysis techniques
3. Exhibit proficiency to build and assess data-based models.
4. Demonstrate skill in Data management & processing tasks using Python
5. Apply data science concepts and methods to solve problems in real-world contexts and will communicate these solutions effectively

NUMPY:

Practical Component:

1. Create NumPy arrays from Python Data Structures, Intrinsic NumPy objects and Random Functions.
2. Manipulation of NumPy arrays- Indexing, Slicing, Reshaping, Joining and Splitting.
3. Computation on NumPy arrays using Universal Functions and Mathematical methods.
4. Import a CSV file and perform various Statistical and Comparison operations on rows/columns.
5. Load an image file and do crop and flip operation using NumPy Indexing

PANDAS

1. Create Pandas Series and Data Frame from various inputs.
2. Import any CSV file to Pandas Data Frame and perform the following:
 - (a) Visualize the first and last 10 records
 - (b) Get the shape, index and column details
 - (c) Select/Delete the records(rows)/columns based on conditions.
 - (d) Perform ranking and sorting operations.
 - (e) Do required statistical operations on the given columns.
 - (f) Find the count and uniqueness of the given categorical values.
 - (g) Rename single/multiple columns.

DATA CLEANING, PREPARATION AND VISUALIZATION

1. Import any CSV file to Pandas Data Frame and perform the following:
 - (a) Handle missing data by detecting and dropping/ filling missing values.
 - (b) Transform data using apply () and map () method. (c) Detect and filter outliers.
 - (d) Perform Vectorized String operations on Pandas Series.
 - (e) Visualize data using Line Plots, Bar Plots, Histograms, Density Plots and Scatter Plots.

REGRESSION AND PREDICTION

1. Create a Linear Regression model for a dataset and display the error measures
2. Chose a dataset with categorical data and apply linear regression model

CLASSIFICATION

1. Apply Naïve Bayes algorithm on a dataset and estimate the accuracy
2. Apply Logistic Regression algorithm on a dataset and estimate the accuracy

AUDIT 1 and 2**ENGLISH FOR RESEARCH PAPER WRITING**

Course objectives: Students will be able to:

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

Units	CONTENTS	Hours
1	Planning and Preparation, Word Order, breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness	4
2	Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction	4
3	Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.	4
4	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,	4
5	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	4
6	useful phrases, how to ensure paper is as good as it could possibly be the first- time submission	4

Suggested Studies:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
Model Curriculum of Engineering & Technology PG Courses [Volume-I][41]
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's book.
4. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

AUDIT 1 and 2**DISASTER MANAGEMENT**

Course Objectives: -Students will be able to:1. learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.2. critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.3. develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.4. 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

Units	CONTENTS	Hours
1	Introduction Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.	4
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.	4
3	Disaster Prone Areas In Indian 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	4
4	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.	4
5	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.	4
6	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.	4

SUGGESTED READINGS:

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies ""New Royal book Company.
Model Curriculum of Engineering & Technology PG Courses [Volume-I]
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.

AUDIT 1 and 2: SANSKRIT FOR TECHNICAL KNOWLEDGE*Course Objectives*

1. To get a working knowledge in illustrious Sanskrit, the scientific language in the world

2. Learning of Sanskrit to improve brain functioning
3. Learning of Sanskrit to develop the logic in mathematics, science & other subjects
4. enhancing the memory power
5. The engineering scholars equipped with Sanskrit will be able to explore the
6. huge knowledge from ancient literature

Syllabus:

Unit	Content	Hours
1	• Alphabets in Sanskrit, • Past/Present/Future Tense, • Simple Sentences	8
2	• Order • Introduction of roots • Technical information about Sanskrit Literature	8
3	• Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics	8

Suggested reading

1. “Abhyasustakam” – 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.

Course Output

Students will be able to

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

AUDIT 1 and 2

VALUE EDUCATION

Course Objectives

Students will be able to

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

Syllabus

Unit	Content	Hours
1	<ul style="list-style-type: none"> • Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. 	4
2	<ul style="list-style-type: none"> 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 	6
3	<ul style="list-style-type: none"> • Personality and Behaviour 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 	6
4	<ul style="list-style-type: none"> • 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 	6

Suggested reading

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

Course outcomes

Students will be able to

1. Knowledge of self-development
2. Learn the importance of Human values
3. Developing the overall personality

AUDIT 1 and 2 CONSTITUTION OF INDIA

Course Objectives: Students will be able to: 1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective. 2. 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. 3. 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

Units	Content	Hours
1	•History of Making of the Indian Constitution: History Drafting Committee, (Composition & Working)	4
2	•Philosophy of the Indian Constitution: Preamble Salient Features	4
3	•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.	4
4	•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	4
5	•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	4
6	•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.	4

Suggested reading

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.

Course Outcomes: Students will be able to:

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. 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.

Discuss the passage of the Hindu Code Bill of 1956

.AUDIT 1 and 2
PEDAGOGY STUDIES

Course Objectives: Students will be able to:

Review existing evidence on the review topic to inform programme design and policymaking undertaken by the DfID, other agencies and researchers.5. Identify critical evidence gaps to guide the development.

Units	Content	Hours
1	<ul style="list-style-type: none"> • 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. 	4
2	<ul style="list-style-type: none"> • Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. • Curriculum, Teacher education. 	2
3	<ul style="list-style-type: none"> • 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. 	4
4	<ul style="list-style-type: none"> • 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 	4
5	<ul style="list-style-type: none"> • Research gaps and future directions • Research design • Contexts 	2

Suggested reading

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.
7. www.pratham.org/images/resource%20working%20paper%202.pdf.

Course Outcomes

Students will be able to understand:

1. What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
2. What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?

3. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

AUDIT 1 and 2

STRESS MANAGEMENT BY YOGA

Course Objectives

1. To achieve overall health of body and mind
2. To overcome stress

Syllabus

Unit	Content	Hours
1	• Definitions of Eight parts of yog. (Ashtanga)	8
2	• Yam and Niyam. Do`s and Don`t`s in life.i) Ahinsa, satya, astheya, bramhacharya and aparigrahaii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan	8
3	• Asan and Pranayami) Various yog poses and their benefits for mind & bodyii) Regularization of breathing techniques and its effects-Types of pranayam	8

Suggested reading

1. ‘Yogic Asanas for Group Tarining-Part-I’ :Janardan Swami Yogabhyasi Mandal, Nagpur
Model Curriculum of Engineering & Technology PG Courses [Volume-I]
[47]
2. “Rajayoga or conquering the Internal Nature” by Swami Vivekananda, AdvaitaAshrama
(Publication Department), Kolkata

Course Outcomes:

Students will be able to:

1. Develop healthy mind in a healthy body thus improving social health also
2. Improve efficiency

AUDIT 1 and 2**PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS***Course Objectives*

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

Syllabus

Unit	Content	Hours
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'ts)• Verses- 71,73,75,78 (do's)	8
2	• Approach to day to day work and duties. • Shrimad BhagwadGeeta : 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.	8
3	• Statements of basic knowledge. • Shrimad BhagwadGeeta: Chapter2- Verses 56, 62, 68 • Chapter 12 -Verses 13, 14, 15, 16,17, 18 • Personality of Role model. Shrimad Bhagwad Geeta: Chapter2- Verses 17, Chapter 3- Verses 36,37,42, • Chapter 4- Verses 18, 38,39 • Chapter18 – Verses 37,38,63	8

Suggested reading

1. “Srimad Bhagavad Gita” by Swami Swarupananda Advaita Ashram (Publication Department), Kolkata
3. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath,
4. Rashtriya Sanskrit Sansthanam, New Delhi.

Course Outcomes

Students will be able to

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

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