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2176
8/10/24

GURU JAMBHESHWAR UNIVERSITY OF SCIENCE & TECHNOLOGY, HISAR
(Established by State Legislature Act 17 of 1995)
'A+' Grade, NAAC Accredited State Govt. University

Acad./AC-III/BOS&R-11/2024/ 6307
Dated: 07/X/2024

To

The Controller of Examinations
GJUS&T, Hisar.

Sub: **Approval of scheme of examination and syllabi of following programs being run by University Teaching Departments w.e.f. academic session mentioned against each:**

(i) Scheme of examination and syllabi of M.Tech. (CSE) – 3rd & 4th semester w.e.f. academic session 2023-24.

(ii) Scheme of examination and syllabi of M.Tech. (CSE) – 1st & 2nd semester w.e.f. academic session 2024-25.

Sir,

I am directed to inform you that the Vice-Chancellor, on the recommendations of Faculty of Engineering & Technology vide resolution no. 5(i) & 5(ii) on dated 08.08.2024, is pleased to approve the scheme of examinations and syllabi of M.Tech. (CSE) – 3rd & 4th semester w.e.f. academic session 2023-24 and Scheme of examination and syllabi of M.Tech. (CSE) – 1st & 2nd semester w.e.f. academic session 2024-25 for University Teaching Departments, under Section 11(5) of the University Act, 1995 in anticipation of approval of the Academic Council.

A copy of the scheme of examinations & syllabi of above said courses is enclosed herewith.

You are therefore, requested to take further necessary action accordingly.

Yours faithfully

DA: As above

7/X/24
Assistant Registrar (Academic)
for Registrar

Endst. No. Acad./AC-III/BOS&R-11/2024/ 6308-6311 Dated: 07-10-24

A copy of the above is forwarded to the following for information and necessary action:-

1. Dean, Faculty of Engineering & Technology, GJUST, Hisar.
2. Chairperson, Department of Computer Science & Engineering, GJUST, Hisar. He is requested to get upload the scheme of examination & syllabi of above said courses being run in University Teaching Departments on the website of the University.
3. OSD to Vice-Chancellor (for kind information of the Vice-Chancellor), GJUST, Hisar.
4. Secretary to Registrar (for kind information of the Registrar), GJUST, Hisar.

Assistant Registrar (Academic)
for Registrar

08/10/24

AE+PC

Dr Ashwani to upload on University website

Department of Computer Science & Engineering
M. Tech. (Computer Science and Engineering)
(TWO YEAR PROGRAMME) SCHEME OF EXAMINATION
Choice Based Credit System w. e. f.
July 2023-24

SEMESTER-III

Sr. No.	Course Code	Nomenclature of the Course	L	T	P	Credits	Internal	External
1	CSL731	Research Methodology	3	--	--	3	30	70
2	CSL732	Mobile Application Development	3	--	--	3	30	70
3	Departmental Elective II * (any one from the attached list of Departmental Elective courses)		3	--	--	3	30	70
4	Open Elective #(any one from the attached list of Open Elective offered by other departments)		3	--	--	3	30	70
5	CSP731	Research Tools for Computer Science & Engineering Lab.	--	--	4	2	50	50
6	CSP732	Mobile Application Development Lab	--	--	4	2	50	50
7	CSD731	Dissertation and Seminar-I**	--	--	4	2	--	100
Total			12	--	12	18	220	480

List of Departmental Electives II *

1. CSL733 Software Project Management
2. CSL734 Data Mining Concepts and Techniques
3. CSL735 Machine Learning and Pattern Recognition
4. CSL736 Bio-informatics
5. CSL737 Introduction to Natural Language Processing

*Departmental elective paper would be offered only if a minimum of 15 students opt for it.

CSD731 (Dissertation and Seminar-I) **:
To be evaluated by a committee constituted by the Chairperson, CSE.

** M. Tech. dissertation workload of two hours per week should be assigned to the faculty members supervising M.Tech. dissertation (s). The workload on this account cannot exceed 2 hours per week.

List of Open Electives (#)

1. 3OE01 Business Analytics
2. 3OE02 Industrial Safety
3. 3OE03 Operations Research
4. 3OE04 Cost Management of Engineering Projects
5. 3OE05 Composite Materials
6. 3OE06 Waste of Energy
7. 3OE07 Advancements in Communication System
8. 3OE08 Introduction to Soft Computing Techniques
9. 3OE09 Advanced Printing Technologies
10. 3OE10 Computer Aided Design and Manufacturing
11. 3OE11 Food Safety and Quality Assurance

The minimum number of students in an open elective offered by any Engineering Department will be 15 subject to a maximum of 40 students per section.

SEMESTER-IV

Sr. No.	Course Code	Nome44nclature of the Course	Credits	Internal	External
1	CSD741	Dissertation and Seminar-II**	14	--	100
	Total		14	--	100

** M. Tech. dissertation workload of two hours per week should be assigned to the faculty members supervising M.Tech. dissertation (s). The workload on this account cannot exceed 2 hours per week.

CSD741 (Dissertation and Seminar-II**):
To be evaluated jointly by internal supervisor and external examiner appointed by COE.

The research problem formulated after review of literature done in 3rd semester should be continued in the 4th semester. A student is required to publish a research paper related to his/her dissertation work in a Scopus Conference/Journal. The M.Tech. Dissertation cannot be submitted without acceptance/publication of a research paper.

Total credits of all semesters 19+19+18+14=70

Research Methodology

General Course Information:

Course Code: CSL731 Course Credits: 3 Type: Compulsory Contact Hours: 3 hours/week Mode: Lectures Examination Duration: 3 hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions are to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the remaining four units. All questions carry equal marks.

Pre-requisites: Basic knowledge of mathematics and concept of research

About the Course and its Objectives & Outcomes:

As a compulsory subject research methodology course offers the theoretical and practical aspects of conducting research. With this course, students will learn the core concepts of research, probability theory and will be able to understand statistical inference principles. This course trains students to experiment with data, apply probability theory principles and various statistical tests. The course emphasizes on the scientific research concepts, statistical analysis, probability and distributions.

The main objective of this course is:

To make the students familiar with basic concept of research and its methodologies so that in future, they are able to identify research problems and apply the research knowledge to formulate the suitable problem statement.

By the end of the course a student is expected to be able:

1. To identify and define a research problem and its parameters.
2. To organize and conduct research in an organized manner.
3. To understand and apply probability distributions.
4. To use software tools to apply statistics.
5. To conduct experiments, interpret data and results.

Syllabus

Unit I

Fundamentals of Research: Meaning of research, objectives of research, motivation in research, types of research, research approaches, significance of research, research methods versus Methodology, research and scientific method, research process, criteria of good research classification of research methods, types and methods of research; empirical and experimental research, problems encountered by researchers.

Defining the Research Problem: Selecting the research problem, necessity of defining the problem, technique involved in defining the problem.

Unit II

Statistical Analysis and Probability distributions: Measures of central tendency and dispersion: Mean median, mode, range, mean deviation and standard deviation, discrete, continuous and mixed random variables, definition of probability, addition and condition probability, Binomial, Poisson, sampling and geometric distributions, sample tests and Chi square test.

Unit III

Research Design and Modeling: Meaning of research design, need for research design, features of good research design, important concepts related to research design, different research designs, basic principles of experimental design and developing a research plan, design of experimental set up use of standards and codes, types of models, model building and stages, need and types of simulation.

Unit IV

Interpretation and Report Writing: Meaning of Interpretation, Techniques of Interpretation, Precautions in Interpretation, Significance of report writing, steps of writing a report, format of research report, Types of reports, Mechanics of writing a research report, Precautions for writing research reports, Preparation of research proposal, report and scientific research paper. Research grant proposal writing, Ethics in science and technology, Copyright Issues, Plagiarism, Introduction to plagiarism detection tools, benefits of research to human community.

Text and Reference Books:

1. C.R. Kothari, Research Methodology, Methods and Techniques, New Age International Publishers, 2004
2. R. Ganesan, Research Methodology for Engineers, MJP Publishers, 2011.
3. Ratan Khasnabis and Suvasis Saha, Research Methodology, University Press, Hyderabad, 2015.
4. Y.P Agarwal, Statistical Methods: Concepts Application and Computation, Sterling Publications Pvt. Ltd., New Delhi, 2004.
5. Yogesh Kumar Singh, Fundamental of Research Methodology and Statistics, New Age International Publishers, 2006.
6. Yatendra Kumar Singh, Bipin Kumar Dubey, Introduction to Research Methods and Publication Ethics, Friends Publication, 2023.

Mobile Application Development

General Course Information:

Course Code: CSL732 Course Credits: 3 Type: Compulsory Contact Hours: 3 hours/week Mode: Lectures (L) Exam Duration: 3 hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions are to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the remaining four units. All questions carry equal marks.

Prerequisite: Java Programming and Object-Oriented programming, Knowledge of RDBMS and OLTP.

About the Course: Mobile Application Development has been introduced as a Professional course for Students keeping in view the Employers' requirements. Android Platform forms the basis for developing Mobile Applications since the last decade as compared to IOS Platform for Apple Products. The Environment requires User Interface to be developed using Buttons, Check-Boxes, Alert Dialog and its kind.

Course Outcomes: By the end of the course students will be able to:

1. List basics of Android, its Evolution and its Architecture.
2. Describe & Demonstrate the Lifecycle of Software for Android Mobile Applications.
3. Apply Mobile Applications on the Android Platform.
4. Implement and Compare working with Buttons and other Widgets for Visual Environment
5. Design and Develop Mobile Applications using data storage in SQLite Database and evaluate its Performance.

Syllabus

Unit - I

Android OS Architecture: Architecture of Android based devices, Introduction of Blackberry OS, Firefox OS& IOS, Understanding Android application structure and its updating, ARM and MIPSprocessor, Internal Details, Dalvik VM, Android Core Building Blocks, Android Emulator, Android Manifest.xml, R.javafile, Screen Orientation.

Unit-II

Android Application Design Essentials: Anatomy of an Android applications, Android Terminologies, Android SDK, User Interface Screen Elements, Drawing and working with Animation, Working with Buttons i.e Toast, Custom Toast Button, Toggle Button, Switch Button,Image Button. CheckBox, Alert Dialog, Spinner, AutoCompleteTextView, RatingBar, DatePicker,TimePicker, Analog Clock and Digital Clock, Working withhardware Buttons.

Unit – III

Activity, Intent & Fragment: Activity Lifecycle, Activity Example, Implicit Intent, Explicit Intent,

Fragment Lifecycle, Fragment Example, Dynamic Fragment.

Android Menu: Option Menu, Context Menu, Popup Menu

Layout Manager: Relative Layout, Linear Layout, Table Layout, Grid Layout.

Unit – IV

Adaptor: Array Adaptor, ArrayList Adaptor, Base Adaptor.

View: Grid View, Web View, Scroll View, Search View, TabHost, Dynamic List View, Expanded

List View. **SQ Lite**: SQLite API, SQLite Spinner, SQLite List View

XML & JSON: XML Parsing SAX, XML Parsing DOM, XML Pull Parser, JSON basics, JSON Parsing.

Text and Reference Books:

1. Redazione Io Programmo, Android Programming, 2011.
2. John Horton, Android Programming for Beginners, packt publishing, 2015.
3. Jason Wei, Android Database Programming, packt publishing, 2012
4. Mark.L.Murphy,AndroidProgrammingTutorials,3rd Edition, 2010
5. Bill Phillips et al., Android Programming - The "Big Nerd Ranch" Guide 2017
6. Rick Rogers et al., Android Application Development: Programming with the Google SDK.
7. T1. Lauren Darcey and Shane Conder," Android Wireless Application Development",Pearson Education, 2nd ed..(2011).
8. Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt.Ltd.

Software Project Management

General Course Information

Course Code: CSL733 Course Credits: 3 Type: Elective Contact Hours: 3 hours/week Mode: Lectures (L) Exam Duration: 3 hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. The syllabus is divided into four units. For the end semester examination, nine questions are to be set by the examiner. Question number one is compulsory and contains seven short answer questions covering entire syllabus. Rest eight questions are set by giving two questions from each of the unit of the syllabus. A candidate is required to attempt any of four questions selecting at least one from each of the four units. All questions carry equal marks.

Pre-requisites: Preliminary knowledge of Software Engineering.

About the Course:
The course involves training students in software project management and project planning. It focuses on the need for careful planning, monitoring and control for delivering quality projects in time. Besides this student learn to measure the success of a project in meeting its objectives.

Course Outcomes: By the end of the course students will be able to:

1. Outline basic concepts related to stepwise project planning.
2. Demonstrate the knowledge about Quality Control, Standard and Risk Management.
3. Illustrate the Activity Planning, and Resource Allocation Process.
4. Apply the concept of team structure and organization structure.
5. Compare various Project Evaluation and Estimation Techniques.
6. Plan activities necessary for completing the software projects successfully.

Syllabus

Unit - I

Introduction to Software Project Management(SPM): Definition of Software Project, Software Project Vs Other types of projects, activities covered by SPM, categorizing software projects, project as system, management control, Requirement specification, Information and control in organization, project management life cycle.

Stepwise Project Planning: Introduction, selecting a project, identifying project scope and objectives, identifying project infrastructure, analysing project characteristics, identifying the project products and activities, estimate efforts for each activity, identifying activity risk, allocate resources, review/publicize plan.

Unit - II

Project Evaluation and Estimation: Cost-Benefit analysis, cash flow forecasting, cost benefit evaluation techniques, Selection of an appropriate project, choosing technologies, choice of process models, rapid application development, waterfall model, V process model and spiral model, Albrecht function point analysis.
Activity Planning: Objectives of activity planning, project schedule, projects and activities, sequencing and scheduling activities, network planning model.

Unit - III

Risk Management: Introduction, the nature of risk, managing risk, risk identification, risk analysis, reducing the risks, evaluating risks to schedule, calculating z-values.
Resource Allocation: Introduction, the nature of resources, identifying resource requirements, scheduling resources, creating critical paths.

Unit - IV

Managing Contracts and People: Introduction, types of contract, stages in contract placement, terms of contract, contract management, acceptance, managing people and organizing teams: Introduction, understanding organization behavior: a background, selecting the right person for job, instruction in best methods, motivation, working in groups, becoming a team, decision making, leadership, organization and team structures.
Software Quality: Introduction, the place of software quality in project planning, the importance of software quality, defining software quality, ISO 9126, McCall's software quality factors, product versus process quality management, external standards, techniques to enhance software quality.

Text and Reference Books:

1. Bob Hughes and Mike Cotterell , Software Project Management, Sixth Edition, TMH, 2018.
2. Walker Royce, Software Project Management, , Addison Wesley, 1998.
3. Pankaj Jalote , Software Project Management in Practice, Pearson, 2002.
4. Ramesh, Managing Global Software Projects, TMH, 2005.

Data Mining Concepts and Techniques

General Course Information:

Course Code: CSL734 Course Credits: 3 Type: Elective Contact Hours: 3 hours/week Mode: Lectures Examination Duration: 3 hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions are to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the remaining four units. All questions carry equal marks.

Pre-requisites: Basic knowledge of databases, introductory statistics and programming

About the Course and its Objectives & Outcomes:

The computational capabilities as well as amount of data generated are growing exponentially. This presents an opportunity for automatically extracting hidden knowledge and interesting patterns from large databases. Data mining techniques like prediction, classification, summarization and clustering can be applied to scientific applications where data is generated from scientific experiments, medical applications where data is collected from patients, medical tests and images, and genetic data stores, financial applications where data is collected from stock markets and web applications where data is generated from user web access patterns. The knowledge extracted using data mining techniques can be utilised for decision making and planning in the concerned fields. The course will be taught with a database as well as machine learning perspectives. The objective of the course is to provide a comprehensive understanding of data prep-processing, data mining tasks and evaluation of results obtained out of data mining processes. The course will enable students to develop understanding of the strength and limitations of popular data mining techniques.

The objectives of this course are to:

1. Provide in-depth knowledge and understanding of data mining process and tasks
2. Develop the ability to design and compare data mining techniques.
3. Understand different kind of data and its handling
4. Implement the data mining techniques using appropriate tools and interpret results.

By the end of the course a student is expected:

1. To be able to appreciate the need for data mining.
2. To be able to identify variable types and select the appropriate statistics.
3. To be able to understand and pre-process data to make it suitable for mining
4. To apply data mining techniques to discover interesting knowledge from various types of databases/datasets.
5. To be able to interpret and evaluate the outcomes of data mining process.
6. To use the tools available for data mining.
7. To choose a suitable data mining algorithm for addressing a given data mining task.

Syllabus

Unit 1

Introduction: What and why of data mining, types of databases, data mining functionalities, data mining, Types of data and sources of data, machine learning and statistics: measures of central tendency, dispersion of data, computing correlations, comparing machine learning algorithms.

Pre-processing of data: Descriptive data summarization, data cleaning, data integration and transformation, data reduction and discretization.

Unit II

Mining Frequent patterns, Associations and Correlations: Frequent item set, closed item sets and association rules, The Apriori Algorithm, Pattern Growth approach for mining frequent itemsets, Mining Association rules without candidate generation and mining frequent itemsets from frequent data, Association rule mining and correlation analysis.

Unit III

Classification and Prediction: Issues regarding Classification and Prediction, Decision tree induction, Bayesian classification, Rule based classification, classification by back propagation, K-nearest neighbor classifier, Rule evaluation measures, Support Vector Machine (SVM), Rough set Approach.

Linear and nonlinear regression, Classifier evaluation measures: Accuracy and error measures, holdout, cross validation methods, model selection and bias-variance trade off, estimating confidence intervals, ROC curves.

Machine Learning and Pattern Recognition

General Course Information:

Course Code: CSL735 Course Credits: 3 Type: Elective Contact Hours: 3 hours/week Mode: Lectures Examination Duration: 3 hours	**Course Assessment Methods**: Two minor examinations each of 20 marks, class performance measured through percentage of lectures attended (4 marks), assignment and quizzes (6 marks), and end semester examination of 70 marks. For the end semester examination nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions each of two marks. Rest of the eight questions are to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt four questions by selecting one from each unit. All the questions carry equal marks.

Pre-requisites: Students are expected to have knowledge of Linear algebra, probability and Statistics **The objectives of this course are to:**

1. Study how to build computer systems that learn from experience.
2. Study the representation of patterns and classes and the proximity measures.
3. Study how to reduce the data and its use for pattern classification.
4. Learn classification and clustering of patterns.

By the end of the course a student is expected to:

1. Describe how to build systems that learn and adapt using real-world applications.
2. Apply feature extraction and feature selection techniques.
3. Develop pattern recognition techniques for practical problems such as document recognition.
4. Compare and Contrast supervised learning and unsupervised learning.

Syllabus

Unit-I

Machine Learning, Introduction, Designing a Learning System, Issues in Machine Learning, Applications of Machine Learning in various fields, Concept learning, Version Spaces and the Candidate Elimination algorithm, Inductive Bias, Pattern Recognition, Background, Introduction, Paradigms for Pattern recognition, Statistical Pattern Recognition, Speech Recognition, Natural Language Processing.

Unit-II

Representation of Patterns and Classes, Different Representation Schemes, Tree-Based Representations, Metric and Non-Metric Proximity Measures, Dissimilarity Measures, Dimensionality reduction and its importance, Feature Extraction, Fisher's Discriminant, Principal Components as Features, Different Approaches to Feature Selection, Branch and Bound Schemes, Sequential Feature Selection.

Unit-III

Nearest Neighbour Classifier and its Variants, Nearest Neighbour Classifier, Soft Nearest Neighbour Classifiers, Efficient Algorithms for Nearest Neighbour Classification, Bayes Classifier, Naive Bayes Classifier, Bayesian Belief Networks, Decision Trees, Introduction to Decision Trees, Construction of Decision Trees, Support Vector Machines, Introduction to Support Vector Machines, Training Support Vector Machines.

Unit-IV

Clustering, What is Clustering, Representation of Patterns and Clusters, Clustering Process, Clustering Algorithms, Clustering Large Datasets, Incremental Clustering, Divide-and-Conquer Clustering, Document Recognition, Document Processing, Document Classification and Retrieval. Ensemble Methods: Bagging, Boosting.

Text and Reference Books:

1. Tom Mitchell, Machine Learning, McGraw-Hill, 1997.
2. R. O. Duda, P.E. Hart and D. G.Stork, Pattern Classification, Wiley, 2000.
3. Devi V.S., Murty, M.N., Pattern Recognition: An Introduction, Universities Press, Hyderabad, 2011.
4. C. M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006.
   R. Xu and D. C. Wunsch, II, Clustering, IEEE Press, 2009.

Bio-informatics

General Course Information:

Course Code: CSL-736 Course Credits: 3 Type: Elective Contact Hours: 3 hours/week Mode: Lectures Examination Duration: 3 hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions are to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the remaining four units. All questions carry equal marks.

Pre-requisites: Basic knowledge of databases, biology.

About the Course and its Objectives & Outcomes:

This course on Bio-informatics is going to cover topics DNA sequencing, sequence alignment, protein structure and the related databases. This course will deepen the student knowledge in both the biosciences and computational sciences.

By the end of the course a student is expected:

1. To be aware of basic terminologies used in the field of Bioinformatics.
2. To be aware of databases related to Bioinformatics and able to comprehend data in these databases.
3. To be able to perform sequence alignment and analysis using software tools.
4. To be able to apply computational techniques and prediction algorithms to solve problems related to the domain of Bioinformatics.

Syllabus

Unit I

Introduction: Definitions, Sequencing, Biological sequence/structure, Genome Projects, Pattern recognition and prediction, Folding problem, Sequence Analysis, Homology and Analogy.

Protein Information Resources: Biological databases, Primary sequence databases, Protein Sequence databases, Secondary databases, Protein pattern databases, and Structure classification databases.

Unit II

Genome Information Resources: DNA sequence databases, specialized genomic resources

DNA Sequence analysis: Importance of DNA analysis, Gene structure and DNA sequences, Features of DNA sequence analysis, EST (Expressed Sequence Tag) searches, Gene hunting, Profile of a cell, EST analysis, Effects of \EST data on DNA databases.

Unit III

Pair wise alignment techniques: Database searching, Alphabets and complexity, Algorithm and programs, Comparing two sequences, sub-sequences, Identity and similarity, The Dotplot, Local and global similarity, different alignment techniques, Dynamic Programming, Pair wise database searching.

Multiple sequence alignment: Definition and Goal, The consensus, computational complexity, Manual methods, Simultaneous methods, Progressive methods, Databases of Multiple alignments and searching

Unit IV

Secondary database searching: Importance and need of secondary database searches, secondary database structure and building a sequence search protocol.

Analysis packages: Analysis package structure, commercial databases, commercial software, comprehensive packages, packages specializing in DNA analysis, Intranet Packages, Internet Packages.

Text and Reference Books:

1. T K Attwood & D J Parry-Smith , Introduction to Bioinformatics, Addison Wesley Longman
2. Jean-Michel Claveriw, Cerdric Notredame , Bioinformatics- A Beginner's Guide, WILEY dreamlech India Pvt. Ltd
3. M.Lesk , Introduction to Bioinformatics , OXFORD publishers (Indian Edition)

Introduction to Natural Language Processing

General Course Information:

Course Code: CSL-737 Course Credits: 3 Type: Elective Contact Hours: 3 hours/week Mode: Lectures Examination Duration: 3 hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks), and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions are to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the remaining four units. All questions carry equal marks.

Pre-requisites: Theory of Automata, Probability Theory

About the Course and its Objectives & Outcomes: The objectives of this course are to:

1. Understand approaches to syntax, semantics, dialogue and summarization in NLP, .
2. Understand current methods for statistical approaches to machine translation.
3. Understand machine learning techniques used in NLP, including hidden Markov models and probabilistic context-free grammars and clustering

By the end of the course a student is expected to:

1. Understand the mathematical and linguistic foundations in the area of NLP.
2. Design, implement and test algorithms for NLP problems.
3. Assess or evaluate NLP based systems.
4. Choose appropriate solutions for Natural Processing Language.

Syllabus

Unit 1

Introduction and Overview: What and why of Natural language Processing, Ambiguity and Uncertainty in language, The turing test.

Regular Expressions: Chomski Hierarchy, Regualr Languages and their limitations, Finite-state automata. Practical regular expressions for finding and counting language phenomena. A little morphology.

String Edit Distance and Alignment: Key algorithmic tool: dynamic programming, first a simple example, then its use in optimal alignment of sequences. String edit operations, edit distance, and examples of use in spelling correction

Unit II

Context Free Grammars: Constituency, CFG definition, use and limitations. Chomsky Normal Form. Top-down parsing, bottom-up parsing, and the problems with each. The desirability of combining evidence from both directions.

Non-probabilisitc Parsing: Efficient CFG parsing with CYK, another dynamic programming algorithm. Also, perhaps, the Earley parser. Designing a little grammar, and parsing with it on some test data.

Information Theory: What is information? Measuring it in bits. The "noisy channel model." The "Shannon game"-motivated by language! Entropy, cross-entropy, information gain. Its application to some language phenomena.

Unit III

Language modeling and Naive Bayes: Probabilistic language modeling and its applications. Markov models. N-grams. Estimating the probability of a word, and smoothing. Generative models of language. Their application to building an automatically-trained email spam filter, and automatically determining the language.

Part of Speech Tagging and Hidden Markov Models:The concept of parts-of-speech, examples, usage. The Penn Treebank and Brown Corpus. Probabilistic (weighted) finite state automata. Hidden Markov models (HMMs), definition and use.

Viterbi Algorithm for Finding Most Likely HMM Path:Dynamic programming with Hidden Markov Models, and its use for part-of-speech tagging, Chinese word segmentation, prosody, information extraction, etc.

Unit IV

Probabilistic Context Free Grammars: Weighted context free grammars. Weighted CYK. Pruning and beam search. Parsing with PCFGs:A treebank and what it takes to create one. The

probabilistic version of CYK. Also: How do humans parse? Experiments with eye-tracking. Modern parsers.

Maximum Entropy Classifiers: The maximum entropy principle, and its relation to maximum likelihood. The need in NLP to integrate many pieces of weak evidence. Maximum entropy classifiers and their application to document classification, sentence segmentation, and other language tasks.

Text and Reference Books:

1. Daniel Jurafsky and James H. Martin, Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech recognition, Second Ed., 2009.
2. Chris ManningandHinrich Schütze, Foundations of Statistical Natural Language Processing, MIT Press. Cambridge, MA, 1999.

Research Tools for Computer Science and Engineering Lab.

Course Code: CSP-731 *Course Credits: 2 Type: Compulsory Contact Hours: 4 hours/week Mode: Lab practice and assignments *In lab. work one credit is equivalent to two hours	**Course Assessment Methods (internal: 50; external:50)** The internal and external assessment is based on the level of participation in lab sessions and the timely submission of lab experiments/assignments, the quality of solutions designed for the assignments, the performance in Viva-Voce, the quality of lab file and ethical practices followed. The internal examination is conducted by the course coordinator. The external examination is conducted by external examiner (appointed by the Controller of Examination) in association with the internal examiner appointed by the Chairperson of the Department.

Pre-requisites: Programming experience and basic statistics

The objectives of this lab. course are to:

1. develop advanced skills in applying research methods.
2. train students in using appropriate research tools to address research problems.

By the end of the course a student is expected to:

1. be able to practically select and appropriate research tools to solve a real world research problem.
2. design experiments to test a research hypothesis.
3. be able to use the tools like MATLAB and R.
4. understand data and interpret results.

Students are required to solve small research problems in the lab. The lab assignments are evenly spread over the semester. Every student is required to prepare a file of lab experiments done. At the end, they achieve proficiency in using MATLAB, R and other related tools to solve research problems.

Mobile Application Development Lab

General Course Information:

Course Code: CSP732 Course Credits: 2 Type: Compulsory Course Contact Hours: 2 hours/week Mode: Lab practice and assignments *In lab. work one credit is equivalent to two hours	**Course Assessment Methods (internal: 50; external:50)** The internal and external assessment is based on the level of participation in lab sessions and the timely submission of lab experiments/assignments, the quality of solutions designed for the assignments, the performance in Viva-Voce, the quality of lab file and ethical practices followed. The internal examination is conducted by the course coordinator. The external examination is conducted by external examiner (appointed by the Controller of Examination) in association with the internal examiner appointed by the Chairperson of the Department.

Prerequisite: Java Programming and Object-oriented programming, knowledge of XML, JSON and database concepts.

About the Course: This laboratory course on Android Programming helps students to learn how to develop android apps. A study of the subject matter presented in this course will enable the student to become familiar with:

Course Outcomes: By the end of the course students will be able to:

CO1. **Analyse** the Development Environment and the working of Emulator for android application.(LOTS: Level 1: Analyse)
CO2. **Demonstrate**andDesign different activities and layouts of application.(LOTS: Level 2: Design)
CO3. **Identify** and embed JSON and XML file in application design. (LOTS: Level 3: Apply)
CO4. **Develop** application based on SQLite and latest connection providers. (LOTS: Level 6: Develop)
CO5. **Create&Demonstrate** use of ethical practices, self-learning and team spirit.(LOTS: Level 6: Create)

Course Contents

List of Experiments/ assignments

1. Setting up development environment, Dalvik Virtual Machine & .apk file extension.
2. Fundamentals: - Basic Building blocks: - Activities, Services, Broadcast Receivers & Content providers.
3. UI Components: – Views & Notifications, Uses of Components for communication -Intents & Intent Filters.

4. Emulator-Android Virtual Device:- Launching emulator, Editing emulator settings, Emulator shortcuts.
5. Develop an app for demonstrating the communication between Intents. Design and implement forms in MS Access.
6. Design a Basic of UI structure:- Form widgets, Text Fields, Layouts, [dip, dp, sip, sp] versus px, Menu, Option menu, Context menu, Sub menu, menu from xml, menu via code.
7. Implementation of Intents: - Explicit Intents, Implicit intents with Examples.
8. Styles & Themes:- styles.xml, draw able resources for shapes, gradients (selectors), style attribute in layout file, Applying themes via code and manifest file.
9. SQLite Programming:- SQLite Open Helper, SQLite Database, Cursor, Reading and updating Contacts, Reading bookmarks.
10. Notifications:- Broadcast Receivers, Services and notifications, Toast buttons.

Note: The actual experiment / assignments will be designed by the course coordinator. One assignment to be done in the groups of two or three students. The assignments must be met the objectives of the course and the levels of given course outcomes. The list of assignments and schedule of submission will be prepared by course coordinator in the beginning of the semester.

3OE01: Business Analytics (3rd Semester)

Course Code: 3OE01 L+T+P : 3+0+0 Credit : 3 (Open Elective) Contact Hours: 3 hours/week	**Course Assessment Methods:** **Internal 30 :** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks). **External 70 :** End semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number 1 will be compulsory and based on the entire syllabus and will contain seven short answers type questions. Further 8 more questions are to be given from entire syllabus and candidate is required to attempt any four questions. All questions carry equal marks.

Course Objectives

Students will be able to:

- Understand the role of business analytics within an organization.
- Analyze data using statistical and data mining techniques and understand relationships between the underlying business processes of an organization.
- Gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making.
- Become familiar with processes needed to develop, report, and analyze business data.
- Use decision-making tools/Operations research techniques.
- Mange business process using analytical and management tools.
- Analyze and solve problems from different industries such as manufacturing, service, retail, software, banking and finance, sports, pharmaceutical, aerospace etc.

Units	Contents
1.	Business analytics: Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organization, competitive advantages of Business Analytics. Statistical Tools: Statistical Notation, Descriptive Statistical methods, Review of probability distribution and data modelling, sampling and estimation methods overview
2.	Trendiness and Regression Analysis: Modelling Relationships and Trends in Data, simple Linear Regression. Important Resources, Business Analytics Personnel, Data and models for Business analytics, problem solving, Visualizing and Exploring Data, Business Analytics Technology.
3.	Organization Structures of Business analytics, Team management, Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, Measuring contribution of Business analytics, Managing Changes. Descriptive Analytics, predictive analytics, predicative Modelling, Predictive

	analytics analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modelling, nonlinear Optimization.
4.	Forecasting Techniques: Qualitative and Judgmental Forecasting, Statistical Forecasting Models, Forecasting Models for Stationary Time Series, Forecasting Models for Time Series with a Linear Trend, Forecasting Time Series with Seasonality, Regression Forecasting with Casual Variables, Selecting Appropriate Forecasting Models. Monte Carlo Simulation and Risk Analysis: Monte Carle Simulation Using Analytic Solver Platform, New-Product Development Model, Newsvendor Model, Overbooking Model, Cash Budget Model
5.	Decision Analysis: Formulating Decision Problems, Decision Strategies with the without Outcome Probabilities, Decision Trees, The Value of Information, Utility and Decision Making.
6.	Recent Trends in : Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data journalism.

Course Outcomes

1. Students will demonstrate knowledge of data analytics.
2. Students will demonstrate the ability of think critically in making decisions based on data and deep analytics.
3. Students will demonstrate the ability to use technical skills in predicative and prescriptive modeling to support business decision-making.
4. Students will demonstrate the ability to translate data into clear, actionable insights.

Reference:

1. Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, Pearson FT Press.
2. Business Analytics by James Evans, persons Education.

3OE02: Industrial Safety (3rd Semester)

Course Code: 3OE02 L+T+P: 3+0+0 Credit : 3 (Open Elective) Contact Hours: 3 hours/week	**Course Assessment Methods:** **Internal 30 :** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks). **External 70 :** End semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus and will contain seven short answers type questions. Further 8 more questions are to be given from entire syllabus and candidate is required to attempt any four questions. All questions carry equal marks.

Syllabus

Units	Contents
1.	Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods
2.	Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment
3.	Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.
4.	Fault tracing: Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.
5.	Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

Reference:

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

3OE03: Operations Research (3rd Semester)

Course Code: 3OE03 L+T+P: 3+0+0 Credit : 3 (Open Elective) Contact Hours: 3 hours/week	**Course Assessment Methods:** **Internal 30 :** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks). **External 70 :** End semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus and will contain seven short answers type questions. Further 8 more questions are to be given from entire syllabus and candidate is required to attempt any four questions. All questions carry equal marks.

Course Outcomes: At the end of the course, the student should be able to

1. Students should able to apply the dynamic programming to solve problems of discrete and continuous variables.
2. Students should able to apply the concept of non-linear programming
3. Students should able to carry out sensitivity analysis
4. Student should able to model the real world problem and simulate it.

Units	Contents
1.	Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models
2.	Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming
3.	Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT
4.	Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.
5.	Competitive Models,Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

References:

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

3OE04: Cost Management of Engineering Projects (3rd Semester)

Course Code: 3OE04 L+T+P: 3+0+0 Credit : 3 (Open Elective) Contact Hours: 3 hours/week	**Course Assessment Methods:** **Internal 30 :** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks). **External 70 :** End semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus and will contain seven short answers type questions. Further 8 more questions are to be given from entire syllabus and candidate is required to attempt any four questions. All questions carry equal marks.

Units	Contents
1.	Introduction and Overview of the Strategic Cost Management Process
2.	Cost concepts in decision-making; Relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making
3.	Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and non-technical activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process
4.	Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector. Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis. Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing.
5.	Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

References:

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

3OE05: Composite Materials (3rd Semester)

Course Code: 3OE05 L+T+P: 3+0+0 Credit : 3 (Open Elective) Contact Hours: 3 hours/week	**Course Assessment Methods:** **Internal 30 :** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks). **External 70 :** End semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus and will contain seven short answers type questions. Further 8 more questions are to be given from entire syllabus and candidate is required to attempt any four questions. All questions carry equal marks.

Units	Contents
1.	INTRODUCTION: Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix. Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.
2.	REINFORCEMENTS: Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Isostrain and Isostress conditions.
3.	Manufacturing of Metal Matrix Composites: Casting – Solid State diffusion technique, Cladding – Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications.
4.	Manufacturing of Polymer Matrix Composites: Preparation of Moulding compounds and prepregs – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications.
5.	Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure. Laminate first play failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.

TEXT BOOKS:

1. Material Science and Technology – Vol 13 – Composites by R.W.Cahn – VCH, West Germany.
2. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R. Balasubramaniam, John Wiley & Sons, NY, Indian edition, 2007.

References:

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

3OE06: Waste to Energy (3rd Semester)

Course Code: 3OE06 L+T+P: 3+0+0 Credit : 3 (Open Elective) Contact Hours: 3 hours/week	**Course Assessment Methods:** **Internal 30 :** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks). **External 70 :** End semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus and will contain seven short answers type questions. Further 8 more questions are to be given from entire syllabus and candidate is required to attempt any four questions. All questions carry equal marks.

Units	Contents
1.	Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors
2.	Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.
3.	Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.
4.	Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.
5.	Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

References:

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

3OE07: Advancements in Communication Systems (3rd Semester)

Course Code: 3OE07 L+T+P: 3+0+0 Credit : 3 (Open Elective) Contact Hours: 3 hours/week	**Course Assessment Methods:** **Internal 30 :** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks). **External 70 :** End semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus and will contain seven short answers type questions. Further 8 more questions are to be given from entire syllabus and candidate is required to attempt any four questions. All questions carry equal marks.

Course Objectives:

- The objective of this course is to study about the advancement in communication systems.
- Study about the digital communication & basic concepts of mobile communication.
- Study of optical communication & multiplexing techniques.
- To understand basics of navigation devices like Radar, Sonar.

Units	Contents
1.	The essentials of a Communication system, Amplitude modulation, Phase modulation (PM) & frequency modulation (FM),Demodulation, ASK, FSK, BPSK, QPSK, Introduction to GSM, CDMA, Architecture of GSM, CDMA, Frequency Reuse concept, ISDN (Integrated Services digital Networks)
2.	Introduction to optical communication system: Electromagnetic spectrum used for optical communication, block diagram of optical communication system, Advantages of optical fiber communication, Optical fibers structures and their types, fiber characteristics, Basic principles of light propagation, Total internal reflection, Acceptance angle, Numerical aperture, Optical sources, Optical Detectors, Principles of optical detection, Optical Networks, why optical Networks? , SONET/SDH, WDM optical networks.
3.	Communication signal multiplexing, Time division multiplexing, Frequency division multiplexing, Introduction to Multiple Access, FDMA, TDMA, Spread Spectrum multiple Access, space division multiple access.
4.	Block Diagram and operation of RADAR, SONAR, Simple form of Radar Equation, Pulse Repetition frequency, VSAT(data broadband satellite), MSAT (Mobile Satellite Communication technique), Sarsat (Search & Rescue satellite) & LEOs (Lower earth orbit satellite), Satellite communication with respect to Fiber Optic Communication, LANDSAT, Defense satellite Beam Acquisition, Tracking & Positioning.

Course Outcomes:

CO-1 Ability to understand about the advanced communication systems.
CO-2 Students get introduction about navigational techniques.
CO-3 Satellite is the core of modern communication. Students get the introduction about satellite by this subject.

Text and Reference Books:

1. Communication systems (4th edn.): Simon Haykins; John wiley & sons.
2. Electronic Communication systems: Kennedy; TMH.
3. Optical Fiber Communications: John M Senior; PHI.
4. Wireless Communications: Theodore S. Rappaport; Pearsons.
5. Introduction to Radar Systems: Merrill I. Skolnik, ; MGH
6. Satellite Communication: D.C. Aggarwal; Khanna.

3OE08: Introduction to Soft Computing Techniques (3rd Semester)

Course Code: 3OE08 L+T+P: 3+0+0 Credit : 3 (Open Elective) Contact Hours: 3 hours/week	**Course Assessment Methods:** **Internal 30 :** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks). **External 70 :** End semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus and will contain seven short answers type questions. Further 8 more questions are to be given from entire syllabus and candidate is required to attempt any four questions. All questions carry equal marks.

Course Objectives:

1. Introduce the soft computing techniques to students of different Engineering Departments.
2. Develop the ability to apply the soft computing techniques like genetic algorithms, fuzzy logic and neural networks in diverse Engineering domains.

By the end of the course a student is expected to:

I. be able to apply Genetic Algorithms, Neural Networks, Fuzzy Logic or a combination of these as computational tools to solve a variety of problems related to optimization in different domains.

II. acquire knowledge of the tools like MATLAB and R to implement soft computing techniques

Units	Contents
1.	Working of a simple Genetic Algorithm and the related definitions: Block diagram of working of a Genetic Algorithm, Representation/Encoding Schemes, initialising a GA population, evaluation function, genetic operators, study of parameters of genetic algorithms and its performance, sampling and selection mechanisms, Optimizing numerical functions using GA.
2.	Genetic Algorithm variations: Scaling fitness, Multi-Objective Genetic Algorithms, Master Slave and Distributed Genetic Algorithms, Designing GAs for numerical optimization, knapsack problem, travelling salesperson and other similar problems.
3.	Neural networks: Basic terminology and definitions, Model of an artificial neuron, Sigmoid function, Neural Network Architectures, Characteristics of neural networks, Learning methods, Rosenblatt's Perceptron, Fixed increment perceptron learning algorithm for a classification problem, Examples of learning of AND/OR gate by perceptron, XOR problem. Back Propagation Neural Networks: Architecture of a back propagation network, Model for multi-layer perceptron, Back propagation learning, Delta or gradient descent learning rule and effect of learning rate, Back propagation learning algorithm
4.	Fuzzy sets: Basic terminology and definitions, Operations on Fuzzy sets, MF formulations and parameterisation, Derivatives of parameterised MFs, Fuzzy numbers, Extension principal and fuzzy relations, Linguistic variables, Fuzzy If-Then Rules, Fuzzy reasoning and compositional rule of inference.

Software and Tools to be learnt: MATLAB tool boxes on global optimization, neural networks and fuzzy logic, R Programming, GALIB 247 and KEEL

Text and Reference Books:

1. David.E. Goldberg, Genetic Algorithms in Search, Optimization and machine learning, Addison Wesley, 1999.
2. Zbigniew Michalewicz, Genetic algorithms +Data Structures = Evolution Programs, Springers-Verlag, 1999.
3. M. Mitchell, An Introduction to Genetic Algorithms, Prentice-Hall, 1998.
4. S. Rajasekaran & G. A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis & Applications, PHI, 2003.
5. S. N. Sivanandam & S. N. Deepa, Principles of Soft Computing, Wiley - India, 2007.
6. J-S. R. Jang, C.-T. Sun, E. Mizutani, Neuro-Fuzzy and Soft Computing, PHI, 1997.
7. Simon O. Haykin, Neural Networks, A Comprehensive Foundation, PHI, 1994.

3OE09: Advanced Printing Technology (3rd Semester)

Course Code: 3OE09 L+T+P: 3+0+0 Credit : 3 (Open Elective) Contact Hours: 3 hours/week	**Course Assessment Methods:** **Internal 30 :** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks). **External 70 :** End semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus and will contain seven short answers type questions. Further 8 more questions are to be given from entire syllabus and candidate is required to attempt any four questions. All questions carry equal marks.

Course Objectives:

The objective of this course is to impart the basis knowledge of different printing processes along with their role, importance and applications

Units	Contents
1.	Historical development in Printing Technology. Recent trends in the field of printing and allied technologies. Pre-Press, Press and Post press operations
2.	Letterpress Printing Process; Characteristics, role, importance and applications Offset Printing Process; Characteristics, role, importance and applications
3.	Flexography Printing Process; Characteristics, role, importance and applications. Gravure Printing Process; Characteristics, role, importance and applications
4.	Screen Printing Process; Characteristics, role, importance and applications Digital Printing Process; Characteristics, role, importance and applications

Course Outcome

The learning outcome of this course is expected that after completion of this course the students will be having the detail knowledge of various printing processes and the recent development in this industry and they will implement their knowledge for print production operations

References:

1. Sheet-Fed Offset Technology, By Sh. Anjan Kumar Baral
2. Letterpress Printing, By C.S. Mishra
3. On demand printing, By Havoed M Fenton, Frank J. Romao
4. Printing Technology, By Adams Fox

3OE10: Computer Aided Design & Manufacturing
(3rd Semester)

Course Code: 3OE10 L+T+P: 3+0+0 Credit : 3 (Open Elective) Contact Hours: 3 hours/week	**Course Assessment Methods:** **Internal 30 :** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks). **External 70 :** End semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus and will contain seven short answers type questions. Further 8 more questions are to be given from entire syllabus and candidate is required to attempt any four questions. All questions carry equal marks.

Course Objectives:

- To understand the basic parametric fundamentals that is used to create and manipulate geometric models.
- To learn about the concepts of surface modeling and solid modeling.
- To implement CNC programs for milling and Turning machining operations,
- To create a computer aided manufacturing (CAM) model and generate the machining codes automatically using the CAM system

Units	Contents
1.	Introduction: Introduction to CAD/CAM, Historical developments, Industrial look at CAD/CAM, Introduction to CIM; Basics of geometric and solid modeling, explicit, implicit, intrinsic and parametric equations, coordinate systems Transformations: Introduction, transformation of points and line, 2-D rotation, reflection, scaling and combined transformation, homogeneous coordinates, 3-D scaling, shearing, rotation, reflection and translation, combined transformations, orthographic and perspective projections, reconstruction of 3-D objects
2.	Curves: Algebraic and geometric forms, tangents and normal, blending functions reparametrization, straight lines, conics, cubic splines, Bezier curves and B-spline curves. Surfaces: Algebraic and geometric forms, tangents and normal, blending functions, reparametrization, sixteen point form, four curve form, plane surface, ruled surface, surface of revolution, tabulated cylinder, bi-cubic surface, Bezier surface, B-spline surface. Solids: Solid models and representation scheme, boundary representation, constructive solid geometry, sweep representation, cell decomposition, spatial occupancy enumeration.
3.	Automation and Numerical Control: Introduction, fixed, programmable and flexible automation, types of NC systems, MCU and other components, NC manual part programming, coordinate systems, G & M codes, Part program for simple parts, computer assisted part programming
4.	Group Technology: Part families, part classification and coding, production flow analysis, Machine cell design, Advantages of GT Flexible Manufacturing Systems & Computer aided process planning: Introduction, FMS components, types of FMS, FMS layouts, planning for FMS, advantages and applications Coventional process planning, types of CAPP, Steps in variant process

	planning, planning for CAPP.

Course Outcomes:

Students would learn about the concepts of surface modeling, physically based modeling and surface visualization.

Students would be able Implement CNC programs for milling and turning machining operations

Books:

1. CAD/ CAM by Groover and Zimmer, Prantice Hall.
2. CAD/ CAM Theory and Practice by Zeid, McGraw Hill
3. CAD/CAM (Principles, Practice & Manufacturing Management) by Chirs Mc Mohan & Jimmie Browne, Published by Addison- Wesley.
4. Numerical Control and Computer Aided Manufacturing by Kundra, Rao & Tiwari, TMH.
5. Automation, Production Systems and Computer Integrated Manufacturing, Groover M.P, Prentice Hall of India.

3OE11: Food Safety and Quality Assurance
(3rd Semester)

Course Code: 3OE11 L+T+P: 3+0+0 Credit : 3 (Open Elective) Contact Hours: 3 hours/week	**Course Assessment Methods:** **Internal 30 :** Two minor examinations each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks) Assignment and quiz (6 marks). **External 70 :** End semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus and will contain seven short answers type questions. Further 8 more questions are to be given from entire syllabus and candidate is required to attempt any four questions. All questions carry equal marks.

Course Objectives:

- To illustrate the importance of food safety, food quality, food laws and regulations in Food industry.
- To describe the food quality management systems.
- To explain the nationals and international food laws and regulations.
- To exemplify different food adulterants.

Units	Contents
1.	Sampling, specification, labeling, safety and quality assessment of fruits and vegetable, cereals, dairy products, meat, fish, poultry and processed food products, Sensory evaluation: Introduction, panel screening, selection methods, interaction and thresholds
2.	Developments, objective and functions of food safety and quality assurance, Quality enhancement models, Statistical Quality Control for food industry, Food Quality Management Systems, implementation of quality control programmes, Quality control tools, Quality control charts for food plant sanitation, Food Safety Management Systems, Causes of failure of Food Safety Programs
3.	Indian food laws and regulations, Food safety acts, Regulations for waste disposals, Codex alimentarious, ISO series, World Trade Organization, Food and Agricultural Organization, World Health Organization, Food safety and legislation in USA and Europe, Technical Barriers in Trade, Enforcers of food laws approval process for food additives, additives food labeling, Intellectual Property Right, HACCP and its application.
4.	Food adulteration: Types of adulterants, Common adulterants for foods like milk and milk products, honey, wheat flours, edible oils, cereals, condiments (whole and ground) pulses, coffee, tea, confectionery, baking powder, non-alcoholic beverages, vinegar, besan and curry powder

Course Outcomes:

After the completion of the course, the students will be able to:

1. Understand various areas of Food Safety & Quality Assurance.
2. Grasp knowledge of the quality assessments of food products.
3. Comprehend food quality managements systems.
4. Apprehend the Indian and International food laws.
5. Conceive the concept of adulteration in food products.