

Poojya Doddappa Appa College of Engineering, Kalaburgi



Vth & VI th Semester BE – Artificial Intelligence & Machine Learning

Scheme of Teaching and Examinations

Outcome Based Education (OBE) and Choice Based Credit System(CBCS)
(Effective from the academic year 2024 – 25)

P D A College of Engineering
B.E. in Artificial Intelligence & Machine Learning
Scheme of Teaching and Examinations 2022
Outcome Based Education(OBE)and Choice Based Credit System(CBCS)
(Effective from the academic year2024-25)

V SEMESTER

Sl. No	Course and Course Code		Course Title	Teaching Department (TD)and Question Paper Setting Board(PSB)	Teaching Hours/Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Self-Study	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	PC	22AI51	Data Science & its Application	TD-Respective Dept. PSB- Respective Dept.	3	2	0	0	03	50	50	100	4
2	IPCC	22AI52	Database Management Systems	TD-Respective Dept. PSB- Respective Dept.	3	0	2	0	03	50	50	100	4
3	PCC	22AI53	Principles of Machine Learning	TD-Respective Dept. PSB- Respective Dept.	4	0	0		03	50	50	100	4
4	PCCL	22AIL54	Artificial Intelligence & Machine Learning Lab	TD-Respective Dept. PSB- Respective Dept.	0	0	2		03	50	50	100	1
5	PEC	22AI55A	Human Computer Interface	TD-Respective Dept. PSB- Respective Dept.	3	0	0		03	50	50	100	3
6	PROJ	22AIMP56	Mini Project	TD-Respective Dept. PSB- Respective Dept.	0	0	4		-	50		50	2
7	AEC	22RMI57	Research Methodology and IPR	Any Department	2	2	0		03	50	50	100	3
8	BSC	22ES58	Environmental Studies	TD:CV/ Env /Chem. PSB:CV	2	0	0		03	50	50	100	2
9	NCMC	22NS59	Mandatory Course	NSS coordinator	0	0	2			50		50	0
		22PE59	Mandatory Course	Physical Education Director									
		22YO59	Mandatory Course	Yoga Teacher									
				Total	17	04	12	0	21	450	350	800	23

Professional Elective Course			
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22AI55A	Human Computer Interface	22AI55C	User Interface Design
22AI55B	Human Centered AI		
<p>PCC: Professional Core Course, PCCL: Professional Core Course laboratory, UHV: Universal Human Value Course, MC: Mandatory Course (Non-credit), AEC: Ability</p>			
<p>Enhancement Course, SEC: Skill Enhancement Course, L: Lecture, T: Tutorial, P: Practical S= SDA: Skill Development Activity, CIE: Continuous Internal Evaluation, SEE: Semester End Evaluation. K: The letter in the course code indicates common to all the stream of engineering. PROJ: Project/Mini Project. PEC: Professional Elective Course</p>			
<p>Professional Core Course (IPCC): Refers to Professional Core Course Theory Integrated with practical of the same course. Credit for IPCC can be 04 and its Teaching-Learning hours (L : T : P) can be considered as (3 : 0 : 2) or (2 : 2 : 2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper. For more details, the regulation governing the Degree of Bachelor of Engineering/Technology (B.E./B.Tech.) 2022-23</p> <p>National Service Scheme /Physical Education/Yoga: All students have to register for any one of the courses namely National Service Scheme (NSS), Physical Education (PE) (Sports and Athletics), and Yoga (YOG) with the concerned coordinator of the course during the first week of III semesters. Activities shall be carried out between III semester to the VI semester (for 4 semesters). Successful completion of the registered course and requisite CIE score is mandatory for the award of the degree. The event shall be appropriately scheduled by the colleges and the same shall be reflected in the calendar prepared for the NSS, PE, and Yoga activities. These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the course is mandatory for the award of degree.</p>			
<p>Mini-project work: Mini Project is a laboratory-oriented / hands on course that will provide a platform to students to enhance their practical knowledge and skills by the development of small systems/applications etc. Based on the ability/ abilities of the student/s and recommendations of the mentor, a single discipline or a multi disciplinary Mini- project can be assigned to an individual student or to a group having not more than 4 students.</p> <p>CIE procedure for Mini-project:</p> <p>(i) Single discipline: The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two faculty members of the Department, one of them being the Guide. The CIE marks awarded for the Mini-project work shall be based on the evaluation of the project report, project presentation skill, and question and answer session in the ratio of 50:25:25. The marks awarded for the project report shall be the same for all the batch mates.</p> <p>(ii) Inter disciplinary: Continuous Internal Evaluations shall be group-wise at the college level with the participation of all the guides of the project. The CIE marks awarded for the Mini-project shall be based on the evaluation of the project report, project presentation skill, and question and answer session in the ratio 50:25:25. The marks awarded for the project report shall be the same for all the batch mates.</p> <p>No SEE component for Mini-Project.</p>			
<p>Professional Elective Courses (PEC): A professional elective (PEC) course is intended to enhance the depth and breadth of educational experience in the Engineering and Technology curriculum. Multidisciplinary courses that are added supplement the latest trend and advanced technology in the selected stream of engineering.</p> <p>Each group will provide an option to select one course. The minimum number of students' strengths for offering a professional elective is 10. However, this conditional shall Not be applicable to cases where the admission to the program is less than 10.</p>			

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VI SEMESTER

Sl. No	Course and Course Code		Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching Hours/Week				Examination			Credits	
					Theory Lectur	Tutorial	Practical /Drawing	Self-Study	Duration in hours	CIE Marks	SEE Marks		Total Marks
					L	T	P	S					
1	HSMS	22 HU61	Entrepreneurship, Management and Finance	TD-Respective Dept. PSB- Respective Dept.	3	0	0	0	03	50	50	100	3
2	PCC	22AI62	Deep learning	TD-Respective Dept. PSB- Respective Dept.	3	2	0	0	03	50	50	100	4
3	PEC(II)	22AI63A	Robotic Process Automation	TD-Respective Dept. PSB- Respective Dept.	3	0	0	0	03	50	50	100	3
4	OEC	22AIOE641	Full Stack Web Development	TD-Respective Dept. PSB- Respective Dept.	3	0	0	0	03	50	50	100	3
5	PROJ	22AI65	Major Project Phase - I	TD-Respective Dept. PSB- Respective Dept.	0	0	4	0	03	50	--	50	2
6	PCCL	22AIL66	Deep Learning Lab	TD-Respective Dept. PSB- Respective Dept.	0	0	2	0	03	50	50	100	1
7	AEC / SDC	22AIKS67	Indian Knowledge Systems		If the course is offered as a Theory				02	50	50	100	1
					0	2	0						
					If a course is offered as a practical								
					0	0	2						
8	NCMC	22NS68	Mandatory Course (Non-credit)	NSS coordinator	0	0	2	0	50	---	50	0	
		22PE68	Mandatory Course (Non-credit)	Physical Education Director									
		22YO68	Mandatory Course (Non-credit)	Yoga Teacher									
				Total	12	02	10	0	20	400	300	700	17

Professional Elective Course			
Professional Elective -II			
22AI63A	Robotic Process Automation	22AI63C	Embedded systems
22AI63B	Computer graphics & vision		
Open Elective -I			
22AIOE641	Full Stack Web Development		

PCC: Professional Core Course, **PCCL:** Professional Core Course laboratory, **UHV:** Universal Human Value Course, **MC:** Mandatory Course (Non-credit), **AEC:** Ability Enhancement Course, **SEC:** Skill Enhancement Course, **L:** Lecture, **T:** Tutorial, **P:** Practical **S= SDA:** Skill Development Activity, **CIE:** Continuous Internal Evaluation, **SEE:** Semester End Evaluation. **K:** The letter in the course code indicates common to all the stream of engineering. **PROJ:** Project/Mini Project. **PEC:** Professional Elective Course. **PROJ:** Project Phase-I, **OEC:** Open Elective Course

Professional Core Course (IPCC): Refers to Professional Core Course Theory Integrated with practical of the same course. Credit for IPCC can be 04 and its Teaching-Learning hours (L : T : P) can be considered as (3 : 0 : 2) or (2 : 2 : 2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper. For more details, the regulation governing the Degree of Bachelor of Engineering/ Technology (B.E./B.Tech.) 2022-23

National Service Scheme /Physical Education/Yoga: All students have to register for any one of the courses namely National Service Scheme (NSS), Physical Education (PE) (Sports and Athletics), and Yoga (YOG) with the concerned coordinator of the course during the first week of III semesters. Activities shall be carried out between III semester to the VI semester (for 4 semesters). Successful completion of the registered course and requisite CIE score is mandatory for the award of the degree. The events shall be appropriately scheduled by the colleges and the same shall be reflected in the calendar prepared for the NSS, PE, and Yoga activities. These courses shall Not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the course is mandatory for the award of degree.

Professional Elective Courses (PEC): A professional elective (PEC) course is intended to enhance the depth and breadth of educational experience in the Engineering and Technology curriculum. Multidisciplinary courses that are added supplement the latest trend and advanced technology in the selected stream of engineering. Each group will provide an option to select one course. The minimum number of students' strengths for offering professional electives is 10. However, this condition shall Not be applicable to cases where the admission to the program is less than 10.

Open Elective Courses:

Students belonging to a particular stream of Engineering and Technology are not entitled to the open electives offered by their parent Department. However, they can opt for an elective offered by other Departments, provided they satisfy the prerequisite condition if any. Registration to open electives shall be documented under the guidance of the Program Coordinator/Advisor/Mentor. The minimum number of students' strength for offering Open Elective Course is 10. However, this condition Shall not be applicable to class where the admission to the program is less than 10.

Project Phase-I: Students have to discuss with the mentor/guide and with their help he/she has to complete the literature survey and prepare the report and finally Define the problem statement for the project work.

Data Science & its Application		
Subject Code	22AI51	CIE: 50
Number of Lecture Hours/Week	3:0:2:3	SEE: 50
Total Number of Lecture Hours	52	SEE Hours: 03
CREDITS- 4		
<p>Course Objectives: This course will enable students to</p> <ul style="list-style-type: none"> • An understanding of the data operations • An overview of simple statistical models and the basics of machine learning techniques of regression. • An understanding good practices of data science • Skills in the use of tools such as python, IDE • Understanding of the basics of the Supervised learning 		
Modules-I		Teaching Hours
Introduction to Data Science: Data science, Brief history of data Science, Increasing Attention to Data Science, Fundamental Fields of Study related to Data Science, Data Science and Related Terminologies, Types of Analytics, Application of Data Science, Data Science Process Model		10 Hrs
Modules-II		
Exploratory Data Analysis: Introduction, Steps in Data Preprocessing, Understanding Data, Looking at the Data, Visualizing Data, Dealing with outliers, Dealing with Missing Values, Standardizing Data, Steps Involved in EDA Using Python Programming, Looking at the Data, Visualization the Data, Treatment of Outliers		11 Hrs
Modules-III		
Types of Machine Learning Algorithms: Introduction, Supervised and unsupervised Learning Algorithms, Supervised Learning Algorithm, Unsupervised Learning Algorithm. Unsupervised Learning Algorithms: Introduction, Association Rule Mining, Conjoint Analysis, Clustering, K-mean clustering		11 Hrs
Modules-IV		
Supervised Learning Algorithms: Introduction, Simple Linear Regression, Multiple Linear Regression, Logistic Regression.		10 Hrs
Modules-V		
Support Vector Machines & Artificial Neural Networks: Support vector machines hyperplanes and support vectors, Hyperparameter in SVMs, SVM Model Building, Model Performance Measures, Artificial Neural Network and Its Applications, ANN Model Building, Steps in ANN Model Building, Model Performance Measures, Types of ANN.		10 Hrs
<p>Question paper pattern:</p> <ul style="list-style-type: none"> • The question paper will have ten questions. • Each full question consists of 20 marks. • There will be 2 full questions (with a maximum of four sub questions) from each module. • Each full question will have sub questions covering all the topics under a module. The students will have to answer 5 full questions, selecting one full question from each module. 		
<p>Text Books:</p> <ol style="list-style-type: none"> 1. Introduction to Data Science practical approach with R and Python, Uma Maheswari and R. Sujatha published by Wiley India Pvt Ltd 2. Introduction to Data Science a Python approach to concepts, Techniques and Applications, I gual, L;Seghi', S. Springer, ISBN:978-3-319-50016-4 		

Reference Books:

1. Emily Robinson and Jacqueline Nolis, “Build a Career in DataScience”, 1st Edition, Manning Publications, 2020. ISBN: 978-1617296246.
2. Aurélien Géron, “Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems”, 2nd Edition, O’Reilly Publications/Shroff Publishers and Distributors Pvt. Ltd., 2019. ISBN- 13: 978-1492032649.
3. François Chollet, “Deep Learning with Python”, 1st Edition, Manning Publications, 2017. ISBN 13: 978-1617294433
4. Jeremy Howard and Sylvain Gugger, “Deep Learning for Coders with fastai and PyTorch”, 1st Edition, O’Reilly Publications/Shroff Publishers and Distributors Pvt. Ltd., 2020. ISBN-13: 978-1492045526.
5. Sebastian Raschka and Vahid Mirjalili, “Python Machine Learning: Machine Learning and Deep Learning with Python, scikit-learn, and TensorFlow 2”, 3rd Edition, Packt Publishing Limited, 2019. ISBN-13: 978-1789955750

E books and online course materials:

Course outcomes: On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
	CO1	Describe what Data Science is and the skill sets needed to be a data scientist.
	CO2	Explain the significance of exploratory data analysis (EDA) in data science
	CO3	Ability to learn the supervised learning, SVM
	CO4	Apply basic machine learning algorithms (Linear Regression)
	CO5	Explore the Networks, Page Rank

DATABASE MANAGEMENT SYSTEM		
Subject Code:	22AI52	Credits:4
CIE: 50 Marks	SEE: 50 Marks	SEE: 03 Hrs.
Hours/Week:04(T+L)	Total hours:(40+12)=52	
Prerequisite: The students should have the knowledge of Data Structures, Computer Organization and C++Programming Principles.		
Course Learning Objectives To enable the students to obtain the knowledge of Data Base Management System in the following topics		
<ul style="list-style-type: none"> • Understand the Data Base Management Principles and relational models. • Understand the relational algebraic approach and database implementation and interaction techniques using SQL. • Understand the functional dependency and Normalization Techniques. • Understand the online transaction processing and recovery methods. 		
Modules		Teaching Hours
Module I		8 Hrs.
Introduction: An example Characteristics of Database approach Actors on the screen; Workers behind the scenes; Advantages of using DBMS approach; A brief history of database applications; when not to use a DBMS. Data models, schemas and instances; Three-Schema architecture and data independence; Database languages and interfaces; The database system environment; Centralized and client-server architectures; Classification of Database Management systems.		
Module II		8 Hrs.
Entity-Relationship Model: Using High-Level Conceptual Data Models For Database Design; An Example Database Application; Entity Types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and Structural Constraints; Weak Entity Types; Refining the ER Design; ER Diagrams, Naming. Conventions and Design Issues; Relationship types of degree higher than two.		
Module III		8 Hrs.
Relational Model and Relational Algebra: Relational Model Concepts; Relational Model Constraints and Relational Database Schemas; Update Operations, Transactions and dealing with constraint violations; Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational. Operations: JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra; Relational Database Design Using ER-to Relational Mapping. SQL: SQL Data Definition and Data Types; Specifying basic constraints in SQL; Schema change statements in SQL; Basic queries in SQL; More complex SQL Queries. Insert, Delete and Update statements in SQL; Specifying constraints as Assertion and Trigger; Views (Virtual Tables) in SQL.		
Module IV		8 Hrs.
Database Design: Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Codd Normal Form . Properties of Relational Decompositions; Algorithms for Relational Database Schema Design; Multi valued Dependencies and Fourth Normal Form; Join Dependencies and Fifth Normal Form.		
Module V		8 Hrs.
Transaction Management: The ACID Properties; Transactions and Schedules; Concurrent Execution of Transactions; Lock-Based Concurrency Control; Performance of locking; Transaction support in SQL. Introduction to Crash Recovery; 2PL, Serializability and Recoverability; Lock Management; Introduction to ARIES; The log; Other recovery-related		

structures; The write-ahead log protocol; Check pointing; Recovering from a System Crash.

Question paper pattern:

1. The question paper will have TEN questions.
2. There will be TWO questions in each module, covering all the topics.
3. The student need to answer FIVE full questions, selecting ONE full question from each module.

Textbooks:

1. Fundamentals of Database Systems - Elmasri and Navathe, 5th Edition, Addison-Wesley,2007
2. Database Management Systems- Raghu Ramakrishnan and Johannes Gehrke– 3rdEdition. McGraw-Hill, 2014.

Reference:

1. Data Base System Concepts-Silberschatz, KorthandSudharshan,6thEdition, Mc GrawHill,2010.
2. An Introduction to Database Systems-C. J. Date, A.Kannan,S.Swamynatham,8thEdition, Pearson Education, 2006.

Course Outcome

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

CO#	Course Outcome
CO1	Express the fundamentals and applications of data base management system.
CO2	Apply good database design principles for the design of ER diagram and relational models.
CO3	Implement and interact data base using SQL and relational algebra.
CO4	Design data base by applying the functional dependency and Normalization techniques.
CO5	Demonstrate the data base transaction and recovery management process.

DATABASE MANAGEMENT SYSTEMS LABORATORY

Prerequisite : The Students should have the knowledge of Data structure and C++

Course Objectives: To enable the students to obtain the knowledge of Database management systems in the following topics.

- Understand the Data Base Management System Environment
- Understand the techniques to design the data base and populate there cords
- Understand the DML operations.
- Understand the query optimization and error handling techniques.
- Understand the DCL and TCL statements

DATA BASE LABORATORY

PART-A

Consider the following relations :

Student (Stud_number: integer, class: integer,

major:char) Course (Course_name: Char,

Course_number: varchar, Credit_hours:int,

Department: char) Section(Secton_id:varchar,

Course_number:varchar, Semester:char, Year:int,

Instructor:char)

Grade_Report (Stud_number:varchar, Section_id:int, Grade:char)

Write the following queries in SQL. No duplicates should be printed in any of the answers.

- What are the referential integrity constraints that should hold on the schema.
- Retrieve the names of all senior students majoring in 'CS'
- Retrieve the names of all courses taught by particular professor in year 2017 and 2018
- For each section taught by particular professor, retrieve the course number, semester, year and number of students who took the section.
- Retrieve the names and major of all students who do not have a grade of A in any of their courses
- Insert a new student in the database
- Change the class of particular student.
- Insert a new course to the database
- Delete the record of the student whose name start with 'S'
- Delete the record of the students whose name contains 'a' and 'e'
- Delete the record of the students whose name ends with 'a'
- Count the total number of students with Grade and Major wise.
- Remove all the referential integrity constraints on the schema
- Delete all the rows from the tables
- Drop all the tables.

PART-B

1. Consider the following relations:

Student (snum: integer, sname: string, major: string, level: string, age:

integer) Class (name: string, meets at: string, room: string, d: integer)

Enrolled (snum: integer, cname: string)

Faculty (fid: integer, fname: string, deptid: integer) The meaning of these relations is

straightforward; for example, Enrolled has one record per student-class pair such

that the student is enrolled in the class. Level is a two character code with 4

different values (example: Junior: JR etc) Write the following queries in SQL.

No duplicates should be printed in any of the answers. Find the names of all

Juniors (level = JR) who are enrolled in a class taught by Prof. Harshith.

- i. Find the names of all classes that either meet in room R128 or have five or more Students enrolled.
- ii. Find the names of all students who are enrolled in two classes that meet at the same time.
- iii. Find the names of faculty members who teach in every room in which some class is taught.
- iv. Find the names of faculty members for whom the combined enrollment of the courses that they teach is less than five

2. The following relations keep track of airline flight information: Flights (no:

integer, from: string, to: string, distance: integer, Departs: time, arrives: time, price:

real) Aircraft (aid: integer, name: string, cruising range:

Certified (eid: integer, aid: integer)

Employees (eid: integer, ename: string, salary: integer)

Note that the Employees relation describes pilots and other kinds of employees as

well; Every pilot is certified for some aircraft, and only pilots are

certified to fly. Write each of the following queries in SQL.

- i. Find the names of aircraft such that all pilots certified to operate them have salaries more than Rs.80,000.
- ii. For each pilot who is certified for more than three aircraft, find the eid and the maximum cruising range of the aircraft for which she or he is certified.
- iii. Find the names of pilots whose salary is less than the price of the cheapest route from Bengaluru to Frankfurt.
- iv. For all aircraft with cruising range over 1000 Kms, find the

name of the aircraft and the average salary of all pilots certified for this aircraft.

- v. Find the names of pilots certified for some Boeing aircraft.
- vi. Find the aids of all aircraft that can be used on routes from Bengaluru to New Delhi.

3. Consider the following database of student enrollment in courses & books adopted for each course.

STUDENT (regno: string, name: string, major: string, bdate: date)
COURSE (course #: int, cname: string, dept: string)

ENROLL (regno: string, course #: int, sem: int, marks: int)
BOOK _ ADOPTION (course #: int, sem: int, book-ISBN: int)

TEXT (book-ISBN: int, book-title: string, publisher: string, author: string)

- i. Create the above tables by properly specifying the primary keys and the foreign keys.
- ii. Enter at least five tuples for each relation.
- iii. Demonstrate how you add a new text book to the database and make this book be adopted by some department.
- iv. Produce a list of text books (include Course #, Book-ISBN, Book-title) in the alphabetical order for courses offered by the 'CS' department that use more than two books.
- v. List any department that has all its adopted books published by a specific publisher.
- vi. Generate suitable reports.
- vii. Create suitable front end for querying and displaying the results

4. The following tables are maintained by a book dealer. AUTHOR (author-id: int, name: string, city: string, country: string)

PUBLISHER (publisher-id: int, name: string, city: string, country: string)

CATALOG (book-id: int, title: string, author-id: int, publisher-id: int, category-id: int, year: int, price: int)

CATEGORY (category-id: int, description: string)

ORDER-DETAILS (order-no: int, book-id: int, quantity: int)

- i. Create the above tables by properly specifying the primary keys and the foreign keys.
- ii. Enter at least five tuples for each relation.

iii. Give the details of the authors who have 2 or more books in the catalog and the price of the books is greater than the average price of the books in the catalog and the year of publication is after 2000.

iv. Find the author of the book which has maximum sales.

v. Demonstrate how you increase the price of books published by a specific publisher by 10%.

vi. Generate suitable reports.

vii. Create suitable front end for querying and displaying the results.

5. Consider the following database for a banking enterprise

BRANCH(branch-name:string, branch-city:string, assets:real)

ACCOUNT(accno:int, branch-name:string, balance:real)

DEPOSITOR(customer-name:string, accno:int)

CUSTOMER(customer-name:string, customer-street:string, customer-city:string)

LOAN(loan-number:int, branch-name:string,

amount:real)

BORROWER(customer-name:string, loan-number:int)

i. Create the above tables by properly specifying the primary keys and the foreign keys

ii. Enter at least five tuples for each relation

iii. Find all the customers who have at least two accounts at the Main branch.

iv. Find all the customers who have an account at all the branches located in a specific city.

v. Demonstrate how you delete all account tuples at every branch located in a specific city.

vi. Generate suitable reports.

vii. Create suitable front end for querying and displaying the results.

PRINCIPALS OF MACHINE LEARNING		
Subject Code	22AI53	CIE: 50
Number of Lecture Hours/Week	3:0:2:3	SEE: 50
Total Number of Lecture Hours	52	SEE Hours: 03
CREDITS- 4		
Prerequisite: Students should have basic knowledge of algebra, discrete math and statistics.		
Course Objectives: To enable the students to obtain the knowledge of Principles of Machine Learning in the following topics. <ul style="list-style-type: none"> • To introduce students to the basic concepts and techniques of machine learning. • To develop skills of using recent machine learning software for solving practical problems. • To gain experience of doing independent study and research. 		
Modules-I		Teaching Hours
Well posed learning problems, Designing a Learning system, Perspective and Issues in Machine Learning. Concept Learning: Concept learning task, Concept learning as search, Find Salgorithm, Version space, Candidate Elimination algorithm, Inductive Bias.		10 Hrs
Modules-II		
Decision Tree Learning: Decision tree representation, Appropriate problems for decision tree learning, Basic decision tree learning algorithm, hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning.		11 Hrs
Modules-III		
Artificial Neural Networks: Introduction, Neural Network representation, Appropriate problems, Perceptrons, Back propagation algorithm.		10 Hrs
Modules-IV		
Bayesian Learning: Introduction, Bayes theorem, Bayes theorem and concept learning, ML and LS error hypothesis, ML for predicting probabilities, MDL principle, Naive Bayes classifier, Bayesian belief networks, EM algorithm		11 Hrs
Modules-V		
Evaluating Hypothesis: Motivation, Estimating hypothesis accuracy, Basics of sampling theorem, General approach for deriving confidence intervals, Difference in error of two hypothesis, Comparing learning algorithms. Instance Based Learning: Introduction, k- nearest neighbor learning, locally weighted regression, radial basis function, cased-based reasoning. Reinforcement Learning: Introduction, Learning Task, Q Learning		10 Hrs
Question paper pattern: <ul style="list-style-type: none"> • The question paper will have ten questions. • Each full question consists of 20 marks. • There will be 2 full questions (with a maximum of four sub questions) from each module. • Each full question will have sub questions covering all the topics under a module. The students will have to answer 5 full questions, selecting one full question from each module. 		
Text Books: 1. Tom M. Mitchell, Machine Learning, India Edition 2013, Mc Graw Hill Education.		
Reference Books: 1. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, 2nd edition, Springer series in statistics. 2. Ethem Alpaydin, Introduction to machine learning, second edition, MIT press		

Course Code	CO #	Course Outcome (CO)
	CO1	Demonstrate the designing of a learning system and issues in machine learning
	CO2	Apply decision tree learning to solve machine learning problems
	CO3	Apply neural network technique to solve complex problems
	CO4	Analysis Bayesian learning technique predicting probabilities
	CO5	Analyze and evaluate the hypothesis accuracy using sampling and probability theory

Artificial Intelligence & Machine Learning Lab		
Subject Code	22AIL54	CIE: 50
Number of Lecture Hours/Week	0:0:3	SEE: 50
Total Number of Lecture Hours	28	SEE Hours: 03
CREDITS- 1		
List of Experiments/ Programs		
Experiments/ Programs		
<ol style="list-style-type: none"> 1. Implement breadth first search algorithm. 2. Implement depth first search algorithm. 3. Implement travel salesman problem. 4. Implement water jug problem. 5. Implement A*search algorithm. 6. Implement AO*Search algorithm. 7. 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. 8. For a given set of training data examples stored in a CSV file, implement and demonstrate the Candidate-Elimination algorithm. Output a description of the set of all hypotheses consistent with the training examples. 9. 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. 		
Course outcomes:		
On completion of the course, the student will have the ability to:		
Course Code	CO #	Course Outcome (CO)
	CO1	Understand artificial intelligence, its characteristics and its Application areas.
	CO2	Formulate real-world problems as state space problems, Optimization problems or constraint Satisfaction problems.
	CO3	Select and apply appropriate algorithms and AI techniques to solve complex problems
	CO4	Design and implement using various search algorithms.
	CO5	Design and develop an expert system by using appropriate tools and techniques.

Human Computer Interface		
Subject Code	22AI55A	CIE: 50
Number of Lecture Hours/Week	3:0:2:3	SEE: 50
Total Number of Lecture Hours	42	SEE Hours: 03
CREDITS- 3		
<p>Course Objectives: The objectives of the course is to enable students to:</p> <ul style="list-style-type: none"> • Be familiar with a variety of both conventional and non-traditional user interface paradigms, the latter including virtual and augmented reality • Understand the social implications of technology and their ethical responsibilities as engineers in the design of technological systems 		
Modules-I		Teaching Hours
Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design. The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.		08 Hrs
Modules-II		
Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions. Screen Designing: Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.		08 Hrs
Modules-III		
Windows – New and Navigation schemes selection of window, selection of devices based and screen- based controls. Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.		09 Hrs
Modules-IV		
HCI in the software process, The software life cycle Usability engineering Iterative design and prototyping Design Focus: Prototyping in practice Design rationale Design rules Principles to support usability Standards Golden rules and heuristics HCI patterns Evaluation techniques, Goals of evaluation, Evaluation through expert analysis, Evaluation through user participation, Choosing an evaluation method. Universal design, Universal design principles Multi-modal interaction		09 Hrs
Modules-V		
Cognitive models Goal and task hierarchies Design Focus: GOMS saves money Linguistic models The challenge of display-based systems Physical and device models Cognitive architectures Ubiquitous computing and augmented realities Ubiquitous computing applications research Design Focus: Ambient Wood – augmenting the physical Virtual and augmented reality Design Focus: Shared experience Design Focus: Applications of augmented reality Information and data visualization Design Focus: Getting the size right.		08 Hrs

Question paper pattern:

- The question paper will have ten questions.
- Each full question consists of 20 marks.
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module. The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. The essential guide to user interface design, Wilbert O Galitz, Wiley Dream Tech. Units 1, 2, 3
2. Human – Computer Interaction. Alan Dix, Janet Finckay, Greg Goryd, Abowd, Russell Bealg, Pearson Education Units 4,5

Reference Books:

1. Designing the user interface. 3rd Edition Ben Shneider mann, Pearson Education Asia.
2. Interaction Design Prece, Rogers, Sharps. Wiley Dream tech.
3. User Interface Design, Soren Lauesen , Pearson Education.
4. Human –Computer Interaction, D. R. Olsen, Cengage Learning.
5. Human –Computer Interaction, Smith - Atakan, Cengage Learning.

E books and online course materials:**Course outcomes:**

On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
	CO1	Ability to apply HCI and principles to interaction design.
	CO2	Ability to design certain tools for blind or PH people.
	CO3	Apply models from cognitive psychology to predicting user performance in various human-computer interaction tasks
	CO4	Appreciate the importance of a design and evaluation methodology that begins with and maintains a focus on the user
	CO5	Design from start to finish will provide you with invaluable team-work experience.

Human Centered AI		
Subject Code	22AI55B	CIE: 50
Number of Lecture Hours/Week	3:0:2:3	SEE: 50
Total Number of Lecture Hours	42	SEE Hours: 03
CREDITS- 3		
Course Objectives: At the end of this course, students should be able to: - identify and understand the problem statement, research questions, methods, findings, and contributions in a research paper - critically assess the contributions of a paper - design and implement interactive systems with AI components		
Modules-I		Teaching Hours

Introduction to Human-AI Interaction- An overview of human centered -AI interaction, Human Needs, Perceptions, and Experiences of Using AI, The needs, perceptions, and experiences of software developers	08 Hrs
Modules- II	
Human Needs, Perceptions, and Experiences of Using AI- The needs, perceptions, and experiences of data scientists, The needs, perceptions, and experiences of other domain experts	08 Hrs
Modules- III	
Heuristics, Biases, and Mental Models of AI Agents- Heuristics and biases in human decision making, How will users' mental models impact their interaction with AI agents? Historical Perspectives of Human-AI Interaction Design	09 Hrs
Modules- IV	
Concrete Human-AI Interaction Designs- Conveying model confidence and uncertainty, Supporting model customization, refinement, and correction, Providing explanation and help users understand model behavior	09 Hrs
Modules- V	
Augment AI to Cope with Limitations of Human Users- Deal with limited attention and overreliance on AI, Example-based explanations and counterfactual, Example-based explanations and counterfactuals..	08 Hrs

Question paper pattern:

- The question paper will have ten questions.
- Each full question consists of 20 marks.
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module. The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. 1st Edition Human-Centered AIA Multidisciplinary Perspective for Policy-Makers, Auditors, and Users

Reference Books-

1. Chapman & Hall/CRC Artificial Intelligence and Robotics Series

E books and online course materials:

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
	CO1	How to design interactive, human-in-the-loop approaches that achieve human-AI symbiosis

CO2	How to support interpretability, transparency, trust, and fairness in AI-based systems
CO3	How will humans and AI evolve together in the next decade
CO4	How can humans efficiently give feedback to AI and correctify its mistakes
CO5	Introduce research topics in human centered -AI interaction

User Interface Design		
Subject Code	22AI55C	CIE: 50
Number of Lecture Hours/Week	3:0:2:3	SEE: 50
Total Number of Lecture Hours	42	SEE Hours: 03
CREDITS- 3		
<p>Course Objectives:</p> <p>The objectives of the course is to enable students to:</p> <ul style="list-style-type: none"> Design the User Interface, design, menu creation ,windows creation and connection between menus and windows. 		
Modules-I		Teaching Hours
The User Interface: The User Interface-Introduction, Overview, The importance of user interface – Defining the user interface, The importance of Good design, Characteristics of graphical and web user interfaces, Principles of user interface design.		08 Hrs
Modules-II		
The User Interface Design process : The User Interface Design process- Obstacles, Usability, Human characteristics in Design, Human Interaction speeds, Business functions-Business definition and requirement analysis, Basic business functions, Design standards.		08 Hrs
Modules-III		
System menus and navigation schemes: System menus and navigation schemes- Structures of menus, Functions of menus, Contents of menus, Formatting of menus, Phrasing the menu, Selecting menu choices, Navigating menus, Kinds of graphical menus.		09 Hrs
Modules-IV		
Windows: Windows - Characteristics, Components of window, Window presentation styles, Types of window, Window management, Organizing window functions, Window operations, Web systems, Characteristics of device based controls.		09 Hrs

Modules- V	
Screen based controls : Screen based controls- Operable control, Text control, Selection control, Custom control, Presentation control, Windows Tests-prototypes, kinds of tests.	08 Hrs

Question paper pattern:

- The question paper will have ten questions.
- Each full question consists of 20 marks.
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module. The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. Wilbert O. Galitz, “The Essential Guide to User Interface Design”, John Wiley & Sons, Second Edition 2002.

Reference Books:

1. Ben Sheiderman, “Design the User Interface”, Pearson Education, 1998.
2. Alan Cooper, ”The Essential of User Interface Design”, Wiley- Dream Tech Ltd.,2002

E books and online course materials:

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
	CO1	Describe the User interface design
	CO2	Identify the key aspects of Management
	CO3	Implement the Menus, Forms, Dialog Boxes
	CO4	Propose the Interactive devices to various applications.
	CO5	Apply the Presentation Styles, Manual, Multiple windows and World Wide Web in the user interface design

MINI PROJECT		
Subject Code	22AIMP56	CIE: 50
Number of Lecture Hours/Week	02	SEE: 50
Total Number of Lecture Hours	28	SEE Hours: 03
CREDITS- 2		
<p>Course Objectives:</p> <ul style="list-style-type: none"> • To understand the current requirement of the industries. • To understand the different software development and testing methodologies. • To understand and apply architectural model, data flow and control flow diagrams. • To acquire good documentation, demonstration skills and impact of application on society. 		
<p>Project comprises of:</p> <ol style="list-style-type: none"> 1. Literature Survey 2. Requirement Analysis - S/w Requirement - H/w Requirements 3. Design Module presentation 4. Application 5. System Requirement Specification document SRS document contains synopsis, problem formulation and requirement analysis based on above factors. <p style="text-align: center;">Document should be submitted by the end of Semester</p>		
<p>Course outcomes:</p> <p>On completion of the course, the student will have the ability to:</p>		
Course Code	CO #	Course Outcome (CO)
	CO1	Demonstrate the skills of performing surveys on current industrial requirements.
	CO2	Analyze the requirements and apply appropriate software Development methodology.
	CO3	Implement and validate the architectural model, dataflow and control flow structures.
	CO4	Demonstrate the documentation and presentation skills.
	CO5	Implement the Societal and Ethical systems.

Research Methodology and IPR		
Subject Code	22RMI57	CIE: 50
Number of Lecture Hours/Week	3:0:0	SEE: 50
Total Number of Lecture Hours	42	SEE Hours: 03
CREDITS- 3		
Course Learning Objectives		
<ul style="list-style-type: none"> • To Understand the knowledge on basics of research and its types. • To Learn the concept of defining research problem and Literature Review, Technical Reading. • To learn the concept of attributions and citation and research design. • Concepts, classification, need for protection, International regime of IPRs - WIPO , TRIPS, Patent - • Meaning, Types, surrender, revocation, restoration, Infringement , Procedure for obtaining Patent and Patent Agents. Meaning, essential requirements, procedure for registration and Infringement of Industrial Designs, Copyright. 		
Modules-1		Teaching Hours
<p style="text-align: center;">Module I</p> <p>Introduction: Meaning of Research, Objectives of Engineering Research, and Motivation in Engineering Research, Types of Engineering Research, Finding and Solving a Worthwhile Problem. Ethics in Engineering Research, Ethics in Engineering Research Practice, Types of Research Misconduct, Ethical Issues Related to Authorship.</p>		8Hrs.
Modules- II		
<p>Defining the research problem - Selecting the problem. Necessity of defining the problem Techniques involved in defining the problem- Importance of literature review in defining a problem Literature Review and Technical Reading, New and Existing Knowledge, Analysis and Synthesis of Prior Art Bibliographic Databases, Web of Science, Google and Google Scholar, Effective Search: The Way Forward Introduction to Technical Reading Conceptualizing Research, Critical and Creative Reading, Taking Notes While Reading, Reading Mathematics and Algorithms, Reading a Datasheet.</p>		8 Hrs.
Modules- III		
<p>Research design and methods - Research design - Basic principles. Need of research design Features of good design- Important concepts relating to research design -Observation and Facts Attributions and Citations: Giving Credit Wherever Due, Citations: Functions and Attributes, Impact of Title and Keywords on Citations, Knowledge Flow through Citation, Citing Datasets, Styles for Citations, Acknowledgments and Attributions, What Should Be Acknowledged, Acknowledgments in, Books Dissertations, Dedication or Acknowledgments.</p>		9Hrs.
Modules- IV		

<p>Basic Concepts of Intellectual Property (IP), Classification of IP, Need for Protection of IP, International regime of IPRs - WIPO , TRIPS.</p> <p>Patents: Meaning of a Patent – Characteristics/ Features .Patentable and Non-Patentable Invention. Procedure for obtaining Patent. Surrender of Patent, revocation & restoration of Patents, Infringement of Patents and related remedies (penalties) . Different prescribed forms used in Patent Act. Patent agents qualifications and disqualifications Case studies on patents - Case study of Neem petent, Curcuma (Turmeric)patent and Basmati rice patent, Apple inc.v Samsung electronics co.Ltd</p>	8 Hrs.
<p style="text-align: center;">Modules-V</p> <p>Industrial Design: Introduction to Industrial Designs. Essential requirements of Registration. Designs which are not registrable, who is entitled to seek Registration, Procedure for Registration of Designs</p> <p>Copy Right Meaning of Copy Right. Characteristics of Copyright. Who is Author, various rights of owner of Copy right. Procedure for registration. Term of copyright, Infringement of Copyright and Its remedies. Software Copyright.</p>	9 Hrs.
<p>Question paper pattern:</p> <p>Assessment Details(both CIE and SEE)</p> <p>The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p> <p>Continuous Internal Evaluation:</p> <p>Three Unit Tests each of 20Marks(duration 01hour)</p> <ol style="list-style-type: none"> 1.First test at the end of 5th week of the semester 2.Second test at the end of the 10th week of the semester 3.Third test at the end of the15th week of the semester <p>Two assignments each of 10Marks</p> <ol style="list-style-type: none"> 4.First assignment at the end of 4th week of the semester 5. Second assignment at the end of 9th week of the semester Group discussion/ Seminar/quizanyoneofthreesuitablyplannedtoattaintheCOsandPOsfor20 Marks (duration 01hours) <p>6.At the end of the 13th week of the semester The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50marks (to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).</p> <p>CIE methods/question paper is designed to attain the different levels of Bloom’s taxonomy as per the Outcome defined for the course.</p> <p>Semester End Examination:</p> <p>Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)</p> <ol style="list-style-type: none"> 1. The question paper will be set for 100marks.Marks scored shall be proportionally reduced to50 marks 2. The question paper will have ten questions. Each question is set for 20marks. 3. There will be 2questions from each module .Each of the two questions is under a module (With a maximum of 2 sub-questions). 4. The students have to answer 5 full questions, selecting one full question from each module. <p>• Marks scored by the students will be proportionally scaled down to 50 marks</p>	
<p>Text Books:</p>	

1. Dipankar Deb•Rajeeb Dey, Valentina E. Balas “Engineering Research Methodology”, ISSN 1868- 4394 ISSN 1868-4408 (electronic), Intelligent Systems Reference Library, ISBN 978-981-13- 2946-3 ISBN 978-981-13-2947-0 (eBook), <https://doi.org/10.1007/978-981-13-2947-0.3>
2. Dr. M.K. Bhandari “Law relating to Intellectual property” January 2017 (Publisher By Central Law Publications).
3. Dr. R Radha Krishna and Dr. S Balasubramanain “Text book of Intellectual Property Right”. First edition, New Delhi 20018. Excel books.
4. P Narayan “Text book of Intellectual Property Right”. 2017 ,Publisher: Eastern Law House

Reference:

1. David V. Thiel “Research Methods for Engineers” Cambridge University Press, 978-1-107-03488- 4-
2. Nishith Desai Associates - Intellectual property law in India – Legal, Regulatory & Tax NPTEL:
3. Research Methodology: Methods and Techniques C.R. Kothari, Gaurav Garg New Age International 4th Edition, 2018

INTELLECTUAL PROPERTY by PROF. FERUZ ALI , Department of Humanities and Social Sciences
IIT
Madras
https://nptel.ac.in/content/syllabus_pdf/109106137.pdf
www.wipo.int
www.ipindia.nic.in

E books and online course materials:

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
	CO1	To know the meaning of engineering research.
	CO2	To know the defining of research problem and procedure of Literature Review.
	CO3	To know the Attributions and Citations and research design.
	CO4	Highlights the basic Concepts and types of IPRs and Patents.
	CO5	Analyse and verify the procedure for Registration of Industrial Designs & Copyrights.

Environmental Studies		
Subject Code	22ES58	CIE: 50
Number of Lecture Hours/Week	3:0:2:3	SEE: 50
Total Number of Lecture Hours	42	SEE Hours: 03
CREDITS- 3:0:2:3		
Course Objectives:		
The objectives of the course is to enable students to:		
Modules-I		Teaching Hours
Introduction: Environment - Components of Environment Ecosystem: Types & Structure of Ecosystem, Balanced ecosystem Human Activities - Food, Shelter, And Economic & Social Security. 2 Hours Impacts of Agriculture & Housing Impacts of Industry, Mining & Transportation Environmental Impact Assessment, Sustainable Development. 3 Hours		9 Hrs
Modules-II		
Natural Resources, Water resources - Availability & Quality aspects, Water borne diseases & water induced diseases, Fluoride problem in drinking water Mineral resources, Forest Wealth Material Cycles -Carbon Cycle ,Nitrogen Cycle & Sculpture Cycle. 2 Hours Energy - Different types of energy, Conventional sources &Non Conventional sourcesofenergySolarenergy,Hydroelectricenergy,WindEnergy,Nuclearenergy, Biomass & Biogas Fossil Fuels, Hydrogen as an alternative energy. 3 Hours		8 Hrs
Modules-III		
Environmental Pollution -Water Pollution, Noise pollution, Land Pollution, Public Health Aspects. 2 Hours Global Environmental Issues: Population Growth, Urbanization, Land Management, Water & Waste Water Management 3 Hours		9 Hrs
Modules-IV		
AirPollution & Automobile Pollution: Definition, Effects -Global Warming, Acid rain & Ozone layer depletion, controlling measures.3Hours Solid Waste Management, E -Waste Management & Biomedical Waste Management- Sources, Characteristics & Disposal methods. 2 Hours		8 Hrs
Modules-V		
Introduction to GIS & Remote sensing, Applications of GIS & Remote Sensing in Environmental Engineering Practices. 2 Hours Environmental Acts & Regulations, Role of government, Legal aspects, Role of Nongovernmental Organizations (NGOs), Environmental Education & Women Education. 3 Hours		8 Hrs
Question paper pattern:		
<ul style="list-style-type: none"> • The question paper will have ten questions. • Each full question consists of 20 marks. • There will be 2 full questions (with a maximum of four sub questions) from each module. • Each full question will have sub questions covering all the topics under a module. The 		

Students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. Benny Joseph (2005), "Environmental Studies", Tata Mc Graw–Hill Publishing Company Limited.
2. R.J.RanjitDanielsandJagadishKrishnaswamy,(2009), "EnvironmentalStudies", WileyIndiaPrivate Ltd., New Delhi.
3. R Raja gopalan, "Environmental Studies – From Crisis to Cure", Oxford University Press, 2005,
4. Aloka Debi, "Environmental Science and Engineering", Universities Press (India) Pvt. Ltd. 2012.

Reference Books:

1. Raman Sivakumar, "Principals of Environmental Science and Engineering" ,Second Edition, Cengage learning Singapore, 2005
2. 2. P. Meenakshi, "Elements of Environmental Science and Engineering", Prentice Hall of India Private Limited, New Delhi, 2006
3. 3. S.M. Prakash, "Environmental Studies", Elite Publishers Mangalore, 2007
4. Erach Bharucha, "Text Book of Environmental Studies", for UGC, University press,2005
5. G. Tyler Miller Jr. , "Environmental Science – working with the Earth", Tenth Edition, Thomson Brooks/Cole,2004. G.TylerMillerJr., "EnvironmentalScience –working with the Earth", Eleventh Edition, Thomson Brooks /Cole, 2006 7.Dr.Pratiba Sing, Dr. Anoop Singh and Dr. Piyush Malaviya, "Text Book of Environmental and Ecology", Acme Learning Pvt. Ltd. New Delhi.

E books and online course materials:

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
	CO1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale,
	CO2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment,
	CO3	Demonstrate ecology knowledge of a complex relationship between biotic and a biotic component
	CO4	Apply their ecological knowledge to illustrate and graph a problem and describe there a lities that managers face when dealing with complex issues.

NATIONAL SERVICE SCHEME

Course Code	22NS59	CIE:50
Semester:3	Credits NCMC – Non Credit Mandatory Course (Completion of the course shall be mandatory for the award of degree)	
SEE: Activities Report Evaluation by College NSS Officer at the end of every semester (3rd to 6th semester)		

Course objectives:

National Service Scheme (NSS) will enable the students to:

1. Understand the community in general in which they work.
2. Identify the needs and problems of the community and involve them in problem –solving.
3. Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
4. Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes.
5. Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in general.

General Instructions - Pedagogy :

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Developing Sustainable Water management system for rural areas and implementation approaches
2. Contribution to any national level initiative of Government of India. Foreg. Digital India, Skill India, Swachh Bharat, Atmanirbhar Bharath, Make in India, Mudra scheme, Skill development programs etc.
3. Spreading public awareness under rural outreach programs.(minimum5 programs).
4. Social connect and responsibilities

Topics or activities to be covered

- 1 Organic farming, Indian Agriculture (Past, Present and Future) Connectivity for marketing.
2. Waste management– Public, Private and Govt organization, 5 R's.
- 3.Setting of the information imparting club for women leading to contribution in social and economic issues

Suggested Learning material:

- Books :
1. NSS Course Manual, Published by NSS Cell, VTU Belagavi.
 2. Government of Karnataka, NSS cell, activities reports and its manual.
 3. Government of India, nss cell, Activities reports and its manual.

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
	CO1	Understand the importance of his / her responsibilities towards society.
	CO2	Analyze the environmental and societal problems/issues and will be able to design solutions for the same
	CO3	Evaluate the existing system and to propose practical solutions for the same for sustainable development.
	CO4	Implement government or self-driven projects effectively in the field.
	CO5	Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in general.

PHYSICAL EDUCATION AND SPORTS

Course Code:22PE59	CIE Marks 50	Credits 0
SEE Marks 00	Course Type Practical Lecture	Hours/Week (L-T-P) 0-0-3
Total Marks 50	Total Hours 24	Hours SEE Hours --

Guideline for Athletic and Sports

Semester	Course Title	Content	No. of Hours
V th sem	Module I : Orientation	A. Fitness B. Food & Nutrition	4 Hours
	Module II: General Fitness & Components of Fitness	A. Agility – Shuttle Run B. Flexibility – Sit and Reach C. Cardiovascular Endurance – Harvard step Test	4 Hours
	Module III :	Specific games (Any one to be selected by the student) 1. Badminton (Fore hand low/high service, back hand service, smash, drop) 2. Basketball (Dribbling, passing, shooting etc.) 3. Athletics (Field events – Throws)	16 Hours

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YOGA AND MEDITATION

Course Code-22YO59	Credits: 0	
CIE:50	SEE: 00	SEE:--
Hours/Week: (L:T:P S):0-0-3(Practical)	Total Marks:50	Total hours:28 hours

Prerequisite: NIL

Course objectives: The Course will Enable students to

- To enable the student to have good health.
- To practice mental hygiene
- To possess emotional stability.
- To integrate moral values.
- To attain higher level of consciousness.

Semester V	Patanjali'sAshtanga Yoga its need and importance. Ashtanga Yoga 1. Asana 2. Pranayama 3. Pratyahara Asana its meaning by name, technique, precautionary measures and benefits of each asana Different types of Asanas a. Sitting 1. Ardha Ushtrasana 2. Vakrasana 3. Yogamudra in Padmasana b. Standing 1. UrdhvaHastothanasana
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	<ol style="list-style-type: none">2. Hastapadasana3. Parivritta Trikonasana4. Utkatasana <p>c. Prone line</p> <ol style="list-style-type: none">1. Padangushtha Dhanurasana2. Poorna Bhujangasana / Rajakapotasana <p>d. Supine line</p> <ol style="list-style-type: none">1. Sarvangasana2. Chakrasana3. Navasana/Noukasana4. Pavanamuktasana <p>Revision of practice 60 strokes/min 3 rounds Meaning by name, technique, precautionary measures and benefits of each Pranayama</p> <ol style="list-style-type: none">1. Ujjayi2. Sheetali3. Shektari

SIXTH SEMESTER

ENTREPRENEURSHIP, MANAGEMENT AND FINANCE		
Subject Code	22HU61	Credits:03
CIE:50	SEE:50	SEE:03 hrs
Hours/Week:03hrs(Theory)		Total Hours: 42 hrs
Prerequisite: None		
<p>Course Objectives: To enable the students to obtain the knowledge of Entrepreneurship, management and finance in the following topics.</p> <ul style="list-style-type: none"> • The Meaning, Functions, Characteristics, Types, Role and Barriers of Entrepreneurship, .Government Support for Entrepreneurship • Management–Meaning, nature, characteristics, scope, functions, role etc and • Engineers social responsibility and ethics • Preparation of Project and Source of Finance • Fundamentals of Financial Accounting • Personnel and Material Management, Inventory Control 		
Modules		Teaching Hours
Module-I		8Hours
<p>ENTREPRENEUR: Meaning of Entrepreneur; Functions of an Entrepreneur; Characteristics of an entrepreneur ,Types of Entrepreneur ;Intrapreneurs–an emerging class; Role of Entrepreneurs in economic development; Barriers to entrepreneurship, Government Support for Innovation and Entrepreneurship in India -Startup-India, Make-in-India, PMMY,AIM, STEP, BIRAC, Stand-up India, TREAD</p>		
Module-II		8Hours
<p>MANAGEMENT: Introduction–Meaning–nature and characteristics of Management, Scope and functional areas of management, Roles of Management, Levels of Management, HenryFayol-14PrinciplestoManagement,EngineersSocialresponsibilityandEthics</p>		

Module-III	
<p>PREPARATION OF PROJECT AND SOURCE OF FINANCE: PREPARATION OF PROJECT: Meaning of project; Project Identification; Project Selection; Project Report; Need and Significance of Report; Contents; SOURCE OF FINANCE: Long Term Sources (Equity, Preference, Debt Capital, Debentures, loan from Financial Institutions etc) and Short Term Source (Loan from commercial banks, Trade Credit, Customer Advances etc)</p>	8Hours
Module-IV	
<p>FUNDAMENTALS OF FINANCIAL ACCOUNTING: Definition, Scope and Functions of Accounting, Accounting Concepts and Conventions: Golden rules of Accounting, Final Accounts - Trading and Profit and Loss Account, Balance sheet</p>	9Hours

Module-V	
<p>PERSONNEL MANAGEMENT, MATERIAL MANAGEMENT AND INVENTORY CONTROL: PERSONNEL MANAGEMENT : Functions of Personnel Management, Recruitment, Selection and Training, Wages, Salary and Incentives MATERIAL MANAGEMENT AND INVENTORY CONTROL: Meaning, Scope and Object of Material Management. Inventory Control - Meaning and Functions of Inventory control ; Economic Order Quantity (EOQ) and various stock level (Reorder level, Minimum level, Maximum level, Average level and Danger level)</p>	9Hours

Question paper pattern:
1. The question paper will have TEN questions.
2. There will be TWO questions in each module, covering all the topics.
3. The student needs to answer FIVE full questions, selecting ONE full question from each module.

Reference Books:
1. Industrial Organization & Engineering Economics - T R Banga & S C Sharma - Khanna Publishers, Dehli.

Course outcomes: On completion of the course, the student will have the ability to:

Course Code	CO#	Course Outcome (CO)
	CO1	Develop Entrepreneurship skills
	CO2	Apply the concepts of management and Engineers Social responsibility & Ethics practice
	CO3	Prepare project report & choose different Source of Finance.
	CO4	Apply Fundamentals of Financial Accounting and interpret the final accounts
	CO5	Understand the Personnel management and inventory Control

DEEP LEARNING		
Subject Code	21AI62	Credits:4
CIE:50	SEE:50	SEE:03hrs
Hours/Week:3hrs(Theory)		Total Hours:52Hrs
Prerequisite: Machine Learning		
<p>Course Objectives: To enable the students to obtain the knowledge of DEEP LEARNING in the following topics.</p> <ul style="list-style-type: none"> • Understand complexity of Deep Learning algorithms and their limitations. • Be capable of performing experiments in Deep Learning using real-world data 		
Modules		Teaching Hours
Module I		
<p>Introduction to Deep Learning: Introduction to deep learning, Biological & artificial neurons ANN & its layer, Exploring activation functions, Forward propagation in ANN, How does ANN learn, Debugging gradient descent with gradient checking. Getting to Know Tensor Flow: Introduction to Tensor Flow, Understanding computational graphs and sessions, Variables, constants and placeholders, Introducing Tensor Board , Handwritten digit classification using Tensor Flow , Introducing eager execution, Math operations in Tensor Flow, TensorFlow 2.0 and Keras, Keras on Tensor Flow</p>		11 Hours
Module II		
<p>Introduction to RNN: Generating Song Lyrics Using RNN, Introducing RNNs Generating song lyrics using RNNs, Different types of RNN architectures.</p> <p>Improvements to the RNN: Improvements to the RNN, LSTM to the rescue, Gated recurrent units, Bi directional RNN, Going deep with deep RNN Language translation using the seq2seq model.</p>		10 Hours
Module III		
<p>Demystifying Convolutional Networks: Demystifying Convolutional Networks, Introduction to CNNs , The architecture of CNNs ,The math behind CNNs , Implementing a CNN in Tensor Flow, CNN architectures, Capsule networks, Building Capsule networks in Tensor Flow. Case study</p>		10 Hours

Module IV		
<p>Learning Text Representations: Learning Text Representations ,Understanding the word2vec model ,Building the word2vec model using gensim, Visualizing word embeddingsinTensorBoard,Doc2vecUnderstanding,skip-thoughtsalgorithm ,Quick thoughts for sentence embeddings.</p>		10 Hours
Module V		
<p>Generating Images Using GANs: Generating Images Using GANs, Differences between discriminative and generative models. DCGAN –Adding convolution to a GAN,Deconvolution generator, convolutional discriminator.</p> <p>Learning More about GANs: Conditional GAN, Loss Function of CGAN, Generating specific digits using CGAN, Understanding InfoGAN, Exploring Mutual Information, Architecture of Info GAN, Translating images using Cycle GAN, Role Of generators, Role of discriminators, Loss Function, Cycle Consistency Loss, Stack GAN, Architecture of Stack GANs. Introduction to auto encoder.</p>		11 Hours
<p>Question paper pattern:</p> <ol style="list-style-type: none"> 1. The question paper will have TEN questions. 2. There will be TWO questions in each module, covering all the topics. 3. The student need to answer FIVE full questions, selecting ONE full question from each module. 		
<p>Textbooks:</p> <p>Cosma Rohilla Shalizi, Advanced Data Analysis from an Elementary Point of View,2020.</p>		
<p>Course outcomes: On completion of the course ,the student twill have the ability to:</p>		
Course Code	CO#	Course Outcome(CO)
	CO1	Understand the concepts o f Deep Learning, Tensor Flow, its main functions, operations and the execution pipeline
	CO2	Understand Recurrent Neural Networks(RNN),Implement different architectures of RNN in Tensor flow
	CO3	Learn convolutional neural networks, Implement different architectures of CNN in Tensor flow
	CO4	Demonstrate Text Representations and Build the world have model using genesis and interpret the results.
	CO5	Build different architectures of GANS in Tensor flow

ROBOTIC PROCESS AUTOMATION		
Subject Code	22AI63A	CIE: 50
Number of Lecture Hours/Week	3:0:0:0	SEE: 50
Total Number of Lecture Hours	42	SEE Hours: 03
CREDITS- 3		
Course Objectives: Basic Programming Concepts		
Modules-I		Teaching Hours
<p>INTRODUCTION TO ROBOTIC PROCESS AUTOMATION: Scope and techniques of automation, Robotic process automation - What can RPA do?, Benefits of RPA, Components of RPA, RPA platforms, The future of automation.</p> <p>RPA BASICS: History of Automation - What is RPA - RPA vs Automation - Processes & Flowcharts - Programming Constructs in RPA - What Processes can be Automated - Types of Bots - Workloads which can be automated - RPA Advanced Concepts - Standardization of processes - RPA Development methodologies - Difference from SDLC - Robotic control flow architecture.</p>		8 Hrs
Modules-II		
<p>RPA TOOL INTRODUCTION AND BASICS: Introduction to RPA Tool - The User Interface - Variables - Managing Variables - Naming Best Practices - The Variables Panel - Generic Value Variables - Text Variables - True or False Variables - Number Variables - Array Variables - Date and Time Variables - Data Table Variables - Managing Arguments - Naming Best Practices - The Arguments Panel - Using Arguments - About Imported Namespaces - Importing New Namespaces- Control Flow - Control Flow Introduction - If Else Statements - Loops - Advanced Control Flow - Sequences - Flowcharts .</p>		8 Hrs
Modules-III		
<p>ADVANCED AUTOMATION CONCEPTS & TECHNIQUES: Recording Introduction - Basic and Desktop Recording - Web Recording - Input/ Output Methods - Screen Scraping - Data Scraping - Scraping advanced techniques - Selectors - Defining and Assessing Selectors - Customization - Debugging - Dynamic Selectors - Partial Selectors - RPA Challenge - Image, Text & Advanced Citrix Automation - Introduction to Image & Text Automation - Image based automation - Keyboard based automation - Information Retrieval - Advanced Citrix Automation challenges - Best Practices - Using tab for Images</p>		9 Hrs
Modules-IV		
<p>HANDLING USER EVENTS & ASSISTANT BOTS, EXCEPTION HANDLING: What are assistant bots? - Monitoring system event triggers - Hotkey trigger - Mouse trigger - System trigger - Monitoring image and element triggers - An example of monitoring email - Example of monitoring a copying event and blocking it - Launching an assistant bot on a keyboard event.</p> <p>EXCEPTION HANDLING: Debugging and Exception Handling - Debugging Tools - Strategies for solving issues - Catching errors.</p>		8 Hrs
Modules-V		
<p>DEPLOYING AND MAINTAINING THE BOT: Publishing using publish utility - Creation of Server - Using Server to control the bots - Creating a provision Robot from the Server - Connecting a Robot to Server - Deploy the Robot to Server - Publishing and managing updates - Managing packages - Uploading packages - Deleting packages</p>		9 Hrs

Question paper pattern:

- The question paper will have ten questions.
- Each full question consists of 20 marks.
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module. The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. Alok Mani Tripathi, “Learning Robotic Process Automation”, Packt Publishing, 2018.

REFERENCES:

1. Frank Casale , Rebecca Dilla, Heidi Jaynes , Lauren Livingston, “Introduction to Robotic Process Automation: a Primer”, Institute of Robotic Process Automation,1st Edition 2015.
2. Richard Murdoch, Robotic Process Automation: Guide To Building Software Robots, Automate Repetitive Tasks & Become An RPA Consultant”, Independently Published, 1st Edition 2018.
3. Srikanth Merianda,”Robotic Process Automation Tools, Process Automation and their benefits: Understanding RPA and Intelligent Automation”, Consulting Opportunity Holdings LLC, 1st Edition 2018.
4. Lim Mei Ying, “Robotic Process Automation with Blue Prism Quick Start Guide: Create software robots and automate business processes”, Packt Publishing, 1st Edition 2018.

WEB REFERENCES:

1. <https://www.uipath.com/rpa/robotic-process-automation>
2. <https://www.academy.uipath.com>

Course outcomes: On completion of the course ,the student twill have the ability to:

Course Code	CO#	Course Outcome(CO)
	CO1	Describe RPA, where it can be applied and how it's implemented.
	CO2	Describe the different types of variables, Control Flow and data manipulation techniques.
	CO3	Identify and understand Image, Text and Data Tables Automation
	CO4	Describe how to handle the User Events and various types of Exceptions and strategies.
	CO5	Understand the Deployment of the Robot and to maintain the connection.

COMPUTER GRAPHICS AND VISION			
Course Code	22AI63B	CIE Marks	50
Number of Contact Hours/Week	3:2:0	SEE Marks	50
Total Number of Contact Hours	40	Exam Hours	03
CREDITS –3			
Course Learning Objectives: This course will enable students to:			
<ul style="list-style-type: none"> • Explain hardware, software and OpenGL Graphics Primitives. • Illustrate interactive computer graphic using the OpenGL. 			
Module I			Teaching Hours
Overview: Computer Graphics and OpenGL: Computer Graphics: Basics of computer graphics, Application of Computer Graphics, Video Display Devices: Random Scan and Raster Scan displays, graphics software. OpenGL: Introduction to OpenGL ,coordinate reference frames, specifying two-dimensional world coordinate reference frames in OpenGL, OpenGL point functions,			8
Module II			
Fill area Primitives, 2D Geometric Transformations and 2D viewing: Fill area Primitives: Polygon fill-areas, OpenGL polygon fill area functions, fill area attributes, general scan line polygon fill algorithm, OpenGL fill-area attribute functions. 2D Geometric Transformations: Basic 2D Geometric Transformations, matrix representations and homogeneous coordinates..			8
Module III			
Clipping, 3D Geometric Transformations, Color and Illumination Models: Clipping: clipping window, normalization and viewport transformations, clipping algorithms, 2D point clipping, 2D line clipping algorithms: cohen- sutherland line clipping only -polygon fill area clipping: Sutherland-Hodgeman polygon clipping algorithm only. 3D Geometric Transformations: 3D translation, rotation, scaling, composite 3D transformations, other 3D transformations, affine transformations, OpenGL geometric transformations functions.			8
Module IV			
3D Viewing and Visible Surface Detection: 3D Viewing: 3D viewing concepts, 3D viewing Pipe line, 3D viewing coordinate parameters, Transformation from world to viewing coordinates, Projection transformation, orthogonal projections, perspective projections, The viewport transformation and 3D screen coordinates. OpenGL 3D viewing functions.			8
Module V			
Input & interaction, Curves and Computer Animation: Input and Interaction: Input devices, clients and servers, Display Lists, Display Lists and Modeling, Programming Event Driven Input, Menus Picking, Building Interactive Models, Animating Interactive programs, Design of Interactive programs, Logic operations ..			8

Question Paper Pattern:
<ul style="list-style-type: none"> • The question paper will have ten questions. • Each full Question consisting of 20 marks • There will be 2 full questions from each module. • Each full question will have sub questions covering all the topics under a module. • The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. Donald Hearn & Pauline Baker: Computer Graphics with OpenGL Version, 3rd / 4th Edition, Pearson Education, 2019
2. Edward Angel: Interactive Computer Graphics- A Top Down approach with OpenGL, 5th edition. Pearson Education, 20018

Reference Books:

1. James D Foley, Andries Van Dam, Steven K Feiner, John F Huges Computer graphics with OpenGL: pearson education
2. Xiang, Plastock : Computer Graphics , sham's outline series, 2nd edition, TMG.

Course outcomes: On completion of the course, the student will have the ability to:

Course Code	CO#	Course Outcome(CO)
	CO1	Design and implement algorithms for 2D graphics primitives and attributes.
	CO2	Illustrate Geometric transformations on both 2D and 3D objects.
	CO3	Apply concepts of clipping and visible surface detection in 2D and 3D viewing, and IlluminationModels
	CO4	Decide suitable hardware and software for developing graphics packages using OpenGL
	CO5	Infer the representation of curves, surfaces, Color and Illumination models

Embedded systems		
Subject Code	22AI63C	CIE: 50
Number of Lecture Hours/Week	3:0:2:3	SEE: 50
Total Number of Lecture Hours	42	SEE Hours: 03
CREDITS- 3		
<p>Course Objectives: The students will be able to understand the</p> <ul style="list-style-type: none"> • Introductory topics of Embedded System design • Characteristics & attributes of Embedded System • Introduction of Embedded System Software and Hardware development • RTOS based Embedded system design 		
Module-I		Teaching Hours
<p>Introduction: Embedded Systems and general purpose computer systems, history, classifications, applications and purpose of embedded systems. Core of Embedded Systems : Microprocessors and microcontrollers, RISC and CISC controllers, Big endian and Little endian processors, Application specific ICs, Programmable logic devices, COTS, sensors and actuators, communication interface, embedded firmware, other system components, PCB and passive components</p>		09 Hrs
Modules- II		
<p>Characteristics and quality attributes of embedded systems: Characteristics, Operational and nonoperational quality attributes, application specific embedded system - washing machine, domain specific – automotive</p>		08 Hrs
Modules- III		
<p>Hardware Software Co design and Program Modelling : Fundamental issues in Hardware Software Co-design, Computational models in Embedded System Design. Embedded Hardware Design and Development: Analog Electronic Components, Digital Electronic Components, VLSI & Integrated Circuit Design, Electronic Design Automation Tools</p>		08 Hrs
Modules- IV		
<p>Embedded Firmware Design and Development: Embedded Firmware Design Approaches, Embedded Firmware Development Languages. Embedded System Development Environments: Types of files generated on cross compilation (only explanation – programming codes need not be dealt), disassemble/decompiler, Simulators, Emulators and Debugging</p>		09 Hrs
Modules- V		
<p>Real-time Operating System(RTOS) based Embedded System Design: Operating System basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.</p>		08 Hrs

Question paper pattern:

- The question paper will have ten questions.
- Each full question consists of 20 marks.
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module. The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. Shibu K V, "Introduction to Embedded Systems", Second Edition, McGraw Hill Education.

Reference Books:

1. James K. Peckol, "Embedded systems- A contemporary design tool", John Wiley, 2008, ISBN: 978-0-471-72180-2.
2. Yifeng Zhu, "Embedded Systems with Arm Cortex-M Microcontrollers in Assembly Language and C", 2nd Ed. Man Press LLC 2015 ISBN: 0982692633 9780982692639.
3. K.V. K.KPrasad, Embedded Real Time Systems, Dreamtech publications, 2003.
4. Rajkamal, Embedded Systems, 211d Edition, McGraw hill Publications, 2010.

E books and online course materials:**Course outcomes:**

On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
	CO1	Explain characteristics of Embedded System design
	CO2	Acquire knowledge about basic concepts of circuit emulators, debugging and RTOS
	CO3	Analyze embedded system software and hardware requirements
	CO4	Develop programming skills in embedded systems for various applications
	CO5	Design basic embedded system for real time applications

FULL STACK WEB DEVELOPMENT		
Subject Code	22AIOE641	Credits:03
CIE:50	SEE:50	SEE:03 hrs
Hours/Week:03hrs(Theory)		TotalHours:42 hrs
<p>Course objectives:</p> <ul style="list-style-type: none"> • Explain the use of learning full stack web development. • .Make use of rapid application development in the design of responsive web pages. • Illustrate Models, Views and Templates with their connectivity in Django for full stack web Development. • .Demonstrate the use of state management and admin interfaces automation in Django. • .Design and implement Django apps containing dynamic pages with SQL databases. 		
Modules		Teaching Hours
Module-I		8Hours
<p>MVC based Web Designing Web framework, MVC Design Pattern, Django Evolution, Views, Mapping URL to Views, Working of Django URL Confs and Loose Coupling, Errors in Django, Wild Card patterns in URLs.</p>		
Module-II		8Hours
<p>Django Templates and Models Template System Basics, Using Django Template System, Basic Template Tags and Filters, MVT Development Pattern, Template Loading, Template Inheritance, MVT Development Pattern. Configuring Databases, Defining and Implementing Models, Basic Data Access, Adding Model String Representations, Inserting/Updating data, Selecting and deleting objects, Schema Evolution</p>		

<p style="text-align: center;">Module-III</p> <p>Django Admin Interfaces and Model Forms Activating Admin Interfaces, Using Admin Interfaces, Customizing Admin Interfaces, Reasons to use Admin Interfaces. Form Processing, Creating Feedback forms, Form submissions, custom validation, creating Model Forms, URLConf Ticks, Including Other URLConfs.</p>	<p>9Hours</p>
<p style="text-align: center;">Module-IV</p> <p>Generic Views and Django State Persistence Using Generic Views, Generic Views of Objects, Extending Generic Views of objects, Extending Generic Views. MIME Types, Generating Non-HTML contents like CSV and PDF, Syndication Feed Framework, Sitemap Frame work, Cookies, Sessions, Users and Authentication.</p>	<p>09Hours</p>
<p style="text-align: center;">Module-V</p> <p>jQuery and AJAX Integration in Django Ajax Solution, Java Script, XMLHttpRequest and Response, HTML, CSS, JSON, iFrames, Settings of Java Script in Django, jQuery and Basic AJAX, jQuery AJAX Facilities, Using jQuery UI Autocomplete in Django</p>	<p>8Hours</p>
<p>Text Books:</p> <ol style="list-style-type: none"> 1. Adrian Holovaty, Jacob Kaplan Moss, The Definitive Guide to Django: Web Development Done Right, Second Edition, Springer-Verlag Berlin and Heidelberg GmbH & Co. KG Publishers, 2009 2. Jonathan Hayward, Django Java Script Integration: AJAX and jQuery, First Edition, Pack Publishing, 2017 <p>Reference Books:</p> <ol style="list-style-type: none"> 1. Aidas Bendroraitis, Jake Kronika, Django 3 Web Development Cookbook, Fourth Edition, Packt Publishing, 2020 2. William Vincent, Django for Beginners: Build websites with Python and Django, First Edition, Amazon Digital Services, 2018 3. Antonio Mele, Django3 by Example, 3rd Edition, Pack Publishers, 2020 4. Arun Ravindran, Django Design Patterns and Best Practices, 2nd Edition, Pack Publishers, 2020. 5. Julia Elman, Mark Lavin, Light weight Django, David A. Bell, 1st Edition, Oreily Publications, 2019 	

Question Paper Pattern:

- The question paper will have ten questions.
- There will be 2 questions from each module.
- Each question will have questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Course outcomes:**On completion of the course, the student will have the ability to:**

Course Code	CO#	Course Outcome(CO)
	CO1	Understand the working of MVT based full stack web development with Django.
	CO2	Designing of Models and Forms for rapid development of web pages.
	CO3	Analyze the role of Template Inheritance and Generic views for developing full stack web
	CO4	Apply the Django framework libraries to render nonHTML contents like CSV and PDF.
	CO5	Perform jQuery based AJAX integration to Django Apps to build responsive full stack web applications,

MAJOR PROJECT PHASE - I		
Subject Code	22AI65	Credits:02
CIE:50	SEE:50	SEE: 03hours
<p>Prerequisite: The students should have Thorough knowledge of Software Engineering and Mastering any one programming language.</p>		
<p>Course Objectives:</p> <ul style="list-style-type: none"> • To understand the current requirement of the Industries. • To understand the different software development and testing methodologies. • To understand and apply architectural model, data flow and control flow diagrams. • To acquire good documentation, demonstration skills and impact of application on society 		
<p>Project Phase – I comprises of:</p>		
<ol style="list-style-type: none"> 1. Literature Survey 2. Requirement Analysis <ul style="list-style-type: none"> - S/w Requirements - H/w Requirements - 3. Design Module presentation 4. Application 5. System Requirement Specification document SRS document contains synopsis, problem formulation and requirement analysis based on above factors. Document should be submitted by the end of VII Sem. Project Phase-I would be evaluated for 2 credits by means of presentation. 		
<p>Course outcomes: On completion of the course, the student will have the ability to:</p>		
Course Code	CO #	Course Outcome (CO)
	CO1	Demonstrate the skills of performing surveys on current industrial requirements.
	CO2	Analyze the requirements and apply appropriate software development methodology.
	CO3	Implement and Validate the architectural model, data flow and control flow structures.
	CO4	Demonstrate the documentation and presentation skills
	CO5	Implement the Societal and Ethical systems.

Deep-Learning LAB		
Subject Code	22AIL66	Credits:01
CIE:50	SEE:50	SEE: 03hours
Hours/Week:2hours(Practical)		Total Hours:14hours
Prerequisite: The students should have the thorough knowledge of python		
Course Objectives:		
To enable the students to obtain the knowledge of Deep learning Lab in the following topics.		
<ul style="list-style-type: none"> • Understand the fundamental principles of deep learning. • To Understand How To Build The Neural Network. • To enable students to develop successful machine learning concepts. 		
<ol style="list-style-type: none"> 1. Perceptron Learning Implementation. 2. Multilayer Perceptron and its Hyper parametering 3. Hyper parameter Tuning 4. Implementation of Multilayer Neural Network using Keras and Data Augmentation on MNIST dataset. 5. CNN Implementation on MNIST Dataset. 6. Transfer Learning of pertained models on MNIST dataset 7. Transfer Learning on Plant Village dataset for Plant Disease Detection 8. Sentiment Analysis using Recurrent Neural Networks(RNN) 9. Text Generation using LSTM 10. Denoising and Dimensionality Reduction for Medical MNIST data set using Auto encoders 		
Question paper pattern: In SEE, students will be asked to execute one program which may be related to the above list of programs.		
Reference Books: Lab Manual		
Course outcomes: On completion of the course, the student will have the ability to:		
Course Code	CO #	Course Outcome (CO)
	CO1	To Understand Document as Vector
	CO2	Various Supervised and Unsupervised learning Method
	CO3	Basic technique for language processing
	CO4	Text analysis
	CO5	Machine translation

INDIAN KNOWLEDGE SYSTEMS		
Subject Code	22AIKS67	Credits:01
CIE:50	SEE:50	SEE:03 hrs
Hours/Week:02hrs(Theory)		TotalHours:15 hrs
<p>Course objectives: The students will be able to</p> <ul style="list-style-type: none"> • To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system. • To make the students understand the traditional knowledge and analyze it and apply it to their day-to-day life. 		
Modules		Teaching Hours
Module-I		
Introduction to Indian Knowledge Systems (IKS): Overview, Vedic Corpus, Philosophy, Character scope and importance, traditional knowledge vis -a-vis indigenous knowledge, traditional knowledge vs. western knowledge		5Hours
Module-II		
Traditional Knowledge in Humanities and Sciences: Linguistics, Number and measurements- Mathematics, Chemistry, Physics, Art, Astronomy, Astrology, Crafts and Trade in India and Engineering and Technology.		5Hours
Module-III		
: Traditional Knowledge in Professional domain: Town planning and architecture Construction, Health, wellness and Psychology-Medicine, Agriculture, Governance and public administration, United Nations Sustainable development goals		5Hours
<p>Text Books:</p> <p>Introduction to Indian Knowledge System- concepts and applications, B Mahadevan, Vinayak Rajat Bhat, Nagendra Pavana R N, 2022, PHI Learning Private Ltd, ISBN-978-93-91818-21-0</p> <p>Traditional Knowledge System in India, Amit Jha, 2009, Atlantic Publishers and Distributors (P) Ltd., ISBN-13: 978-8126912230,</p> <p>2</p> <p>Knowledge Traditions and Practices of India, Kapil Kapoor, Avadesh Kumar Singh, Vol. 1, 2005, DK Print World (P) Ltd., ISBN 81-246-0334,</p>		

Suggested Web Links:

1. <https://www.youtube.com/watch?v=LZP1StpYEPM>
2. <http://nptel.ac.in/courses/121106003>
3. <http://www.iitkgp.ac.in/department/KS;jsessionid=C5042785F727F6EB46CBF432D7683B63>
(Centre of Excellence for Indian Knowledge System, IIT Kharagpur)
4. https://www.wipo.int/pressroom/en/briefs/tk_ip.html
5. https://unctad.org/system/files/official-document/ditcted10_en.pdf
6. http://nbaindia.org/uploaded/docs/traditionalknowledge_190707.pdf
7. https://unfoundation.org/what-we-do/issues/sustainable-developmentgoals/?gclid=EA1aIQobChMImp-Jtb_p8gIVTeN3Ch27LAmPEAAAYASAAEgIm1vD_BwE

Question Paper Pattern:

- The question paper will have ten questions
- There will be 2 questions from each module.
- Each question will have questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Course outcomes: On completion of the course, the student will have the ability to:

Course Code	CO#	Course Outcome(CO)
	CO1	Provide an overview of the concept of the Indian Knowledge System and its importance
	CO2	Appreciate the need and importance of protecting traditional knowledge.
	CO3	Recognize the relevance of Traditional knowledge in different domains.
	CO4	Establish the significance of Indian Knowledge systems in the contemporary world

NATIONAL SERVICE SCHEME

NATIONAL SERVICE SCHEME		
Course Code	22NS68	CIE:50
Semester:3	Credits NCMC – Non Credit Mandatory Course (Completion of the course shall be mandatory for the award of degree)	
SEE: Activities Report Evaluation by College NSS Officer at the end of every semester (3rd to 6th semester)		

Course objectives:
National Service Scheme (NSS) will enable the students to:

1. Understand the community in general in which they work.
2. Identify the needs and problems of the community and involve them in problem –solving.
3. Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
4. Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes.
5. Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in general.

General Instructions - Pedagogy :
These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. In addition to the traditional lecture method, different types of innovative teaching methods 11. Plantation and adoption of plants. Know your plants. 12. Organize National integration and social harmony events /workshops /seminars. (Minimum 02 programs). 13. Govt. school Rejuvenation and helping them to achieve good infrastructure.

Topics or activities to be covered

1. Plantation and adoption of plants. Know your plants.
2. Organize National integration and social harmony events /workshops /seminars. (Minimum 02 programs)
3. Govt. school Rejuvenation and helping them to achieve good infrastructure.

Suggested Learning material:
Books : 1. NSS Course Manual, Published by NSS Cell, VTU Belagavi.
2. Government of Karnataka, NSS cell, activities reports and its manual.
3. Government of India, nss cell, Activities reports and its manual.

Course outcomes:
On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
	CO1	Understand the importance of his / her responsibilities towards society.
	CO2	Analyze the environmental and societal problems/issues and will be able to design solutions for the same
	CO3	Evaluate the existing system and to propose practical solutions for the same for sustainable development.
	CO4	Implement government or self-driven projects effectively in the field.
	CO5	Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in general.

PHYSICAL EDUCATION AND SPORTS		
Course Code 22PE68	CIE Marks 50	Credits 0
SEE Marks 00	Course Type Practical Lecture	Hours/Week (L-T-P) 0-0-3

Total Marks 50	Total Hours 24	Hours SEE Hours --
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Guideline for Athletic and Sports

Semester	Course Title	Content	No. of Hours
Vlth sem	Orientation	1. Postural deformities. 2. Stress management	Total 24 hrs 2 hrs / week
	Specific Games	(Any one to be selected by the student) 1. Throw ball 2. Table Tennis 3. Athletics (Field Events- Jumps) – Any event as per availability of Ground.	
	Aerobics	Aerobics	

YOGA AND MEDITATION

Course Code	22YO68	Credits:0
CIE:50	SEE: 00	SEE:--
Hours/Week: (L:T:P: S):0-0-3(Practical)	Total Marks:50	Total hours:28 hours

Prerequisite:NIL

Course objectives: The Course will Enable students to

- To enable the student to have good health.
- To practice mental hygiene
- To possess emotional stability.
- To integrate moral values.
- To attain higher level of consciousness.

Ashtanga Yoga

1. Dharana
2. Dhyana (Meditation)
3. Samadhi Asana by name, technique, precautionary measures and benefits of each asana Different types of Asanas a. Sitting
 1. Bakasana
 2. Hanumanasana
 3. Ekapada Rajakapotasana
 4. Yogamudra in Vajrasana b. Standing
 1. Vatayanasana
 2. Garudasana c. Balancing
 1. Veerabhadrasana
 2. Sheershasana d. Supine line
 1. Sarvangasana
 2. Setubandha Sarvangasana

	<p>3. Shavasanaa (Relaxation poisture). Revision of Kapalabhati practice 80 strokes/min - 3 rounds Different types. Meaning by name, technique, precautionary measures and benefits of each Pranayama 1. Bhastrika</p> <p>2. Bhramari Meaning, Need, importance of Shatkriya. Different types. Meaning by name, technique, precautionary measures and benefit</p>
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Suggested Books

- Swami Kuvulyananda : Asma (Kavalyadhama, Lonavala)
- Tiwari, O P : Asana Why and How
- Ajitkumar : Yoga Pravesha (Kannada)
- Swami Satyananda Saraswati: Asana Pranayama, Mudra, Bandha
(Bihar School of yoga, Munger)
- Swami Satyananda Saraswati : Surya Namaskar
(Bihar School of yoga, Munger)
- Nagendra H R : The art and science of Pranayama
- Tiruka : Shatkriyegalu (Kannada)
- Iyengar B K S : Yoga Pradipika (Kannada)
- Iyengar B K S : Light on Yoga (English)

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
	CO1	Understand the meaning, aim and objectives of Yoga.
	CO2	Perform Suryanamaskar and able to teach its benefits.
	CO3	Understand and teach different Asanas by name, its importance, methods and benefits
	CO4	Instruct Kapalabhati and its need and importance
	CO5	Teach different types of Pranayama by its name, precautions, procedure and uses
	CO6	Coach different types of Kriyas , method to follow and usefulness