Shri Shankaracharya Technical Campus

(An Autonomous Institute affiliated to Chhattisgarh Swami Vivekananda Technical University Bhilai)

SCHEME OF EXAMINATION AND SYLLABUS

B.Tech. (Gaming Technology) (Fifth Semester)

Computer Science & Engineering

Sl. No.	Board of Studies (BOS)	Courses	Course Code	Period per Week			Scheme of Examination			Total Marks	Credit
							Theory/Lab				
				L	T	P	ESE	CT	TA		
1	Computer Science & Engineering	Theory of Computation	CS114501	2	1	-	100	20	30	150	3
2	Computer Science & Engineering	Computer Network	CS114502	2	1	-	100	20	30	150	3
3	Computer Science & Engineering	Data Science and Modeling	CS114503	2	1	-	100	20	30	150	3
4	Computer Science & Engineering	Artificial Intelligence and Machine Learning	CS114504	2	1	-	100	20	30	150	3
5	Computer Science & Engineering	Professional Elective-I		2	1	-	100	20	30	150	3
6	Computer Science & Engineering	Computer Network Lab	CS114591	-	-	2	25	-	25	50	1
7	Computer Science & Engineering	Data Science & Modeling Lab	CS114592	-	-	2	25	-	25	50	1
8	Computer Science & Engineering	Artificial Intelligence Lab	CS114593	-	-	2	25	-	25	50	1
9	Computer Science & Engineering	Minor Project-I	CS114594	-	-	2	25	-	25	50	1
10	Computer Science & Engineering	Practical Training/Internship (Reports and Seminar)	CS114595	-	-	2	-	-	25	25	1
11	Computer Science & Engineering	Constitution of India	CS114596	-	-	-	-	-	25	25	-
Total				**13**	**2**	**10**	**600**	**100**	**300**	**1000**	**20**

L-Lecture T- Tutorial P-Practical

CT- Class Test TA- Teachers Assessment ESE- End Semester Exam

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairman (AC)	Chairman (BoS)	Date of Release	Version	

SHRI SHANKARACHARYA TECHNICAL CAMUS
BHILAI (C.G.)
(An Autonomous Institution)

SCHEME OF TEACHING AND EXAMINATION
B.Tech. (Gaming Technology) (Fifth Semester)
Computer Science & Engineering

Table-I (Professional Elective-I)

Sl. No.	Board of Studies (BOS)	Courses (Subject)	Course Code	Credit
1	Computer Science & Engineering	Interactive Stories and Video Game Art	CS114521	3
2	Computer Science & Engineering	Game Engine Architecture	CS114522	3
3	Computer Science & Engineering	2 D Game Design	CS114523	3
4	Computer Science & Engineering	Creative Suit 3 Integration	CS114524	3
5	Computer Science & Engineering	Fundamentals of Gaming and Virtual Reality	CS114525	3

L-Lecture T- Tutorial P-Practical
CT- Class Test TA- Teachers Assessment ESE- End Semester Exam

Subject Code CS114501	Theory Of Computation	L = 2	T = 1	P = 0	Credits = 3
Examination Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours
	Minimum number of class tests to be conducted=02			Minimum Assignments=02	

Course Objectives	Course Outcomes
Formal languages and automata theory deals with the concepts of automata, formal languages, Grammar, computability and decidability. The reasons to study Formal Languages and Automata Theory are Automata Theory provides a simple, elegant view of the complex machine that we call a computer .More precisely, the objectives are: • To give an overview of the theoretical foundations of computer science from the perspective of formal languages. • To illustrate finite state machines to solve problems in computing. • To explain the hierarchy of problems arising in the computer sciences. • To familiarize Regular grammars, context frees grammar. • To solve various problems of applying normal form techniques, push down automata and Turing Machines	On successful completion of the course, the student will be able to: **CO1**.Design finite automata to accept a set of strings of a language. **CO2**.Determine whether the given language is regular or not. . **CO3**.Design context free grammars to generate strings of context free language. **CO4**.Design push down automata and the equivalent context free grammars and Design Turing machine. **CO5**.Distinguish between computability and non-computability, Decidability and un-decidability.

UNIT – I:The Theory Of Automata **CO1**

Introduction to automata theory, Examples of automata machine, Finite automata as a language acceptor and translator, Deterministic finite automata. Non-deterministic finite automata, finite automata with output (Mealy Machine. Moore machine), Finite automata with Epsilon moves, Minimizing number of states of a DFA, My hill Nerode theorem, Properties and limitation of FSM, Application of finite automata. **[8Hrs.]**

UNIT – II: Regular Expressions **CO2**

Alphabet, String and Languages, Regular expression, Properties of RegularExpression, Finite automata and Regular expressions, Arden's Theorem, Regular Expression to DFA conversion &vice versa. Pumping lemma for regular sets, Application of pumping lemma, Regular sets and Regular grammar, Closure properties of regular sets. Decision algorithm for regular sets and regular grammar.

[7Hrs.]

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UNIT – III: Grammars **CO3**

Definition and types of grammar, Chomsky hierarchy of grammar, Relation between types of grammars, Context free grammar, Left most & right most derivation trees, Ambiguity in grammar, Simplification of context free grammar, Chomsky Normal From, Greibach Normal From, properties of context free language, Pumping lemma for context free language, Decision algorithm for context tree language.

[7Hrs.]

UNIT – IV: Push Down Automata And Turing Machine **CO4**

Basic definitions, Deterministic push down automata and non-deterministic push down automata, Acceptance of push down automata, Push down automata and context free language, Turing machine model, Representation of Turing Machine, Construction of Turing Machine for simple problem's, Universal Turing machine and other modifications .Church's Hypothesis, Halting problem of Turing Machine. **[7Hrs.]**

UNIT – V: Computability **CO5**

Introduction and Basic concepts, Recursive function, Partial recursive function, Initial functions, Composition of functions, Ackerman's function, Recursively Enumerable and Recursive languages, Decidable and decidable problem, Post correspondence problem, Space and time complexity**. [7Hrs.]**

Text Books:

S.No.	Title	Author(s)	Publisher
1	Theory of Computer Science (Automata Language & Computation)	K.L.P. Mishra and N. Chandrasekran	PHI
2	Introduction to Automata theory. Language and Computation	John E. Hopcropt & Jeffery D. Ullman	Narosa, Publishing House

Reference Books:

S. No.	Title	Author(s)	Publisher
1	Introduction to Languages and the Theory of Computation	John Martin,	Tata McGraw Hill.
2	Introduction to Formal Languages Automata Theory and Computation	Kamala Krithivasan, Rama R	2nd Edition, Pearson Education.

Subject Code CS114502	Computer Network	L = 2	T = 1	P = 0	Credits = 3
Examination Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours
	Minimum number of class tests to be conducted=02			Minimum Assignments=02	

Course Objectives	Course Outcomes
To Provide students with 0an enhanced knowledge in Computer Networking. • Understanding concept of local area networks, their topologies, protocols and applications. • Understanding the different protocols, and network architectures. • To make students understand the basic model of data communication and various concepts of networking.	On completion of this course the student will be able to: **CO1:**Describe the basis and structure of an abstract layered Network protocol model. **CO2:** understand the working of network protocols. **CO3:** Students will have deep understanding of various protocols used at Data Link Layer and will be able to analyze the advantages and disadvantages of various available protocols for flow and error control. **CO4:**Students will be able to analyze various Ethernet standards and will be able to choose an appropriate standard according to requirement of LAN. **CO5:** Students will be able to use various network based applications.

UNIT – I : Introduction : **CO1**

History of Computer Network, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN, PAN,. Applications, networks architecture requirements, ISO-OSI, TCP/IP, XNS, IPX/SPX. **Physical Layer :** Transmission media, switching and encoding, asynchronous communications; Narrow band, broad band ISDN and ATM. Bandwidth calculation. **[8Hrs]**

UNIT – II : Data link layer : **CO2**

Design issues, framing, error detection and correction techniques with numerical, CRC, Elementary Protocol : stop and wait, Sliding Window, Slip, Data link layer in HDLC, ATM. Multiple Access Protocols, Link Layer Addressing, ARP, DHCP, Ethernet devices – Hubs, Bridges, and Switches. **Medium Access sub layer :** ALOHA, MAC addresses, CSMA, CSMA/CD. IEEE 802.XStandardEthernet,wireless LAN.

[8Hrs]

UNIT – III : Network Layer : **CO3**

Forwarding and Routing, Network Service Models, Virtual Circuit and Datagram Networks, Router, Routing Table, Internet Protocol (IP) – IPv4 and IPv6 , ICMP, Link State Routing , Distance Vector Routing, Hierarchical Routing , RIP, OSPF, BGP, Broadcast and Multicast Routing , MPLS, Mobile IP, IP sec. IPv4 : Classes, Classless, Subneting, Super netting and its numerical. **[8Hrs]**

UNIT – IV : Transport Layer : **CO4**

Transport Layer Services – Multiplexing and Demultiplexing, UDP –Go Back-N and Selective Repeat**.**

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Connection-Oriented Transport: TCP, Segment Structure, RTT estimation, Flow Control, Connection Management, Congestion Control, TCP Delay Modeling, SSL and TLS. QoS architecture models: IntServvsDiffServ. **[8Hrs]**

UNIT – V : Presentation Layer protocols : **CO5**

AFP, ICA, LPP, NCP, NDR, Telnet. **Session Layer protocols**: PAP, PPTP, RPC, SCP. **Application Layer**: Principles of Network Applications , The Web and HTTP, HTTPS, FTP, Electronic Mail, SMTP, IRC, Video Conferencing, MIME, DNS, Socket Programming with TCP and UDP. **Network Security:** Principles of Cryptography, Firewalls, Application Gateway, Attacks and Countermeasures. **[8Hrs]**

Text Books:

S.No.	Title	Author(s)	Publisher
1	Data Communications and Networking	Behrouz A. Forouzan	Third Edition TMH
2	Computer Networking: A Top-Down Approach Featuring the Internet	James F. Kurose and Keith W. Ross	Pearson Education, Third edition, 2006

Reference Books:

S. No.	Title	Author(s)	Publisher
1	Computer Networks	Andrew S Tanenbaum	4th Edition. Pearson Education/PHI
2	An Engineering Approach to Computer Networks	S.Keshav	2nd Edition, Pearson Education

Subject Code CS114503	Data Science And Modeling	L = 2	T = 1	P = 0	Credits = 3
Examination Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours
	Minimum number of class tests to be conducted=02			Minimum Assignments=02	

Course Objectives	Course Outcomes
The objective of this course is to impart necessary knowledge of the mathematical foundations needed for data science and develop programming skills required to build data science applications.	On successful completion of the course, the student will be able to: **CO1** Basic Concepts of Data Science **CO2**: Code using the python libraries needed for data science. **CO3** Demonstrate understanding of the mathematical foundations needed for data science. **CO4:** Collect, explores, clean, munge and manipulates data. **CO5** Implement models such as k-nearest Neighbors, Naive Bayes, linear and logistic regression, decision trees, neural networks and clustering. And Build data science applications using Python based toolkits.

UNIT I **CO1**

Introduction to data science: Why Data Science, Benefits and uses of data science; Facets of data, The data science process: Setting up goal, retrieving data, data preparation, data exploration, data modeling, Presentation and automation. **[8 Hrs.]**

UNIT II **CO2**

Introduction to Programming: Sequence data: string, list, dictionary, array and tuple. Tools for Data Science, Toolkits using Python: Matplotlib, NumPy, Pandas, Scikit-learn, NLTK 2.2 3. Control structures if-then-else and loops, functions in python. Objects in python

Reading data and handling missing values: Pandas for data manipulation Working with data: Reading Files, (xlsx, csv, txt), creating copy, attribute of data, Indexing and selecting data , data types, summary of data, extracting unique element, Categorical and object data type, Converting data type, finding null values, Detecting missing values, approaches to fill missing values Data,, Rescaling, Dimensionality Reduction **[7 Hrs.]**

UNIT III **CO3**

Exploratory Data Analysis and Data Visualization: Introduction to statistics used in data science, level of data : Nominal, ordinal, interval scale and ratio. Central tendencies (mean, median and mode), skewed data, data dispersion: range, interquartile range, variance, standard deviation, coefficient of variation.

Data visualization tools : matplotlib : scatter, histogram , bar. Seaborn library: box and whiskers plot,

pairwise plot.. **[7 Hrs.]**

UNIT IV **CO4**

Feature Engineering Data wrangling and tools for Data wrangling, Data transformation: converting categorical data into one hot encoding. Feature Selection, Feature Transformation, Dimensionality Reduction **[7 Hrs.]**

UNIT V **CO5**

Machine learning algorithm for building a model:Linear Regression- model assumptions, Classification and Regression algorithms- Naïve Bayes, K-Nearest Neighbors, logistic regression, support vector machines (SVM), decision trees, and random forest, Classification Errors: Confusion matrix recall precision and f-measure. Linear regression evaluation matric: mean square error with respect to case study **[7 Hrs.]**

Text Books:

S.No.	Title	Author(s)	Publisher
1	Data Science from Scratch: First Principles with Python	Joel Grus	O'Reilly Media
2	Doing Data Science, Straight Talk From The Frontline	Cathy O' Neil and Rachel Schutt	O'Reilly
3	Mining of Massive Datasets	Jure Leskovek, Anand Rajaraman and Jeffrey Ullman	Cambridge University Press

Reference Books:

S. No.	Title	Author(s)	Publisher
1	Machine Learning	Jeeva Jose	Khanna Publishers
2	Data Sciences	Jain V.K	Khanna Publishers
3	Big Data and Hadoop	Jain V.K	Khanna Publishers
4	Machine Learning	Chopra Rajiv	Khanna Publishers
5	Practical Statistics for Data Scientists	Peter Bruce, Andrew Bruce, Peter Gedeck	O'Reilly

Subject Code CS114504	Artificial Intelligence and Machine Learning	L = 2	T = 1	P = 0	Credits = 3
Examination	**ESE**	**CT**	**TA**	**Total**	**ESE Duration**

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Scheme	100	20	30	150	3 Hours
	Minimum number of class tests to be conducted=02			Minimum Assignments=02	

Course Objectives	Course Outcomes
The objective of this course is to familiarize the prospective engineers with different kinds of Learning techniques and get acquainted with the basics of machine learning methods and model validation methods and ways to measure their accuracy.	On successful completion of the course, the student will be able to: **CO1** : Get deep insight of AI and its problem Solving techniques. **CO2**: Represent information or knowledge through various representation techniques. **CO3** : Understand various classification and Regression techniques **CO4** : Understand various clustering methodologies and its evaluation process **CO5** : Validate, understand and analyze the different Machine learning curves and performance evaluation methods

Unit I : Introduction to Artificial Intelligence **[CO1]**

Introduction: Defining Artificial Intelligence and its applications

Problem Solving techniques: Blind Search: Depth First and Breadth Search**,** heuristic search: Best first search, A* search, AO* Search, Constraint satisfaction problem, Min-Max Search, Alpha-Beta Pruning **[7 Hrs]**

Unit II : Knowledge Representations **[CO2]**

Logic: Predicate Logic, Resolution in predicate logic, Other ways of knowledge representation: Brief Introduction of semantic nets, frame, conceptual dependency, Scripts

Planning: Goal Stack and Partial Order Planning **[7 Hrs]**

Unit III: Machine Learning and Supervised Learning **[CO3]**

Machine Learning Introduction: What Is Machine Learning?, How Do We Define Learning?, Applications of ML, Aspects of developing a Learning system: training data, Concept representation, function approximation, Machine Learning Techniques: Supervised Learning, Unsupervised Learning and Reinforcement Learning

Supervised Learning : Source of uncertainty, Entropy and Information Gain, K Nearest Neighbor- Challenges in KNN, Application of KNN, Decision trees – ID3, Classification and Regression Trees, Translating Decision tress into rules, Rule Based Classification, Over fitting, noisy data and pruning, Linear Regression, Logistic Regression, Support Vector Machine (SVM) **[8 Hrs]**

Unit IV : Unsupervised Learning **[CO4]**

Partition Based Clustering, K – Means, K- Medoids, Hierarchical Clustering, Agglomerative, Divisive, Distance Measure, DBSCAN, Density Based Clustering, Evaluation of Clustering methods. **[7 Hrs]**

Unit V: Validations **[CO5]**

Validation Techniques, Need for Cross Validation, K-fold validation, Validation and Test Dataset, Evaluation Measures: SSE, MME, R2, Confusion Matrix – Recall, Precision, Accuracy, F-Measure, Learning Curves : ROC and AUC curve. **[7 Hrs]**

Text Books:

S. No.	Title	Author(s)	Publisher
1	Artificial Intelligence	Elaine Rich and Kevin Knight	Tata McGraw Hill
2	Introduction to Machine Learning with Python	Aurelien Geron	Oreilly
3	Machine Learning for Absolute Beginners: A Plain English Introduction	Oliver Theobald	Scatterplot Press
4	Machine Learning Simplified: A gentle introduction to Supervised Learning	Andrew Wolf	Leanpub

Reference Books:

S. No.	Title	Author(s)	Publisher
1	Introduction to Artificial Intelligence and Expert Systems	Dan W.Patterson	Prentice Hall of India.
2	Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems (First Edition)	Aurelien Geron	O'Reilly Media
3	Dive into Deep Learning	Aston Zhang, Zachary C. Lipton, Mu Li, and Alexander J. Smola	E-Books
4	Machine Learning for Humans	Vishal Maini ,Samer Sabri	E-Books

Subject Code CS114591	Computer Network Lab	L =0	T = 0	P = 2	Credits = 1
Examination Scheme	ESE	CT	TA	Total	ESE Duration
	25	-	25	50	3 Hours

Course Objectives	Course Outcomes
To Provide students the basic knowledge of Computer Networking, tools used, their purpose and their connectivity based on requirements.	On completion of this course the student will be able to setup and configure various networking hardware and software. They will also be able to identify the basic faults and can resolve.

List of experiments

1. Introduction to cables, connectors and topologies.
2. Demonstration of Switch, Hub, Router and their uses and types.
3. Installation of UTP, Co-axial cable, Cross cable, parallel cable.
4. Case Study of Ethernet (10base5,10base2,10 base T)
5. Case Study of various Wireless technologies available.
6. Basic network command and Network configuration commands like ping, netstat, hostname, nslookup, route, arp, tracert, ipconfig, ARP etc.
7. To enable secured / unsecured file sharing, device sharing over network.
8. Installation and working of Remote Desktop and other third party related software's.
9. To setup IP and other values avoiding DHCP.
10. Use of Subnet mask to create two or more different logical network in same lab.
11. Installation and working with IIS Server.
12. Basic Configuration of Home Router/Modem
13. Introduction to Server administration.
14. Basic Chat Program in Java using TCP.
15. Basic Chat Program in Java using UDP.

Text Books:

S.No.	Title	Authors	Edition	Publisher
1	Networking Bible	Barrie Sosinsky		Wiley
2	Network Programmability and Automation	Jason Edelman		O′Reilly
3	Subnetting for Beginners: How to Easily Master Ip	Adam Vardy		Amazon
4	Networking Made Easy: Get Yourself Connected	James Berstein		

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Subject Code CS114592	Data Science And Modeling Lab	L = 0	T = 0	P = 2	Credits =1
Examination Scheme	ESE	CT	TA	Total	ESE Duration
	25	-	25	50	3 hours

Course Objectives	Course Outcomes
The objective of this course is to impart necessary knowledge of the mathematical foundations needed for data science and develop programming skills required to build data science applications.	On successful completion of the course, the student will be able to: **CO1** Basic Concepts of Data Science **CO2** Demonstrate understanding of the mathematical foundations needed for data science. **CO3** Collect, explore, clean, manage and manipulate data. **CO4** Implement models such as k-nearest Neighbors, Naive Bayes, linear and logistic regression, decision trees, neural networks and clustering. **CO5** Build data science applications using Python based toolkits.

List of Experiments

1. Write programs to understand the use of Matplotlib for Simple Interactive Chart, Set the Properties of the Plot, matplotlib and NumPy.
2. Write programs to understand the use of Numpy's Structured Arrays, Reading and Writing Array Data on Files.
3. Write programs to understand the use of Matplotlib for Working with Multiple Figures and Axes, Adding Text, Adding a Grid, Adding a Legend, Saving the Charts.
4. Write programs to understand the use of Matplotlib for Working with Line Chart, Histogram, Bar Chart, Pie Charts
5. Write programs to understand the use of Numpy's Shape Manipulation, Array Manipulation, vectorization.
6. Write a program in Python to predict the class of the flower based on available attributes.
7. Write a program in Python to predict if a loan will get approved or not.
8. Write a program in Python to predict the traffic on a new mode of transport.
9. Write a program in Python to predict the class of user.
10. Write a program in Python to indentify the tweets which are hate tweets and which are not.
11. Write a program in Python to predict the age of the actors.
12. Mini project to predict the time taken to solve a problem given the current status of the user

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Text Books:

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S.No.	Title	Author(s)	Publisher
1	Python Crash Course: A Hands-On, Project-Based Introduction to Programming	Eric Matthes	William Pollock
2	Data Science from Scratch: First Principles with Python	Joel Grus	O'Reilly Media

Reference Books:

S. No.	Title	Author(s)	Publisher
1	Machine Learning	Jeeva Jose	Khanna Publishers
2	Data Sciences	Jain V.K	Khanna Publishers
3	Fluent Python	Luciano Ramalho	O'Reilly Media
4	Machine Learning	Chopra Rajiv	Khanna Publishers

		July 2022	1.00	Applicable for AY 2022-23 Onwards
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Subject Code CS114593	Artificial Intelligence and Machine Learning Lab	L = 0	T = 0	P = 2	Credits =1
Examination Scheme	ESE	CT	TA	Total	ESE Duration
	25	-	25	50	3 hours

Course Objectives	Course Outcomes
Implementing the various AI searching algorithms. Make use of Data sets in implementing the machine learning algorithms. Implement the machine learning concepts and algorithms in any suitable language of choice.	On successful completion of the course, the student will be able to: **CO1** Understand the implementation procedures for the machine learning algorithms. **CO2** Design python programs for various learning algorithms. **CO3** Apply appropriate data sets to the Machine Learning algorithms. **CO4** Identify and apply machine Learning algorithms to solve real world problems.

List of Experiments

1. Implement A* Search algorithm.
2. Implement AO* Search algorithm.
3. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
4. 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.
5. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.
6. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
7. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using the k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.
8. Write a program to implement the k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
9. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select the appropriate data set for your experiment and draw graphs.

Text Books:

S. No.	Title	Author(s)	Publisher
1	Python for Data Analysis	WesMc Kinney	O'Reilly

Reference Books:

S. No.	Title	Author(s)	Publisher
1	Python Data Analytics	Fabio Nelli	Apress

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Chairman (AC)	Chairman (BoS)	Date of Release	Version	

Subject Code CS114594	Minor Project-I	L = 0	T = 0	P =2	Credits = 1
Evaluation Scheme	ESE	CT	TA	-	ESE Duration
	25	-	25	-	3 Hours

Course Objective	Course Outcomes
The objectives of this lab are: The objective of this course is to improve student 's ability to analyze, design and solve complex engineering problems through pedagogies **(Project Based Learning)** that support them in developing these skills. The goal here is not to passively absorb and reiterate information; but rather to actively engage with the content, work through itwith others, relate to it through an analysis, use modern tools and effectively solve problems with the corresponding knowledge gained.	On successful completion of the course, the student will be able to: **CO1:** Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach. **CO2:** Reproduce, improve and refine technical aspects of engineering projects applying appropriate techniques, resources, and modern engineering and IT tools. **CO3:** Work as an individual and as a member or leaderin teams in development of technical projects. **CO4:** Follow management principle and value health, safety and ethical practices during project. **CO5:** Communicate and report effectively project related activities and findings.

The Process Followed to Maintain the Quality of Student Projects are: [12 Hrs.]

(a) Allotment of Projects:

(i) Students form their team (max four students) and submit their areas in which they would liketo pursue their projects.

(ii) Through meeting and deliberations students are allotted guide depending on their preference and maximum number of groups under a faculty is limited to three.

(b) Identification of projects:

Students are asked to formulate problem statement and state objectives of their project inconsultation with the project guide

c) Continuous Monitoring

(i) Progress is continuously monitored by guide and instructions are given how to proceedfurther

during their project periods as per time table.

(ii) Students submit weekly progress report to the project in-charge after consultation with theirproject guide.

(d) Evaluation

(i) In order to evaluate projects two project seminars (assessment) are taken in which student ‘steam present their project through presentations and demonstrate their work.

(ii) Students are assessed on the basis of their technical skill implementation, use of modern tools, communication skill, team work, health, safety and ethical practices and relevance of theproject.

(iii) At the end of the semesters a report is submitted by the students and student ‘s projects arefinally evaluated by external examiner in end semester practical examination based

Reference Books:

S. No.	Title	Authors	Publisher
1	Basics Of Project Management	IES Master Team	IES Master Publication (1 January 2021)
2	Modern Systems Analysis and Design	Jeffrey A. Hoffer, Joey F. George, Joseph S. Valakati	Pearson Education; Third Edition; 2002.

Professional Elective-I

Subject Code CS114521	Computer Graphics and Animation	L = 2	T = 1	P = 0	Credits = 3
Examination Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours
	Minimum number of class tests to be conducted=02			Minimum Assignments=02	

Course Objectives	Course Outcomes
The objective of this course is to	On successful completion of the course, the student will be able to: **CO1** Discuss various algorithms for scan conversion, Extract scene with different clipping methods and filling of basic objects **CO2** Use of geometric transformations on graphics objects and their application in composite form also exploring projections **CO3** Render projected objects to naturalize the scene in 2D view and use of illumination models for this. **CO4** Visible surface detection techniques for display of 3D scene on 2D screen. **CO5** Design simple applications using principles of virtual reality.

UNIT – I : Display Algorithms **CO1**

Overview of Computer Graphics, Computer Graphics Application, Display Technologies: Raster Refresh (Raster-Scan) Graphics Displays, Random-Scan Display Processor, LCD displays.

Scan conversion: Bresenham's Line drawing algorithm. Bresenhams' method of Circle drawing, Midpoint Circle Algorithm

Clipping Lines algorithms–Cohen-Sutherland, Liang-Barsky and Cyrus-Beck

Filling Alogorithms: Flood Fill and Boundary Fill Algorithm **[8 Hrs.]**

UNIT – II: Transformations **CO2**

Two-Dimensional Transformations: 2D Transformations, Homogeneous Coordinates and Matrix Representation of 2D Transformations, Rotation, Reflection, Scaling, Combined Transformation, The Window-to-Viewport Transformations.

Three-Dimensional Transformations: Three-Dimensional Scaling, Three-Dimensional Shearing, Three- Dimensional Rotation, Three-Dimensional Reflection, Three- Dimensional Translation, Rotation about an Arbitrary Axis in Space, Reflection through an Arbitrary Plane, Matrix Representation of 3D Transformations, Composition of 3D Transformations

Affine and Perspective Geometry: Perspective Transformations, Vanishing Points, Orthographic Projections, Axonometric Projections, Oblique Projections **[7Hrs.]**

UNIT – III: Viewing and Appearance **CO3**

Viewing in 3D: Stages in 3D viewing, Canonical View Volume (CVV), Specifying an Arbitrary 3D View, Mathematics of Planar Geometric Projections, Combined transformation matrices for projections and

viewing, Coordinate Systems and matrices, camera model and viewing pyramid.

Light: Radiometry, Transport, Equation, Photometry

Color: Colorimetry, Color Spaces, Chromatic Adaptation, Color Appearance **[7Hrs.]**

UNIT – IV: Curves and Surfaces **CO4**

Visible-Surface Determination: Techniques for efficient Visible-Surface Algorithms, Categories of algorithms, Back face removal, The z-Buffer Algorithm, Scan-line method, Painter's algorithms (depth sorting)

Plane Curves and Surfaces: Curve Representation, Nonparametric Curves, Parametric Curves, Cubic Splines,, Bezier Curves, B-spline Curves, Quadric Surfaces, Bezier Surfaces. **[7Hrs.]**

UNIT – V : Animation **CO5**

Computer Animation: Fundamentals of computer animation, Animation Techniques, Principles of Animation, Animation and Flash Overview, Using Layer and Creating Animation, Key framing, Deformations, Character Animation, Physics-Based Animation, Procedural Techniques, Groups of Objects. **[7Hrs.]**

Text Books:

S.No.	Title	Author(s)	Publisher
1	Computer Graphics	Donald Hearn and M.Pauline Baker	PHI
2	Computer Graphics- A practical Approach,	Rishabh Anand,	Khanna Publishing House
3	Procedural Elements for Computer Graphics	David F. Rogers	T.M.H

Reference Books:

S. No.	Title	Author(s)	Publisher
1	Computer graphics, Multimedia and Animation	Malay. K. Pakhir	PHI
2	Graphics, GUI, Games & Multimedia Projects in C	Pilania & Mahendra	Standard Publ.
3	Fundamentals of 3Dimensional Computer Graphics by, 1999,	Alan Watt	Addision Wesley.
4	Principles of Interactive Computer Graphics	W.M. Newman & R. F. Sproull, Peterson,	TMH.

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairman (AC)	Chairman (BoS)	Date of Release	Version	

Subject Code CS114522	Game Engine Architecture	L = 2	T = 1	P = 0	Credits = 3
Examination Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours
	Minimum number of class tests to be conducted=02			Minimum Assignments=02	

Course Objectives	Course Outcomes
The objective of this course is to understand the various architecture of game engine design, their support system and human interface.	On successful completion of the course, the student will be able to: CO1. To Structure of Game engine and various tools CO2. Understand fundamentals of softeware engineering form games and and 3D maths for game CO3 to understand Engine system and game loop and real time simulation CO4. To study Human interface device, Cameras and pausing of games. CO5. To provide a knowledge rendering engine,Action state machine ,rigid body dynamics, Mathematics of Sound and and audio engine architecture.

UNIT-1 CO1

Introduction : Structure of a Typical Game Team , What Is a Game? , What Is a Game Engine? , Engine Differences Across Genres , Game Engine Survey , Runtime Engine Architecture , Tools and the Asset Pipeline, Tools of the Trade : Version Control , Microsoft Visual Studio , Profiling Tools , Contents , Memory Leak and Corruption Detection , Other Tools. **[8 hrs]**

UNIT-2 CO2

Fundamentals of Software Engineering for Games , C++ Review and Best Practices , Data, Code, and Memory in C/C++ , Catching and Handling Errors , 3D Math for Games , Solving 3D Problems in 2D ,Points and Vectors , Matrices, , Quaternions , Comparison of Rotational Representations, , Other Useful Mathematical Objects , Hardware-Accelerated SIMD Math , Random Number Generation. **[7 hrs]**

UNIT-3 CO3

Low-Level Engine Systems , Engine Support Systems , Subsystem Start-Up and Shut-Down , Memory Management , Containers , Strings , Engine Configuration ,Resources and the File System , File System ,The Resource Manager , The Game Loop and Real-Time Simulation , The Rendering Loop , The Game Loop , Game Loop Architectural Styles , Abstract Timelines, Measuring and Dealing with Time , Multiprocessor Game Loop .**[7 hrs]**

UNIT-4 CO4

Human Interface Devices , Types of Human Interface Devices , Interfacing with a HID , Types of Inputs ,

Types of Outputs , Game Engine HID Systems ,Human Interface Devices in Practice , Tools for Debugging and Development , Logging and Tracing , Debug Drawing Facilities , In-Game Menus , In-Game Console , Debug Cameras and Pausing the Game , Cheats, Screenshots and Movie Capture ,In-Game Profiling , In-Game Memory Stats and Leak Detection. **[7 hrs]**

UNIT-5 CO5

The Rendering Engine, Animation system : types , poses skeleton,clips, post processing, Action state machine,Rigid body dynamics,Mathematics of Sound and Audio engine architectures, Data driven game engine.**[7 hrs}**

Text Books

S.No.	Title	Author(s)	Publisher
1	The Game Engine Architecture	Jason Gregory	3rd edition CRC press,Tylor & Francis group.
2	3D Game Engine Architecture Engineering Real-Time Applications with Wild Magic	David H. Eberly	Magic Software, Inc.

		July 2022	1.00	Applicable for AY 2022-23 Onwards
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Subject Code CS114523	2 D Game Design	L = 2	T = 1	P = 0	Credits = 3
Examination Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours
	Minimum number of class tests to be conducted=02			Minimum Assignments=02	

Course Objectives	Course Outcomes
The objective of this course is to understand the various technical area relates to elements of game design so that students can build, play, analyze, and learn about the development of 2D game engines and games	On successful completion of the course, the student will be able to: CO1. To Structure of 2 D Game engine development with Java script , HTML and WebGL. CO2. To Understand fundamentals of implementing common components of video games.and working with texture , Sprites and fonts. CO3 to understand Behaviors and detecting collision of Game object. CO4. To study Camera manipulation and simulating motion parallax with layer management. CO5. To provide a knowledge illumination effect and shadow and Light sources.

UNIT-1 CO1
Introducing 2D Game Engine Development with JavaScript, Setting Up Your Development Environment, Working in the NetBeans Development Environment, Working with HTML5 and WebGL, Canvas for Drawing, Elementary Drawing with WebGL, Drawing Objects in the World, Encapsulating Drawing, Transforming a Renderable Object, View, Projection, and Viewports. **[8 hrs]**

UNIT-2 CO2
Implementing Common Components of Video Games: The Game Loop , Keyboard Input, Resource Management and Asynchronous Loading, Game Level from a Scene File , Scene Object: Client Interface to the Game Engine,Working with Textures, Sprites, and Fonts: Texture Mapping and Texture Coordinates, Drawing with Sprite Sheets, Sprite Animations, Fonts and Drawing of Text. **[7hrs]**

UNIT-3 CO3
Defining Behaviors and Detecting Collisions: Game Objects, Chasing of a Game Object, Collisions Between Game Objects, Per-Pixel Collisions, Per-Pixel Collisions for Sprites.**[7hrs]**

UNIT-4 CO4
Manipulating the Camera, Camera Manipulations, Interpolation, Camer a Shake Effect, Multiple Cameras, Mouse Input Through Cameras, Supporting Camera Background, Tiling of the Background, Simulating Motion Parallax with Parallax Scrolling, Layer Management

UNIT-5 CO5
Implementing Illumination and Shadow, Ambient Light, Light Source, Multiple Light Sources and Distance Attenuation, Diffuse Reflection and Normal Mapping, Light Source Types, Shadow Simulation. **[7hrs]**

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Chairman (AC)	Chairman (BoS)	Date of Release	Version	

Text Books :

S.No.	Title	Author(s)	Publisher
1	Build your 2 D Game Engine	by Kelvin Sung Jebediah Pavleas Fernando Arnez Jason Pace	ISBN-13 (pbk): 978-1-4842-0953-0 ISBN-13 (electronic): 978-1-4842-0952-3
2	Developing 2 D game with Unity	Jared Halpern, Apress	ISBN-13 (pbk): 978-1-4842-3771-7 ISBN-13 (electronic): 978-1-4842-3772-4 https://doi.org/10.1007/978-1-4842-3772-4

		July 2022	1.00	Applicable for AY 2022-23 Onwards
Chairman (AC)	Chairman (BoS)	Date of Release	Version	

Subject Code CS114524	Creative Suite 3 Integration	L = 2	T = 1	P = 0	Credits = 3
Examination Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours
	Minimum number of class tests to be conducted=02			Minimum Assignments=02	

Course Objectives	Course Outcomes
The objective of this course is to understand the benefits and efficiencies gained by having all the creative tools Photoshop, Illustrator, InDesign, Dreamweaver, Flash Pro, Acrobat, Bridge and Version Cue.	On successful completion of the course, the student will be able to: **CO1**. To introduce the Creative tools like photoshop, dream weaver, Indesign, photoshop, illustrator , flashpro and bridge and vrsion cue. **CO2**. To Understand workspace of photoshop, dream weaver, Indesign, photoshop ,illustrator , flashpro and bridge and version cue. **CO3** to understand the working of layers of Fireworks , flash, , illustrator, Dream Weaver, Indesign, Photoshop, File compatibility. **CO4**. To study how to manage colors and swatch panel and Opacity and font utilities. **CO5**. To provide a knowledge smart object, smart filter and pdf printing.

UNIT-1 The programs photoshop CS3 , DreamWeaver CS3 and Flash CS3, indesign , illustrator, Fire works introduction, Shortcuts , Action and New feature, Accessing program with bridge. **CO1 [8 hrs]**

UNIT-2 Managing Assests with version Cue,The work space photoshop , illustrator, DreamWeaver, Flash , Indesign, Fireworks. Bridge , version Cue. **CO2 [7 hrs]**

UNIT-3 Working with layers : Similarities and differences, Fireworks , flash, , illustrator, DreamWeaver, Indesign, Photoshop, File compatibility. **CO3 [7 hrs]**

UNIT-4,Managing colors, Bridge, Using colors, Swatch panel , Opacity , Spot color, Paragraph composor,font Utilities , Dreamwearver and web font issues. **CO4 [7 hrs]**

UNIT-5 Smart Object , Illustrator in photoshop, Smart filters, photoshop into photoshop, Illustrator, Indesign , photoshop ,adobe and pdf and pdf printing. **CO5 [7 hrs]**

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Text Books :

S.No.	Title	Author(s)	Publisher
1	Creative Suite 3 Integration	Keith Martin	ISBN: 978-0-240-52059-9, Focal Press is an imprint of Elsevier Linacre House, Jordan Hill, Oxford OX2 8DP, UK 30 Corporate Drive, Suite 400, Burlington, MA 01803, USA

Subject Code CS114525	Fundamentals of Gaming and Virtual Reality	L = 2	T = 1	P = 0	Credits = 3
Examination Scheme	ESE	CT	TA	Total	ESE Duration
	100	20	30	150	3 Hours
	Minimum number of class tests to be conducted=02			Minimum Assignments=02	

Course Objectives	Course Outcomes
The objective of this course is to understand the benefits of development, function/use of spatial computing	On successful completion of the course, the student will be able to: **CO1**. To understand how human interact with computer **CO2**. To Understand the basics of Virtual reality and use of VR in 3 D art **CO3** to understand the Augmented reality, Intergration of hardware and software and AR cloud **CO4**. To create cross platform augmented reality and virtual reality and effective use of audio. **CO5**. To enhance data representation, visualization and AI in spatial computing

UNIT-1 CO1

How human interact with computer :Common term definition, Modelities through ages, Body tracking technologies, sensroy design, five sensory principles. **[8 hrs]**

UNIT-2 CO2

Virtual reality for art,VR animation,3D art optimization, Draw calls , Using VR for creating 3 D Art, acquiring 3 D model. **[7 hrs]**

UNIT-3 CO3

Hardware ,SLAM , Tracking: A brief history of Augmented reality, Integrating hardware and software, Mapping, Platforms and other development considerations, The AR Cloud. **[7 hrs]**

UNIT-4 CO4

Creating cross-plateform augmented reality and virtual reality, Virtual reality tool kit , Handling locomotion, Effective use of audio, Common interaction paradigm. **[7 hrs]**

UNIT-5 CO5

Enhancing data representation: Data Visualization and AI in spatial computing,Principle,2D and 3D data represented in XR ,Interactivity , Failures , WebXR,3D reconstruction and direct manipulation of real world data. **[7 hrs]**

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Chairman (AC)	Chairman (BoS)	Date of Release	Version	

Text Books:

S.No.	Title	Author(s)	Publisher
1	Creating Augmented and Virtual Realities: theory and Practice for Next-Generation Spatial Computing	Edited by Erin Pangilinan, Steve Lukas, and Vasanth Mohan	Published by O'Reilly Media, Inc., 1005 Gravenstein Highway North, Sebastopol, CA 95472