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Institute of Computer Applications

Name of Program: BCA + MCA

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BCCA901	Compulsory	Advanced Computer Graphics	3	1	0	4	60	20	20	0	0

Course Education Objectives (CEOs):

- Provide knowledge about hardware and software used in computer Graphics.
- Offer an in-depth exploration of fundamental concepts in 2D and 3D computer graphics.
- Impart knowledge about drawing algorithms.
- Provide detailed knowledge about color and intensity levels.
- Explain the global and local illumination models.
- Design and implement a rendering algorithm based on Monte Carlo path tracing.
- Analysis of basic ray-tracing algorithm and explain its limitations.
- Applying efficient graphics technique to solve engineering problems.

Course Outcomes (COs):

After the successful completion of the course students should be able to:

- Understand basic knowledge about hardware and software used in Computer Graphics.
- Understand the color and intensity levels and identify the visible area of any surface.
- Analyze the basic ray-tracing algorithm and explain its limitations.
- Be able to Compare various graphics algorithm used in 2D and 3D.
- Be able to understand and identify the performance characteristics of graphics algorithms.
- Employ algorithm to model engineering problems, when appropriate.

UNIT I

Raster graphics, Vector graphics, Basic raster graphics algorithms for drawing 2 D Primitive lines, circles, ellipses, arcs etc., Anti aliasing and its techniques. Clipping: clipping points, line and area clipping & polygon filling algorithm.

UNIT II

Geometric Transformation: 2D transformations like translation, rotation, scaling, reflection and shearing etc., composite transformation and homogeneous coordinate system in transformation.

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3D transformations, window to viewport transformations, projection: Types of projection methods, perspective projection with different location of centre of projection.
Graphics Hardware: Hardcopy & display techniques, Input devices, image scanners etc.

UNIT III

Modeling: parametric and non parametric, Curves and its blending methods. Uniform, non uniform curves, rational and non rational curves, NURBS, Surfaces and its generation techniques, Hardware and software color models and its applications in different fields.

UNIT IV

Wireframe, surface and solid modeling, Polygon meshes and its need of approximation, Shading Techniques: Lambert, gouraud and phong methods. Illumination models: Global and local illumination model, Transparency, Shadows, Visible surface determination techniques for visible determination like Z-buffer algorithm, a buffer algorithm, scan line algorithm, area subdivision algorithm for implementation of visible surface detection. Visible surfaces ray-tracing, recursive ray tracing, radio-city methods.

UNIT V

Procedural modeling, fractals and its generation techniques, grammar-based models, multi-particle system, concepts of hardware and software rendering. Animation: introduction to 2D and 3D animation, Dynamics and role of dynamics in animation

Suggested Readings:

1. Foley et. al., “Computer Graphics Principles & practice”, Addison Wesley Ltd., 2003.
2. R.H. Bartels, J.C. Beatty and B.A. Barsky, “An Introduction to Splines for use in Computer Graphics and Geometric Modeling”, Morgan Kaufmann Publishers Inc., 1987.
3. D. Hearn and P. Baker, “Computer Graphics”, Prentice Hall, 2003.
4. W. Newman and R. Sproul, “Principles of Interactive Computer Graphics, McGraw-Hill, 1973.
5. R. Plastock and G. Kalley, “Theory and Problems of Computer Graphics”, Schaum’s Series, McGraw Hill, 2001.
6. F.P. Preparata and M.I. Shamos, “Computational Geometry: An Introduction”, Springer-Verlag New York Inc., 1985.
7. D. Rogers and J. Adams, “Mathematical Elements for Computer Graphics”, MacGraw-Hill International Edition, 1989.
8. David F. Rogers, “Procedural Elements for Computer Graphics”, McGraw Hill Book Company, 1985.
9. Alan Watt and Mark Watt, “Advanced Animation and Rendering Techniques”, Addison-Wesley, 2002

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BCCA902	Compulsory	Cloud computing	4	0	0	4	60	20	20	0	0

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; Q/A – Quiz/Assignment/Attendance, MST - Mid Sem Test.

***Teacher Assessment** shall be based on following components:
Quiz/Assignment/project/Participation in class (Given that no component shall be exceed 10 Marks)

Course Educational Objectives (CEOs):

- Learn about the cloud environment, building software systems and components that scale to millions of users in modern internet, cloud concepts.
- To understand the architecture and concept of different cloud models: IaaS, PaaS, SaaS
- To understand the Cloud based software applications on top of cloud platforms.

Course Outcomes (Cos): Students will be able to

- Understanding the key dimensions of the challenge of Cloud Computing
- Assessment of the economics, financial, and technological implications for selecting cloud computing for own organization.
- Assessing the financial, technological, and organizational capacity of employer‘s for actively initiating and installing cloud-based applications.
- Assessment of own organizations ‘needs for capacity building and training in cloud computing-related IT areas.

UNIT 1

Introduction: Historical development, Essentials, Benefits and need for Cloud Computing - Business and IT Perspective, Cloud and Virtualization, Vision of Cloud Computing, Characteristics of cloud computing as per NIST, Cloud models- IaaS, PaaS, SaaS ,Cloud computing environments.

UNIT 2

Overview of cloud applications: ECG Analysis in the cloud, Protein structure prediction,

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Satellite Image Processing, CRM and ERP, Social networking**.**
Cloud Computing Architecture: Types of Clouds, Cloud Interoperability & Standards, Fault Tolerance, Cloud Solutions: Cloud Ecosystem, Cloud Business Process Management, Cloud Service Management.

UNIT 3
Cloud Governance- High Availability and Disaster Recovery-Charging Models, Usage Reporting, Billing and Metering.
Virtualization: Fundamental concepts of storage, compute, networking, desktop and application virtualization. Virtualization benefits, server virtualization, Block and file level storage virtualization Hypervisor management software, Concepts of Map reduce..

UNIT 4
Infrastructure Requirements, Virtual LAN (VLAN) and Virtual SAN (VSAN) and their benefits
Cloud Security: Cloud Information security fundamentals, Design principles, Cloud security services, Secure Cloud Software Requirements, Policy Implementation, Cloud Computing Security Challenges, Virtualization security Management, Cloud Computing Security Architecture.

UNIT 5
Cloud as a Service: Gamut of Cloud Solutions Cloud and dynamic infrastructure, Cloud Adoption and rudiments, Cloud Services Requirements, Web Based Application, Pros and Cons of Cloud Service Development, Types of Cloud Service Development

Suggested Readings:

1. Cloud Computing, Roger Jennings, Wiley India
2. Buyya, Selvi ,‖ Mastering Cloud Computing —,TMH Pub
3.Cloud Computing Explained, John Rhoton, Recursive Press
4. Kumar Saurabh, —Cloud Computing‖ , Wiley Pub
5. Krutz , Vines, —Cloud Security — , Wiley Pub
6. Velte, —Cloud Computing-A Practical Approach‖ ,TMH Pub
7. Sosinsky, —' Cloud Computing' , Wiley Pu

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							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BCCA903	Compulsory	Distributed Systems	3	1	0	4	60	20	20	0	0

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; Q/A – Quiz/Assignment/Attendance, MST - Mid Sem Test.

***Teacher Assessment** shall be based on following components: Quiz/Assignment/Project/Participation in class (Given that no component shall be exceed 10 Marks)

Course Educational Objectives (CEOs):

- Understand foundations of Distributed Systems
- Understand the network virtualization, remote method invocation and objects and RPC.
- Introduce the idea of peer to peer services and file system
- Methods of understanding clock synchronization protocols &replication
- Understand the issues involved in studying process and resource management

Course Outcomes (COs):

- Discuss trends in Distributed Systems
- Demonstrate an understanding of the challenges faced by future distributed systems
- Learn and apply the concept of network virtualization and remote method invocation
- Apply network virtualization in Real time systems like
- Analyze the mechanism of peer to peer systems, DFS and DNS.
- Understand key mechanisms and models for distributed systems including logical clocks, causality, distributed mutual exclusion, distributed deadlocks.
- Design process and resource management systems.

UNIT-I

Concepts of Distributed Systems: Introduction, Goals of Distributed Systems, Distributed computing models Hardware and Software concepts, the client server model, Remote procedure call, remote object invocation, message and stream oriented communications.

UNIT-II

Process and synchronization in Distributed Systems: Threads, clients, servers, code

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migration, Clock synchronization, Logical clocks, Global state, Mutual exclusion, Election algorithms: Bully algorithm, Ring algorithm, Leader election in rings, anonymous rings, Asynchronous rings, synchronous rings, election in wireless networks.

UNIT-III

Consistency, Replication, Fault Tolerance and Security : Object replication, Data centric consistency model, client-centric consistency models, Introduction to fault tolerance, process resilience, recovery, distributed security architecture, security management, KERBEROS, secure socket layer, cryptography.

UNIT-IV

Distributed Based File Systems: Introduction - File service architecture, File System: Features- File model -File accessing models - File sharing semantics Naming: Identifiers, Addresses, Name Resolution – Name Space Implementation – Name Caches – LDAP.

UNIT-V

Transactions & Replications: Introduction, System Model and Group Communication, Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction Recovery; Replication-Introduction, Passive (Primary) Replication, Active Replication. Distributed Algorithms: Destination based routing, APP (assignment problem in parallel), Deadlock free Packet switching, Introduction to Wave & traversal algorithms, Election algorithm. CORBA Case Study: CORBA, CORBA services.

Suggested Readings:

1. Andrew S. Tanenbaum, Maarten Van Steen, "Distributed Systems Principles and Paradigms", Pearson
Education Inc. 2002.
2. Lui, "Distributed Computing Principles and Applications".
3. Harry Singh, "Progressing to Distributed Multiprocessing", Prentice-Hall Inc.
4. B.W. Lampson, "Distributed Systems Architecture Design & Implementation", 1985 Springer Varlag.
5. Parker Y. and Verjies J. P., "Distributed computing Systems, Synchronization, Control & Communications", PHI.
6. Robert J. & Thieranf, "Distributed Processing Systems" 1978, Prentice Hall.
7. George Coulouris, J. Dollimore, and T. Kindberg, "Distribute System: Design and Concepts", Pearson Education

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							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BCCA904	Compulsory	Modeling and simulation	3	1	0	4	60	20	20	0	0

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; Q/A – Quiz/Assignment/Attendance, MST - Mid Sem Test.

***Teacher Assessment** shall be based on following components: Quiz/Assignment/Project/Participation in class (Given that no component shall be exceed 10 Marks)

Course Educational Objectives (CEOs):

- To develop mathematical models of phenomena involved in various computer engineering processes and solutions for these models.
- To introduce students to basic simulation methods and tools for modeling and simulation of continuous, discrete and combined systems.

Course Outcomes (COs):

- Understand the important physical phenomena from the problem statement
- Develop model equations for the given system
- Demonstrate the model solving ability for various processes/unit operations
- Demonstrate the ability to use a process simulation

Unit-I

System Models – Continuous and discrete models – Static and Dynamic Models – Principles used in modeling – system studies – system analysis – design and postulation

Unit-II

System simulation: Types of Models, Techniques of simulation – Monte Carlo Method – Comparison of analysis and simulation – Types of system – Simulation Numerical

Unit –III

Computation for simulation – Applications of digital analog and hybrid computers in continuous system simulation – Real time simulation

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Unit-IV

Exponential growth models, exponential decay models – Logistic curves –Generation of growth models – system models – system dynamic diagrams

Unit-V

Discrete system Simulation : Discrete events – Generation of arrival patterns – Simulation of telephone systems – Simulation languages – GPSS programming General description – simscript programs, simscript system concept.

Suggested Readings:

1. Banks, J, Carson S and Nilson B L, "Discrete Event System Simulation "PHI
2. Deo N "System simulation with digital computers" PHI
3. Law A M and Kelton W D "Simulation Modeling and analysis" Mc Graw Hill
4. Geoffrey Gordon., System simulation – Prentice Hall of India Pvt. Ltd. 1999.
5. Maryanski F., Digital Computer Simulation, CBS Distributors.
6. Simulation Modeling and Analysis (Averillm Law): TMH.
7. B.Barnes - Modelling and Performance Measurement of Computer System.
8. T.A. Payer - Introduction to simulation

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							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BCCA915	Elective	Computer Vision & Digital Image Processing	4	0	0	4	60	20	20	0	0

Course Education Objectives (CEOs):

a) Make the students learn basic principles of image formation and image processing algorithms.
b) Make the students aware of different algorithms for 3D reconstruction and recognition from single or multiple images (video).
c) Emphasis is on the core vision tasks of scene understanding and recognition.
d) Applications to 3D modelling, video analysis, video surveillance, object recognition and vision based control will be discussed**.**

Course Outcomes (COs):

After learning the course the students should be able to:

a) Implement fundamental image processing techniques required for computer vision
b) Understand Image formation process
c) Perform shape analysis
d) Extract features form Images and do analysis of Images
e) Generate 3D model from images
f) To develop applications using computer vision techniques
g) Understand video processing, motion computation and 3D vision and geometry

Unit-I

Computer Vision: Introduction, role, applications, successes, research issues; computer and natural vision, basic image properties.

Digital Image: basics, a simple model, Sampling and Quantization, properties, relationship between pixels imaging geometry.

Unit II

Digital image representation, steps in image processing, elements of digital image processing, systems digitization, display and recording devices.

Unit III

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Image transformations, Introduction to Fourier transforms, Discrete Fourier transforms, Fast Fourier transform, Walsh transformation,

Image enhancement, Filters in spatial and frequency domains, Histogram based processing, Image subtraction, Averaging, Image smoothing, smoothing and sharpening filters, Nedion filtering, Low pass filtering, Image sharpening by High pass filtering.

Unit IV

Image Encoding & Segmentation: Segmentation, Mapping, Quantizer, Coder. Error free compression, Lossy Compression schemes, JPEG Compression, standard.detection of discontinuation by point detection, line detection, edge detection. Edge linking & Boundary Detection: Local analysis, global by Hough transform and Global by graph theoretic techniques.

Unit V

Image Representation and Description: Chain codes, polygonal approximation, signatures, boundary segments, boundary descriptors, regional descriptors, introduction to image understanding. Motion Tracking, Image differencing, Feature matching, Optic flow.

Suggested Readings:

1. David A. Forsyth and J. Ponce, "Computer Vision - A modern approach", Pearson, 2nd edition (November 5, 2011)
2. E. Trucco and A. Verri, "Introductory Techniques for 3D Computer Vision", Prentice Hall, (March 16, 1998)
3. Rafael C. Gonzalez, Richard E. Woods, "Digital Image Processing", Pearson, 3rd edition
4. Dana H. Ballard, Christopher M. Brown, "Computer Vision", Prentice-Hall, Englewood Cliffs, 1982.
5. Richard Szeliski, "Computer Vision: Algorithms and Applications", Springer, 2010.
6. M. Sonka, V. Hlavac, and R. Boyle, "Image Processing, Analysis, and Machine Vision", CL Engineering; 3rd edition (March 19, 2007)
7. E. R. Davies, "Computer & Machine Vision – Theory, Algorithms, Practicalities", 4th Edition, Academic Press, 2012.
8. Simon J. D. Prince, "Computer Vision: Models, Learning, and Inference", Cambridge University Press, 1st edition, 2012.
9. Mark Nixon, "Feature Extraction & Image Processing for Computer Vision", 3rd Edition, Academic Press, 2012.
10. B. K. P. Horn, "Robot Vision", McGraw-Hill Higher Education, 1986.

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							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BCCA925	Elective	Embedded Systems	4	0	0	4	60	20	20	0	0

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; Q/A – Quiz/Assignment/Attendance, MST - Mid Sem Test.

***Teacher Assessment** shall be based on following components: Quiz/Assignment/Project/Participation in class (Given that no component shall be exceed 10 Marks)

Course Educational Objectives (CEOs):

- Understand the fundamentals of embedded systems
- Know about typical engineering issues of software development

Course Outcomes (Cos): After the successful completion of this course students will be able to

- Learn software modeling fundamentals
- Familiarize the student with the architecture of embedded systems in general
- Learn the rationale and concepts for designing embedded systems

UNIT – I

Embedded System: Introduction, architecture, classifications, requirements, Applications, challenges and design issues in embedded systems, fundamentals of embedded processor and microcontrollers, communication interface, Embedded firmware, system components, CISC vs. RISC, types of microcontrollers

UNIT – II

Hardware and software design, Microprocessor Vs Micro Controller, Embedded system model, embedded board using von Neuman model, Fundamental issues of hardware software co-design, computational models in embedded design, unified modeling language, general purpose ISA models, instruction level parallelism,

UNIT-III

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Internal processor design: ALU – registers – control unit - clock – on chip memory – processor i/o – interrupts – processor buses – processor, Introduction and application of Middleware, Architecture of 8085 microcontroller, architectural patterns and reference models, analyzing and evaluating the architecture, debugging testing and maintaining

UNIT-IV

Embedded firmware design approaches- OS based, Super loop based. Embedded firmware development languages- Assembly language based, high level language based, mixed. Programming in embedded C

UNIT-V

Objective, Need, different Phases & Modeling of the EDLC. Choice of Target Architectures for Embedded Application Development for Control Dominated, Data Dominated Systems, Software & Hardware Design, PCB Design, Manufacturing & PCB Assembly Bug, tracking reduction of risks& costs, Unit testing, Regression testing, Functional tests, Testing embedded software, Performance testing

Suggested Readings:

1. James K.Peckol, “Embedded system Design”,JohnWiley&Sons,2010
2. EliciaWhite,”Making Embedded Systems”,O’Reilly Series,SPD,2011
3. Rajkamal,”Embedded Systems”,TMH,2009
4. Lyla B Das,” Embedded Systems-An Integrated Approach”,Pearson2013
5. Steve Heath, “Embedded system design”, Elsevier, 2003.
6. David E. Simon, “An Embedded Software Primer”, Pearson Education,2003

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COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY			PRACTICAL	
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BCCAE935	Elective	Fault Tolerant Computer Systems	4	0	0	4	60	20	20	0	0

Course Education Objectives (CEOs):

In this course students should understand the challenges and problems in Fault Tolerant computing.

- To understand Fault measurement and modelling.
- To understand Fault detection and Diagnosis.
- To understand Fault avoidance/Prevention techniques.
- To understand Fault Tolerance Applications.

Course Outcomes (COs):

After successful completion of this course the students will be able to:

- To understand research problems and challenges in fault tolerant computing.
- To identify the state-of-the-art techniques and tools to address research problems and challenges in Fault Tolerant Computing.

UNIT – I

Introduction: Definition of fault tolerance, Redundancy, Applications of fault-tolerance, Fundamentals of dependability.

UNIT – II

Attributes: Reliability, availability, safety, Impairments: faults, errors and failures, Means: fault prevention, removal and forecasting

UNIT – III

Dependability Evaluation: Common measures: failures rate, mean time to failure, mean time to repair, etc. Reliability block diagrams, Markov processes, Reliability.

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UNIT – IV

Redundancy: Hardware redundancy, Redundancy schemes, Evaluation and comparison, Applications, Information redundancy ,Codes: linear, Hamming, cyclic, unordered, arithmetic, etc.

Encoding and decoding techniques, Applications, Time redundancy**.**

UNIT - V

Programming: Software fault tolerance, Specific features, Software fault tolerance techniques: N-version programming, recovery blocks, self-checking software, etc.

Suggested Readings:

1 Anderson, T., and P.A. Lee, Fault-Tolerant Principles and Practices, Prentice-Hall
2 Hwang, K., and F.A. Briggs, Computer Architecture and Parallel Processing, McGraw-Hill.
Jalote, P.
3. Fault-Tolerance in Distributed Systems, ISBN 0-13-301367-7, Prentice-Hall,
4. Johnson, B.W., Design and Analysis of Fault-Tolerant Systems, Addison Wesely
5. Leveson, Nancy G., Safeware, system safety and computers, Addison Wesely.
6. Pradhan, D.K., Fault-Tolerant Computing — Theory and Techniques, (2 Volumes), Prentice-Hall.
7. Pradhan, Dhiraj K., Fault-Tolerant Computer System Design, ISBN 0-13-057887-8, Prentice-Hall PTR

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							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BCCA906	Compulsory	Lab -1 (Cloud Computing Lab)	0	0	4	2	0	0	0	30	20

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***Teacher Assessment** shall be based on following components:
Quiz/Assignment/Project/Participation in class (Given that no component shall be exceed 10 Marks)

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Course Learning Objectives (CEOs):

- To know about the cloud
- Various features of the cloud – Security, User Management,
- Case studies on different clouds on Amazon

Course Outcomes (Cos): Student will be able to:

- Appreciate cloud architecture
- Create and run virtual machines on open source OS
- implement Infrastructure, storage as a Service.
- Install and appreciate security features for cloud

Note: Program should be fully documented with sample I/O.

S No	Experiments	Lab Session
1.	**Title:** Study of Cloud Computing & Architecture**.** **Concept:** Cloud Computing & Architecture. **Objective:** Objective of this module is to provide students an overview of the Cloud Computing and Architecture and different types of Cloud Computing **Scope:** Cloud Computing & Architecture Types of Cloud Computing **Technology: --**	
2.	**Title:** Virtualization in Cloud. **Concept:** Virtualization **Objective:** In this module students will learn to implement VM Ware's Workstation **Technology: Oracle's Virtual Box**	
3.	**Title:** Study and installation of Storage as Service. **Concept:** Storage as Service (SaaS) **Objective:** is that, students must be able to understand the concept of SaaS , and how it is implemented using ownCloud which gives universal access to files through a web interface. Scope: is to installation and understanding features of ownCloud as SaaS. **Technology:** ownCloud	
4.	**Title:** Securing Servers in Cloud**.** **Concept:** Cloud Security **Objective:** is to understand how to secure web server, how to secure data directory and introduction to encryption for own cloud. **Scope:** Installing and using security feature of ownCloud Technology: ownCloud	
5.	**Title:** Case study on Amazon EC2. **Concept:** Amazon EC2 Objective: in this module students will	

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	learn about Amazon EC2. Amazon Elastic Compute Cloud is a central part of Amazon.com's cloud computing platform, Amazon Web Services. EC2 allows users to rent virtual computers on which to run their own computer application	
6.	**Title:** Case study on Google App Engine**.** **Concept:** Google App Engine **Objective**: students will learnTo understand Google App Enginendits services. They will get knowledge of Open Source Cloud. Know about Google Play platforms. **Technology:** Google App Engine	
7.	**Title:** Mini project. **Concept:** using different features of cloud computing creating own cloud for institute, organization etc. **Objective:** is student must be able to create own cloud using different features which are learned in previous practices. Scope: creating a cloud like social site for institute. **Technology:** any open system used for cloud	

Suggested Readings:

1. Cloud Computing, Roger Jennings, Wiley India
2. Buyya, Selvi ,‖ Mastering Cloud Computing —,TMH Pub
3.Cloud Computing Explained, John Rhoton, Recursive Press
4. Kumar Saurabh, —Cloud Computing‖ , Wiley Pub
5. Krutz , Vines, —Cloud Security — , Wiley Pub
6. Velte, —Cloud Computing-A Practical Approach‖ ,TMH Pub
7. Sosinsky, —' Cloud Computing' , Wiley Pu

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							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
BCCA907	Compulsory	Lab - 2 (Advanced computer Graphics Lab)	0	0	4	2	0	0	0	30	20

Course Education Objectives (CEOs):

- Provide knowledge about hardware and software used in computer Graphics.
- Offer an in-depth exploration of fundamental concepts in 2D and 3D computer graphics.
- Impart knowledge about drawing algorithms.
- Provide detailed knowledge about color and intensity levels.
- Explain the global and local illumination models.
- Design and implement a rendering algorithm based on Monte Carlo path tracing.
- Analysis of basic ray-tracing algorithm and explain its limitations.
- Applying efficient graphics technique to solve engineering problems.

Course Outcomes (COs):

After the successful completion of the course students should be able to:

- Understand basic knowledge about hardware and software used in Computer Graphics.
- Understand the color and intensity levels and identify the visible area of any surface.
- Analyze the basic ray-tracing algorithm and explain its limitations.
- Be able to Compare various graphics algorithm used in 2D and 3D.
- Be able to understand and identify the performance characteristics of graphics algorithms.
- Employ algorithm to model engineering problems, when appropriate.

List of Experiments:

1. By using the concept of Scan line polygon fill algorithm, write a C- program for filling a given object with color.
2. Write a program for simple animation of a football goal.
3. Program to show the projection of 3D objects using Standard Perspective Projection.
4. Write a C-program for performing the basic 2D transformations such as translation, scaling, rotation, shearing and reflection for a given 2D object?

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5. Write a C-program for performing the basic transformations such as translation, Scaling, Rotation for a given 3D object?
6. Write a C program to clip a Window to Viewport Mapping.
7. Write an open GL program for Bezier Curve.
8. Write a program to perform Bezier curve with c^0 and c^1 continuity.
9. Write a program to draw a cube with or without back face culling.
10. Write a program to perform Hermite Curve.
11. Write a program to perform diffuse illumination.
12. Write a program to draw a sphere with Back face culling.
13. Write a program for ambient, specular and diffuse light source.
14. Write a program for Diffuse only light source.
15. Write a program to perform Z buffer visible surface Algorithm.

Suggested Readings:

1. Foley et. al., "Computer Graphics Principles & practice", Addison Wesley Ltd., 2003.
2. R.H. Bartels, J.C. Beatty and B.A. Barsky, "An Introduction to Splines for use in Computer Graphics and Geometric Modeling", Morgan Kaufmann Publishers Inc., 1987.
3. D. Hearn and P. Baker, "Computer Graphics", Prentice Hall, 2003.
4. W. Newman and R. Sproul, "Principles of Interactive Computer Graphics, McGraw-Hill, 1973.
5. R. Plastock and G. Kalley, "Theory and Problems of Computer Graphics", Schaum's Series, McGraw Hill, 2001.
6. F.P. Preparata and M.I. Shamos, "Computational Geometry: An Introduction", Springer-Verlag New York Inc., 1985.
7. D. Rogers and J. Adams, "Mathematical Elements for Computer Graphics", MacGraw-Hill International Edition, 1989.
8. David F. Rogers, "Procedural Elements for Computer Graphics", McGraw Hill Book Company, 1985.
9. Alan Watt and Mark Watt, "Advanced Animation and Rendering Techniques", Addison-Wesley, 2002.