B.C.A. SEMESTER - 6

Course 601-1 : Computer Graphics

Course Code	601-1
Course Title	Computer Graphics
Credit	4
Teaching / Week	4 Hours / Week (Suggested) (Total Minimum 48 Hours)
Minimum Weeks/Semester	15 Weeks (Including Class work, preparation, Examinations etc.)
Review/Revision	2021-2022
Implementation Year	2022-2023 A.Y.
Purpose of Course (POC)	Make students aware and understand Computer Graphics.
Course Objective	To make students understand and learn the geometrical processes on various shapes, objects and text.
Pre-requisite	Basic concepts of computer-based animation, various objects and basic school geometry.
Course Outcome	Students will be able to understand and write algorithms for construction of various shapes like line, circle & ellipse, and various processes on them.
Course Content	**Unit 1. Introduction** 1.1 Application areas of Graphics Systems 1.1.1. Presentation Graphics 1.1.2. Entertainment 1.1.3. Education and Training 1.1.4. Image Processing 1.2 Computer Graphics Files 1.3 Introduction to graphic standards **Unit 2. Graphics Systems** 2.1. Video Display Devices 2.1.1. Refresh CRT 2.1.2. Color CRT 2.1.3. LCD 2.1.4. Direct View Storage Tube 2.2. Raster scan and Random Scan Display 2.3. Raster Graphics and Vector Graphics 2.4. Concepts of various objects: Point, Line, Circle, Ellipse and Polygons **Unit 3. Line generation** 3.1. Geometry of line 3.2. Frame Buffer 3.3. Line Drawing Algorithms 3.3.1. DDA Algorithm 3.3.2. VECGEN 3.3.3. Bresenham 3.4. Line Styles 3.4.1. Thick line 3.4.2. Line caps and joint 3.5. Anti-aliasing of line **Unit 4. Polygons** 4.1 Polygon Representation

	4.2 Polygon Inside Tests 4.2.1 Even-odd method 4.2.2 Winding number method 4.3 Polygon Area Filling Algorithm 4.3.1 Flood Fill 4.3.2 Scan Line 4.3.3 Boundary Fill 4.4 Filling polygon with a pattern **Unit 5. Geometric Transformations** 5.1 Basic Transformations 5.1.1 Scaling 5.1.2 Translation 5.1.3 Rotation 5.1.3.1 Rotation about origin 5.1.3.2 Rotation about Homogeneous Coordinates 5.2 Other transformations 5.2.1 Reflection 5.2.2 Shearing [All Units carry Equal Weightage]
Reference Books	1. Computer Graphics - second edition, Donald Hearn & M. Pauline Baker – Tata McGraw Hill Pub. 2. Computer Graphics, Harrington S. -Tata McGraw Hill. 3. Computer Graphics, Desai A. A. –PHI. 4. Computer Graphics: Algorithms & Implementations, Mukherjee & Jana – PHI. 5. Interactive Computer Graphics, Giloi W. K. –Prentice Hall India. 6. Principles of Interactive Computer Graphics, New Man W. & Sproul P. F. –McGraw Hill 7. Procedural Elements for Computer Graphics, Rogers D. F. – McGraw Hill.
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.

Course 601-2: Fundamentals of Cloud Computing

Course Code	601-2
Course Title	Cloud Computing
Credit	4
Teaching / Week	4 Hours / Week (Suggested) (Total Minimum 48 Hours)
Minimum Weeks/Semester	15 Weeks (Including Class work, preparation, Examinations etc.)
Review/Revision	2021-2022
Implementation Year	2022-2023 A.Y.
Purpose of Course (POC)	To provide fundamental knowledge and management of cloud computing system along with Big Data.
Course Objective	To provide comprehensive knowledge of cloud computing, its architecture, Management and security. This course will also provide the introductory knowledge of Big Data.
Pre-requisite	Basic concepts and understanding of operating system and computer network technologies.
Course Outcome	After learning the course, the student will be able: • To understand the cloud models such as software as a service and the other models Iaas and Paas as well as managing in a multi-cloud world, developing your cloud strategy such as integrating data in the cloud, promoting cloud security, and more. • To learn about Big data sets that are too large to be handled by traditional data-processing application software and about Data Lake.
Course Content	**Unit-1: Introduction to Cloud Computing** 1.1 Fundamentals of Cloud Computing 1.1.1 Concepts of cloud and cloud computing 1.1.2 Types of cloud based on deployment (Public, Private and Hybrid) 1.2 Cloud service models: 1.2.1 IaaS (Infrastructure as a Service), PaaS (Platform as a Service) 1.2.2 SaaS (Software as a Service) 1.2.3 Network as a Service, Database as a Service 1.3 Advantages and dis-advantages of Cloud computing **Unit-2: Architecture of Cloud Computing** 2.1 Basics of Planning and deployment of Cloud 2.1.1 Cloud Planning phases 2.1.1.1 Business Architecture Development 2.1.1.2 IT Architecture Development 2.1.1.3 Transformation Plan Development 2.1.2 Technologies behind the Cloud 2.1.2.1 Virtualization 2.1.2.2 Service oriented Architecture (SOA) 2.1.2.3 Utility Computing 2.2 Cloud Computing Architecture 2.3 Infrastructure components of Cloud **Unit-3: Cloud Management:** 3.1 Tasks of Cloud management 3.2 Cloud Storage Devices: (Block storage, File Storage) 3.3 Cloud Storage Classes: (Managed and Unmanaged) 3.3.1 Cloud Virtualization:

	3.3.1.1 Hypervisor 3.3.1.2 Types of Hardware Virtualization: (Full, Emulation, Para) **Unit-4: Cloud Securing, Operations and Applications:** 4.1 Security Boundaries 4.1.1 Cloud security Alliance (CSA) 4.1.2 Cloud operations and its management concepts 4.2 Cloud applications: 4.2.1 Business Applications 4.2.2 Data storage and backup applications **Unit-5: Concepts of Big Data and Data Lake:** 5.1 Concepts of Bigdata 5.1.1 Sources of Bigdata 5.1.2 Bigdata benefits over Traditional Database 5.1.3 Concepts of Data Warehouse 5.1.3.1 Concepts of data processing techniques: 5.1.3.1.1 OLTP (Online Transaction Processing) 5.1.3.1.2 OLAP (Online Analytical Processing) 5.2 Concepts of Data Lake: 5.2.1 Data lake concepts and its architecture 5.2.2 Significance of data lake 5.2.3 Comparison of Data Lake and Data Warehousing [All Units carry Equal Weightage]
Reference Books	1. Cloud Computing For Dummies 2nd Edition, by Judith S. Hurwitz, Daniel Kirsch, John Wiley & Sons Inc., ISBN: 978-1119546658 2. Cloud Computing: Concepts, Technology & Architecture, Ricardo Puttini, Thomas Erl, and Zaigham Mahmood, PHI, ISBN: 978-0133387520, 3. Cloud Computing: Principles and Paradigms - R. Buyya et al, Wiley 2010 4. Cloud Computing : Principles Systems and Application - L Gillam et al - Springer 2010 5.Cloud Computing Bible - Sosinsky - Wiley - India, 2011 6.Cloud Computing Second Edition Dr. Kumar Saurabh, Wiley - India, 2012 7.Service Oriented Architeture: Concepts , Technology and Design, Thomas Erl, Prentice Hall publication, 2005 8.Understanding Enterprise SOA - Enterprise Service Oriented Architecture, Eric Pulier, Hugh Taylor, Dreamtech Press 2008 9.Cloud Computing - Insight into New Era Infrastructure, Dr Kumar Saurabh, Wiley India 2012 10.Understanding SOA with Web Services - Sanjiva Weerawarana, Franscisco Cubera, Frank Leymann, Tony Storey, Donald F Ferguson, Eric Newcomer, Greg Lomow - Addision Wesely Publication, 2004 11.Enterprise Service Bus - Dave Chappelll - O'Reilly Publications 2004 12. Amazon Web Services For Dummies, Bernard Golden, ISBN:978-1118571835 13. Principles of Interactive Computer Graphics, New Man W. & Sproul P. F. –McGraw Hill 14. Procedural Elements for Computer Graphics, Rogers D. F. – McGraw Hill.
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.

Course: 602 – E-Commerce and Cyber Security

Course Code	602
Course Title	E-Commerce and Cyber Security
Credit	4
Teaching / Week	4 Hours / Week (Suggested) (Total Minimum 48 Hours)
Minimum Weeks/Semester	15 Weeks (Including Class work, preparation, Examinations etc.)
Review/Revision	2021-2022
Implementation Year	2022-2023 A.Y.
Purpose of Course (POC)	To make students aware of e-Commerce, Cyber Security, Cyber Crime and Cyber Laws
Course Objective	To impart basic knowledge of e-Commerce, Cyber Security, Cyber Crime & Cyber Law
Pre-requisite	Fundamental Knowledge of Networking, Web Applications & Database
Course Outcome	The students will get the basic knowledge of e-Commerce, Cyber Security, Cyber Crime & Cyber Law and hence will help them in developing secured applications and will make them aware of various Cyber Laws
Content	**Unit 1:** Introduction to Electronic Commerce 1.1 Concepts of e-Commerce 1.2 Aims of e-Commerce 1.3 e-Commerce Framework 1.4 e-Commerce Consumer Applications 1.5 e-Commerce Organizational Applications 1.6 Introduction to m-Commerce **Unit 2:** Network Infrastructure of e-Com , Payment and Security: 2.1. Concepts of Information Way 2.2. Components of I-Way 2.2.1. Network Access Equipment 2.2.2. Local on-ramps 2.2.3. Global Information Distribution Network 2.3. Transaction Models 2.4 e-Commerce Payments and Security Issues 2.4.1. e-Commerce Payment Systems 2.4.2. Debit Card Based, Credit Card Based ,. Risks & EPS 2.4.3. e-Cash, e-Cheque, e-wallet 2.5. Security on Web, SSL **Unit-3:** Introduction to Cyber Crimes: 3.1 Category of Cyber Crimes 3.2 Technical Aspects of Cyber Crimes 3.2.1 Unauthorized access & Hacking 3.2.2 Trojan, Virus and Worm Attacks 3.2.3 E-Mail related Crimes: Spoofing, Spamming, Bombing 3.2.4 Denial of Service Attacks 3.2.5 Distributed Denial of Service Attack 3.3 Various crimes : 3.3.1 IPR Violations (Software piracy, Copyright Infringement, Trademarks Violations, Theft of Computer source code, Patent Violations) 3.3.2 Cyber Squatting, Cyber Smearing, Cyber Stacking 3.3.3 Financial Crimes: (Banking, credit card, Debit card related) **Unit-4:** 4.1 Concepts of Cyber Security:

	4.1.1 Types of Threats 4.1.2 Advantages of Cyber Security 4.2 Basic Terminologies: 4.2.1 IP Address, MAC Address 4.2.2 Domain name Server(DNS) 4.2.3 DHCP, Router, Bots 4.3 Common Types of Attacks: 4.3.1 Distributed Denial of Service 4.3.2 Man in the Middle, Email Attack 4.3.2 Password Attack, Malware 4.4 Hackers: 4.4.1 Various Vulnerabilities: 4.4.1.1 Injection attacks, Changes in security settings 4.4.1.2 Expouser of Sensitive Data 4.4.1.3 Breach in authentication protocol 4.4.2 Types of Hackers: White hat and Black hat **Unit-5:** 5.1 Ethical Hacker 5.1.1 Roles and Responsibilities 5.1.2 Benefit of Ethical Hacking 5.1.3 Skills require to become Ethical hacker 5.2 Penetration testing concepts 5.2.1 Phases of Ethical hacking 5.2.1 Areas of penetration testing 5.3 SQL Injection: 5.3.1 Concepts of SQL Injection 5.3.2 Types of SQL Injection 5.3.3 Case study of SQL Injection 5.4 Firewall: 5.4.1 Concepts of Firewall 5.4.2 Types of Firewall 5.4.3 Working, Advantages and Importance of Firewall [All Units carry Equal Weightage]
Reference Book	1. Frontiers of Electronic Commerce, Ravi Kalakota and Andrew Whinston, Addition Wesley 2. Electronic Commerce: A Managerial Perspective, Efraim turban, Jae Lee, David King, H. Michel Chung, Addition Wesley 3. E-Commerce: An Indian Perspective, Joseph, PHI 4. E-Mail Hacking, Ankit Fadia, Vikas Publishing House Pvt. Ltd. 5. e-Commerce Concept, Models Strategies, G.V.S. Murthy, Himalaya Publisher 6. Cyber Crime in India, Dr M Dasgupta, Centax Publications Pvt Ltd 7. Cyber Laws and Crimes, Barkha U, Rama Mohan, Universal Law Publishing Co. Pvt Ltd. 8. Cyber Crime, Bansal S.K., A.P.H. Publishing Corporation 9. Cyber Security Understanding Cyber Crime, Computer Forensic and Legal Perspectives, Nina Godbole, Sunit Belapur, Willey India Publication
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	30% Internal assessment. 70% External assessment.

Course: 603: Project

Course Code	603
Course Title	Project
Credit	14
Teaching / Week	2 Hrs. / Week / 5 students (Reporting & Contact hours)
Minimum Weeks/Semester	15 (Including class work, examination, preparation etc.) 28 hours/week
Review/Revision	2021-2022
Implementation Year	2022-2023 A.Y.
Purpose of Course (POC)	To make students get hands on experience of software development life cycle.
Course Objective	The main objective is to make students acquire knowledge of analyzing and solving real world problems and hands on experience of software development life cycle.
Pre-requisite	Knowledge of Operating System, Computer Networking, Software Engineering, Database, Application Development Tools, Web Designing Related Tools, Computer Languages.
Course Outcome	Students will understand the complete process of software development life cycle and will be able to produce good applications of real world problems.
Guidelines for Project	The project will be in-house. Duration of the Project Work should be minimum eight weeks. The project work will start with the beginning of the semester. All the students will have to submit following reports to their respective examination centers. 1. The Joining Report (Once). 2. Project Title Report (Once). 3. Progress Reports (Fortnightly) signed by the guide (internal faculty) & submitted to the Head/Project Coordinator in person. 4. Project Completion Certificate issued from the College. The student shall not be allowed to appear for the Final Examination if the student fails to submit the above-mentioned documents. Project Viva-voce will be conducted at the end of the semester. The project report in form of soft-copy can be accepted along with the required documents/reports in form of hardcopy.
Evaluation Method	30% Internal assessment. 70% External assessment. Internal Evaluation: Minimum two faculties (preferably senior most) should be nominated by the Head of the Department or the senior most faculty in absence of the Head to evaluate the performance of the students' presentation. External Evaluation: The evaluation should be as per the following break up: 1. Analysis: 25% weightage 2. Design: 25% weightage 3. Implementation: 25% weightage 4. Presentation: 15% weightage 5. Project Report: 10% weightage

Course: 604: Seminar on Information Technology Innovations & Trends

Course Code	604
Course Title	Seminar on Information Technology Innovations & Trends
Credit	3
Teaching / Week	3
Minimum Weeks/Semester	15 (Including class work, examination, preparation etc.)
Review/Revision	2021-2022
Implementation Year	2022-2023
Purpose of Course (POC)	1. To improve the communication and presentation skills. 2. To let students, update knowledge on latest & forthcoming technologies. 3. Let students keep pace with new trends of Information Technology.
Course Outcome	Students will be able to develop their presentation skills and will keep themselves updated with latest trends in Information Technology.
Course Objective	Information Technology is a constantly changing field. The idea of introducing this subject is to let students keep pace with the changing scenario of I. T. During the lectures, faculty will help students to select the topic. The students will collect relevant information from various sources and prepare a presentation. During the class hours, students will present their presentation on the given topic. The faculty will access and help them to improve their presentation skills.
Pre-requisite	-
Guidelines for Seminar	Students will prepare a presentation using ICT Tools and submit hard copy of the presentation for Internal and External evaluation.
Evaluation Method	30% Internal assessment. 70% External assessment. Evaluation: External examiners appointed by the university will evaluate the Seminar Presentation. The external seminar exam will be scheduled simultaneously along with the project exams. For internal evaluation, Minimum two faculties (Preferably senior most) nominated by the Department Head or the Senior most faculty, in absence of the Department Head, will evaluate the performance of the student's presentation and will be treated as Internal Evaluation. The students will submit and produce the softcopy of the seminar report along with the hardcopy of the required certificates at the time of internal and external exams. The evaluation should be as per the following break up: 1. Selection of the Topic & Relevance: 20% weightage 2. Understanding of the topic: 35% weightage 3. Source of the topic: 10% weightage 4. Presentation: 35% weightage

Course: Foundation Elective (FND – 06)

Course Code	FND-05
Course Title	Foundation Elective
Credit	2
Teaching / Week	-
Minimum Weeks/Semester	-
Review/Revision	2021-2022
Implementation Year	2022-2023 A.Y.
Purpose of Course (POC)	To enhance the student's capabilities in terms of extra curriculum activity or by gaining additional knowledge in any field including their core subjects.
Course Objective	Make students to participate and learn new technology or any multi-disciplinary subject by joining university approved 2 credit certificate course. Students are encouraged to participate in sports/NSS/NCC and contribute at University level or state level or National level.
Pre-requisite	No specific requirement.
Course Outcome	Students will be able to obtain additional 2 credits by active participation in field of NSS/NCC/Sports/Saptdhara/Certificate course.
Structure of the Course:	Students are required to select any one from the following and produce the evidence. Additional 2 credits will be granted to the students on recommendation by the principal on fulfilment of any of the following criteria during the semester. 1) Active participation in NSS/ NCC at University level / State level / National level and produce the certificate. 2) Active Participation in any one saptdhara/Sports activity and represent/participate at University level / State level / National level and produce the certificate. 3) Successful completion of any minimum two credit course recognized by the University from any university affiliated institution. The credits will be granted on producing the completion certificate. (Certification course fees will be paid separately by the student for which the student enrolled. It is an optional activity in lieu of NSS/NCC/Sports/Saptdhara.)
Evaluation Method:	On producing the supporting document as per the need described in "Structure of the Course" section.