SARVAJANIK UNIVERSITY
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Faculty of Science

Shree Ramkrishna Institute of Computer Education & Applied Sciences, Surat

B.Sc. Computer Science

SEMESTER- 5

Program Structure		Semester 5						
Course Code	Title	Teaching Hrs. per Week		Course Credits	University Examination		Internal Marks	Total Marks
		Theory	Practical		Duration	Marks		
	Life Skills / NSS / NCC	2		2				
BCS 501	DSC-9 Mobile Application Development	4		4		30	70	100
BCS 502	DSC-10 Operating Systems	4		4		30	70	100
BCS 503	SEC 3-Introduction to Bigdata and IOT	4		4		30	70	100
BCS 504	DSE-5 Digital Marketing & SEO	2		2		30	70	100
	DSE-5 Cloud Computing							
	DSE-5 Enterprise Resource							

	Planning							
	Transdisciplinary Open Electives	2		2				
BCS 505	Practical-5		12	6		50	100	150
				24				650

		Semester -6						
Course Code	Title	Teaching Hrs. per week		Course Credits	University Examination		Internal Marks	Total Marks
		Theory	Practical		Duration	Marks		
	Life Skills/ NSS/ NCC / NCC/ NSS	2		2				
BCS 601	DSC 11, 12 , DSE 6 Project / Internship		24	18		150	300	450
BCS 602	DSE-6 Seminar : Emerging trends, technologies and tools in Computer Science & IT		2	2		30	70	100
	Transdisciplinary Open Electives	2		2				
				24				650

DSC-9: Smart Device Programming

Course Code	
Course Title	**DSC-9: SMART DEVICE COMPUTING**
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	---
Purpose of Course	To introduce the most demanding and developing mobile app technology. Fundamentals of android open source technology
Course Objective	1. To make students understand fundamentals of mobile app technology. 2. To make students understand various inbuilt features of android. 3. To make students understand the android design essentials. 4. To make students understand android user interface design basics.
Pr-requisite	Pre-requisite Fundamentals of web technologies and fundamentals related to mobile OS.
Course Out come	Students will have knowledge about android which is widely used Mobile OS and open source technology and its concepts. Various features of android like Application Design Essentials, User Interface Design Essentials, Use of Common Android APIs, data storage using SQLite and deploying Android application.
Course Content	**Unit-1 :Introduction to Android** 1.1 Android - Architecture 1.2 Android Application Components 1.3 Android Application Directory Structure **Unit-2 : Android Application Design Essentials** 2.1 Understanding the IDE – Emulator/ AVD, logcat, Gradle, SDK 2.2. Android Activity Lifecycle 2.3 Application Context and Activity Context 2.4 Android Manifest File and its common settings 2.5 Intent and Intent Filter **Unit-3 : Android User Interface Design Essentials** 3.1 UI elements – EditText, TextView, Button, RadioButton, CheckBox, Listview, RecyclerView, Spinner 3.2 Designing User Interfaces with Layouts 3.2.1 Relative Layouts 3.2.2 Linear Layouts 3.2.3 Constraint Layouts **Unit-4 : Programming for different devices** 4.1 Android TV, Android for Car, Android Things 4.2 Overview of screen compatibility 4.3 Support different pixel densities **Unit-5 : Menus and Dialog Box** 5.1 Menus – Context menu, Pop-up menu, Option menu 5.2 Toast Message and Alert Dialog box **Unit-6 : Using Shared preferences**

	6.1 Purpose of Shred Preferences 6.2 Shared Preference Modes 6.3 Writing to shared Preferences 6.4 Methods of editor class 6.5 Reading from Shared Preference **Unit-7 : Preserving and Saving data in Local Database** 7.1 Introduction to SQLite 7.2 SqliteOpenHelper Class 7.3 SQlite Methods - ExecSQL, Rawquery, Insert, Update, Delete **Unit 8: SqlServer connection with android app** 8.1 Connecting to the MS Sql Server 8.2 Storing and Retrieving data in MS Sql Server
Text and Reference Literature	1. Silberschatz, Korth, Sudarshan ,Database System Concepts, McGraw-Hill computer science series 2. C J Date, An introduction to Database Systems, Addition-Wesley Nilesh shah, Database System using Oracle, PHI. 3. Ramez Elmasri & Shamkant B. Navathe, Fundamentals of Database Systems, Addison-Wesley 4. Hector Gracia-Molina, Jeffrey D. Ullman, and Jennifer Widom, Database System Implementation, Pearson. 5. Ivan Bayross, SQL, PL/SQL, BPB Publications 6. Scott Urman, Oracle9i PL/SQL programming, McGraw-Hill
Teaching Methodology	The course is composed of Lectures, assignments and a group project.
Evaluation Method	70% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 30% assessment is based on semester end written examination

DSC-10: Operating System

Course Code	
Course Title	**DCS-10 Operating Systems**
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	---
Purpose of Course	Conceptualize the students with the theoretical concepts of Operating System
Course Objective	Familiarization with different objectives of operating system components like process management and inter-process communication; Experiments on process scheduling and other operating system tasks through simulation/implementation under a simulated environment
Pre-requisite	Fundamentals of Computer Organization and Operating System
Course Out come	• Describe the various components of Operating Systems. • Case study of Unix operating systems to analyze the different services provided by UNIX Operating System • Design and implement various system calls and concurrent processes requiring synchronization.
Course Content	**Unit- 1: Operating System Concepts** 1.1. Operating system fundamental and its types 1.2. Components of operating system 1.3. BIOS, Booting process and kernel 1.4. Functions of operating systems 1.5. Interrupt and System call, Data bus and Address bus **Unit- 2: I/O Device and File Management** 2.1 I/O Devices, Device controllers and drivers, DMA, Programmed I/O, Interrupt driven I/O, I/O using DMA 2.2 Disk space Management 2.3 Allocation and Disk Arm Scheduling Methods (FCFS, SSTF, SCAN, C-SCAN) 2.4 Drivers for different devices. **Unit- 3: Files structure** 3.1 File storage mechanism, File allocation table, Directory and File structure, Attributes, Types, Access, Operations, Protection, and sharing and remote access. 3.2 File system management and optimization - Disk space management, backup, consistency, Performance, Defragmentation **Unit- 4: Memory Management** 2.1 Address space, Contiguous and non contiguous allocation, Managing free space

	2.2 Virtual memory - Paging, Page size, Page table, Page fault, Demand Paging, Page replacement algorithms (FIFO, LRU, 2nd Chance NRU Optimal), Shared page 2.3 Segmentation - Implementation of pure segmentation, segmentation with paging. **Unit- 5: Process Management** 5.1 Process, Process states, PCB, Process scheduling 5.2 Scheduling Algorithms 5.3 Study of Round-robin, FCFS, SJF, SRTF and priority algorithms 5.4 Overview of deadlock 5.5 Deadlock avoidance, prevention and recovery 5.6 Overview of Inter process communication 5.7 Deadlocks - Overview of Deadlock Avoidance, Prevention and Recovery **Unit- 6: Security and Protection in operating systems** 6.1 Main features of security and protection 6.2 Different security concerns 6.3 Ways available in OS to protect the the system 6.4 Inbuilt security features of operating system. 6.5 Group policy **Unit- 7: Introduction to Unix operating system** 1.1 Introduction: History of Unix, features 1.2 Unix system architecture and kernel 1.3 Unix command format, Unix internal and external commands, Directory commands, File related commands, Disk related commands, general utilities. **Unit- 8: File, Process and memory management in Unix operating systems** 8.1 Unix File System: Boot inode, super and data block, in-core structure, Directories, conversion of pathname to inode, inode to a new file, Disk block allocation. 8.2 Process Management in unix: Process state and data structures of a Process, User vs, kernel node, context of a Process, background processes, Process scheduling commands, Process terminating and examining commands. 8.3 Storage Management in unix: Formatting, making file system, checking disk space, mountable file system, disk partitioning, file compression. Special Tools and Utilities: Filters, Stream editor SED and AWK, Unix system calls and library functions, Processes, signals and Interrupts, storage and compression facilities. 8.4 Basic shell Programming concepts.

Text and Reference Literature	1. Silberschatz, Korth, Sudarshan ,Database System Concepts, McGraw-Hill computer science series 2. C J Date, An introduction to Database Systems, Addition-Wesley 3. Nilesh shah, Database System using Oracle, PHI. 4. Ramez Elmasri & Shamkant B. Navathe, Fundamentals of Database Systems, Addison-Wesley 5. Hector Gracia-Molina, Jeffrey D. Ullman, and Jennifer Widom, Database System Implementation, Pearson. 6. Ivan Bayross, SQL, PL/SQL, BPB Publications 7. Scott Urman, Oracle9i PL/SQL programming, McGraw-Hill
Teaching Methodology	The course is composed of Lectures, assignments and a group project.
Evaluation Method	70% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 30% assessment is based on semester end written examination

SEC-3: Introduction to Artificial Intelligence and IoT

Course Code	
Course Title	**SEC-3: Introduction to Artificial Intelligence and IoT**
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	---
Purpose of Course	This course presents the blend of Artificial Intelligence and Internet of Things. Artificial Intelligence spans a wide variety of topics at the forefront of computer science research, including areas like machine learning, planning, computer vision, natural language processing, and many others. It is the goal of this course to study Artificial Intelligence in today's environment and to instill an understanding of representations and external constraints with the idea of enabling a student to think creatively. The subject also extends concepts of Internet of Things.
Course Objective	**The objectives are as follows:** 1) To give initial exposure of Artificial Intelligence to the students 2) To make student understand AI problems and problem solving approach 3) To make student learn fundamental AI techniques and their applications
Pr-requisite	Students are expected to have understanding of Computerized Information System
Course Out come	After having completed the course the student will be able to: 1) describe concepts, methods, and theories of problem solving approach of AI, solution search, heuristics, game playing etc. 2) describe concepts, methods, and theories knowledge representation and reasoning systems 3) describe concepts behind various AI task like planning, Decision making and Learning 4) describe various Techniques and Application Areas of AI in context of Expert Systems, ANN, Machine Learning and NLP
Course Content	**Unit 1 Introduction to Artificial Intelligence** 1.1 Intelligence 1.1.1 Composition of intelligence - Reasoning, Learning, Problem Solving, Perception, Linguistic Intelligence 1.2 Artificial Intelligence 1.2.1 Philosophy and goals of AI 1.2.2 Applications of AI 1.3 AI Agents & Environments –types of agents, ideal rational agent, structure of intelligent agents, Simple Turing test environment, environment properties

	Unit 2 Problem Solving By Search 2.1 Problem Formulation and State Space Representation of 8-Puzzle, missionaries and cannibals problem, Traveling Salesman problem, Robot Navigation Problem, Water Jug Problem 2.2 Search techniques for Solution Search- Concepts of search strategies - uninformed search: BFS, DFS, informed search-Best First Search 2.3 Introduction to planning, decision making and learning tasks. **Unit 3 Knowledge Representation & Reasoning** 3.1 Knowledge-Based agents, systems & Machine Intelligence 3.2 Knowledge Representation Techniques - Logical and Procedural Representation Schemes and Inference, Semantic Network representation, Production Rules 3.3 Introduction to Knowledge based Reasoning, Forward and Backward Chaining **Unit 4 Expert Systems & ANN** 4.1 Expert Systems 4.1.1 Expert Systems – Characteristics & Applications 4.1.2 Rule based system architecture 4.1.3 Examples of Expert System, Advantages and Limitations. 4.2 Artificial Neural Network 4.2.1 Artificial Neural Network Structures and their Limitations, 4.2.2 Perceptrons & Multi-layer Perceptrons, 4.2.3 Learning ANN structures, Application examples of ANN 4.3 Machine Learning 4.3.1 Machine Learning –Types, Applications, LifeCycle 4.3.2 Introduction to Classification , Clustering 4.3.3 Introduction to Deep Learning 4.4 Natural Language Processing 4.4.1 Components, Applications, NLP Process & Phases, Difficulties in NLP **Unit 5 Introduction to The Internet of Things** 5.1 The Internet of Things Conceptual Overview 5.2 Components of IoT 5.3 Characteristics of IoT 5.4 Challenges in realizing IoT applications 5.5 Big Data Anaytics as Complementary Technology of IoT **Unit 6 Embedded Computing Basics** 6.1 Embedded system components 6.2 Flavours of Microcontroller : 8-bit microcontroller: 8051, 32 bit microcontroller: ARM 6.3 System on chips concept

	6.4 Embedded system applications **Unit 7 Overview of Arduino** 7.1 Introduction to Arduino 7.2 Flavours of Arduino 7.3 Components of Arduino board 7.4 Arduino Power supply, Breadboard **Unit 8 Programming with Arduino** 8.1 Installing Arduino Desktop IDE 8.2 Installing Board drivers, configuring board type, sketch 8.3Hardware interfacing & programming 8.3.1. LED on/off using timer 8.3.2. Working with sensors 8.3.3. Arduino Traffic Light Controller
Reference Book	1. A First Course in Artificial Intelligence by Deepak Khemani, McGrawHill, ISBN : 978-1-25-902998-1 2. Introduction to Artificial Intelligence and Expert System by Dan W. Patterson, PHI, ISBN : 978-93-325-5194-7 3. Artificial Intelligence –A Modern Approach (2nd Edition 2004) by Stuart J. Russell and Peter Norvig, Pearson Education, ISBN: 978-81-775-8367-0 4. Introduction to Artificial Intelligence by Rajendra Akerkar, PHI, ISBN : 978-81-203-2864-8 3. Artificial Intelligence -Structures and Strategies for Complex Problem Solving (4th Edition 2004) by George F. Luger, Pearson Education 4. Foundation of Artificial Intelligence and Expert Systems by V.S. Janakiraman, K. Sarukesi, P. Gopalakrishnan, Mc Millan (2002) 6. Artificial Intelligence: The Basics (Paperback) by Kevin Warwick, Publisher: Routledge; 7. The Essence of Artificial Intelligence (Paperback) by Alison Cawsey Publisher: Prentice Hall 8.“Artificial Intelligence” -By Elaine Rich And Kevin Knight (2nd Edition) Tata Mcgraw Hill 9.INTERNET OF THINGS by Sandeep Vishwakarma, Kiran Gurbani, Nitesh Shukla Publisher : Himalaya Publishing House 10. IoT & Applications I.A. Dhotre Technical Publication 11.Designing the Internet of Things Adrian McEwen and Cassimally Wiley 12.The Internet of Things Connection objects to web Edited by Hakima Chauchi Wiley 13.Introduction to Embedded System -By Shibu K V , McGrawHill 14. Getting Started with Internet of Things –By Cuno Pfister, O’Reilly 15. Learning Internet of Things-By Peter Waher , Packt Publication 16. Internet of Things : A Hands on Approach – By Arshdip Bahga and

	Vijay Madisetti 17. "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press)
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	30% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 70% assessment is based on semester end written examination

DSE-5: Computer Graphics and Animations

Course Code	
Course Title	**Computer Graphics and animation**
Credit	2
Teaching per Week	2 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	-
Purpose of Course	To train the students to acquire skills in generating marketable computer graphics and animated pictures,
Course Objective	• To understand the concept of computer graphics and Skills in Graphic Designing • To understand the animation techniques.
Pre-requisite	----
Course Out come	Students are able to understand the concept of graphics and animation effect and image manipulation after completion of course.
Course Description:	Computer animation is the art of creating moving images via the use of computers. It is a subfield of computer graphics and animation. Increasingly it is created by means of 3D computer graphics, though 2D computer graphics are still widely used for low bandwidth and faster real-time rendering needs.
Course Content	**Unit 1: Introduction to computer graphics** 1.1.Definition computer graphics 1.2.Pixel and Frame Buffer 1.3.Raster and Random Scan display 1.4.Applications of Computer Graphics 1.5.Aliasing and anti aliasing methods **Unit 2: 2D transformation** 2.1 2-Dimensional transformation 2.2. Translation, Rotation, Scaling, Reflection, Shear 2.3. Matrix representation and Homogeneous Coordinates. 2.4. Composite transformation **Unit 3: 2D viewing** 3.1 Introduction to window and view port 3.2 Viewing pipeline 3.3 Viewing coordinate reference frame 3.4 Window to view port coordinate transformation 3.5 Clipping operations **Unit 4: 3D Concepts** 4.1 Three dimensional display methods 4.1.1 Parallel and perspective projections, Depth Queuing ,Visible line and surface identification ,Surface rendering, Exploaded and cutways views, three dimension and stereoscopic views

	Unit 5: Visible surface Detections 5.1. Back face detection 5.2. Depth buffer method 5.3.Scan-line method **Unit 6: Visual Realism** 6.1. Light Sources: types of light sources, effects of light 6.2. Illumination, Shading, Transparency, Shadow, 6.3. Colors: model and changes setting **Unit 7: Animation** 7.1. Basic Principles of computer animation 7.2. Types of animation 7.3. Animation methods -Principles, keyframe, Frame by frame animation, masks, motion, dynamic, behavior, Working in the timeline, Working with symbols, Shape tween, staggering animation effect 7.4. Morphing 7.5. Animation tools for 2D and 3D 7.6. Graphics File formats for 2D and 3D image **Unit 8: Digital Image Processing** 8.1. Defining Digital Image 8.2. Step for digital image processing 8.3. basic concept of image processing techniques
Reference books:	1. Computer Graphics – By- Donald D. Hearn & M. Pauline Baker PEARSON PUBLICATION 2. Computer Graphics – By Zhigang Xiang and Roy Plasock, Tata McGraw Hill 3. Computer Graphics by Dr. A.A. Desai 4. Computer Graphics By- Rajesh Maurya – Wiley Publications
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	30% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 70% assessment is based on semester end written examination

DSE-5: Cloud Computing

Course Code	
Course Title	**DSE-5: Cloud Computing**
Credit	2
Teaching per Week	2 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	---
Purpose of Course	The course gives students an idea about Cloud Computing fundamentals and Cloud Based Systems.
Course Objective	To provide comprehensive knowledge of cloud computing and aspects related to it.
Pre-requisite	Basic understanding of operating system and computer network
Course Out come	After completion of this course, the student will gain comprehensive knowledge of Cloud based systems and aspects related to it
Course Content	**Unit 1 Introduction to Cloud Computing** 1.1 Overview, Roots of Cloud Computing, 1.2 Benefits and Disadvantages of Cloud Computing, 1.3 Cloud Infrastructure Management, 1.4 Challenges and Risks **Unit 2 Cloud Fundamentals** 2.1 Cloud characteristics-On Demand Service 2.2 Ubiquitous Network Access, 2.3 Location Independent Resource Pooling, Rapid Elasticity. 2.4 Cloud Types-Public, Private, Hybrid, Community, Shared Private, Dedicated Private **Unit 3 Cloud Computing Essentials** 3.1 Cloud Computing Architectural Framework 3.2 Cloud Deployment Models 3.3 Virtualization in Cloud Computing 3.4 Parallelization in Cloud Computing 3.5 Security for Cloud Computing **Unit 4 Virtualization** 4.1 Introduction to Virtualization Technologies, 4.2 Load Balancing and Virtualization, 4.3 Understanding Hyper visors, 4.4 Types of Virtualization 4.4.1 Server virtualization 4.4.2 Storage virtualization 4.4.3 Network virtualization

	Unit 5 Cloud Service Models 5.1 Exploring the Cloud Computing Stack, 5.2 Infrastructure as a Service 5.3 Platform as a Service (PaaS) 5.3.1 Azure 5.3.2 Goole AppEng 5.3.3 Hadoop 5.3.4 SalesForce 5.4 Software as a Service (SaaS)-Characteristics, Open SaaS and SOA 5.4.1 Cloud services 5.4.2 Web portal 5.4.3. Web OS **Unit 6 Other Cloud Service Models** 6.1 Identity as a Service(IDaaS) 6.2 Network Identity Service Classes 6.3 IDaaS Interoperability-user authentication, Authorization MarkUp Languages 6.4 Compliance as a Service(CaaS) **Unit 7 Cloud Resource Management** 7.1 Inter Cloud Resource Management, 7.2 Resource Provisioning and Platform Deployment, Global Exchange of Cloud Resources. 7.3 Administrating the Clouds, Cloud Management Products, Emerging Cloud Management Standards **Unit 8 Cloud Security** 8.1 Security Overview, Cloud Security Challenges and Risks, 8.2 Software-as-a- Service Security, 8.3 Cloud computing security architecture: Architectural Considerations, General Issues Securing the Cloud, Securing Data
Reference Book	1.Cloud Computing: Principles and Paradigms - R. Buyya et al - Wiley 2010 2.Cloud Computing : Principles Systems and Application - L Gillam et al - Springer 2010 3.Cloud Computing Bible - Sosinsky - Wiley - India, 2011 4.Cloud Computing Second Edition Dr. Kumar Saurabh - Wiley - India, 2012 5.Cloud Computing - Insight into New Era Infrastructure - Dr Kumar Saurabh - Wiley India 2012

Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	30% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 70% assessment is based on semester end written examination

Course Code	
Course Title	**Practical-5**
Credit	10
Teaching per Week	12 Hours
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	---
Purpose of Course	The purpose of course is to make students aware with practical implementation of concept learnt in theory subjects.
Course Objective	To provide Fundamental knowledge of practical implementation based on DSC9, DSC10 and SEC -3
Pre-requisite	---
Course Out come	Student should be able to demonstrate skills mentioned in DSC9, DSC10 and SEC-3 practically.
Course Content	As per theory subject content of relative subject
Reference Book	
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	70% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 30% assessment is based on semester end written examination