TAMILNADU GOVERNMENT POLYTECHNIC COLLEGE, (Autonomous), MADURAI- 11

N - 20 SCHEME

DIPLOMA IN COMPUTER ENGINEERING

(Implemented from the Academic Year 2021 – 2022 onwards)

VI SEMESTER

Col No	SUBJECT CODE	SUBJECT	HOURSPERWEEK		
			THEORY	PRACTICAL	TOTAL
1	4052610	Computer Hardware and Servicing	6		6
2	4052620	Computer Networks and Security	5		5
3		**Elective Theory-II**	5		5
	4052631	Software Engineering			
	4052632	Multimedia Systems			
	4052633	Data science and Big Data			
4	4052640	Computer Hardware and Networking Practical		6	6
5		**Elective Practical - II**		4	4
	4052651	Software Engineering Practical			
	4052652	Multimedia Systems Practical			
	4052653	Data Science and Big Data Practical			
6	4052660	Project work and Internship		6	6
			16	16	32
		Physical Education			2
		Library			1
	Total				35

TAMILNADU GOVERNMENT POLYTECHNIC COLLEGE, (Autonomous), MADURAI- 11

N - 20 SCHEME

DIPLOMA IN COMPUTER ENGINEERING

(Implemented from the Academic Year 2021 – 2022 onwards)

Course Name : 1052:Diploma in Computer Engineering

Subject Code : 4052610

Semester : VI

Subject title : Computer Hardware and Servicing

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per Semester: 16 Weeks

Subject	Instructions		Examination			Duration
	Hours /Week	Hours / semester	Internal Assessment	End Semester Examination	Total	
Computer Hardware and Servicing	6	96	25	100*	100	3 Hrs

* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

TOPICS & ALLOCATION OF HOURS :

Unit No.	Topics	Time (Hours)
I	MOTHERBOARD COMPONENTS	18
II	MEMORY & I/O DEVICES	18
III	DISPLAY, POWER SUPPLY & BIOS	17
IV	DESKTOP, LAPTOP, MOBILE AND TABLET PC	18
V	FUTURE HARDWARE SYSTEMS	18
	TEST AND REVISION	07
	TOTAL	96

RATIONALE:

A Computer Engineer should be able to install and maintain Keyboard, Printer, Mouse, Monitor, etc. along with the computer system. Additionally he should also be able to maintain and service mobile phones. The course provides the necessary knowledge and skills regarding working, construction and interfacing aspects of peripherals. The students will get to know how various peripherals communicate with central processing unit of the computer system and pattern their respective operations. The student will get to know about how Mobile phones are maintained. This subject provides the required background of installation, maintenance and testing of peripheral with Computers and Laptops. The student will also get to know about the basics Non Volatile Memory(NVM), Remote Direct Memory Access (RDMA) and Embedding hardware.

OBJECTIVES:

On completion of the following units of syllabus contents, the students must be able to

- Know the evolution of Personal Computer from PC through Core i and Laptop.
- Know and explain the major components that make up the system unit.
- Know the data process and store them in meaningful information.
- Explain about the principle of operations of Keyboard, Mouse and Displays.
- Understand the components of media system.
- Know the Basics, working principle, specification and modern technology of different types of drives.
- Know the specification of I/O Ports of all I/O devices like serial, parallel, USB – Gameport,blue tooth and IP Connectors
- Know the operation, working principle and troubleshooting of devices like Dot matrix, Inkjet, Laser, Thermal, MFP Printers.
- Know the aspects related to Power Supply.
- Understand the common problems in the computer system and the peripherals
- Trouble shoot the problems in Personal computers.
- Trouble shoot the problems in Computer peripherals.
- Know and explain the major components of Laptop.
- Trouble shoot the problems in Laptop.
- Understand the basic components and tools used in servicing of Mobile
- phones.Know to install the software required for mobile phones and to maintain it.
- Understand the basics of Non Volatile Memory(NVM), Remote Direct Memory Access(RDMA) and Embedding hardware.

DETAILED SYLLABUS

Contents: Theory

UNIT - I MOTHERBOARD COMPONENTS		18 HOURS
I	**1.1.Motherboard components:** Processor sockets/slots — Memory sockets – Chipsets — Cache– BIOS — Clock generator — RTC — Super I/O Controller — Power connector — Battery — Keyboard/Mouse Connectors — Jumpers — Ports and Headers — Pin Connectors - Motherboard Form factor - Hardware, Software and Firmware.	5 Hrs
	1.**2.Computer peripheral devices:** Internal and external devices	2 Hrs
	1.3.Processors: Introduction –Core2 Duo processor, Quad core processor,Core i3, i5, i7 series, AMD AIO series, Xeon Processor.	5 Hrs
	1.4.Chipsets: Chipset basics - North / South Bridge architecture and Hub architecture.	3 Hrs
	1.5.Bus Standards: Overview and features of PCI, AGP, USB, & Processor Bus.	3 Hrs

UNIT - II MEMORY AND I/O DEVICES		18 HOURS
II	**2.1.Primary and Secondary Memory:** Introduction. Main Memory – types – Organization, Access time, Cycle time, and Memory errors and Error detection Techniques. Hard Disk: Introduction — Construction — Working Principle — File Systems — Formatting and Troubleshooting.	4 Hrs
	2.2. Removable Storage and Special Devices: DVD-ROM — Recordable DVD Rewritable DVD. Blu-ray: Introduction - Blu-ray Disc Parameters - Recording and Playback Principles. Special drives: External drives, Memory stick, USB flash drive, Solid state drive. Data Recovery tools - DOS, and Third party tools.	4 Hrs
	2.3.Keyboard and Mouse: Keyboard: Interfacing and Signals (USB, Wireless), Types of keys, Keyboard Matrix, Key bouncing, Types of keyboard (Simple, Mechanical). Mouse: Optical mouse operation — Optical mouse cleaning – Troubleshooting flowchart for a mouse.	4 Hrs
	2.4. Printers and Scanners: Printer: Introduction Types of printers –	4 Hrs

	Dot Matrix, Inkjet, Laser, Thermal, MFP printer (Multi-Function Printer) - Operation and Troubleshooting. Scanner: Introduction, Scanner mechanism, working principle — Types of Scanners (Barcode, Handheld,Flatbed) – Preventive maintenance and Troubleshooting tools.	
	2.5.Special I/O Devices: Trackball, Touch pad, Pointing stick, Joystick, Light pen, Graphic tablet, Camera, Bar-code reader, RFID reader	2 Hrs

UNIT- III DISPLAY, POWER SUPPLY and BIOS   17 HOURS

III	**3.1.Displays and Graphic Cards:** Displays: LCD Principles – Plasma Displays – TFT Displays - LED Displays. Graphic Cards: Video capturecard - Troubleshoot display and graphics card problems	5 Hrs
	3.2.SMPS: Block diagram - Basic Principles and Operations O/P Voltage – Cable color code – Connectors and PowerGood – Common Failures(No circuit diagram to be discussed)	5 Hrs
	3.3.Bios: Bios functions – Cold and Warm booting – BIOS error codes — BIOS interrupts — BIOS advanced setup. Upgrading BIOS, FlashBIOS-setup. Identification of different BIOS (AMI, AWARD BIOS).	5 Hrs
	3.4.POST: Error, Beep Codes, Error messages, Post – Faults related to Hardware.	2 Hrs

UNIT - IV DESKTOP, LAPTOP, MOBILE AND TABLET PC   18 HOURS

IV	**4.1.Upgrading of Systems**: Hardware up-gradation. Updating of System & Application software: Device Driver - OS Update and Firewall Security – Control panel - Installed devices and properties – Install procedure, Rollback or Un-install procedure, Tests of various device driver software.	4 Hrs
	4.2.Installation and Troubleshooting: Formatting, Partitioning and Installation of OS –Trouble Shooting Laptop and Desktop computer problems. Antivirus and Application Software Installation - Backup and Restore procedure - recovery software	4 Hrs
	4.3.Laptop: Difference between laptop and desktop- Types of laptop, working principles, configuring laptops and power settings, Upgrade RAM, hard disk, Replacing battery - Configuration of camera, mic, WLAN	3 Hrs

	and Bluetooth, touchpad, Laptop Keyboard.	
	4.4. Mobile phone: Basics of mobile communication, battery- antenna- Ear piece- microphone -speaker-buzzer-LCD- keyboard. Basic circuit board components – Names and functions of different ICs used in mobilephones. Installation & Troubleshooting: Mobile servicing kit, Assembling and disassembling of different types of mobile phones – Installation of OS - Fault finding & troubleshooting	4 Hrs
	4.5.Introduction to Tablet PC: Digitizers Versus Touch-Screen Displays, Merits and Demerits. Comparisons: Laptops, Desktops, Pocket PC, Other PDAs, Other Pen-Based Computers, Differences in Hardware. Windows XP Tablet PC Edition Configuration: Basic Interface Settings, Screen Settings, Display Properties, Other Settings and Options	3 Hrs

UNIT – V FUTURE HARDWARE SYSTEMS		18 HOURS
V	**5.1.Moore's law :** Calculating the Hardware Growth using Moore's Law,Introduction to Non Volatile Memory Technology, Architecture of NVM technology – Advantages and Scope of NVM Technology	4Hrs
	5.2.Emerging Non Volatile Memory Technologies (Concepts only)- Magnetic random-access memory (MRAM), Spin-Transfer Torque Random-Access Memory (STT-RAM), Ferro electric Random Access Memory (FeRAM), Phase-Change Memory (PCM), and Resistive Random-Access Memory (RRAM).	5Hrs
	5.3.Introduction to advanced Network technologies: Remote Direct Memory Access (RDMA), Working Principle of RDMA - Limitationsand Challenges in RDMA technology	4Hrs
	5.4.Embedded systems- Basic concepts, Embedded Board and the von Neumann Model, Basic Electronics of Embedded devices - AC circuits, DC Circuits, and Active Devices, Power supply- Scope, Control and Probes- Advantages and Applications of Embedded devices.	5 Hrs

REFERENCES

S.No	Title	Author	Publisher	Year of Publishing Edition
1	Computer Installation and Servicing	D.Balasubramanian	Tata Mc-Graw Hill, New Delhi	Second Edition 2010
2	Troubleshooting, Maintaining and Repairing PCs	Stephen J.Bigelow	TMH, New Delhi	Fifth Edition
3	PC Hardware in a nutshell	Robert Bruce Thompson.	O'Reilly Media	Third Indian Reprint 2008.
4	The Laptop Repair Workbook: An Introduction to Troubleshooting and repairing Laptop Computers	Morris Rosenthal	Foner books	First Edition 2008
5	The Cell Phone Handbook	P.J. Stetz and Penelo e Stetz	Find Tech Ltd	Second Edition
6	Advanced Mobile Repairing	Pandit Sanjib	BPB Publication, New Delhi	First Edition 2010
7	Absolute Beginner's Guide to Tablet PCs	Craig F. Mathews	ToolKits, Inc.	First Edition 2004
8	Embedded Hardware: Know It All	Ganssle J, Noergaard T, Eady F, Edwards L, Katz DJ, Gentile	Newnes	1stEdition (2007)

TAMILNADU GOVERNMENT POLYTECHNIC COLLEGE, (Autonomous), MADURAI- 11

N - 20 SCHEME

DIPLOMA IN COMPUTER ENGINEERING

(Implemented from the Academic Year 2021 – 2022 onwards)

Course Name　　:　1052:Diploma in Computer Engineering

Subject Code　　:　4052620

Semester　　　　:　VI

Subject Title　　:　Computer Networks and Security

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	End Semester Examinations	Total	
Computer Networks and Security	5	80	25	100*	100	3 Hrs.

* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and Allocation of Hours

UNIT	Topic	Hrs.
I	DATA COMMUNICATIONS	15
II	OSI MODEL AND LAN PROTOCOLS	16
III	TCP/IP PROTOCOLS	15
IV	NETWORK SECURITY	13
V	APPLICATION OF NETWORK SECURITY	14
	Test and Model Exam	7
	Total	**80**

RATIONALE:

The course aims to groom the students to gain concepts, knowledge and skills required to work on Computer Networking and Security industry. Course curriculum has been designed to give overview and use cases of Data Communication, Layered Networks, Internetworking technology/protocols and Computer Security is covered and this will help to prepare the students to keep pace with computer networking and security industry trends.

OBJECTIVES:

- Understand the concept of data communication.
- Discuss the advantages and disadvantages of different network topologies.
- Know different network classification based on different category.
- Study about different networking devices and their practical usages.
- Understand the different layers of OSI and their functions.
- Compare different LAN protocols.
- Understanding of Synchronization in networks
- Study of different WAN networks and protocols
- Study of Broadband Next Gen (BNG)
- Identify the protocols used in TCP /IP and compare with OSI model.
- Know the IP addressing and TCP/ IP protocols briefly.
- QoS and Traffic Engineering in networks
- Overview of Operations, Administration and Maintenance (OAM) in networks
- Understand the basic concepts of network security.
- Identify the attacks and threats.
- Understand the basic concepts of RAID and digital Signatures.
- Study about Cryptography and different Cryptography Algorithms.
- Discuss about Network Security Applications.
- Know the applications of Network Security.
- Discuss about VPN and Firewalls.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topics	Hours
I	**DATA COMMUNICATIONS**	
	Data Communication: Components of a data communication – Data flow: Simplex – Half duplex – Full duplex; Networks – Network criteria – Types of Connections: Point to point – multipoint; Topologies: Star, Bus, Ring, Mesh, Hybrid – Advantages and Disadvantages of each topology.	2
	Types of Networks: Need for computer Networks **-** LAN – MAN –WAN – CAN – HAN –Internet – Intranet – Extranet , Client-Server, Peer to Peer, Wi-Fi, Bluetooth, Mobile Networks, Data Centre Networks, Service Provider Networks	5
	Transmission Media : Characteristics of Transmission Media - Classification of transmission media - Guided – Twisted pair – Coaxial – Fiber optics – Unguided – Radio waves – Infrared – LowOrbit satellite (LOS) - VSAT - Cabling and Standards	3
	Network devices: Features and Concepts of Switches - Routers (Wired and Wireless) –Gateways.	3
	Synchronization in Networks: Concepts of Frequency and Time synchronization in Computer networks.	2
II	**OSI MODEL and LAN PROTOCOLS**	
	Network Models: Protocol definition - Standards - OSI Model - Layered architecture-Functions of all layers.	3
	802.X Protocols : Concepts and PDU format of CSMA/CD (802.3) – Token bus (802.4) –Token ring (802.5) – Ethernet – Types of Ethernet (Fast Ethernet, gigabit Ethernet, High speed Ethernet 10GE to 800GE) -Comparison between 802.3, 802.4 and 802.5 - Overview of Carrier Ethernet and use cases	4
	2.3. Understanding Wireless Network protocols- 802.11a, 802.11b, 802.11g, 802.11n, 802.11ac	2

	2.4.WAN Networks: Different layers in Service Provider Networks – Protocols Involved – High level design of Data Centre Networks	3	
	Switching: Definition **–** Circuit switching – Packet switching – Message switching – Optical Switching OTN– Multicasting	2	
	BNG – Concepts – Services – Broadband NextGen	2	
III	**TCP/IP SUIT and PROTOCOLS**		
	Overview of TCP / IP: OSI & TCP/IP – Transport Layer Protocol Connection Oriented and Connectionless Services- Sockets - TCP & UDP.	3	
	Network Layers Protocol: IP – Interior Gateway Protocols (IGMP, ICMP, ARP, RARP, IGP, BGP Concept only).	2	
	IP Addressing : Dotted Decimal Notation -Subnetting & Supernetting – VLSM Technique-IPv6 (concepts only)	3	
	3.4Application Layer Protocols: FTP- Telnet – SMTP– HTTP DNS – POP	2	
	3.5 QoS and Traffic Engineering – Overview of QoS and Traffic Engineering techniques and protocols	3	
	3.6. OAM– Concepts of OAM in networks Protocols – Fault detection and isolation	2	
IV	**NETWORK SECURITY**		
	Introduction to Network security: Definition – Need for security – Principles of Security – Attacks – Types of Attacks – Criminalattacks – Legal Attacks – Passive and Active attacks - Software Supply Chain attacks - Security Services – Security Mechanisms .	3	
	Cryptography: Definition - Symmetric Encryption principles - Symmetric Block Encryption Algorithms - DES, AES - Stream	3	

	ciphers – RC4 – Digest function – Public key Cryptography Principles-RSA- Diffe-Hellman algorithm – Digital Signature(Definition only) **Network Security Application**: Authentication applications - Kerberos (concepts only) - Overview- Motivation -Encryption Techniques.	2
	4.4 Internet Security: Email security – PGP - S/MIME - IP security - Overview -IP Security Architecture - Web security - SSL, TLS,SET (Concepts only) — Link Layer MACSEC security overview-Network Address Translation NAT - Distributed Denial of Service attacks- DDoS and its mitigation – Lawful intercept of traffic flow overview	5
V	**APPLICATIONS OF NETWORK SECURITY** **Introduction to network security** : Definition and Basic concepts- Basic concepts of RAID levels(0,1,2,3,4,5).	2
	Hackers Techniques: Historical hacking techniques & open sharing-Bad Passwords- Advanced Techniques- Viruses-worms-Trojan horses-SPAM	2
	Security Mechanism : Introduction – Types of Firewalls – Packetfilters – Application gate ways – Limitations of firewalls.	2
	Intrusion: Intruders– Intruder detection – Classification of IntruderDetection systems -Honey pots.	2
	Wireless Security Issues: Definition and Types -Transmission Security, Authentication , WLAN Detection, Eaves Dropping, Active Attacks, WEP Definition and Features.	2
	Network Security Appliances: Overview of Network security appliances: IPSec, DDoS, NAT, IPS gateways.	4

TextBooks :

1	Data Communication and networking	Behrouz A.Forouzen	Tata Mc GrawHill
2	Network Security Essentials	William Stallings	Pearson Publications.
3	CRYPTOGRAPHY AND NETWORK SECURITY	William Stallings	Pearson Publications.
4	CRYPTOGRAPHY AND NETWORK SECURITY	Behrouz A.Forouzen	TataMcGraw-Hill,New Delhi
5	Computer Networks	Andrew S.Tanenbaum	Pearson Publications.

TAMILNADU GOVERNMENT POLYTECHNIC COLLEGE, (Autonomous), MADURAI- 11

N - 20 SCHEME

DIPLOMA IN COMPUTER ENGINEERING

(Implemented from the Academic Year 2021 – 2022 onwards)

Course Name   : 1052:Diploma in Computer Engineering

Subject Code   : 4052631

Semester   VI

Subject title   : Elective Theory II – Software Engineering

TEACHING AND SCHEME OF EXAMINATION:

No. of weeks per Semester 16 Weeks

Subject	Instructions		Examinatio			Duration
	Hours / Week	Hours / Semester	Internal Assessment	End Semester Examination	Total	
Software Engineering	5	80	25	100*	100	3 Hrs

* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

TOPICS AND ALLOCATION OF HOURS

Unit No	Topic	No of
I	INTRODUCTION TO SOFTWARE ENGINEERING	**15**
II	SOFTWARE DESIGN AND PLANNING	**15**
III	SOFTWARE MAINTENANCE AND RISK MANAGEMENT	**15**
IV	SOFTWARE TESTING	**15**
V	SOFTWARE RELIABILTY AND QUALITY ASSURANCE	**13**
TEST AND REVISION		**07**
TOTAL		80

RATIONALE

Software Engineering deals with reliability and quality assurance of the software under development. It provides framework for development of quality software product. The course enables the students to write specifications for software system understand the importance of good software, design and develop test plans from design specifications. The course also covers other important aspects of software Engineering such as software lifecycle, requirement analysis and documentation, characteristics of good design, design techniques, testing, software implementation and maintenance etc.

OBJECTIVES

On completion subject, the students must be able to

- Define Software Engineering.
- Understand the characteristics of Software Engineering.
- Explain different software development models.
- Learn about the phases of software development cycle.
- Understand the significance of requirement analysis.
- Know various tools and techniques used for requirement analysis.
- Understand architectural and modular design.
- Understand the different types of project metrics.
- Understand different software estimation techniques.
- Describe CASE.
- Explain about software maintenance. e.
- Identify and mange risks.
- Know the different scheduling methods.
- Define the basic terms used in testing terminology.
- Describe black box and white box testing.
- Describe testing tools.
- Understand the concepts of Software quality and quality assurance.
- Know the concepts of software reliability and software quality standards.
- Define software re-engineering.
- Differentiate forward engineering from re-engineering.

DETAILED SYLLABUS

UNIT I INTRODUCTION TO SOFTWARE ENGINEERING	.. 15 HOURS	
1.1	**Basics of Software Engineering :** Need for Software Engineering – Definition – Software Characteristics – Software Myths – Program versus Software Products	3
1.2.	**Software Development Life Cycle Models:** Introduction –Waterfall Model – Prototyping model – Spiral Model – Iterative Enhancement model – Agile model – Object Oriented Model - Advantages and Disadvantages of above models – Comparison of various models.	6
1.3	**Software Requirement Analysis (SRS):** Value of good SRS- developing SRS from Business Requirements- Requirement Process-Requirement Specification — Desirable Characteristics of an SRS-Components of anSRS- Structures of a requirements documents-Requirements gathering- Creating a backlog in Agile model.	6
UNIT – II SOFTWARE DESIGN AND PLANNING	**15 HOURS**	
2.1.	**Software Design** : Definition of software design – Objectives of software design - Process of software design – Architectural design – Modular design – Structure chart – Coupling and Cohesion – Differenttypes - Interface design - Design of Human Computer Interface	4
2.2.	**CODING:** Information Hiding –Programming style — Internal documentation – Monitoring and Control for coding –Structured programming- Error / Exception handling-Executing sprints for agile model. Scrum meetings in agile - importance of code reviews and unit testing	4

2.3.	**Software Planning:** Software metrics - Definition - Types of metrics - Product and product metrics-relevant metrics in agile-Function point and feature point metrics - Software project estimation — Steps for estimation — Reason for poor and inaccurate estimation — Project estimation guidelines – Models for estimation – COCOMO Model - Automated tools for estimation – Sprint planning in agile.	4
2.4	**CASE :** CASE and its scope- Architecture of CASE environment – Building blocks for CASE – CASE support in software Life cycle – Objectives of CASE – Characteristics of CASE tools – List of CASE tools – Categories, advantages and advantages of CASE tools.	**3**

UNIT – III   SOFTWARE MAINTENANCE AND RISK MANAGEMENT   15 HRS

3.1.	**Software Maintenance:** Software as an evolution entity – Software configuration management activities – Change control process - Software version control – Software configuration management – Need for maintenance - Categories of maintenance – Maintenance cost -Factors affecting the effort	5
3.2.	**Risk management :** Definition of risk - Basics for different types ofsoftware risks - Monitoring of risks - Risk management - Risk avoidance – Risk detection – Risk control – Risk recovery – Sources of risks - Types of risks	5
3.3.	**Project scheduling** : Introduction – Factors affecting the task set for the project - scheduling methods - Work breakdown structure - Flow graph - Gant chart - PERT - Setting up Sprint burn down charts for Agile model	5

UNIT – IV   SOFTWARE TESTING   15 HRS

4.1.	**Software Testing :** Introduction to testing – Testing principles – Testing objectives – Basic terms used in testing – Fault – Error – Failure - Testcases – Black box and white box testing – Advantages and disadvantages of above testing – Methods for Block box testing strategies – Methods forwhite box testing strategies – Testing activities – Test plan - Tracking defects.	3
4.2.	**Levels of testing:** Integration tests – System testing – Types.	3
4.3.	**Software Testing strategies:** Static testing strategies – Formal technical reviews - Code walkthrough - Code inspection - Debugging – Definition – Characteristics of bugs - Life cycle of a Debugging task – Debugging approaches.	3
4.4	**Software Testing Tools:** Need for tools – Classification of tools – Functional/Regression Testing tools - Performance/Load Testing Tools –Testing process management Tools – Benefits of tools – Risk Associated with tools – Selecting tools – Introducing the tool in thetesting process - Different categories of tools – Examples for commercial software testing tool.	3
4.5	**Code of Ethics for Software Professionals:** Human Ethics - Professional Ethics - Ethical issues in Software Engineering – Code ofEthics and professional Practice: Software Engineering code of ethics and professional Practice - Ethical issues: Right versus Wrong	3
UNIT – V SOFTWARE RELIABILITY AND QUALITY ASSURANCE 13 HRS		
5.1.	**Software Quality Assurance :** Verification and validation - SQA – Objectives and Goals - SQA plan - Definition of software quality - Classification of software qualities - Software quality attributes – Important qualities of software products - Importance of software quality –SEI – CMM - Five levels - ISO 9000 – Need for ISO Certification – Benefits of ISO 9000 certification – Limitation of ISO 9000 certification – Uses of ISO - Salient features of ISO 9000 Requirements – Introduction to ISO 9126	5

5.2	**Software Reliability :** Definition - Reliability terminologies - Classificationof failures - Reliability metrics - Reliability growth modeling - Reliability measurement process	3
5.3	**Reverse Software Engineering:** Definition - Purpose - Reverse engineering Process – Reverse engineering tasks – Characteristics and application areas of reverse engineering – Software re-engineering – Principle – Re-engineering process – Difference between forward engineering and re-engineering.	5

REFERENCES

S. No	TITLE	AUTHOR	PUBLISHER	Year of Publishing / Edition
1.	Software Engineering	Ian Sommerville	PearsonEducation	Sixth Edition
2.	Fundamentals of Software Engineering	Rajib Mall	PHI Learning Pvt Limited, New Delhi	28th Printing August 2011
3.	Software Engineering	Bharat Bhusan Agarwal, Sumit Prakash Tayal	Firewall Media, New Delhi	Second Edition 2008
4.	Software Testing	K.Mustafa and R.A.Khan	Narosa Publishing House, New Delhi	Reprint 2009
5.	Software Quality	R.A. Khan, K.Mustafa and Sl	Narosa Publishing House, New Delhi	Reprint 2008
6.	Software Engineering	Stephen Schach	TMGH Education Pvt Ltd, New Delhi	Eight Reprint 2011
7.	Software Engineering fundamentals	Ali Behforooz and Fredick J Hudson	Oxford University press,	2005

8.	Software Testing Principles and Practices	Srnivasan desikan, Gopalswamy Ramesh	Pearson	First Edition
9.	Suftware Testing Concepts and Tools	Nageshwara Rao Pusulri	DreamTeach	First Edition
10.	Software Engineering Concepts and application	Subhasjit Dattun	OXFORD University Press	2010
11.	Software Engineering	Rohit Khurana	Vikas Publishing	Second Edition

TAMILNADU GOVERNMENT POLYTECHNIC COLLEGE, (Autonomous), MADURAI- 11

N - 20 SCHEME

DIPLOMA IN COMPUTER ENGINEERING

(Implemented from the Academic Year 2021 – 2022 onwards)

Course Name   :   1052:Diploma in Computer Engineering

Subject Code   :   4052632

Semester   :   VI

Subject Title   :   Elective Theory II - Multimedia Systems

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination				
	Hours / Week	Hours / Semester	Marks				Duration
			Internal Assessment	End Semester Examinations	Total		
Multimedia Systems	5 Hrs	80 Hrs	25	100*	100		3 Hrs.

* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and Allocation of Hours

Unit	Topics	Time (Hrs)
I	Introduction to Multimedia	11
II	Defining Objects for Multimedia Systems	15
III	Multimedia Data and Standards, Database	16
IV	Multimedia Devices and Making Multimedia	15
V	Multimedia for Internet and Streaming	16
	Test and Model Exam	7
	Total	**80**

RATIONALE:

The exponential growth of Engineering and Technology particularly Information and Communications Engineering has benefited the day-today life of entire mankind in all respects. The research and developments are continually happening in this field to fine tune and improve the field particularly in multimedia which directly or indirectly has impact on every man's daily life. As such the introduction of current and future trends and technology of multimedia systems would strengthen the knowledge and skills of Engineering community in taking one-step further the prosperity of mankind.

OBJECTIVES:

On successful completion of the course, the students will be able to

➢ Understand the relevance and underlining infrastructure of Multimedia system.
➢ Apply contemporary theories of multimedia learning to the development of multimedia products.
➢ Analyze instructional and informational media (audio/ visual materials, web based materials, games and simulations etc) applied with multimedia techniques.
➢ Acquire knowledge about multimedia software tools.
➢ Understand the multimedia systems components and fundamental elements of any multimedia system.
➢ Acquire knowledge about compression / decompression and various media file formats.
➢ Understand the underlying principles of processing various multimedia data.
➢ Understand the working principles of various multimedia input-output devices.
➢ Gain knowledge about various multimedia related standards.
➢ Understand the design and development process of multimedia projects.
➢ Understand the technologies of multimedia used in Internet and its applications.
➢ Acquire knowledge about streaming, webcasting and many evolving technologies.

DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topics	Hours
I	**Introduction:** Definition of Multimedia, Multimedia Basics, Multimedia Elements, Multimedia Applications, Delivering Multimedia.	2
	Multimedia Systems Architecture: Multimedia Workstation Architecture, High resolution Graphic displays, The IMA Architectural Framework, Network architecture for Multimedia systems.	3
	Evolving Technologies For Multimedia Systems: Hypermedia Documents, Hypertext, Hyper Speech, HDTV and UDTV, 3D Technologies and Holography.	2
	Defining Objects for Multimedia System: Text, Images, Audio and Voice, Full-Motion and Live Video, Multimedia Data Interface Standards, Video Processing Standards.	2
	Multimedia Software: Overview of Multimedia Software Tools, Open Source Replacements, Multimedia OS, VRML, OpenGL, Windows and Open Source API.	2
II	**Text:** About Fonts and Faces, Using Text in Multimedia, Hypermedia and Hypertext, Using Hypertext, Hypermedia Structures, Hypertext Tools.	2
	Images: Making Still Images, Bitmaps, 1 bit images, 8-bit gray level images, 8-bitcolor images, Dithering, 24 bit color images, Vector Drawing, 3-D Drawing and Rendering, Color, Understanding Natural Light and Color, Computerized Color, Color Palettes, Color Look-up table. Image Processing¸ Image acquisition, Image enhancement. Color image processing.	4
	Sound : The Power of Sound, Digital Audio, Making Digital Audio Files, MIDI Audio, MIDI vs. Digital Audio, Multimedia System Sounds, Adding Sound to Your Multimedia Project , Audio Recording, Keeping Track of Your Sounds, Audio CDs, Sound for your Mobile, Sound for the Internet.	3
	Animation, the Power of Motion, Principles of Animation, Animation by Computer, Animation Techniques. Animation using OpenGL.	
	Video: Using Video, How Video Works and Is Displayed, Analog	3

	Video, Digital Video, Displays, Digital Video Containers, Codec, Video Format Converters, Obtaining Video Clips, Shooting and Editing Video.		3
III	**3.1 Data Compression**: Need for Data compression, General Data compression Scheme, Compression standards, Non-lossy compression for images, Lossy compression for Photographs and Video, Hardware Vs Software Compression.		3
	3.2 Compression Schemes and standards:(Only Concepts of) Binary Image Compression, Color, Gray Scale and Still-Video Image Compression, JPEG, Video Image Compression, Multimedia Standards for Video, Requirements for Full-motion Video Compression, MPEG, Audio compression, Fractal compression, advantages / disadvantages.		4
	3.3 Data and File Format Standards: Popular File Formats, RTF, RIFF, GIF, PNG, TIFF, MIDI, JPEG, JFIF, AVI, WAV, BMP, WMF, MIX, MPEG standards. TWAIN.		3
	3.4 Database System: Data Types in Multimedia Databases, Storage and Retrieval, Database Management System, Database Organization and Transaction Management for Multimedia System.		3
	3.5 Content Based Retrieval in Digital Libraries(C-BIRD)– C-BIRD GUI – Color Histogram – Color Density – Color Layout – Texture layout- - Search by Illumination Invariance - Search by Object Model.		3
IV	**4.1 Multimedia Input/output Technologies:** Limitations of Traditional input devices, Multimedia input/output devices, PEN input, Working of Electronic Pen, Digitizer, (only the concepts of) Video and Image display systems, Printer, Scanner. Digital voice and video: Voice Recognition system, Digital Camera, Video frame grabber, Video and still image processing, Full – motion video controller, Video Capture Board.		5
	4.2 Making Multimedia: The Stages of a Multimedia Project: Creativity, Organization, Communication, Hardware, Software: Text Editing and Word Processing Tools, OCR Software, Painting and Drawing Tools, 3-D Modeling and Animation Tools, Image-Editing Tools, Sound-Editing Tools, Animation, Video, and Digital Movie Tools, Authoring Systems, Making Instant Multimedia, Types of Authoring Tools.		4
	4.3 Multimedia Skills: The Team, Project Manager, Multimedia Designer, Interface Designer, Writer, Video Specialist, Audio Specialist,		3

	Multimedia Programmer, Producer of Multimedia for the Web.	3
	4.4 Designing and Producing, Designing, Designing the Structure, Designing the User Interface, Producing-Tracking, Copyrights.	
V	**5.1 The Internet and Multimedia** : The Bandwidth Bottleneck, Internet Services, MIME Types, Multimedia on the Web, Web Page Makers and Site Builders, Plug-ins and Delivery Vehicles.	3
	5.2 Designing for the World Wide Web: Developing for the Web, Small-Device Workspace, text and images for the Web, Clickable Buttons, Client-Side Image Maps, Sound for the Web, Animation for the Web, and Video for the Web, HTML5 Video - Plug-ins and Players.	3
	5.3 Multimedia Communication: Study of Multimedia networking, Quality of data transmission, Media on demand, Multimedia Over Wireless and Mobile Networks – Media Entertainment, web-based applications, e-learning and education.	4
	5.4 Streaming: Introduction - Applications of Streaming- The Streaming Architecture, Stream Serving: Webcasting - On-Demand Servicing - Voice and Video Conferencing - Internet Telephony - Virtual Reality.	6

Reference Books

1. "Ze- Nian Li and M.S. Drew", "Fundamental of Multimedia", Pearson Education, Second Edition, 2014.
2. "Tay Vaughan", "Multimedia: Making It Work", Tata-McGrawHill.
3. "Prabhat, k.Andleigh, Kiran Thakra", "Multimedia systems Design", PHI
4. "Ralf Steinmetz, and Klara Nahrstedt", "Multimedia Computing Communication and Applications", Pearson Education.
5. "Ranjan Parekh", "Principles of Multimedia", TMGH, New Delhi.
6. "John F. Koegel Buford", " Multimedia Systems", Pearson Education.
7. David Austerberry, The Technology of Video and Audio Streaming, Focal Press.

TAMILNADU GOVERNMENT POLYTECHNIC COLLEGE, (Autonomous), MADURAI- 11

N - 20 SCHEME

DIPLOMA IN COMPUTER ENGINEERING

(Implemented from the Academic Year 2021 – 2022 onwards)

Course Name   : 1052:Diploma in Computer Engineering

Subject Code   : 4052633

Semester   VI

Subject title   : Elective Theory - II Data Science and Big Data

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester 16 Weeks

Subject	Instructions		Examination				
Data Science and Big Data	**Hours/ Week**	**Hours/ Semester**	**Marks**				
	5	80	**Internal Assessment**	**End Semester Examination**	**Total**	**Duration**	
			25	100 *	100	3 Hrs	

* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

Topics and Allocation of Hours

Unit No.	Topic	No. of Hours
I	Introduction to Data Science	15
II	Fundamentals of Data Modelling	15
III	Fundamentals of Big Data	15
IV	Big Data Storage	14
V	Big Data Processing	14
	Test and Revision	7
	Total	80

RATIONALE:

This course provides a comprehensive understanding of data science and data modeling. The foundation on data science is laid to understand the core concepts and the techniques that underlie today's big data computing technologies. This course helps the students in identifying and applying appropriate techniques and tools to solve problems in managing huge quantities of data.

OBJECTIVES:

This subject has two major divisions. The objectives of these topics are given below.

Data Science

After studying the first two units of this syllabus, students will be able

- To understand the fundamentals of data science, various data types, theirsources, problems and issues, various formats of data .
- To apply the Python libraries and Microsoft Excel for Data analysis.
- To work with Microsoft Excel for data analysis and applying various
- functions for data analysis.
- To familiarise with the basic data representation methods.
- To understand the concepts of samples, attributes and their relationships.
- To develop and implement simple linear regression models.
- To understand the concept of model equation and of fit.
- To understand and differentiate the concepts of predictive models and the classification models.
- To familiarize with the concepts of Neural Networks, Decision Trees and Nearest neighbors techniques.

Big Data

After studying the lessons from Units III to V, the students will be able to

- Get conceptual understanding of Big Data, Web data, classification of data, Big Data characteristics, types, classification and handling techniques.
- Get the conceptual understanding of the impact of ICT developments on Big Data Adoption.

- Understand the Big Data Analytics Life Cycle.
- Get the conceptual understandings of Big Data Storage systems and technologies.
- Understand the concepts of NoSQL databases, their types and characteristics.
- Understand the concepts of Hadoop and its Ecosystem.
- Understand the steps involved in Big data processing like parallel processing, distributed processing and Batch processing.
- Get understanding of MapReduce, map and reduce tasks, MapReduce algorithm.
- Understand the various techniques for Big Data analysis.
- Get introduced to the concepts and types of machine learning techniques.
- Explore the applications of Big Data in different fields.

Detailed Syllabus

Contents : Theory

Unit	Name of the Topics	Hours
I	**Introduction to Data Science**	**15**
	1.1.Data Science - Subfields of Data Science- Data Types-Data Science Road Map- Programming languages for Data Science- Problems with Data- Formatting issues- Python features- Python Technical libraries- Python Arrays and Data Frames.	6
	1.2.Data sources- Data Quality- Consistency and accuracy (Integrity), Noise: Outliers, Missing and Duplicate values- Data Preprocessing using Cleaning, Enrichment, Editing, Reduction, Wrangling- Data Formats: TXT, CSV, XML, JSON, TLV- Loading and Saving files	4
	1.3 Working with Excel: Loading data- Statistical functions- Text Functions- Lookup Functions- Sorting- Filtering- Data Analysis: Correlation, covariance, Descriptive statistics, Regression.	5
II	**Fundamentals of Data Modelling**	**15**

	2.1.Linear Algebra: Data representation - Data as a Matrix - Samples and Attributes- Classification of attributes- Concept of Rank-Identify the relationship among attributes	5
	2.2.Predictive models: Regression Models - Linear regression - Simple and Multiple Regression-Correlation-Mean squared Error-Testing goodness of fit-Model Equation	5
	2.3.Classification models: Two class- Multi class classification-Separability- Performance measures- Terminology- Confusion Matrix-Types (Concepts only): Neural Network- Decision Trees-Nearest Neighbors.	5
III	**Fundamentals of Big Data**	15
	3.1Data - Web Data- Classification of Data- Big Data-Characteristics- Volume, Velocity, Variety, Veracity, Value- Need for Big Data- Big Data Types and classifications- Sources of Big Data-Big Data handling techniques-Challenges.	6
	3.2 Impact of ICT developments on Big data Adoption: data analytics and data science, digitization, affordable technology and commodity hardware, social media, hyper connected communities and devices, cloud computing and IoT.	4
	3.3.Big Data Analytics Life Cycle: Business Case Evaluation, Data Identification, Data Acquisition & Filtering, Data Extraction, Data Validation & Cleansing, Data Aggregation & Representation, Data Analysis, Data Visualization, Utilization of Analysis Results.	5
IV	**Big Data Storage**	14
	4.1.Storage Concepts: Clusters, File Systems, Distributed File System, NoSQL, Sharding, Replication, Master Slave, Peer to Peer, CAP Theorem	4

	4.2. Big Data Storage Technologies: On-Disk Storage Devices-Distributed File system-RDBMS- NoSQL Databases- Characteristics of NoSQL- Types of NoSQL Storage devices. In-Memory storage devices-Data Grids-Databases	5
	4.3.Hadoop: Introduction- Hadoop and its Ecosystem: Hadoop core components - Features of Hadoop- Hadoop Ecosystem components- Hadoop streaming- Hadoop pipes- Hadoop distributed File system- HDFS data storage -Hadoop Ecosystem tools.	5
V	**Big Data Processing**	**14**
	5.1.Parallel data processing- Distributed data processing- Hadoop Framework- Processing workloads- cluster for processing- Batch processing with MapReduce- Map and Reduce Tasks- MapReduce algorithms- Processing in Realtime mode- Real time processing and MapReduce.	**5**
	5.2.Big Data Analysis Techniques: Quantitative analysis, Qualitative analysis, Data mining, Statistical analysis: Correlation, regression, Machine Learning: Classification, clustering, outlier detection, filtering. Semantic analysis: Natural language processing, Text Analytics, Sentiment analysis, Visual Analysis	**5**
	5.3.Big Data Analytics Applications and case studies: Big data in Marketing and sales- Big data and Healthcare- Big data in Medicine- Big Data in Advertising.	**4**

Reference books

1. Field Cady, "The Data Science Handbook", Wiley, 2017.
2. Jake VanderPlas, "Python Data Science Handbook- Essential tools for working with data", O'REILLY, 2017
3. Davy Cielen, Arno D. B. Meysman, Mohamed Ali, "Introducing Data Science", manning publications, 2016
4. Thomas Erl, Wajid Khattak - Big Data Fundamentals Concepts, Drivers & Techniques-Prentice Hall (2016).
5. Raj kamal, Preeti Saxena, "Big Data Analytics-Introduction to Hadoop, Spark and Machine Learning", McGraw Hill Education(India) Pvt Ltd., 2019.

6. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.

7. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.

8. NPTEL MOOC courses on "Data Science" and "Big Data".

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N - 20 SCHEME

DIPLOMA IN COMPUTER ENGINEERING

(Implemented from the Academic Year 2021 – 2022 onwards)

Course Name   : 1052:Diploma in Computer Engineering **.**

Subject Code   4052640

Semester   : VI

Subject title   : Computer Hardware and Networking Practical

SCHEME OF INSTRUCTION AND EXAMINATION:

No. of weeks per Semester: 16 Weeks

Subject	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	End Semester Examinations	Total	
Computer Hardware and Networking Practical	6 Hrs	96 Hrs	25	100*	100	3 Hrs.

*Autonomous Examination Conducted for 100 Marks and Converted To 75Marks

RATIONALE:

The course aims at making the students familiar with various parts of Computers, Laptops, Tablet, devices and know the different types of peripherals desired. In addition, the course will provide the students with necessary knowledge and skills in computer, laptop, notebook, tablet its software installation and maintenance and to make them diagnose the software faults. This subject also gives the knowledge and competency to diagnose the problems in computer hardware and peripherals and also gives the knowledge for trouble shooting for systematic repair and maintenance of computers and laptops.

OBJECTIVES

On completion of the following exercises, the students must be able to

- ☐ Know the various indicators, switches and connectors used in Computers.
- ☐ Familiarize the layout of SMPS, motherboard and various Disk Drives.
- ☐ Configure Bios set up options.
- ☐ Install various secondary storage devices with memory partition and formatting.
- ☐ Know the various types of printer installation and to handle the troubleshooting ability.
- ☐ Assemble PC system and checking the working condition.
- ☐ Installation of Dual OS in a system.
- ☐ Identify the problems in Computer systems, software installation and rectification
- ☐ Assembling and disassembling of Laptop to identify the parts and to install OS and configure it.
- ☐ Enable to perform different cabling in a network.
- ☐ Configure Internet connection and use utilities to debug the network issues.
- ☐ Configure router for any topology
- ☐ Installation of sever operating system
- ☐ Configuring various services in server operating system
- ☐ Install various packet sniffing tools in linux

LAB EXERCISES

PART – A

Contents: Practical

1	HARD DISK a) Install Hard Disk. b) Configure CMOS-Setup. c) Partition and Format Hard Disk. d) Identify Master /Slave / IDE Devices. e) Practice with scan disk, disk cleanup, disk De-fragmentation, Virus Detecting and Rectifying Software. f) Creating System restore points in windows for system recovery.
2	a) Install and Configure a DVD Writer & Blu-ray Disc Writer. b) Recording a Blank DVD & Blu-ray Disc.

3	Printer Installation and Servicing
	        a) Install and configure Dot matrix printer, Ink jet and Laser printer.
	        b) Troubleshoot the above printers

4	Install and configure Scanner, Web cam, and bio-metric device with system and troubleshoot the problems
5	Do the following cabling works in a network a) Cable Crimpling b) Standard Cabling c) Cross Cabling d) Testing the Crimped cable using a Cable tester
6	a) Configure Host IP, Subnet Mask and Default Gateway in a system in LAN(TCP/IP Configuration). b)Configure Internet connection and use IPCONFIG, PING / Tracert and Netstat utilities to Debug the Network issues.
7	a) Install and configure Network Devices: HUB, Switch and Routers b)Install and Configure Wired and Wireless NIC and transfer files betweensystems

8	Transfer files between systems in LAN using FTP Configuration. Install a printer in LAN and share it in the network.
	PART B – SYSTEM ADMINISTRATION PRACTICAL
1	Installation of Windows 2008 / 2013 Server
2	Installation and configuration of DHCP Server
3	Installation and configuration of Mail Server
4	Installation and configuration of Active directory Services. Create a user and permission using logon script and group permissions.
5	Installation and configuration of DNS Server
6	a) Installation of Red Hat Linux using Graphical mode. b) Installation of Red Hat Linux using VMware.
7	Installation of various open source packet sniffing tools and inspect packets in linux.

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DETAILED ALLOCATION OF MARKS

SCHEME OF VALUATION	
Procedure Writing – One Question from PART - A	20 Marks
Procedure Writing – One Question from PART - B	25 Marks
Executing Exercise (PART – A)	20 Marks
Executing Exercise (PART – B)	20 Marks
Result(Part – A)	5 Marks
Result(Part – B)	5 Marks
VIVA - VOCE	5 Marks
TOTAL	100 Marks

LIST OF EQUIPMENTS	
Hardware Requirements :	
Desktop Systems	30 Nos
Hard disk drive	06 Nos
DVD, Blu-ray Drive	06 Nos
Blank DVD , Blu-ray Disc	30 Nos
Head cleaning CD	01 No
Dot matrix Printer	01 No
Laser Printer	01 No
Ink Jet Printer	01 No
Web camera	01 No
Biometric Device	01 No
Scanner	01 No
Crimping Tool	06 Nos
Screwdriver set	06 Nos
Network Cables	50 mtrs
Switch	01 No
Hub	01 No
Router	01 No
Wires / Wire cutters	
Software Requirements:	
Windows server OS	
Windows /Linux OS	
DVD and Blu-ray Burning S/W.	

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N - 20 SCHEME

DIPLOMA IN COMPUTER ENGINEERING

(Implemented from the Academic Year 2021 – 2022 onwards)

Course Name : 1052:Diploma in Computer Engineering

Subject Code : 4052651

Semester   VI

Subject title   : Elective Practical II – Software Engineering Practical

SCHEME OF INSTRUCTION AND EXAMINATION:

No. of weeks per Semester: 16 Weeks

Subject	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	End Semester Examinations	Total	
Software Engineering Practical	4 Hrs	64 Hrs	25	100*	100	3 Hrs.

* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

RATIONALE:

  The course aims at making the students familiar with the Software Development Lifecycle. While the Software Engineering theory paper provides a good view to our students on the various models, different phases involved in the model, risk tracking etc., the practical application of this is missing. This subject is quite difficult to comprehend just by sitting in theory classes or reading books, unless the students experience it practically. Hence exposing our students to a lab which mimics a real-life situation / case study would immensely benefit the students. This way the student will understand the concept of Software Engineering — how projects are planned and executed, different stages of the project life cycle, how are metrics tracked, risk management and quality assurance. IT companies spend a lot of time and effort in teaching the Software Development Life cycle principles. Each team member must have complete understanding of the execution methodology and the role he / she is playing in the project, without which the project will never be successful. Inculcating this knowledge to our team would help in easily deploying them in the industry.

OBJECTIVES

On completion of the following exercises, the students must be able to

- Understand the difference between different SDLC models especially Iterative / incremental and Agile methodologies
- Understand difference between a green field implementation (programs) and Software products.
- Learn how the requirements management phase works — how does the requirement gathering happen, how does this get converted to BRDs / SRSs in Iterative and Backlog in Agile, Dos and Don'ts etc
- Understand how the estimation and project planning is done based on the requirements. We will do feature point / complexity point estimate for Iterative and Story point estimate for Agile
- Preparing a work breakdown structure
- Setting up quality assurance process in line with CMMI principles and defining metrics that will be gathered
- Convert the requirements to design. Understand the different designing principles and alignment to standards. Building interface designs to integrate different modules
- Convert the design to structured coding following the coding standards. Understand the concept of continuous integration. Assessing the quality of the code.
- Perform Unit Testing
- Perform System Integration testing – preparing the test plan, test cases,system testing, tracking the defects found during testing
- Understand how the Requirement Traceability works
- Assessing the risk of the project by analyzing the metrics gathered

LAB EXERCISES

Contents : Practical

REQUIREMENT ANALYSIS
1) Develop requirements specification for student Management system such as overall problem description, system features, external interface requirements andnon-functional requirements.
DESIGN
Draw the following Structural modeling diagrams for student Management system: **2)** Develop an UML Class Diagram.   **3)** Develop an UML Object Diagram.   **4)** Develop an UML Component Diagram.   **5)** Develop an UML Deployment Diagram.
Draw the following Dynamic modeling diagrams for Library Management system: **6)** Develop a Use case Diagram.   **7)** Develop an UML Sequence Diagram.   **8)** Develop an UML Collaboration Diagram.   **9)** Develop an UML StateChart Diagram.   **10)** Develop an UML Activity Diagram.
TESTING
11) Write a simple JAVA code and perform unit testing.
REVERSE ENGINEERING
12) Perform reverse engineering from a simple JAVA code.
MINI PROJECT
Develop a University Result Management System using Classical Life Cycle model.

DETAILED ALLOCATION OF MARKS

SCHEME OF VALUATION	
Procedure / Program Writing **–** One Question	45 Marks
Execution	35 Marks
Result with printout	10 Marks
Demonstration of mini project	5 Marks
VIVA - VOCE	5 Marks
TOTAL	100 Marks

REQUIREMENTS	
Hardware Requirements :	
Desktop Systems	30 Nos
Software Requirements : Microsoft office (Word, Excel, Powerpoint), MS – Project or JIRA for miniproject Relational Database(SQL Server Express or MYSQL, JAVA/IDE, **JUNIT(**open source) for unit testing **SELENIUM**(automated testing)	

Course Name   :   1052:Diploma in Computer Engineering

Subject Code   :   4052552

Semester   :   VI

Subject Title   :   Elective Practical II - Multimedia Systems Practical

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	End Semester Examinations	Total	
Multimedia Systems Practical	4 Hrs	64 Hrs	25	100*	100	3 Hrs.

* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

RATIONALE:

     The competencies which form the basis for this practical enable students to develop skills with interactive visual and auditory technology. This lab prepares students to use digital multimedia for communication, creativity, collaboration, critical thinking. This practical is to bring awareness to the students regarding the numerous resources available in the area of multimedia. Students will become a skilled and creative user of current multimedia technology with an increased understanding of multimedia concepts and techniques

OBJECTIVES:

After the completion of this lab students will be able to

- Create Audio / Video hardware & software applications.
- Record & edit digital audio using sound editing software.
- Learn about video editing.

- Apply various filters & Compression techniques in Multimedia Applications.
- Learn photo editing software.
- Learn about 2D, 3D and cloud animation.
- Learn about chroma key technique.

DETAILED SYLLABUS

1. Use a audio processing software and perform the audio editing tasks — Import audio, select and edit the sound, create fade-in and fade-out effects, label audio segments, use noise remove filter, mix multiple sound sources, change stereo to mono tracks, export audio to different format and save.
2. Use a video processing software to perform – Trim video clips, rotate video, merge video, split video, add titles, add special effects and edit video dimensions, bit rate, frame rate, sample rate, channel.
3. Create a movie from video clips to demonstrate - Audio-Video mixing, add music,video effects, video transition and titles.
4. Use suitable software and perform a) compress / decompress audio / video files. b) Convert audio/video to different format.
5. Use a scanner to create two or more partial scanned images of large poster/photo. Create a panoramic view of multiple photos by stitching together them using any panorama software.
6. Develop a web page which shows animation with sound effect using any professional HTML editor.
7. Convert the given image into pencil sketch using suitable photo editing software.
8. Design a certificate for sports day with different text effects using suitable software.
9. Import any two pictures, Morph, Merge and Overlap those two pictures.
10. Draw the raindrop that falls on the ground. Show the splash effect and sound effectusing suitable software.
11. Create a moving cloud animation using any animation software.
12. Create a 2D animation using motion guide layer and masking.
13. Create a 2D animation of an aeroplane take off using suitable software.
14. Design a metallic text using 3D animation tool

15. Import an image with green screen background. Change the background of the imported image with required image using chroma key technique.

DETAILED ALLOCATION OF MARKS

Procedure / Program	45 Marks
Execution	40 Marks
Result with printout	10 Marks
VIVA – VOCE	5 Marks
TOTAL	100 Marks

LIST OF HARDWARE SUGGESTED

I Desktop PCs– 30 Nos

II Laser Printer Monochrome, Color – 1 Each

III Digital (Video) Camera – 1No.

IV Flat bed A4 size Scanner - 1 No.

LIST OF SOFTWARE SUGGESTED

Operating system: Windows 7, Windows 10, Linux

Software tools: Open Source Software or Commercial Software.

The following is the suggestive list of open source software and their commercial replacement. Experiments may be done using either open source software or commercial software.

3D Graphics and Animation

1. Art of Illusion Replaces: AutoDesk Maya

2. Blender Replaces: AutoDesk Maya

Audio Players

3. aTunes, Audacious, Clementine are Replaces: iTunes

4. CoolPlayer, MPH-HC Replaces: Windows Media Player

5. Zing Replaces: Windows Media Player

Audio Recorders and Editors

6. Audacity Replaces: Sonar X1, Sony ACID, Adobe Audition

7. Frinika Replaces: Sonar X1, Sony ACID

Audio Ripping and Conversion

8. fre:ac, BonkEnc Exact Audio Copy, Audio Convertor Studio

9. CUERipper, CDex Exact Audio Copy

10. MMConvert Exact Audio Copy

Multimedia Players

11. VLC Media Player Replaces: Windows Media Player

12. Mplayer Replaces: Windows Media Player

13. KODI Replaces: Windows Media Player

14. MediaPortal Replaces: Windows Media Player

Video Editing

15. Cinelerra Replaces: Adobe Premiere

16. OpenShot Video Editor Replaces: Adobe Premiere Pro CS5

17. Avidemux Replaces: Adobe Premiere

18. Kdenlive Replaces: Adobe Premiere Pro CS5

19. CineFX Replaces: Adobe Premiere Pro CS5

Video File Conversion

20. DVDx Replaces: Movavi Video Converter, Zamzar

21. DVD Flick Replaces: Movavi Video Converter, Zamzar

22. FFDShow Replaces: Movavi Video Converter, Zamzar

Video Player

23. Miro Replaces: Windows Media Player

CD / DVD Burners 24

Infrared Recorder**DVD**

Authoring

25. DVD Flick, DVDStyler**,** Bombono DVD

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N - 20 SCHEME

DIPLOMA IN COMPUTER ENGINEERING

(Implemented from the Academic Year 2021 – 2022 onwards)

Course Name   : 1052:Diploma in Computer Engineering

Subject Code   :   4052653

Semester   :   VI

Subject Title   :   Elective Practical II - Data Science and Big Data Practical

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Subject	Instructions		Examination			
	Hours / Week	Hours / Semester	Marks			Duration
			Internal Assessment	End Semester Examinations	Total	
Data Science and Big Data Practical	4	64	25	100*	100	3 Hrs.

* Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

RATIONALE:

The data science process is about analyzing, visualizing, extracting, managing and storing data. It enables companies to efficiently understand large volume of data from multiple sources and derive valuable insights to make smarter data-driven decisions. Data Science is widely used in various industry domains, including marketing, healthcare, finance, banking, policy work, and more. This practical subject helps students understand how they can use Python NumPy, Pandas and Matplotlib to critically examine a dataset with summary statistics and graphs, and extract meaningful insights. Also, the data analysis using Microsoft Excel has been included to familiarize some advanced features like data analysis. Microsoft Excel has been chosen as the software to start with in this subject because many of our students are already be familiar with Excel, so very little further time will be required for them to learn to apply Excel for Data Processing. Processing unstructured data in the form of text files is also introduced. Basic statistics and data

visualization techniques have been introduced as simple exercises.

OBJECTIVES:

On Completion of the exercises in this practical subject, the students will be able to

- ➢ Install the required packages to set up a data science coding environment
- ➢ Load different types of data into a Python Environment.
- ➢ Use basic operation with NumPy and Pandas libraries to prepare data
- ➢ Preprocess the data by handling missing data, duplicate values
- ➢ Aggregate the data
- ➢ Create data subsets
- ➢ Perform data cleaning operations
- ➢ Develop a single dataset by merging various datasets together
- ➢ Examine statistical summaries
- ➢ Use Matplotlib to create data visualizations
- ➢ Find the relationship between the data attributes
- ➢ Measure the basic statistical properties of the data
- ➢ Fit a regression model and understand the predictive capabilities of the models.
- ➢ Understand the basic text processing concepts.

LAB EXERCISES

1.	Load the data about the exam fee paid by the students of all branches of your college. Perform the following operations on it using Excel. a. Arrange the data branch wise within the branch and arrange register numbers. Replace all names with CAPITAL. b. Count the number of students in each branch and semester c. Calculate the total fee paid by students of each branch. d. Find the minimum and the maximum fee paid by the student. e. Find the sum, average, max, min of fee paid in each branch
2.	Load the data collected from all students during online answer paper submission with the following details for each exam. Regno, name, course_code, subject_code, semester, number_of_pages(nop), mode_of_dispatch, email_id, mobile_number. Perform the following operations using Excel. a. Check the file for any missing data in the columns. b. Count the number of students appeared for the exam. c. Count the number of papers (subjects) submitted by each student (Using register number) d. Create a new column by concatenating register number and the subject code. Using this column, perform the vlookup function to find the number of pages (nop) written by the students in that subject, and the mode of dispatch. e. Count the number of students appeared (submitted) for each subject. f. Count the number of different (unique) subject_codes that have been submitted.
3.	Read the dataset from the Auto-MPG repository and perform the descriptive statistics on the data using Excel-Data Analysis. Verify the same using the statistical functions of Excel.
4.	Read the dataset from the Auto-MPG repository and a) Identify the relationship between the variables using correlation. b) Identify the independent and the dependent variables. c) Perform the linear regression on the related variables and find theregression equation. d) Estimate the performance of the regression model.

5.	Load any external csv data file and store it in a Pandas DataFrame.
	a.Check the shape and column types of the DataFrame (rows andcolumns).
	[Note: Use df.info () and df.shape()]
	b. Subset the data column by names, by index, by range.
	c. Subset data based on index label, row index, multiple rows.
	d. Subset based on rows and columns
6.	DESCRIPTIVE STATISTICS using Python-Pandas
	a) Write a Python script to find basic descriptive statistics on AUTO-MPG dataset.
	b) Find the values of the descriptive statistics.
	c) Determine the measures of a central location, such as mean, markers suchas quartiles or percentiles, and measures of variability or spread, such as the standard deviation.
7.	READING AND WRITING DIFFERENT TYPES OF DATASETS
	a. Reading different types of data sets (.txt, .csv) from Web and disk and writing in file in specific disk location.
	b) Reading Excel data sheet using Pandas
	c) Export the values from the DataFrame to several other formats.
8.	DATA VISUALIZATION
	a. Load the Auto-MPG dataset from csv file into pandas.
	a) Analyze the Behavior of the Number of Cylinders and Horsepower Using aBoxplot
	b) Find the relationship between horsepower and weight using the scatter plotusing the data from Auto-MPG:
	c) Find the outliers using plot.
	d) Plot the histogram, bar chart and pie chart on sample data.
9.	COVARIANCE and CORRELATION
	a. Find the correlation and covariance between two variables.
	b. Plot the correlation plot on the dataset and visualize giving an overview ofrelationships among data.
	C. Fit a simple linear regression model using libraries such as Numpy or Scikit-learn. (importLinearRegression from sklearn.linear_model)
	• Import the packages and classes you need.
	• Provide data for independent and dependent variables.

	• Create a regression model and fit it with existing data.
	• Check the results of model fitting to know whether the model is satisfactory.
10.	OUTLIER Detection
	When analysing data collected as part of a science experiment it may be desirable to remove the most extreme values before performing other calculations. Write a function that takes a list of values and an non-negative integer, n, as its parameters.
	The function should create a new copy of the list with the n largest elements and the n smallest elements removed. Then it should return the new copy of the list as the function's only result. The order of the elements in the returned list does not have to match the order of the elements in the original list.
11	Text Processing
	a) Open a text file and read all the lines of the file.
	b) Tokenise (separate the words) the text.
	c) Count the total number of lines, total number of words and unique words
	d) Sort the words alphabetically.
	e) Find the most frequent and least frequent words.
	f) List the words having certain suffixes.
	Note: You can open a Tamil text file using 'UTF-16' encoding.
12	Text Processing-II
	Load a text file containing a list of words into aDataFrame. Apply the following functions and verify the results.
	Replace(), repeat(), count(pattern), startswith(pattern), endswith(pattern), find(pattern), findall(pattern).
	Mini Project: Develop any data science application using Python/Excel for processing your college data.

DETAILED ALLOCATION OF MARKS

Writing answer for any one program from the list	45 Marks
Execution	35 Marks
Result with printout	10 Marks
Demonstration of Mini Project	5 Marks
Viva -Voce	5 Marks
TOTAL	100 Marks

Hardware Requirements

Desktop Computers   – 30 Nos

Laser printer   - 1 No.

For the optimal student experience, we recommend the following hardware configuration:

• Processor: Intel Core i5 or equivalent

• Memory: 4 GB RAM

• Storage: 35 GB available space

Software Requirements

You'll also need the following software installed

- OS: Windows 7 SP1 64-bit, Windows 8.1 64-bit or Windows 10 64-bit, Linux.
- Browser: Google Chrome/Mozilla Firefox Latest Version
- Notepad++ as IDE (this is optional, as you can practice every thing using the Jupyter Notebook on your browser)
- Python 3.4+ (latest is Python 3.9) installed (from https://python.org)
- Python libraries as needed (NumPy, Pandas, Matplotlib and so on)
- Microsoft Excel

Install Anaconda by following the instructions at this link: https://www.anaconda.com/distribution/Data Source:

Students may use the following data sources form their department

Online examination answer paper uploaded details.

Data about the alumni of your college

Your college result details.

Data collected from students like students' profile, resume etc.

Some other online resources for testing

https://archive.ics.uci.edu/ml/machine-learning-databases/auto-mpg/

https://archive.ics.uci.edu/ml/machine-learning-databases/iris/iris.data

https://www.kaggle.com/rohankayan/years-of-experience-and-salary-dataset

Course Name   : 1052:Diploma in Computer Engineering

Subject Code   : 4052660

Semester   : VI

Subject   : Project Work and Internship

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per semester: 16 Weeks

Subject	Instructions		Examination			
	Hours /Week	Hours/ Semester	Marks			Duration
			Internal Assessment	End Semester Examinations	Total	
Project Work and Internship	6	96	25	100*	100	3Hrs

Minimum Marks for pass is 50 out of which minimum 50 Marks should be obtained out of 100 Marks in the Autonomous Examination alone.

Examinations will be conducted for 100 marks and it will be reduced to 75 marks.

RATIONALE:

Project Work aims at developing innovative skills in the students whereby they apply the knowledge and skills gained through the course by undertaking a project. The individual students have different aptitudes and strengths. Project work, therefore, should match the strengths of students. The primary emphasis of the project work is to understand and gain the knowledge of the principles of software engineering practices, so as to participate and manage a large software engineering projects in future

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OBJECTIVES:

- Implement the theoretical and practical knowledge gained through the curriculum into an application suitable for a real practical working environment preferably in an industrial environment .

- Develop software packages or applications to implement the actual needs of the community.

- Get exposure on industrial environment and its work ethics.

- Learn and understand the gap between the technological knowledge acquired through curriculum and the actual industrial need and to compensate it by acquiring additional knowledge as required

- Carry out cooperative learning through synchronous guided discussions within the class in key dates, asynchronous document sharing and discussions, as well as to prepare collaborative edition of the final project report.

- Expose students to the field of computing and to gain experience in software design.

- Understand and gain knowledge about disaster management.

GUIDELINES FOR PROJECT FORMULATION

The project work constitutes a major component in most of the professional programmes and it is to be carried out with due care and should be executed with seriousness by the candidates. Batch size : Maximum 6 students per batch

TYPE OF PROJECT

As majority of the students are expected to work out a real life project in some industry / research and development laboratories / educational institutions / software companies, it is suggested that the project is to be chosen which should have some direct relevance in day-to-day activities of the candidates in his/her institution. Students are encouraged to work in the areas listed at the end. However, it is not mandatory for a student to work on a real life project. The student can formulate a project problem with the help of Guide.

PROJECT PROPOSAL (SYNOPSIS)

The students of all the Diploma Courses have to do a Project Work as part of the Curriculum and in partial fulfillment for the award of Diploma by the State Board of Technical Education and Training, Tamil Nadu. In order to encourage students to do worthwhile and innovative projects, every year prizes are awarded for the best three projects i.e. institution wise, region wise and state wise. **The Project work must be reviewed twice in the same semester. The project work is approved during the V semester by the properly constituted committee with guidelines.**

The project proposal should clearly state the project objectives and the environment of the proposed project to be undertaken. The project work should compulsorily include the software development. The project proposal should contain complete details in the following form:

1. Title of the Project.

2. Introduction and Objectives of the Project.

3. Project Category (DBMS/OOPS/Networking/Multimedia/Artificial Intelligence / Expert Systems etc.).

4. Tools / Platform, Hardware and Software Requirement specifications.

5. Analysis (DFDs at least up to second level , ER Diagrams/ Class Diagrams/ DatabaseDesign etc. as per the project requirements).

6. A complete structure which includes: Number of modules and their description to provide an estimation of the student's effort onVthe project. Data Structures as per theproject requirements for all the modules.

- Process logic of each module.
- Testing process to be used.
- Reports generation (Mention tentative content of report).

7..Are you doing this project for any Industry/Client? Mention Yes/No.

  If Yes, Mention the Name and Address of the Industry or Client.

8. Future scope and further enhancement of the project. Also mention limitation of the project.

SUGGESTIVE AREAS OF PROJECT WORK:

- Database Management Systems
- Software Engineering and Software Development
- Web page Designing
- Digital Image Processing
- Computer Graphics and Animation
- Multimedia Systems
- Computer Networks
- Artificial Intelligence
- Internet and e-commerce
- Computer Security and Cryptography
- Computer hardware and embedded systems
- Internet Of Things
- Cloud Computing
- Any other related area found worth.

INTERNSHIP TRAINING

The internship training for a period of two weeks shall be undergone by every candidate at the end of IV / V semester during vacation. The certificate shall be produced along with the internship report for evaluation. The evaluation of internship training shall be done along with final year "Project Work & Internship" for 20 marks. The internship shall be undertaken in any industry / Government or Private certified agencies which are in social sector / Govt. Skill Centres / Institutions / Schemes.

A neatly prepared PROJECT REPORT as per the format has to be submitted by individual student during the Project Work & Internship Autonomous examination.

INTERNAL ASSESSMENT :

The internal assessment should be calculated based on the review of the progress of the work done by the student periodically as follows.

Detail of assessment	Period of assessment	Max.Marks
First Review	6th week	10
Second Review	12th week	10
Attendance	Entire semester	5
Total		**25**

Proper record should be maintained for the two Project Reviews and preserved for one semester after the publication of Autonomous Exams results. It should be produced to the flying squad and the inspection team at the time of inspection/verification.

EVALUATION FOR AUTONOMOUS EXAMINATION:

Details of Mark allocation	Max.Marks
Demonstration/Presentation	25
Report	25
Viva Voce	30
Internship report	20
Total	**100**