5.1 BASICS OF MANAGEMENT

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RATIONALE

The diploma holders are generally expected to take up middle level managerial positions, their exposure to basic management principles is very essential. Topics like Structure of Organization, Leadership, Motivation, Ethics and Values, Marketing management, Financial management, Customer Relationship Management (CRM) & Total Quality Management (TQM), etc. have been included in the subject to provide elementary knowledge about these management areas.. This course explores cyber-security measures and the different forms of cybercrime and emergent forms of cyber-warfare.

LEARNING OUTCOMES

After undergoing the subject, the student will be able to:

- Explain the principles of management including its functions in an organisation.
- Have insight into different types of organizations and their structures.
- Inculcate leadership qualities to motivate self and others.
- Manage human resources at the shop-floor
- Maintain and be a part of healthy work culture in an organisation.
- Use marketing skills for the benefit of organization .
- Maintain books of accounts and take financial decisions.
- Undertake store management.
- Use modern concepts like TQM, TPM and CRM.
- Distinguish and classify the forms of cybercriminal activity and the technological and 'social engineering' methods used to undertake such crimes.
- Analyse and assess the impact of cybercrime on government, businesses, individuals and society.

DETAILED CONTENTS

1. Principles of Management (06 hrs)

1.1. Introduction, importance and general functions of management.
1.2. Concept and Types of an organization - Sole trading ,partnership, companies, corporation, PSU's and cooperative societies.
1.3. Structure of an organisation -

a) Line organization
b) Staff organisation
c) Functional organization
d) Line and staff organization

1.4. Hierarchical Management Structure
- Top, middle and lower level management

1.5. Departmentalization
- Introduction and its advantages.

2. **Leadership and Motivation** (06 hrs)

2.1 Leadership
- Definition and Need of Leadership
- Qualities of a good leader
- Manager vs. leader
- Theories of leadership –trait theory and Behaviour theory.

2.2 Motivation
- Definition and characteristics of motivation
- Factors affecting motivation
- Maslow's Need Hierarchy Theory of Motivation and X&Y need Hierarchy theory of motivation.

3. **Work Culture** (06 hrs)

3.1. Introduction and importance of Healthy Work Culture in organization
3.2. Components of Culture
3.3. Importance of attitude, values and behaviour
Behavioural Science – Individual and group behavior.
3.4. Professional ethics – Concept and need of Professional Ethics and human values.

4. **HRM and its functions** (04 hrs)

4.1 Human Resource Management
- Manpower Planning, recruitment and selection
- Training and development of work force at the shop-floor.
- Performance appraisal
- Wages, salary and incentive schemes

5. **Marketing and sales** (06 hrs)

5.1 Marketing
- Introduction, importance and its functions
- Marketing mix for industries and service sector
- Basic Marketing strategies

5.2 Sales
- Difference between marketing and selling
- Advertisement- print media and electronic media
- Market-Survey and Sales promotion.

6. **Basic of Accounting and Finance** (06 hrs)

6.1 Basic of Accounting:
- Meaning and definition of accounting
- Double entry system of book keeping
- Trading account, PLA account and balance sheet of a company

6.2 Objectives of Financial Management
- Profit Maximization v/s Wealth Maximization

7. **Material and Stores Management** (04hrs)

- Introduction, functions and objectives of material management
- Purchasing: definition and procedure
- Just in time (JIT)

8. **TQM , TPM** (02 hrs)

Total Quality Management (TQM) and Total Preventive Maintenance (TPM) - Concepts and importance

9. **Customer Relationship management (CRM)** (02 hrs)

Customer Relationship management - Concepts and importance

10. **Cyber Security** (06 hrs)

-Introduction to Cyberspace and Cyber Law, Pros and Cons of social media.
-Different Components of cyber Laws; Cyber Law and Netizens
- Categories of Cyber Crime: Personal, Business, Financial, Office Security
-Cyber Crime – Complete transparency, hacking/cracking, denial of service, IP piracy, phrasing, hetaerism etc. Cyber Attack – cyber attackers.
-Introduction to IPR, copyright & patent

INSTRUCTIONAL STRATEGY

It is observed that the diploma holders generally take up middle level managerial positions, therefore, their exposure to basic management principles is very essential. Accordingly students may be given conceptual understanding of different functions related to management. Some of the topics may be taught using question answer,

assignment or seminar method. The teacher will discuss success stories and case studies with students, which in turn, will develop appropriate managerial qualities in the students. In addition, expert lectures may also be arranged from within the institutions or from management organizations. Appropriate extracted reading material and handouts may be provided.

RECOMMENDED BOOKS

1. Principles of Management by Philip Kotler TEE Publication
2. Principles and Practice of Management by Shyamal Bannerjee: Oxford and IBM Publishing Co, New Delhi.
3. Modern Management Techniques by SL Goel: Deep and Deep Publications Pvt Limited , Rajouri Garden, New Delhi.
4. Management by James AF Stoner, R Edward Freeman and Daniel R Gilbert Jr. : Prentice Hall of India Pvt Ltd, New Delhi.
5. Essentials of Management by H Koontz, C O' Daniel , McGraw Hill Book Company, New Delhi.
6. Intellectual Property Rights and the Law by Dr. GB Reddy.
7. Service Quality Standards, Sales & Marketing Department, Maruti Udyog Ltd.
8. Nandan Kamath, A Guide to Cyber Laws & IT Act 2000 with Rules & Notification
9. Keith Merill & Deepti Chopra (IK Inter.), Cyber Cops, Cyber Criminals & Internet

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1.	06	12
2.	06	12
3.	06	12
4.	04	9
5.	06	12
6.	06	12
7.	04	9
8.	02	05
9.	02	05
10.	06	12
Total	**48**	**100**

5.2 DIGITAL MARKETING

L	T	P
2	-	3

RATIONALE

The course is designed to help you master the essential disciplines in digital marketing, including search engine optimization (SEO), social media, conversion optimization, web analytics, content marketing, email and mobile marketing. Digital marketing is one of the world's fastest growing disciplines.

LEARNING OUTCOMES

After undergoing the subject, the students will be able to:

- Identify core concepts of digital marketing and the role of digital marketing in business.
- Ability to develop marketing strategies based on product, price, place and promotion objectives.
- Understand how they can use digital marketing to increase sales and grow their business
- Ability to formulate marketing strategies that incorporate psychological and sociological factors which influence consumers.
- Hands on experience in using Analytics Tools eg: Google Analytics for report extraction and campaign measurement.
- Ability to analyze marketing problems and provide solutions based on a critical examination of marketing information.
- Understanding of the opportunities for deploying emerging digital marketing media and techniques.
- Successfully implement online campaigns for your business and marketing problems within the organization by learning AdWords Campaign Management

DETAILED CONTENTS

1. Principles of Digital Marketing (5 Hours)

   Defining Digital Marketing , Setting Digital Marketing Objectives, Set of activities of digital marketing: Search Engine Optimization, SEO, Search Engine Marketing – Google AdWords, Social Media Marketing: Facebook, LinkedIn, YouTube, Display Advertising – Contextual, Behavioral, Targeted, Content Marketing & Blogging, Lead Generation : Marketing Offer – Attractive / Relevant Offer, Landing Page – Offer's details with form, Conversion Page – Thank you page, Email Marketing, Video Marketing, Responsive Design, Google Analytics

2. Search Engine Optimization (8 Hours)

What is SEO?, Why SEO?, How Search Engine works?, Essential SEO guidelines for website owner, designer, blogger and content writer : Keyword Research - Creating Content Hierarchy, Brainstorming – Think and discuss them, Google Suggest, Related Searches, Google Keyword Planner, Keyword Tools, Google Trends – Finding Search Trends, Most Search Terms, How to translate keywords?, Organizing the keywords, Writing Headlines (Page Titles) with examples, Writing Summary (META Descriptions) with examples, SEO for Images, Structuring the Content- SEO-friendly Domain Name, SEO-friendly URL Structure, Plan your Site's Hierarchy, Internal Linking – Site Navigation, How Google reads our pages?, Localized SEO, Website Speed Testing, HTML Improvements using Google Search Console, Links from YouTube Videos, Users' Engagement , Links to Related Stories , Enable Social Sharing , Embedding videos , Enabling site search feature

3. Google AdWords (6 Hours)

Setting up Google AdWords Campaigns – that avails high ranking at low cost, Content Structuring, Understanding Quality Score, Finding and selecting the right Keywords, Keywords Matching Options, Campaign Setup procedure, Ads and Ad Groups, Organizing Ad Groups, Creating Effective Ads, Optimizing Landing Pages, Bid Management, Negative Keywords, Analytics – Measure and fine-tune, Remarketing Campaigns – How to configure, Setup and Monitor them?, YouTube Video Ad Campaigns

4. Google Analytics (5 Hours)

Getting Started with Google Analytics, Understanding Dashboard – Audience | Advertising | Traffic Source | Content | Conversions, Taking decisions based on Analytics Reporting, Defining Business Goals and Objectives, Tracking Social Media Traffic, Tracking SEO Traffic, Integrating your Google AdWords campaigns into Google Analytics, Measuring Tools and Methods, Measuring your Site's ROI, Introduction to Goal Conversion – Tracking the Conversions, Configuring UTMs (Custom URLs), Google Tag Manager – a brief overview.

5. Social Media Marketing (8 Hours)

Social Media Marketing Strategy : Setting up Goals- Finding out where your targeted people connect, Popular Social Media Networks, KnowEm – Check Social Media Username Availability, Knowing your Audience - Google Alerts – Monitoring your brands, competitions, and industry trends using, TweetDeck – a monitoring tool similar to Google Alerts for Twitter, Hashtags – Best Practices & Tools, Facebook / Instagram / LinkedIn- Setting up a Facebook Business Page, Facebook Graph Search – SEO for Facebook, Facebook Fans vs Talking about this, Promoting your Page, Boost Post, Facebook/Instagram Advertising using

Facebook Ads Manager, Remarketing/Retargeting using Facebook Custom Audiences, LinkedIn Advertising: Text Ads | Sponsored Content, Measuring Success- Fans, Likes, Comments & Share, Track performance using Google Analytics, UTMs – URL Builder, Bounce Rate, Time Spent on Site and Conversions!, Tracking Offline Conversions, Tracking your emails, Viral Videos Examples, Instagram, Facebook and Pinterest – Best Practices, Tips and Tools

INSTRUCTIONAL STRATEGY

Since the entire course content is web based, students can practice it online. The teachers should have practice on this framework. Entire course is hands-on based so practicals should be conducted in the laboratory.

LIST OF PRACTICALS

1. Create SEO Friendly Web Pages
2. Submit Website in various search Engines
3. Content Writing
4. Build a Network of Partner Websites to Get Influence on the SERP and Jump up to 30+ Positions
5. Develop a Facebook Customized Page Tab
6. Create and Write a blog.
7. Write an email newsletter
8. Make a video and Youtube Channel
9. Create infographics
10. Create Google Adword Account and make use of Keyword Planner
11. Create and Use Google Analytics Account
12. Create "refer-a-friend" or "bookmark this page" links on your site
13. Create Google Map on Places for Business
14. Understanding Plagiarism Checker tools
15. Understanding various SEO Tools like woorank, seositecheckup, seoquake, similarweb, siteliner, etc.
16. Creating XML Sitemap and robot.txt files

RECOMMENDED BOOKS:

1) Digital Marketing by Vandana Ahuja, published by Oxford Publication
2) Fundamentals of Digital Marketing by Puneet Bhatia, published by Pearson.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Times Allocated (hrs.)	Marks Allocated (%)
1.	5	15
2.	8	25
3.	6	20
4.	5	15
5.	8	25
Total	32	100

5.3 COMPUTER PERIPHERALS AND INTERFACING

L	T	P
3	-	3

RATIONALE

A computer engineer should be able to interface and maintain key-board, printer, mouse monitor etc along with the computer system. 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 be able to maintain keyboard, printer, monitors and Power Supplies (CVTs and UPSs) along with computer system. This subject provide the required background of computer installation, maintenance and testing of peripheral with micro computers So a course on Computer Peripherals and Interfacing Devices is required to develop such skills.

LEARNING OUTCOME

After undergoing the subject, the students will be able to:

- Identify various types of display devices/technologies.
- Describe different types and various parts of motherboard.
- Define and describe various types of processors.
- Use and describe various storage devices.
- Identify, various input-output devices and explain their working.
- Change various BIOS features.
- Assemble/maintain and troubleshoot a system.

DETAILED CONETENTS

1. Video Display (08 hrs)

The basic principle of working of video monitors (CRT, LCD,LED), video display adapters, video modes, Video display EGA/VGA/SVGA/PCI adapters and their architecture, Overview of raster scan, vector graphic, their main difference and relative advantages, Concept of reduction and bandwidth of monitors refreshing of screen

2. Hardware Organization of PCs (07 hrs)

Types of motherboard and their details (Form Factor, Chipset), types of processors (INTEL, AMD) and their compatibility with motherboards, serial and parallel ports, PS/2, USB Ports, Interconnection between units, connectors and cables.

3. Storage Devices (06 hrs)

Types of Hard Disk Drives- EIDE, SATA, SCSI, SAS External Hard Disk. Constructional features and working of hard disk drive, optical (CD, DVD, Blue Ray) disk drive and Flash Drive, Logical structure of Hard Disk and its organization, boot record.

4. Input Devices (06 hrs)

Detailed working principle and troubleshooting of various input devices such as keyboard, mouse, scanner. Basic principle of touch screen, light pen, digitizers. Drivers for various input devices and their role.

5. Output Devices (06 hrs)

Overview of printer and its classification, impact and non-impact printer, principle and working of desk Jet, dot matrix, line Printer and laser printers (Monochrome and Colour), plotter (Piezoelectric and Thermal), and modems. Software drivers for various output devices and their role.

6. Power Supplies (06 hrs)

Explain the working of SMPS used in computers. On-Line/Off-Line/Line-Interactive/uninterrupted power supplies (UPS), basic principle of working their importance and maintenance

7. The Basic Input/Output System (05 hrs)

What is BIOS? Function of BIOS, software interrupts, testing and initialization, configuring the system

8. Introduction to Raspberry Pi (04 hrs)

LIST OF PRACTICALS

1) To study the construction and working of CRT, LCD, LED (coloured and black and white monitor) and its troubleshooting .
2) To Study the components and internal parts, working of hard disk and CDROM, DVD, Flash Drives
3) To study the operations and components and internal parts of Key Board, mouse and their troubleshooting
4) Study of components and internal parts and working of DMP, Inkjet printer and Laser printer and various installation of printers
5) To study the SMPS circuit and measure its various voltages. Connecting SMPS to mother- board and other devices.
6) Study the operation and maintenance of UPS.
7) Exercise on assembling a PC with peripherals and testing the same.
8) Setup and configuration of ROM BIOS
9) Visit to nearby industry

INSTRUCTIONAL STRATEGY

While teaching the subject the teacher may take the interfacing devices like disk drives, printers, key-boards, scanners, plotters etc. physically and explain its working. Additional practical exercise on maintenance and repair on peripheral devices will help the students to develop adequate skills.

RECOMMENDED BOOKS

1. Hardware Trouble Shooting and Maintenance by B. Govinda Rajalu, IBM PC and Clones, Tata McGraw Hill 1991
2. The waite group writing MS DOS Device, Drives byRobert, S Lai: Addison, Wesley Publishing Co. 2nd Ed. 1992.
3. Hardware and Software of Personal Computers by SK Bose; Wiley Eastern Limited, New Delhi.
4. Microprocessors and Interfacing by Hall, Douglas: McGraw Hill
5. Microprocessors and Interfacing by Uffenbeck.
6. Fundamentals of Computers by Sukhvir Singh; Khanna Publishers, New Delhi
7. Computer Peripherals for Micro Computers, Microprocessor and PC by Levis Hahensteu
8. Inside the PC (Eight Edition) by Peter Norton; Tech Media Publication, New Delhi
9. Upgrading and Preparing PC

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (%)
1.	08	16
2.	07	16
3.	06	12
4.	06	12
5.	06	12
6.	06	12
7.	05	12
8.	04	08
Total	**48**	**100**

5.4 WEB DEVELOPMENT USING PHP

L	T	P
3	-	4

RATIONALE

This course will enable the students to understand the basics of internet and various application of internet like e-mail, FTP, Telnet, Newsgroups and video conferencing In addition, this course develops competency amongst the students to design professional web sites and interactive web pages. They will have overview of different technologies like of HTML, DHTML, XML, CGI, ASP, JSP, Java Scripts, VB Scripts.

LEARNING OUTCOME

After undergoing the subject, the students will be able to:

- Compare and contrast the use of various markup languages.
- Create a simple XML document.
- Perform various logical operations in PHP.
- Create simple programmes to validate forms in PHP.
- Perform database connectivity using PHP.
- Design a simple HTML form using AJAX technologies.

DETAILED CONTENTS

1. XML Basics (08 hrs)

   The History of XML;The Origins of XML; Comparison of XML And HTML Components of XML; Anatomy of an XML Document : A Sample XML Document,; XML Declaration; The Root Element ; An Empty Element; Attributes, Markup Delimiters; Element Mark Up; Attribute Mark Up;

2. PHP (24 hrs)

   Introduction, syntax, variables, statements, operators, decision making, loops, arrays, strings, forms, get and post methods, functions, Introduction to cookies, storage of cookies at client side, Using information of cookies, Creating single or multiple server side sessions, Timeout in sessions, Event management in PHP, introduction to content management systems based on PHP

3. PHP and MySQL (10 hrs)

Introduction to MySQL, connecting to MySQL database, creation, insertion, deletion and retrieval of MySQL data using PHP, PHP and XML, XML parsers, XML DOM, Introduction to NoSQL and use of new databases (MongoDb, Hbase)

4. AJAX (06 hrs)

Introduction, HTTP request, AJAX Server Script, AJAX Database.

LIST OF PRACTICALS

1. To design a simple XML document with new tags
2. Represent Library books data using XML
3. Understanding XML schema and its various data types and tags
4. Creation of Web pages using PHP
5. To store a cookie using PHP on client side.
6. To save the user session on server side.
7. To connect mysql database using PHP, reading the database and writing values into the database
8. To implement web pages using the AJAX.

INSTRUCTIONAL STRATEGY

Teachers should lay emphasis on developing practical skills among the students. Experts may be invited from industries to discuss actual projects and experiences.

RECOMMENDED BOOKS

1. XML How to Program by Deitel, Deitel, Nieto, and Sandhu; Pearson Education.
2. Java 2: The Complete Reference by Herbert Scheldt; BPB
3. Web Enabled Development Application by Ivan Bayross : Commercial; TMH
4. HTML,CSS, JavaScript,Perl, Python and PHP by Schafer Textbooks; Wiley India

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1.	08	18
2.	24	48
3.	10	20
4.	06	14
Total	**48**	**100**

ELECTIVE
5.5 (a) MOBILE TECHNOLOGIES

L	T	P
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RATIONALE

Mobile Technologies includes basic introduction of various wireless, cellular and mobile communication technologies. Different concepts related to communication of mobile devices and their hardware and software configuration will be explained.

Note: Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to appreciate learning of these concepts and principles.

LEARNING OUTCOMES

After undergoing this subject, the student will be able to:

- Identify various issues in different mobile communication technologies.
- Explain the evolution of computing techniques such as distributed computing, Cloud Computing etc..
- Compare and contrast the different features of GSM and 3G, 4G Technologies.
- Analyse and use of various layers such as Physical, Network, Transport layer in Mobile IP technology.
- Classify various infrastructure based wireless LAN technologies such as Wi -fi, Wi-Max etc,
- Compare various infrastructure less wirelss LAN technologies such as Bluetooth, Mobile Adoc networks, VANETS, NFC etc for various applications.
- Describe the use of various Mobile OS and their features.
- Write a simple program to run on mobile devices.

DETAILED CONTENTS

1. Mobility: (14 hrs)

   Issues, challenges, and benefits; Introduction of mobile and cellular communication technology; Review of distributed/network operating systems, ubiquitous computing, Cloud Computing

2. Global System for Mobile Communication (GSM) System Overview: (14 hrs)

   GSM Architecture, Mobility Management, Network Signaling, GPRS, CDMA, EDGE, Introduction to 3G, 4G Technologies

3. Mobile IP Networks (16 hrs)

   Physical mobility, challenges, limits and connectivity, mobile IP and cellular IP in mobile computing. Transport layer issues in wireless, Indirect TCP, Mobile TCP

4. Wireless LANs: (16 hrs)

   Introduction to IEEE 802.11, wifi standards, Bluetooth technologies and standards, Near Field Communication, Wi Max Standard. Mobile AdHoc Networks, Vehicular Area Networks.

5. Mobile Devices and OS: (12 hrs)

   Various types of Devices, Operating Systems: Introduction to various mobile operating systems (Android, Windows 10, iOS)

6. Application Development: (8 hrs)

   WWW programming model, Development Environment for Mobile Devices, Introduction to small program development in Mobile

INSTRUCTIONAL STATREGY

Teacher may use various teaching aids like slides, animations, flow charts, block diagrams etc. for imparting effective instructions in the subject. The teacher should explain about field applications before teaching the basics of different communication technologies to develop proper understanding latest development in this area.

RECOMMENDED BOOKS

1. Mobile Communication by Jochen Schiller; Pearson Education.
2. Principles of Mobile Computing by U. Hansman and L. Merck; Springer.
3. Computer Networks by A. S. Tanenbaum; Pearson Education
4. Mobility Processes, Computers and Agents by D. Milojicic, F. Douglis; Addison Wesley
5. Mobile Computing by Raj Kamal; Oxford University Press

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (hrs)	Marks Allotted (%)
1.	14	18
2.	14	18
3.	16	20
4.	16	20
5.	12	14
6.	08	10
Total	**80**	**100**

5.5 (b) INTERNET OF THINGS

L T P
5 - -

RATIONALE

This course will enable students to familiarize with the basics of Internet of Things , some of the application areas where Internet of Things can be applied, understand the middleware for Internet of Things , concepts of Web of Things and IOT protocols.

LEARNING OUTCOMES:

Upon completion of the course, the students will be able to
- Identify and design the new models for market strategic interaction
- Design business intelligence and information security
- Analyze various protocols for IoT
- Design a middleware for IoT
- Analyze and design different models for network dynamics

DETAILED CONTENTS

(18 hrs)

1. IoT & Web Technology:
The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Security, Privacy & Trust.

2. M2M to IoT – A Basic Perspective & Architecture: (18 hrs)
Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies, Building Architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

3. IoT -State of the Art: (18 hrs)
Introduction, State of the art, Architecture Reference Model- Introduction, Reference Model and architecture, IoT reference Model, IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.

4. Security and Governance: (14 hrs)
Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities.

5. IoT Applications for Value Creations: (10 hrs)
Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, IoT for Retailing Industry, IoT For Oil and Gas Industry.

INSTRUCTIONAL STATREGY

Teacher may use various teaching aids like slides, animations, flow charts, block diagrams etc. for imparting effective instructions in the subject. The teacher should explain about field applications before teaching the basics of different communication layers and technologies to develop proper understanding latest development in this area.

RECOMMENDED BOOKS:

1. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014.
2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013.
3. Cuno Pfister, Getting Started with the Internet of Things, O" Reilly Media, 2011.
4. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1 st Edition, Academic Press, 2014.

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Hrs)	Marks Allotted (%)
1	18	20
2	18	20
3	18	25
4	16	20
5	10	15
Total	**80**	**100**

5.5 (c) BIG DATA

L	T	P
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RATIONALE

The importance of Big Data in various domain disciplines has increased tremendously in recent years. The subject provides an overview of the historical and modern context and operation of Big Data for beginners. The objective of the curriculum is that the students can begin to study/practice Big Data tools and techniques.

Note: Teachers should demonstrate and expose the students to various practical applications of Big Data through tutorials and exercises.

LEARNING OUTCOME

After undergoing this subject, the student will be able to:

- Understand the challenges of Big Data
- Install and run Big Data tools
- Use tools to analyze big data and create statistical models.
- Solve problems using tools such as R and RStudio, and MapReduce/Hadoop
- Analyze data using different statistical techniques.
- Explain the utility of popular Big Data tools like: - Hadoop, Hive, Pig, Map Reduce, R Programming
- Deploy a structured life cycle approach to data science and big data analytics projects
- Use techniques and tools to analyze big data and create statistical models

DETAILED CONTENTS

1. Introduction to Data Science and BIG DATA (20 hrs)

   Data science process – roles, stages in data science project – working with data from files – working with relational databases – exploring data – managing data – cleaning and sampling for modeling and validation – big data, Evolution of big data, Future of big data, Challenges in big data, Batch computing models for Big Data computing. Introduction to NoSQL.

2. Introduction to HADOOP and MAP REDUCE (20 hrs)

   Introduction – distributed file system – algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce – Hadoop - Understanding the Map Reduce

architecture - Apache Hadoop & Hadoop EcoSystem – Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce - Data Serialization.

3. BIG Data Tools (24 hrs)

Hadoop Installation, Hadoop Commands, Open Source Big Data Databases, Hbase , MongoDB , Hive, Open Source Big Data Analysis Platforms and Tools, Hadoop ,MapReduce, HPCC Systems Pig, Hive

4. Introduction to R (16 hrs)

Reading and getting data into R – ordered and unordered factors – arrays and matrices – lists and data frames – reading data from files – probability distributions – statistical models in R.

Suggested list of exercises to be done by students to understand and use big data applications:

1. Installation of Hadoop , pig and Hive on GNUlinux/Debian/ubuntu
2. Practice of various Hadoop commands
3. Getting started with Pig.
4. Using Hive.
5. Installation of MongoDB on Gnulinux.
6. Installation of MapReduce
7. Basics of R Programming/ Rstudio

INSTRUCTIONAL STRATEGY

The teachers should lay emphasis on demonstration and application of big data along with the theoretical inputs in the class. Experts may by invited to deliver lectures and share experiences.

RECOMMENDED BOOKS

1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley, ISBN: 9788126551071, 2015.
2. Chris Eaton, Dirk deroos et al. , “Understanding Big data ”, McGraw Hill, 2012.
3. Tom White, “HADOOP: The definitive Guide” , O Reilly 2012.
4. Vignesh Prajapati, “Big Data Analytics with R and Haoop”, Packet Publishing 2013.
5. Nina Zumel, John Mount, “Practical Data Science with R”, Manning Publications, 2014.
6. Jure Leskovec, Anand Rajaraman, Jeffrey D. Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2014.

7. Mark Gardener, “Beginning R - The Statistical Pr ogramming Language”, John Wiley & Sons, Inc., 2012.
8. A Simple Introduction to DATA SCIENCE: BOOK ONE (New Street Data Science Basics 1) Kindle Edition ,by Lars Nielsen (Author), Noreen Burlingame (Author) .
9. A Simple Introduction to Data Science: BOOK TWO (New Street Data Science Basics 2) Kindle Edition by Lars Nielsen (Author)
10. The Big Data Revolution : Kindle Edition, by Jason Kolb (Author), Jeremy Kolb (Author)
11. Big Data:Principles and best practices of scalable realtime data systems (Englisch),von Nathan Marz (Autor), James Warren (Autor)
12. Data Mining Methods and Models: wileyindia ,by Daniel T Larose (Author)
13. Pro Apache Hadoop, 2ed :Author: wileyindia , by Sameer Wadkar, Madhu Siddalingaiah, Jason Venner ,(Authors)

SUGGESTED DISTRIBUTION OF MARKS

Topic	**Time Allotted (Hrs)**	**Marks Allotted (%)**
1	20	25
2	20	25
3	24	30
4	16	20
Total	**80**	**100**

5.6 MINOR PROJECT WORK

L T P
- - 4

Minor project work aims at exposing the students to the various industries dealing with computers. It is expected from them to get acquainted with computer environment possess desired attitudes. For this purpose student during middle of the course are required to be sent for a period of two to four weeks at a stretch in different establishments. Depending upon the interest of students they are sent for exposure to:

1) Industrial practices in installation and maintenance of computers and computer networks
2) Fabrication of computers
3) Fault diagnosis and testing of computers
4) Industrial practices in respect of documentation and fabrication
5) A variety of computers and peripherals in assembly organizations
6) Software package development organizations
7) Maintenance of database
8) Write be stored procedure or functions which can be attached as the library objects to the main projects
9) Write a procedure function to convert number of words.
10) Write a procedure function to convert all data function (create your own) Database connectivity, (SQL server, Oracle, Access), Library classes in C++ (same application).,
11) design web applications using PHP

Note: The teachers may guide /help students to identify their minor project work and chalk out their plan of action well in advance.

As a minor project activity each student is supposed to study the operations at site and prepare a detail project report of the observations/processes/activities by him/her. The students should be guided by the respective subject teachers; each teacher may guide a group of 4 to 5 students.

The teachers along with field supervisors/engineers will conduct performance assessment of students. Criteria for assessment will be as follows:

	Criteria	**Weightage**
(a)	Attendance and Punctuality	15%
(b)	Initiative in performing tasks/creating new things	30%
(c)	Relation with people	15%
(d)	Report Writing	40%

PERSONALITY DEVELOPMENT CAMP

This is to be organized at a stretch for two to three days during fifth or sixth semester. Extension Lectures by experts or teachers from the polytechnic will be delivered on the following broad topics. There will be no examination for this subject.

1. Communication Skills
2. Correspondence and job finding/applying/thanks and follow-up
3. Resume Writing
4. Interview Techniques: In-Person interviews; telephonic interviews, panel interviews; group interviews and video conferencing etc.
5. Presentation Techniques
6. Group Discussions Techniques
7. Aspects of Personality Development
8. Motivation
9. Leadership
10. Stress Management
11. Time Management
12. Interpersonal Relationship
13. Health and Hygiene