LAXMI CHARITABLE TRUST'S

SHETH L.U.J. & SIR M.V. COLLEGE OF ARTS, SCIENCE & COMMERCE

DR. S. RADHAKRISHNAN MARG, ANDHERI (E), MUMBAI – 400 069

Unit and Course Outcome A.Y 2023-2024

Faculty Name - Mrs. Manisha Sayani

Program: Bachelors of Arts in Multimedia & Mass Communication

Course: Fundamentals of Mass Communication

FYBAMMC SEM-I

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit I:	1. To understand the need of Mass communication 2. Learning of various mass communication models. 3. Understanding their functions and barriers of mass communication.	CO1- To introduce students to the history, evolution and the development of mass communication in the world with reference to India. CO2- To study the evolution of mass media as an important social institution. CO3- To understand the development of the mass communication models. CO4- To develop a critical understanding of Mass Media. CO5- To understand the concept of New Media and Media convergence and its implications.
Unit-II:	1. Understanding the difference between mass communication and mass media. 2. To learn various tools of mass communication. 3. Understanding the importance and nature of Audiences.	
Unit-III:	1.To understand the historical, ethical and current legal framework in which mass communication has evolved in a global society. 2. Helping students to understand more clearly with the help of case studies. 3. Showing the contribution of various religion reformers in saving their valuable literature.	
Unit-IV:	1. Understanding media and its convergence; how new mass media is a back bone to society. 2. To understand how the new mass media allows a huge increase in the volume of communication. 3. In- depth understanding of social media on mass communication.	
Unit-V:	1. Creating awareness in the masses due to the emergence of technology. 2. Technology leads to cultural diffusion, helping students to observe and discuss in the classroom. 3. Understanding how mass media is used for various purposes, how it leads to change in lifestyle, and adopting developments through technologies.	

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SHETH L.U.J. & SIR M.V. COLLEGE OF ARTS, SCIENCE & COMMERCE ANDHERI (E) MUMBAI-69

Faculty Name – Ms. Charmy Shah

Program: Bachelors of Arts in Multimedia & Mass Communication

Course: Current Affairs

FYBAMMC SEM-I

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I:	1. To learn about political stories of national importance. 2. To also know in detail the contributions of political leaders and their history. 3. To know the environment more nearly covering genres of news.	CO1- To provide learners with an overview on current developments in various fields. CO2- To generate interest among the learners about burning issues covered in the media. CO3-To equip them with a basic understanding of politics, economics, environment and technology so that students can grasp the relevance of related news. CO4- Twenty minutes of newspaper reading and discussion is mandatory in every lecture.
Unit-II:	1. To introduce and understand the government of India. 2. In-depth information about the Home Ministry and its Ministerial Team. 3. Covering all the aspects of communalism and communal violence/ tensions. 4. To know more about Jammu and Kashmir and its issues. 5. Understanding in-depth about Governmental schemes, projects and policies.	
Unit-III:	1. To learn about United Nations Systems. 2. To highlight the key functions and roles of the United Nations General Assembly. 3. To discuss and understand international issues and conflicts.	
Unit-IV :	1. To learn in detail about the history of polity in Maharashtra. 2. To also understand past and current situations of politics and their political leaders. 3. Introducing students to the marginalized and displaced Tribes. 4. Talking about developmental projects of the state.	
Unit-V:	1. To highlight the use of mobile applications and strategies to capture the attention of readers. 2. To understand the cusp of rapid transformation with digital media. 3. To learn some of the content automation tools and its handlings. 4. Introducing students to Virtual Reality and Augmented Reality. 5. To learn and discuss digital gaming and how it leads to market growth.	

SIDHALT & SIR M. V. COLLEGE OF SCIENCE & COMMERCE ANDHERI (W) MUMBAI

Faculty Name – Ms. Charmy Shah

Program: Bachelors of Arts in Multimedia & Mass Communication

Course: Effective Communication-I

FYBAMMC SEM-I

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I:	1. To understand and introduce communication 2. To understand the process and types of communication 3. To enhance the listening skills required to communicate effectively.	1. To make students aware of the functional and operational use of language in media. understand each type in detail. 2. To equip or enhance students with structural and analytical reading, writing and thinking skills. 3. To introduce key concepts of communications.
Unit-II:	1. Understanding reading and its types. 2. Understanding languages and their aspects when communicating through various platforms. 3. To get deeper and broader knowledge about grammar aspects.	
Unit-III:	1. To make students understand the importance of thinking and its role in communication. 2. Understanding types and errors of thinking. 3. To understand presentations and the tips on how to deliver and communicate effectively.	
Unit-IV:	1. Understanding the concept, needs, and technologies of translation. 2. Understanding the difference between interpretation and translation. 3. To understand the translator's perspective for effectively communicating in the media.	

SHETH L.U.J. & SIR M.V. COLLEGE OF SCIENCE & COMMERCE

Faculty Name - Ms. Namrata Singh

Program: Bachelors of Arts in Multimedia & Mass Communication

Course: Foundation Course-I

FYBAMMC SEM-I

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I	1. To understand the cultural and religion wise composition. 2. To learn the classification of Indian Languages. 3. To understand the regional variations in India.	CO- 1 To introduce students to the overview of the Indian Society. CO-2 To help them understand the constitution of India. CO-3 To acquaint them with the socio-political problems of India. CO-4 The student will apprehend regional variations according to rural, urban and tribal characteristics. CO-5 Students will become more aware of the political frameworks. CO-6 Learners will comprehend the multi-cultural diversity of Indian society through its demographic composition. Appreciate the concept of linguistic diversity in relation to the Indian situation
Unit-II	1. To learn the meaning of Social Inequality. 2. To learn about social stratification, its characteristics and its types. 3. To understand the class system. 4. To understand the declining sex ratio in India. 5. To learn about the status and portrayal of women in each era.	
Unit-III.	1. To understand the inequalities of the caste system. 2. To learn about the causes of Communalism in India. 3. To learn about the remedial actions to overcome communalism, linguism, regionalism.	
Unit-IV.	1. To understand the meaning of Preamble and its Characteristics. 2. To learn the structure of the Indian Constitution. 3. To learn about the significance of the Fundamental Duties, its advantages, and disadvantages.	
Unit-V.	1. To learn about the multi-party system of Indian politics and its evolution. 2. To understand the working of the local self-government. 3. To learn the important features of the Amendments.	

Faculty Name - Ms. Namrata Singh

Program: Bachelors of Arts in Multimedia & Mass Communication

Course: History of Media

FYBAMMC SEM-I

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I	1. To learn about the pointers in History of Newspapers in India. 2. To understand about the factors that added to the boom of newspapers in India. 3. To learn the role of the press in India's struggle for freedom. 4. To deeply understand the different Press acts of India.	CO1- Learner will be able to understand Media History through key events in the cultural history. CO2- TO enable the learner to understand the major developments in Media History. CO3- To understand the history and role of professionals in shaping communications. CO4- To understand the values that's shaped and continues to influence Indian Mass Media. CO5- Learner will develop the ability to think and analyze about Media. CO6. To sharpen the reading, writing, speaking and listening skills that will help the students to understand the development of Media.
Unit-II	1. To learn about the diversity and growth of Indian Language Newspapers. 2. To understand the effect of the vernacular press act on Indian Publishers. 3. To learn the difference between English newspapers and Language Newspapers.	
Unit-III	1. To learn about different types of Documentaries. 2. To learn how to make documentaries. 3. To understand about Indian Documentary and the struggle for Indian Independence. 4. To learn about the New Media and their roles in Movie making.	
Unit-IV	1. To study the history of Prasar Bharti Act. 2. To study the functions and objectives of Radio. 3. To study the Business model of the cable TV industry. 4. To understand the key recommendations of TRAI.	
Unit-V	1. To study about the various movements of history. 2. To learn about our Media icons who played an important role in marking the change.	

Faculty Name - Ms. Namrata Singh

Program: Bachelors of Arts in Multimedia & Mass Communication

Course: Visual Communication

39FYBAMMC SEM-I

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I:	1. To understand communication and the aspects. 2. To introduce students to VISUAL AIDS and the history of visuals. 3. Understanding visual communication in detail with various connections. 4. To learn about visible and invisible concepts.	CO1- To provide students with tools that would help them visualize and communicate. CO2- Understanding Visual Communication as part of Mass Communication. CO3- To acquire basic knowledge to be able to carry out a project in the field of visual communication. CO4- To acquire basic knowledge in theories and languages of Visual Communication. CO5- The ability to understand and analyze visual communication from a critical perspective.
Unit-II:	1. To extend the knowledge of the students by discussing theories and case studies. 2. To make them understand how the visual cortex works to create unified perception. 3. Knowing about complexity and multifaceted cognitive processes.	
Unit-III:	1. To understand theories related to color for visuals. 2. Understanding the psychological influence of color on perception. 3. Understanding in detail visual plans and designs.	
Unit-IV:	1. Understanding of various tools of visual communication. 2. Understanding various styles and types of visual communications. 3. To strategize visuals for mass appeals. 4. To understand the perception and structure of each platform.	
Unit-V:	1. To adapt to new changes with the advent of technologies. 2. Understanding the ethics and audience behavior. 3. Understanding the role of stereotyping in social media.	

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DR. S. RADHAKRISHNAN MARG, ANDHERI (E), MUMBAI – 400 069

Unit and Course Outcome A.Y 2023-2024

Faculty Name - Mrs. Manisha Sayani

Program: Bachelors of Arts in Multimedia & Mass Communication

Course: Introduction to Advertising

FYBAMMC SEM-II

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I	1. To understand the evolution of advertising 2. To relate with the advantages & disadvantages to consumers, traders, manufactures and society. 3. To understand advertising laws and ethics 4. To understand various types of advertising	CO1- To provide the students with basic understanding of advertising, growth, importance, and types. CO2- To understand effective advertising campaigns, tools, models etc. CO3- To comprehend the role of advertising, various departments, careers, and creativity. CO4- To provide students with various advertising trends, and future.
Unit-II:	1. To comprehend the concept of IMC 2. To understand the role and various tools of IMC 3. To be able to understand the difference between print media & Outdoor media 4. To get basic knowledge about Radio & Television as a means of mass communication and advertising	
Unit-III	1. To make students understand the creative process in advertising industry 2. To make students comprehend the different elements in an advertisement	
Unit-IV	1. To help students understand the different types of ad agencies and their basic difference 2. To be able to know the various departments in an ad agency 3. To understand the latest trends in career in advertising industry	

Faculty Name - Ms. Namrata Singh

Program: Bachelors of Arts in Multimedia & Mass Communication

Course: Content Writing

FYBAMMC SEM-II

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I	1. To learn and revise English grammar. 2. To practice vocabulary building in order to understand its aspects and significance. 3. Learning about common errors while communicating in the English language and understanding the requirements for good writing. 4. In-depth knowledge of creativity exposure in creating phrases and idioms.	CO1- To provide students with tools that would help them communicate effectively. CO2- Understanding crisp writing as part of Mass communication. CO3- The ability to draw the essence of situations and develop clarity of thought.
Unit-II	1. To understand some editing tips for better writing and encouraging readers to read which helps in publishing well. 2. To boost students to write and edit captions that are catchy and attractive. 3. To learn to edit headlines with proper words, and grammar, also replacing words that are simple and clear in meaning. 4. To learn how to structure a story and editing tips for creating a flow and tightening the copy or the story.	
Unit-III	1. To understand how to write tickers for the television medium. 2. Understanding writing techniques like captions, hashtags and content for social media posts and other networks. 3. Understanding in detail writing methods for writing headlines and content briefs along with its software's and tools.	
Unit-IV	1. Understanding PowerPoint presentations, their related terms and tools. 2. Understanding in detail infographics and their impact while making presentations. 3. Tips on how to make a presentation convincing to listeners and viewers. 4. To learn terms and concepts related to Google Advanced Search and Plagiarism in detail.	
Unit-V	1. Understanding content and its essentials. 2. To differentiate between print and digital platforms and their content creation. 3. To understand the importance of keywords in Digital media.	

Faculty Name - Ms. Charmy Shah

Program: Bachelors of Arts in Multimedia & Mass Communication

Course: Effective Communication-II

FYBAMMC SEM-II

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I	1. To learn about report writing and its various elements. 2. Understanding in-depth headlines and their features. 3. To make students understand the need to communicate with internal and external publics of the organization company through types of organizational writing. 4. Understanding publicity in detail.	Co1- To make the students aware of the use of language in media and organization. CO2- To equip or enhance students with structural and analytical reading, writing, and thinking skills. CO3- To introduce key concepts of communication.
Unit-II	1. To learn the ability to spot mistakes via editing. 2. To understand how editing is different from medium to medium. 3. To elaborate on grammar aspects for communicating effectively.	
Unit-III	1. To understand paraphrasing in writing communication. 2. The role of plagiarism while paraphrasing and translations. 3. Understanding summarization.	
Unit-IV	1. To learn to interpret data resulting from pies, graphs, maps, and charts.	

Faculty Name - Ms. Namrata Singh

Program: Bachelors of Arts in Multimedia & Mass Communication

Course: Foundation Course-II

FYBAMMC SEM-II

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I	1. To study the elements of liberalization, its advantages, and disadvantages. 2. To study the impact of Globalization on Indian Industries. 3. To study the role of IT and Communication.	CO-1: To introduce students to the overview of the Indian Society. CO-2: To help them understand the constitution of India. CO-3: To acquaint them with the socio-political problems of India. CO-4: To understand stress and conflicts. CO-5: To manage stress and conflicts in contemporary society. CO-6: To learn about Contemporary Societal Challenges
Unit-II	1. To study the basic characteristics of Human Rights. 2. To understand the evolution of Human rights. 3. To study the classification of the provisions of UDHR.	
Unit-III	1. To study the concept and disciplines of Ecology. 2. To study the structure of Ecosystem and causes of environmental degradation. 3. To learns about Sustainable development and the global need for the Sustainable development	
Unit-IV	1. To learn about the levels of Stress. 2. To study about the types of Organizational conflict. 3. To understand the measures for resolving aggression and violence in society.	
Unit-V	1. To learn the assumptions & limitations in Hierarchy of Needs Theory. 2. To study the need for peace and harmony in India.	

Faculty Name - Ms. Charmy Shah

Program: Bachelors of Arts in Multimedia & Mass Communication

Course: Introduction to Journalism

FYBAMMC SEM-II

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I	1. To learn the history and eras of journalism along with challenges. 2. To understand the new media and technology advances. 3. To briefly understand the news transmission and gathering process. 4. To discuss and learn about how the internet led to the rise of citizen journalism along with its pros, risks, and nature.	CO1- To help media students to acquaint themselves with an influential medium of journalism that holds the key to opinion formation and to create awareness.
Unit-II	1. To get knowledge about news and the process of gathering news. 2. Elements required for a good news story. 3. Understanding the beats and parts of a news story in detail.	
Unit-III	1. Understanding the avenues to explore in journalism. 2. To learn about journalists/ reporters and their practices on various platforms. 3. Understanding the types of news. 4. To make students understand the difference between PR and journalism.	
Unit-IV	1. To learn and understand career prospects in journalism. 2. To encourage students to participate in grabbing opportunities related to the field.	
Unit-V	1. To make students understand the importance of a piece of information to convert it into the news. 2. The unbiasedness and impartiality objectives must be cleared among the students. 3. To make understanding students to cover news from all angles and the format in writing news.	

Bajpai

SIR M. V. COLLEGE OF SCIENCE & COMMERCE

Faculty Name – Ms. Namrata Singh

Program: Bachelors of Arts in Multimedia & Mass Communication

Course: Media, Gender & Culture

FYBAMMC SEM-II

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I	1. To understand the evolution of culture and significance of Cultural studies and media. 2. Brief learning on the concepts related to culture. 3. To learn and understand the various ideologies and theories reflecting the culture, gender, and media.	CO1- To discuss the significance of culture and the media industry. CO2- To understand the association between the media, gender, and culture in the society. CO3- To stress on the changing perspectives of media, gender, and culture in the globalized era.
Unit-II	1. To understand and discuss social constructionism and its terms. . 2. To understand culture from various aspects such as politics, religion- technology and media. 3. Understanding how power is an integral element of culture and features. 4. To learn recent trends in culture consumption.	
Unit-III	1. To have a deeper understanding about influences of media on gender and views. 2. To discuss and have better understanding on gender equality with reference to the media. 3.To relate the gender challenges on various platforms.	
Unit-IV	1. To know about current trends of globalization. 2. To discuss case studies and concepts relation to global culture. 3. Understanding about consumer culture and its evolution. 4. Elaborating the aspects related to issues and impact of cultures along importance in media and gender.	

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DR. S. RADHAKRISHNAN MARG, ANDHERI (E), MUMBAI – 400 069

Unit and Course Outcome A.Y 2023-2024

Faculty Name - Mrs. Manisha Sayani

Program: Bachelors of Arts in Multimedia & Mass Communication

Course: Corporate Communication & Public Relations

SYBAMMC SEM-III

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I	1. To study the features of corporate identity. 2. To study the advantages of corporate reputation 3. To study important code and ethics of corporate communication. 4. To study corporate communication and management	CO-1 Define and introduce the various elements of corporate communication and public relations and consider their roles in managing organizations CO-2 Classify key concepts of corporate communication and public relations. CO-3 Examine how various elements of corporate communication must be coordinated to communicate effectively in today's competitive world. CO-4 Compare and contrast the different practices associated with corporate communication with the latest trends and social media tools. CO-5 Critically evaluate the theories of public relations CO-6 Construct effective corporate communication and public relation plans/strategies.
Unit-II	1. To study the growth and importance of Public Relations. 2. To study the objective and significance of Public Relations in Business. 3. To study the key roles of PR in various sectors. 4. To study about theories and propagandas from various PR events.	
Unit-III	1. To study the various importance of Media Relations. 2. To study the principles and analysis of Media Relations. 3. To study effective communication with employees. 4. To study on managing the crisis through communication with various examples.	
Unit-IV	1. To study how technology plays an important role in corporate communication. 2. To study about social media influencers. 3. To understand E-Public Relations and its importance.	

Sayani

SHETH L.U.J. & SIR M.V. COLLEGE OF SCIENCE & COMMERCE • ANDHERI (E) MUMBAI-93.

Faculty Name - Ms. Namrata Singh

Program: Bachelors of Arts in Multimedia & Mass Communication

Course: Radio Program Production-I

SYBAMMC SEM-III

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I	1. To study about the invention of Radio and the beginning of broadcasting 2. To study the golden age of American radio 3. To study the rise of radio networks and the Radio act of 1927 4. To understand the script writing style for Radio	CO1- The course is intended to explore the art of audio production. CO2-The students are made familiar with the aesthetics of sound and its application in various radio program formats. CO3-To provide them with the basic knowledge and understanding of radio business and production.
Unit-II	1. To learn how to generate ideas for a radio program. 2. To study research on different target audience 3. To understand the structure of the organization and their roles.	
Unit-III	1. To understand about various equipment used to broadcast a radio program. 2. To learn about digital mixers and its importance. 3. To study the history of Sound recording	
Unit-IV	1. To study the News story material. 2. To understand news style for TV and Radio. 3. To study about Media Convergence and pragmatism	
Unit-V	1. To learn about various questioning techniques. 2. To learn about preparation done before the interview.	

Faculty Name - Ms. Namrata Singh

Program:Bachelors of Arts in Multimedia & Mass Communication

Course: Media Studies

SYBAMMC SEM-III

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I	1. To learn various dynamics of culture and the theories. 2. To learn and differentiate various eras of Mass society.	CO1- To make students understand the dynamic role of the media in society CO2- To introduce students to the study of contemporary forms of mediated communication CO3- To introduces students to a variety of analytical perspectives and theories related to media CO4 - To understand the impact of media on individual attitude, values, behavior, and geopolitics CO5- To study the impact of new media technologies and pop culture in the field of advertising CO6- To understand the impact of globalization on media
Unit-II	1. To understand various theories laid by theorists 2. To adapt change in perspective and attitude along with society and mass communication	
Unit-III	1. To understand theorists and their theories related to media and consumption 2. to learn about technological advances with eras. 3. To formulate and identify biases of communication and get in depth knowledge about social issues.	
Unit-IV	1. To understand the theories on media effects 2. To learn about media and its effect on behaviors. 3. To get an in-depth idea about the history of politics and current scenarios as discussions.	
Unit-V	1. To learn about new media and its effects 2. To understand the new global village concept by theorist 3. To understand the evolution of the internet via theory.	

Faculty Name - Ms. Charmy Shah

Program: Bachelors of Arts in Multimedia & Mass Communication

Course: Film Communication-I

SYBAMMC SEM-III

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I:	1. To learn about History of cinema, its origin, and various phases of cinema 2. To learn about the language and key concepts of cinema 3. To understand the transition from documentary to feature films.	C01- To inculcate liking and understanding of good cinema. C02- To make students aware with a brief history of movies; the major cinema movements. C03- Understanding the power of visuals and sound and the ability to make use of them in effective communication. C04- Insight into film techniques and aesthetics.
Unit-II	1. To learn about techniques and technology in film making 2. To learn about film makers 3. To learn and understand various aspects of film appreciation and its components	
Unit-III:	1. To learn about early years of world including Indian cinema 2. To understand the silent era and its transition till the development stage.	
Unit-IV:	1. To know and introduce students to major cinema movements and filmmakers. 2. To know films from various countries and cultures and learn its concepts used in this industry. 3. To know about the contributions of people who got recognized and accredited for their hard work in the respective cinema.	
Unit-V:	1. To understand and have knowledge about art and commercial cinema. 2. To understand Indian diaspora and Bollywood 3. Learning about the important contributions as directors, producers, actors, actress and so on of persons and learning Indian new wave cinema in detail	

Faculty Name – Ms. Charmy Shah

Program: Bachelors of Arts in Multimedia & Mass Communication

Course: Introduction to Photography

SYBAMMC SEM-III

Unit No. & Name	Unit Outcomes	Course Outcomes
Uni-I	1. The understand about the body parts of a basic camera 2. To understand the formats and various concepts related to camera 3. To learn how a camera is a storyteller by capturing still images.	**C01-** To introduce to media learners the ability of an image into effective communication. 2. C02- To help the learner understand that media photography is a language of visual communication and beyond just point and shoot fun moments. C03- To practice how a picture speaks thousand words by enlightening the learner on how. C04- To develop the base of visualization among learners in using pictures in practical projects. C05- To help learners work on a given theme of the subject into making relevant pictures or photo features.
Unit-II	1. To understand techniques of how to capture images. 2. To understand various techniques and understand focal length. 3. To learn in detail the various types of lenses and its uses.	
Unit-III	1. To learn about intensity and exposure of light while clicking an image 2. To understand in comparison with advertisements and various types of lighting. 3. To earn about color and moods in photography 4. To learn to be as creative as possible.	
Unit-IV	1. To understand concepts related to frame and aspect ratio 2. To understand the types under composition 3. To understand in detail about viewpoints and perspectives along with types.	
Unit-V	1. To learn about electronic format 2. To learn about pixels and its values and megapixel 3. To understand various types of files saved and limitations of RAW format	

Faculty Name - Mr. Mukesh Verma

Program: Bachelors of Arts in Multimedia & Mass Communication

Course: Computers & Multimedia-I

SYBAMMC SEM-III

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I	1. Learning Introduction to Photoshop Image editing theory Bitmaps v/s Vectors When to use Photoshop and when to use drawing tools. 2. Understanding the Photoshop Workspace, The tools, Toolbox controls Property bar, Options bar, Floating palettes. 3. Learning and working with images Image mode, Image size, canvas size Image resolution, size and resampling. 4. learning Image Editing Levels, Curves, Contrast adjustment, Color adjustment Photo filters. 5. Understanding and Working with Text layer, Character palate, Paragraph palate Text resizing, Text color, Text attributes Working on simple project/ one page design.	Co1- To equip the students with an understanding of industry knowledge required to make a career in the field of print and Advertising, Digital Marketing, Television media, Film etc. CO2- To train them with the software knowledge required in the above-mentioned Industries.
Unit-II	1. Understanding the Introduction to CorelDraw. CorelDraw Interface, Tool Box, Importing files in CorelDraw, Different file formats. 2. Learning to Using text Artistic and paragraph text, Formatting Text, Embedding Objects into text, Wrapping Text around Object, Linking Text to Objects Text C2C. 3. Understanding the Exploring tools Basic shapes: Cut, Erase, Combine, shaping tool: Nodes, Handles, Corners Convert to Curves: Reshaping, Creating figures, Logos. 4. Learning how to Applying effects Power of Blends, Distortion and contour Effects, Envelopes, Lens effects, Transparency, Creating Depth Effects and Power Clips. 5. Understanding the Exporting in CorelDraw Exporting, Types of export, Exporting for other software.	
Unit-III	1. Understanding of Introduction to QuarkXPress List the menus, List the tools, Benefits of using Quark, Application of Quark. 2. Learning to Text Edits in Quark Format of text, Purpose of text selection, Aligning text in different design formats, Text alignment with embedded images. 3. Learning how to Use palettes Using palettes for different types of publications made in quark, Magazine in quark,	

	Newspaper in quark. 4. Understanding the Color correction in quark Embedding images in proper formats, Color correction on the images, Adjusting according to the color tone of the publication. 5. Learning how to Export files Types of files, Exporting for different publications/templates, Newspaper, magazine, etc.	
Unit-IV	1. Understanding of Introduction to editing importance, Great editing examples, Editing for different formats (film/ad/news.) 2. Learning How premiere helps in editing, Understanding the toolbar, importing files, Experimenting with video and audio layers, Basics of editing (cut/layers/different windows.) 3. Understanding file formats Understanding different file formats (AVI/MPEG/MOV/H264), Importing raw footage for edits, performing video checks while editing. 4. Learning how to Use color grading What is color grading, Examples of color grading, using filters and presents in color mixing, Applying presents on layers for editing. 5. Learning to Export and rendering Exporting in different formats, choosing right formats for exposing, managing quality while exporting, Rendering and maintaining file format, Improving quality and time to render techniques.	
Unit-V	1. Learning the Introduction to Digital Audio Sound basics, Audio band pitch volume Understanding Digital audio Sampling, bit rate. 2. Understanding the Concept of Dolby Digital Mono, Stereo, Quadraphonic Surround sound, 5.1 Channel, Subwoofer Difference in Dolby Digital and DTS, More about DTS Three-way sound speaker. 3. Understanding the Sound Recording Equipment Microphone and Types of microphones Preamps, Power amps, Sound card Input from audio sources, Extract audio from CD Different audio saving formats Wave, WMA, CDA, MP3 Digital Computer software. 4. Learning and Working with Sound Workspace, play bar, timeline, Transport toolbar Working with audio file Basic editing, cut/copy/paste, paste special Using Markers, Regions and Commands Sound processing techniques Channel converter, Bit depth converter. 5. Understanding the Advanced Sound Processing Delay, Echo, Reverb, Chorus Mixing sounds Noise gating. Expansion, changing pitch and Time duration Soundtrack output Create your audio CD and mark chapters.	

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DR. S. RADHAKRISHNAN MARG, ANDHERI (E), MUMBAI – 400 069

Unit and Course Outcome A.Y 2023-2024

Faculty Name - Ms. Namrata Singh

Program: Bachelors of Arts in Multimedia & Mass Communication

Course: Radio Program Production-II

SYBAMMC SEM-IV

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I	1. To study various Interview styles. 2. To study about different Radio formats. 3. To learn techniques for ending a radio program.	CO1. To give learners basic knowledge of radio/audio production theory, techniques, and aesthetics via practical experience in the writing and production of several program formats. CO2. To make them familiar with the art of audio recording, editing, mixing, and aural storytelling techniques.
Unit-II	1. To understand different Base Stations. 2. To learn structure of commentary as the state of art 3. To understand the beginning of sports broadcasting 4. To learn different types of Commentary.	
Unit-III	1. To study the evolution of the Internet. 2. To understand the working of Social Networking. 3. To briefly understand the making & working of Radio podcasting	
Unit-IV	1. To understand how-to pick-up subjects for the phone-in programs. 2. To learn the reasons to take live calls.	
Unit-V	1. To understand the subsistence of Copyright. 2. To understand the difference between commercials vs. Non-commercial radio 3. To learn the tips to mastering Radio voice.	

SHETH L.U.J. & SIR M.V. COLLEGE OF SCIENCE & COMMERCE ANDHERI (E) MUMBAI

Faculty Name - Ms. Namrata Singh

Program: Bachelors of Arts in Multimedia & Mass Communication

Course: Writing & Editing for Media

SYBAMMC SEM-IV

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I	1. To learn the art and basic tools of writing. 2. To study the elements of News stories. 3. To learn the types of Feature stories and how to craft the story. 4. To study different writing style guides	CO1. Provide the ability to understand writing styles that fit various media platforms. CO2. It would help the learner acquire information gathering skills and techniques. CO3. On completion of this course, students will be able to understand similarities and differences in writing for all forms of media including the internet and digital. CO4. The learner will gather knowledge of different news and copy formats along with appropriate style-sheets and layout. CO5. The learner will imbibe the importance of writing clearly, precisely, and accurately for different types of audiences CO6. Provide basic proficiency in proof-reading and editing.
Unit-II	1. To study how to write scripts for the Broadcast media. 2. To study about the different scripting formats. 3. To learn the Rundown sheet for Radio program 4. To learn the tips and techniques to write the television commercial	
Unit-III	1. To study the difference between newspaper writing and writing for the web. 2. To learn about Digital Convergence and audience engagement 3. To learn how to write blogs and essentials of blogging	
Unit-IV	1. To learn how to edit a copy. 2. To study the principles of good news editing. 3. To learn the general tips for proofing and editing.	

Faculty Name - Ms. Charmy Shah

Program: Bachelors of Arts in Multimedia & Mass Communication

Course: Media, Laws & Ethics

SYBAMMC SEM-IV

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I:	1. To learn about preamble and constitution 2. To understand about various freedoms like speech and expression 3. To develop a sense of social responsibility towards society by understanding they theory 4. To learn social media and its related concepts in detail	CO1- To provide the learners with an understanding of laws that impact the media. C02- To sensitize them towards the social and ethical responsibility of the media.
Unit-II:	1. To know about Press Council of India 2. Introducing TRAI to students to understand the telecommunication industry 3. Understanding about various regulatory bodies related to media and their functions	
Unit-III:	1. To know importance related to IPR 2. To learn defamation and it laws in India 3. To know and understand what is contempt of court and its punishments 4. To know prohibition of Drugs and magical Remedies advertisements under act.	
Unit-IV:	1. To know and learn about privacy and its conflict to RTI 2. To discuss and learn about women in current situation and trends and Indecency Representation on Women's Act 3. To understand about various organizations laid by Media bodies underlying certain laws, sections, and its functions.	
Unit-V:	1. To understand role and concepts related to ethics 2.The ethical responsibility as a journalist and conflict of interest 3.To widening knowledge about stereotypes and its applications on various categories of human and according to age	

Faculty Name - Ms. Charmy Shah

Program: Bachelors of Arts in Multimedia & Mass Communication

Course: Mass Media Research

SYBAMMC SEM-IV

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I:	1. To introduce students to research and the need for research in society. 2. Understanding about research process in detail 3. Understanding various types of research and learning about hypotheses and its use in research.	CO1- To introduce students to debates in Research approaches and equip them with tools to carry on research CO2- To understand the scope and techniques of media research, their utility and limitations
Unit-II:	1. To learn about research design and its importance in carrying out research. 2. The questions to be solved while preparing an outline of the research or thesis. 3. The types of research design.	
Unit-III:	1. To learn various data collection methods 2. To learn about literature of review 3. To know about measurement techniques, tabulation, and Research Format.	
Unit-IV:	1.To understand about Content analysis and its uses 2.To learn steps in content analysis 3.To understand the limitations of content analysis in detail	
Unit-V:	1. Learning about the various applications of Research in Mass Media 2. To learn about the effect of media on people. 3. To find solutions to media-related questions.	
Unit-VI:	1. To learn about codes of signs, symbols and actions and communicate the same with all masses- Study of signs "Semiotics" 2. The importance of semiotics 3. Understanding relation of semiotics and media	

Faculty Name - Ms. Charmy Shah

Program: Bachelors of Arts in Multimedia & Mass Communication

Course: Film Communication-II

SYBAMMC SEM-IV

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-1:	1. To learn about various regional cinema and its contributions to the industry 2. To know about social issues, topics and how films evolved by contributions of individuals. 3. To know famous personalities and their journey in the industry personal and professional both.	CO-1 Outline the cinema from different regions and understand the process of filmmaking. CO-2 Understand the contribution of cinema in society. CO-3 Apply various technical and grammatical rules to filmmaking. CO-4 Debate the use of mass communication in filmmaking and its marketing. CO-5 Evaluate the economic aspects of film. CO-6 Propose a new script for a meaningful film.
Unit-2:	1. To understand the famous popular Hindi Commercial films 2. To get in-depth knowledge of how cinema has evolved from past to present with movie names. . 3. To learn about various economic aspects of cinema along with the genres.	
Unit-3:	1. Understand about contemporary era of filmmaking 2. The conversion from celluloid to Digital cinema 3. To learn how people adapted a convergence in viewing culture of cinema 4. To learn about OTT platforms.	
Unit-4:	1. To learn the process from Film production to Film Exhibition 2. To learn the stages of Film Making in brief 3. To learn the concepts in detail related to exhibition of movies through various techniques. 4. To grow the industry with more competition and creative skills.	
Unit-5:	1. To learn about institutions and Trade associations for Films and its history to present the situation. 2. To learn about film festivals and major film festivals in India and Abroad. 3. To learn about Film awards and its nature, various awards are recognized in India and Abroad.	

Faculty Name - Mr. Mukesh Verma

Program: Bachelors of Arts in Multimedia & Mass Communication

Course: Computers & Multimedia-II

SYBAMMC SEM-IV

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I	1. To learn Tools of Photoshop. 2. Understand effects Sharpen, Blur, Eyedropper and color pick filter. 3. Learning to change image background, Layer Masking and gradient. 4. Learning Blends modes and advanced blending options. 5. Students learn text editing and its selection. 6. Learning to create a professional design using all tools.	CO1: To help learners be media industry ready. This will help learners to be aware of the minimum requirement of the software when stepping in the industry. CO2: To introduce the media soft wares to make the learner understand what goes behind the seene and help them choose their stream. CO3: To prepare learners skilled enough for independence during project papers in TY sem.VI. CO4: To help learners work on small scale projects during the academic period.
Unit-II	1. Learning to Adobe Illustrator Illustrator Interface, Tool Box, Panels and Bars Importing files in illustrator, Different file formats. 2. Learning text Artistic and paragraph text, Formatting Text, Embedding Objects into text, Wrapping Text around Object, Linking Text to Objects. 3. Understanding to Create Simple designs Text based logo replication, Shape based logo replica, Creating new symbols, Fill color, Outline color, Weight and opacity. 4. Understanding to Apply effects Power of Blends, Distortion and contour Effects, Envelopes, Lens effects, Transparency, Creating Depth Effects and Power Clips. 5. Learning to Export in Illustrator Exporting, Types of export, Exporting for other softwares.	
Unit-III	1. Understand to Adobe In Design List the menus, List the tools, Palates Benefits of using In Design, Application of In Design 2. Learning Text Edits in InDesign Format of text, Character and Paragraph Bars Purpose of text selection, Aligning text in different design formats, Text alignment with embedded images 3. Learning Using palettes for different types of publications made in InDesign, Magazine in InDesign, Paragraph styles Newspaper in InDesign, Paragraphs type palate, Text wrap palate.	

	4. Learning Colour correction in InDesign Embedding images in proper formats, Colour correction on the images. Adjusting according to the color tone of the publication. 5. Learning to Export files Types of files, Exporting for different publications templates, Newspaper, magazine, etc.	
Unit-IV	1. Understanding Introduction to editing Editing importance, Great editing examples, Editing for different formats (film/ad/news) 2. Understanding the toolbar, Importing files, Experimenting with video and audio layers, Basics of editing (cut/layers/different windows/) 3. Understanding the Right application of various file formats Understanding different file formats (AVI/MPEG/MOV/H264, etc.) Importing raw footage for edits, Performing video checks while editing Using inbuilt transitions. 4. Learning Using color grading What is color grading. Examples of color grading, Using filters and presents in color mixing. Applying presents on layers for editing. 5. Learning Exporting and rendering Exporting in different formats, Choosing right formats for exposing, Managing quality while exporting, Rendering and maintaining file format, Improving quality and time to render techniques.	
Unit-V	1. Understanding the Introduction to Dreamweaver Workspace overview Document toolbar, Document window, Panel groups, Files pane, Property inspector, Tag selector Defining website in Dreamweaver. 2. Learning and Working with DW Creating Dreamweaver template Page layout in DW CSS layouts: advantages and disadvantages Creating HTML pages, Insert content and form Creating Forms in DW. 3. Understanding to Linking pages Using DW to accomplish basic web page development, Page properties Title, Background image, BGcolor, Text color, Links. 4. learning for Using Tables Cell padding, cell spacing, Border Table basics: Colour BG in cell, Invisible tables, Changing span, Making image into clickable link. 5.Understanding to Typo in DW Changing Font typefaces, size, style, colors Text to hyperlink.	

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SHETH L.U.J. & SIR M.V. COLLEGE OF ARTS, SCIENCE & COMMERCE

DR. S. RADHAKRISHNAN MARG, ANDHERI (E), MUMBAI – 400 069

Unit and Course Outcome A.Y 2023-2024

Faculty Name - Mrs. Manisha Sayani

Program: Bachelor's of Arts in Multi Media and Mass Communication:

Course: Brand Building

TYBAMMC SEM-V

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I	1. To learn and understand brand and its related concepts 2. To study importance of branding and its process 3. To distinguish between a brand and a product.	CO1- To understand the awareness and growing importance of brand building CO2- To know how to build, sustain and grow brands CO3- To know the various new ways of building brands. CO4- To know about the global perspective of brand building.
Unit-II	1. To understand the concept of brand identity. 2. to learn to connect with brands and match personality. 3. To educate students about various CSRs from brands	
Unit-III	1. To understand the concept of positioning and its various types 2. To learn about benefits from brands and its attributes	
Unit-IV	1. To understand the brand leveraging and its concepts 2. to learn about benefits and various brand related concepts	
Unit-V	1.To understand in detail strategies and equity at various level 2. To clear the concepts of branding strategy	
Unit-VI	1.To understand various models and theories 2. To create brand awareness and brand loyalty models clear	
Unit-VII	1.To learn about coordination and corporate image in detail 2. learning about branding and it uses in various areas of lifestyle	
Unit-VIII	1. To understand about global brands 2. To enhance leadership in positioning and Globalization	
Unit-IX	1. To enhance corporate image building 2. To learn and compare advertising and corporate image	

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Unit-X	1. To understand importance of CSR and its roles 2. To learn about CSR and advertising performed by brands	
Unit-XI	1. To learn about factors for conception 2. To know about stages of growth and case studies	
Unit-XII	1. Understanding the various sectors for branding	

Faculty Name - Mrs. Manisha Sayani

Program: Bachelor's of Arts in Multi Media and Mass Communication:

Course: Consumer Behavior

TYBAMMC SEM-V

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I	1. To study the components of consumer behavior. 2. To study consumer behavior and digital world 3. To study VALS in detail 4. To study the importance of persuasion.	CO1- To understand the sociological and psychological perspective of consumer behavior. CO2- To introduce students to the complexities of consumer behavior, its importance in marketing and advertising. CO3- To sensitize students to the changing trends in consumer behavior.
Unit-II	1. To study the types of motivation and its related theories. 2. To study the attitude and multi attitudes 3. To study personality and its traits along with consumer behavior 4. To study the application of theories in marketing and self-concepts.	
Unit-III	1. To learn behavioral and classical theories 2. To learn cognitive learning and its use in consumer behavior	
Unit-IV	1. To study the family and consumer behavior consumption 2. To learn changing core values and Indian culture 3. To learn determinants of consumer behavior	
Unit-V	1. To study the characteristics of opinion leaders. 2. To study the process and models of consumer decisions. 3. To study the adoption process.	

Sayani

Faculty Name -Mrs. Manisha Sayani

Program: Bachelor's of Arts in Multi Media and Mass Communication:

Course: Agency Management

TYBAMMC SEM-V

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I	1. To learn about advertising agencies and its functions 2. To understand about different types of ad agencies	CO1- To acquaint the students with concepts, techniques and give experience in the application of concepts for developing an effective advertising campaign. CO2- How an ad agency works and what opportunities exist. CO3- To familiarize students with the different aspects of running an ad agency CO4- To inculcate competencies thereby enabling to undertake professional work with the advertising industry.
Unit-II	1. To learn about the role of account planner in ad agency 2. To understand in depth the account planning process	
Unit-III	1. To learn about global advertising and marketing 2. To learn to analysis about foreign countries and its usage in global advertising and marketing	
Unit-IV	1. To understand about social marketing and its concept 2. To understand the difficulties in social marketing 3. The effects of social marketing	
Unit-V	1. To learn about advertising and its impact on children and various audiences 2. To educate students about Controversial ads and gender biases 3. To learn about advertising and compare it with the economy.	
Unit-VI	1. To learn about various types of advertising 2. to learn the scope of advertising for various audiences.	
Unit-VII	1. To explore the world of internet and digital marketing 2. To learn the swift of offline to online marketing	

Faculty Name - Ms. Namrata Singh

Program: Bachelor's of Arts in Multi Media and Mass Communication:

Course: CopyWriting

TYBAMMC SEM-V

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I	1. To understand the role and importance of copywriting. 2. Various responsibility of a copywriter	CO1- To familiarize the students with the concept of copywriting as selling through writing CO2- To learn the process of creating original, strategic, compelling copy for various mediums. CO3- To train students to generate, develop and express ideas effectively CO4- To learn the rudimentary techniques of advertising - headline and body copywriting, the economy of words and thought peculiar to this type of writing, and the necessity of creative thinking in written expression. CO5- In an ad agency, as a copywriter, one cannot "just be creative and express self"- here one is in a 'creative professional', and have to be able to use the power of creativity for a commercial/ business reason- as someone is paying you to get a problem solved, using your creativity. CO^-There are two basic disciplines through which we make our communication- verbal / written and visual, and both need different skill
Unit-II	1. Developing critical thinking for learning creative writing. 2. Understanding the psychology of the brain and its role in developing the skills for writing.	
Unit-III	1. Learning idea generation techniques through various prompts which helps in structuring the content.	
Unit-IV	1. To understand in successfully adding the same emotions and contextual relevance in the new language as the original source.	
Unit-V	1. Learning about the structure and formats of the briefs. 2. Understanding the client brief for proper execution of the content.	
Unit-VI	1. How to write appealing content by considering various elements and through the art of storytelling.	
Unit-VII	1. Learning to write copy for various advertising and marketing media. 2. To add various elements to balance a copy and convey the marketing message.	
Unit-VIII	1. To explore and learn by real time examples of campaigns by various agencies. 2. To understand various appeals and tone of voice	
Unit-IX	1. To learn writing the copy for personal medium and mass medium.	

Unit- X	1. Understanding the thought process of different categories of audiences. 2. Learning to persuade the audience through the copy.	sets to master them. The structure of the syllabus is designed to hone the necessary skills required for these two diverse disciplines.
Unit- XI	1. Understanding the copy writing aspects for offline and online platforms	
Unit-XII	1. Understanding various writing appeals to connect a chord with the specific audience through storytelling.	
Unit-XIII	1. Evaluating the writings by understanding the reach of the advertising message. 2. Learning about campaign objectives. 3. Learning the final output of an advertising copy.	

Bagani

Faculty Name - Ms. Charmy S. Shah

Program: Bachelor's of Arts in Multi Media and Mass Communication:

Course: Advertising and Marketing Research

TYBAMMC SEM-V

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I	1. To learn about Research 2. To learn the fundamentals of Research 3. Aims and objectives research	CO1- The course is designed to indicate the analytical abilities and research skills among the students. CO2- To understand research methodologies- Qualitative vs Quantitative CO3- To discuss the foundation of Research and audience analysis that is imperative to successful advertising. CO4- To understand the scope and techniques of Advertising and Marketing research, and their utility.
Unit-II	1. To learn about research design and its concepts 2. To learn the types of research	
Unit-III	1. To understand the importance of questionnaire in research 2. To learn the techniques for qualitative research 3. To learn the measuring scale for quantitative using attitudes	
Unit-IV	1. To learn the meaning of sample and sampling 2. To understand the process and methods of sampling 3. To learn the types of sampling and its application	
Unit-V	1. To learn preparing sheets and how to process the data 2. To learn statistical software and understand its applications for analysis	
Unit-VI	1. To understand the methods used for data collection 2. To learn and understand how interpretation is done for results and analysis presented via pie charts, histogram and so on.	
Unit-VII	1. To learn about data and its interpretation 2. To learn various analysis tools	
Unit-VIII	1. To understand the prospects of research reports 2. To understand in depth how to write and state the hypothesis along with other research components	
Unit-IX	1. To learn about advertising research 2. To learn the various techniques used by the researcher 3. To understand each psychological rating scales in depth and audiences.	
Unit-X	1. To learn research and its marketing objectives and types	

Faculty Name - Ms. Charmy S. Shah

Program: Bachelor's of Arts in Multimedia and Mass Communication:

Course: Social Media Marketing

TYBAMMC SEM-V

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I	1. To learn about the swift of online and offline marketing 2. To understand the advantages and disadvantages e- business 3. To understand the various types of digital marketing	CO1- Students learn real world skills from leading designers, artists, and entrepreneurs CO2- The primary goal is to create problem solvers who strike a balance between traditional art and technology, and between individual vision and teamwork. CO3- With a fundamental understanding of digital tools and their creative applications, graduates meet the demands of a diverse and expanding job market in visual storytelling CO4- Identify and apply strategies to improve and succeed no matter what their initial skills. CO5- Solve problems and learn from creative risks by using people skills, design principles, and processes. CO6- Build a strong foundation in all aspects of design and production for storytelling in motion. CO7- Use inspiration in fields outside of digital media such as poetry, science, music, astronomy, history, dance and more. CO8- Develop a professional commitment to their field, their work, and themselves; preparing them to be members and leaders in their profession, as well as learning how to act both as individuals and as team members to support the whole.
Unit-II	1. To learn about the importance and related myths to social media and marketing 2. To learn the importance of content and how to strategize it 3. To learn the various online platforms and its concepts	
Unit-III	1. To learn in detail social marketing and get explore to know about planning done for marketing 2. To understand the importance of Campaigns and how to manage campaigns across various platforms 3. To learn about blogs and online opportunities via blogging	
Unit-IV	1. To study different ways through which research samples are collected. 2. To learn methods of sampling.	
Unit-V	1. To understand the basic idea on data collection. 2. Understanding the types of data collection.	
Unit-VI	1. Learning Basic format of research report writing.	
Unit-VII	1. Learning about advertising research in detail. 2. To study different other types of copy testing. 3. Learning various other steps in pre-testing. 4. Briefly understanding the concept of Neuroscience and its applications.	
Unit-VIII	1. Learning different marketing processes in detail.	

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Unit and Course Outcome A.Y 2023-2024

Faculty Name - Mrs. Manisha Sayani

Program: Bachelor's of Arts in Multimedia and Mass Communication:

Course: Retailing & Merchandising

TYBAMMC SEM-VI

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I	1. To study the basics & functioning of Retailing. 2. To study through case study on Multi-Channel Retailing. 3. To understand the meaning & concept of Merchandising. 4. To understand Retail pricing in detail.	CO1-To familiarize the students with retail management concepts and operations. CO2- To explain the understanding of retail management and types of retailers. CO3- To discuss an understanding of retail management terminology including merchandize management, store management and retail strategy. CO4- To acquaint the students with legal and ethical aspects of retail management. CO5- To create awareness about emerging trends in retail management.
Unit-II	1. To study the objectives of Retail communication. 2. To study the tips for attractive retail graphic design. 3. To understand the retail ERP system.	
Unit-III	1. To learn the advantages and disadvantages of merchandising. 2. To study the process of Merchandising. 3. To study the components of Assortment Strategies. 4. To study the importance of visual merchandising. 5. To study the emergence of retail planograms. 6. To study the advantages and disadvantages of specialty stores.	
Unit-IV	1. To study the objective of visual merchandising. 2. To study the types of Non store retail merchandising.	

Faculty Name - Mrs. Manisha Sayani

Program: Bachelor's of Arts in Multimedia and Mass Communication:

Course: Brand Management

TYBAMMC SEM-VI

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I	1. To understand the meaning of brand and its related concepts 2. To understand various models 3. To understand brand positioning and its importance along with related concepts	CO1- To understand the awareness and growing importance of brand management. CO2. To know how to build, sustain and grow brands CO3. To know the various sources of brand equity. CO4. To know about the global perspective of brand management
Unit-II	1. To make students understand the brand and its criteria for being chosen. 2. To learn about personalizing marketing 3. To explore about various marketing marketing aspects, channels and strategies	
Unit-III	1. To make students learn about all necessary concepts related to brand equity 2. To teach about brand personality and its values 3. To learn about various quantitative research techniques in detail	
Unit-IV	1. To study about brand performances and the global branding strategies management 2. To cultivate the sense of communication as brands do through online promotions, loyalty programs and so on	

Sayani

Faculty Name - Ms. Charmy Shah

Program: Bachelor's of Arts in Multimedia and Mass Communication:

Course: Digital Media

TYBAMMC SEM-VI

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I	1. Introduction to Digital media and its key concepts 2. To learn about its evolution and principles. 3. To differ traditional media and digital media.	CO1- Understand digital marketing platform CO2- Understand the key goals and stages of digital campaigns CO3- Understand the of use key digital marketing tools CO4- Learn to develop digital marketing plans
Unit-II	1. To understand SEO (On-page and Off- page) in detail 2. Importance of websites and keywords 3. To study the algorithms and its mechanisms.	
Unit-III	1. To study how Google Ads & SEM works for Advertising & Marketing.	
Unit-IV	1. To introduce students to the social world and medium of communication. 2. Learning various platforms of social media and its tools used in evaluating campaigns analysis. 3. To understand blogging and create blogs, as a tool for communication to the online audiences.	
Unit-V	1. To introduce students to online marketing channels. 2. To understand Google Adwords and PPC (Pay per Click) 3. Understanding web analytics and its tools.	
Unit-VI	1. To introduce students to websites along with its concepts and how it helps businesses to get business. 2. To explain in detail the features of a website. 3. HTML & HTTP	
Unit-VII	1. To study the difference between the owned, paid and earned media. 2. Understand in detail about Affiliate marketing. 3. To Learn the buying process for Online platforms.	
Unit-VIII	1. To create appropriate content for utilization on the internet. 2. Learning skills and qualities required for content writing on various online sites, applications and websites.	
Unit-IX	1. To learn about cyber laws 2. Case studies related to each law so as to better understand the real world. 3. Ethics in Digital Media.	

Faculty Name - Ms. Namrata Singh

Program: Bachelor's of Arts in Multimedia and Mass Communication:

Course: Media Planning & Buying

TYBAMMC SEM-VI

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I	1. Learning the concepts of Media planning. 2. Key role of a Media planner.	CO1- To develop knowledge of various characteristics of media. CO2- To understand procedures, requirements, and techniques of media planning and buying. CO3- To learn the various media mix and its implementation CO4- To understand budget allocation for a Media plan
Unit-II	1. To study the negotiation skills for proper buying of media. 2. To study the various laws for learning consumers perspective in making a purchase.	
Unit-III	1. To learn the step by step process for selection of media. 2. Understanding different strategies taken for an effective selection of media.	
Unit-IV	1. To understand the reasons behind selection of media vehicles.	
Unit-V	1. Calculating the revenue expenditure spent on each media cycle and execution of the budget on the right media.	
Unit-VI	1. Understanding the individual reach of media through various measurement bodies.	
Unit-VII	1. Learning about various media and different mediums for advertising. 2. Understanding the pros and cons of each medium.	
Unit-VIII	1. To learn how to buy media space for traditional medias	
Unit-IX	1. Learning about the IMC and its tools. 2. To study innovative ways for advertising and marketing of the product.	
Unit- X	1. To study the difference between the owned, paid and earned media. 2. Understand in detail about Affiliate marketing. 3. To Learn the buying process for Online platforms. 4. To study about online platforms and available spaces used for advertising. 5. Understanding various advertising formats with respect to social media and video advertising.	

Faculty Name - Mrs. Manisha Sayani

Program: Bachelor's of Arts in Multimedia and Mass Communication:

Course: Advertising Design

TYBAMMC SEM-VI

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I	1. To study about the agency and its departments who handle an advertising campaign of a brand. 2. To study about the production stage of the campaign. 3. To study the idea generation process for any creative.	CO1 - To make students understand the process of planning & production of advertisement CO2- To highlight the importance of visual communication CO3- To provide practical training in the field of advertising
Unit-II	1. To learn about the elements of designing. 2. To study the Gestalt principle which helps to create perspective through designs. 1. Understanding different fonts and typefaces of an ad-copy. 2. Learning meaning and tone form the typography. 1. To study the focal point of an advertising and using this idea in making the creatives.	
Unit-III	1. To learn how negative space in a figure-ground is creative and gives new shapes and vision and adding meaning to the brand. 2. Learning about the types of layout used in creating copies. 3. Understanding the process of creating layouts.	
Unit-IV	1. To learn the shapes and symbols from our surroundings. 2. To study the effects and beauty of colors from nature and use it in the creative.	
Unit-V	1. To study different types of logos and its meaning. 2. To learn the alignment of the elements of an ad-copy to make it persuasive for the target audience.	

Faculty Name - Mrs. Manisha Sayani

Program: Bachelor's of Arts in Multimedia and Mass Communication:

Course: Advertising & Sales Promotion

TYBAMMC SEM-VI

Unit No. & Name	Unit Outcomes	Course Outcomes
Unit-I	1. To understand the process of sales promotion. 2. To understand the increased sales promotion activities. 3. To learn in detail the Theories of sales promotion.	CO1- Students should be able to demonstrate a thorough understanding of the major sales promotion concepts. CO2- Use a framework to make effective sales promotion decisions. CO3- Adopt the necessary skills and point of view of an effective sales promotion Campaign.
Unit-II	1. To study the types of consumer oriented sales promotion. 2. To study about cooperative advertising. 3. To study the objectives & types of sales force promotions.	
Unit-III	1. To study and analyze sales promotion campaigns through various contemporary case studies.	
Unit-IV	1. To understand how to retain consumers through value-added promotions. 2. To learn how to design a sales promotion campaign. 3. To study in detail about the budget allocation for the promotion. 4. To study about the sales promotion traps.	

Sayani

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DR. S. RADHAKRISHNAN MARG, ANDHERI (E), MUMBAI – 400 069

F. Y. B.Sc. BIOTECHNOLOGY Semester – I (A.Y. 2022-23)

USBT101- Core Subject- Fundamentals of biotechnology-I

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
1. Introduction and scope of biotechnology **What is biotechnology?** Biotechnology –an interdisciplinary biological science; Biotechnology – definition; History & Introduction to Biotechnology; Traditional and Modern Biotechnology; Scope and importance of biotechnology; **World of Biotechnology-** Pharmaceutical Biotechnology, Plant Biotechnology, Industrial Biotechnology, Marine Biotechnology, Animal Biotechnology, Medical biotechnology, Environmental Biotechnology. **Biotechnology in India** – Bio-business in India, booming biotech market, success story of biotech market, policy initiatives; and global trends; Biotechnology research in India. **Potential of modern biotechnology;** Achievement of biotechnology; Prevention of misuse of biotechnology; Biotechnology Institutions in India (Publicand Private Sector); Public Perception of Biotechnology.**Case study: Serum Institute of India and its products.**	UO1: To understand the history of biotechnology. UO2: To get familiarised with the scope and importance of biotechnology. UO3: To gain insight about research and public perception of biotechnology.	Course Objective: To familiarize the students with the potential and different applications of biotechnology. CO1: To develop an understanding of developments in various fields of Biotechnology CO2: To be able to relate to applications and benefits of Biotechnology in the fields of agriculture, livestock, human health and environment CO3: To discuss the basics of fermentation.

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2. Applications of biotechnology. Applications of biotechnology: - **Agriculture:** GM fruits- GM papaya, GM tomato, Insect resistant transgenic plants – Bt cotton, Btbrinjal, Modifications in nutrient quality – starch, oilseed protein, golden rice **Livestock:** Growth, disease resistance, product quality, pharmaceuticals and nutritional supplements, industrial applications. **Human welfare:** Cloned genes for production of - Insulin; recombinant vaccine for Hepatitis B virus. Molecular farming, Edible vaccines and their advantages **Environment** - Pollution abatement through GMOs **Bioethics, Case study:** Genetically modified microbes for bioremediation of oil spills in marine environments.	UO1: To highlight uses of biotechnology in agriculture. UO2: To develop insight about insect resistant plants and livestock. UO3: To study the role of biotechnology in human welfare and environment.	
3. Fermentation technology. **Introduction to fermentation processes:** Microbial biomass, Microbial enzymes, Microbial metabolites, recombinant products, transformation processes. Development of fermentation Industry **Component parts of fermentation process.** **Screening:** Definition, Primary screening and its methods, Secondary screening and its methods **Fermenter design:** Definition of a fermenter, aerated stirred tank batch fermenter-Typical design, Construction materials used, aeration and agitation. **Basic introduction to process parameters:** Temperature control, Foam production and control pH measurement and control, CO2 and O2 control **Fermentation medium:** Basic requirements of industrial media, Criteria for use of raw materials in media, Examples of raw materials used, Growth factors, Water, Carbohydrate sources, Protein source **Product: A typical process of Ethanol production and Antibiotic production**	UO1: To study the introduction to fermentation processes UO2: To gain insight about the fermentor design UO3: To understand the process parameters and fermentation medium UO4: To study the production of ethanol and penicillin	

USBT102 -Core Subject- Microbiology-1

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
1. Introduction to microbiology. **Fundamentals, History and Evolution of Microbiology:** Discovery of Microorganisms, Conflict over spontaneous generation. Role of microorganisms in disease **Classification:** The place of Microorganisms in the living world, Classification Whittaker's five kingdom classification, Introduction to Bergey's Manual, Groups of Microorganisms, Applications of microbiology in various fields **Nutrition, Cultivation and Maintenance of microorganisms:** Nutritional categories of microorganisms, Design and Types of Culture Media, methods of isolation.	UO1: To gain insight into the history and evolution of microbiology UO2: To study the classification of microorganisms UO3: To gain knowledge about the nutrition, cultivation and maintenance of microorganisms	Course Objective: To build firm foundation in microbiology, sterilization techniques and staining. CO1: To develop an understanding of cultivation of microorganisms. CO2: To develop skills towards use of microscopy and staining techniques CO3: To understand the role of sterilization and disinfection in the field of microbiology
2. Sterilization techniques **Introduction:** Definition and concept of Sterilization and Disinfection. **Types and Applications:** Dry Heat, Steam under pressure Gases, Radiation and Filtration **Chemical Agents and their Mode of Action:** Aldehydes, Halogens, Quaternary Ammonium Compounds, Phenol and Phenolic Compounds, Heavy Metals, Alcohol, Dyes, and Detergents. **Disinfectant:**Ideal Disinfectant. Examples of Disinfectants and Evaluation of Disinfectant	UO1: To understand the definition concept of sterilization and disinfection UO2: To study the different types and applications of sterilization UO3: To gain knowledge about the chemical agents and their mode of action UO4: To gain knowledge about disinfectants	

3. Microscopy and stains **Simple and Compound Microscope:** General principles of optics; various parts and their functions- objectives – numerical aperture, resolving power, depth offocus, working distance, aberrations; oculars; condensers. **Dark Field Microscope; Phase Contrast Microscope andFluorescent Microscope, TEM, SEM, Applications of microscopes** **Stains and Staining Solutions-** Definition of Dye and Chromogen; acidic and basic dyes; functions and types of chromophore and auxochrome groups. Theories to explain staining. Definition and function of stain; mordant, intensifiers and fixative Natural and Synthetic Dyes. Simple Staining. Differential Staining – Gram staining and Acid Fast Staining with specific examples.	UO1: To gain knowledge about simple and compound microscope UO2: To study the different types of microscopes and their applications UO3: To gain insight about the stains and staining solutions	

USBT103 -Core Subject- Basic Chemistry-1

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
1.Nomenclature and Chemical bonds. **Classification and Systematic Nomenclature of organic compounds** (few examples) **Chemical Bonds:** Types and transition between the main types of bonding. **Ionic Bond:** Nature of Ionic Bond, factors influencing the formation of Ionic Bond. Structure of NaCl and CsCl. **Covalent Bond:**Nature of Covalent Bond, Types of covalent bond (Polar and Coordinate covalent bonds). Structure of CH_4, NH_3, H_2O,Shapes of $BeCl_2$, BF_3. **Hydrogen Bond**: Theory of Hydrogen Bonding and Types of Hydrogen Bonding (with examples of RCOOH, ROH, Salicylaldehyde, Amides and Polyamides).	UO1: To clear the concepts and basics of nomenclature. UO2: To develop an understanding among students about the types of chemical bonds. UO3: To acquaint the students with the different theories related to chemical bonds with the help of examples.	Course Objective: To acquaint the students with basic concepts of Chemistry like nomenclature, chemical bonds, titrimetric, gravimetry, stereochemistry etc. CO1: To develop an understanding of chemical bonds. CO2: To develop skills towards use of titrimetric and gravimetric analysis CO3: To be able to differentiate between chiral and achiral molecules and different enantiomers.

2. **Titrimetric and gravimetry.** **Titrimetric Analysis:** Titration, Titrant, Titrand, End Point, Equivalence Point,Titration Error, Indicator, Primary and Secondary Standards,Characteristics and examples.Types of Titrations – Acid –Base, Redox. Precipitation,Complexometric Titration. Acid – Base Titration – StrongAcid Vs Strong Base. Theoretical aspects of Titration Curveand End Point Evaluation. Theory of Acid –Base Indicators, Choice and Suitability ofIndicators. **Gravimetric Analysis:** Solubility and Precipitation, Factors affecting Solubility,Nucleation, Particle Size, Crystal Growth, Colloidal State, Ageing/Digestion of Precipitate.Co-Precipitation and Post-Precipitation. Washing, Drying andIgnition of Precipitate.	UO1: To develop an understanding among students about terms related to titrimetry and gravimetry. UO2: To explain the students about various types of titrations graphically and theoretically. UO3: To develop an understanding among students about types and methods of gravimetric analysis and its applications.	
3. **Stereochemistry** **Isomerism:** Types of Isomerism: Constitutional Isomerism (Chain, Position and Functional) and Stereoisomerism, Chirality. **Geometric Isomerism and Optical Isomerism:**Enantiomers, Diastereomers, and Racemic mixtures Cis-Trans,Threo, Erythro and Meso isomers. Diastereomerism (Cis-Trans Isomerism) in Alkenes and Cycloalkanes (3 and 4membered ring) **Conformation:** Conformations of Ethane. Difference between Configuration and Conformation. **Configuration:** Asymmetric Carbon Atom, Stereogenic/ Chiral Centers,Chirality Representation of Configuration by ¯Flying Wedge Formula **Projection formulae**: Fischer, Newman and Sawhorse. The Inter-conversion of the Formulae.	UO1: To familiarize the students about types of projection formulae and their interconversions. UO2: To acquaint them with the difference between conformation and configuration. UO3: To teach them about the types of isomerism and solve problems based on that. UO4: To acquaint the students with different types of nomenclature in stereochemistry such as R/S and solve problems based on the same.	

USBT104 -Core Subject- Biochemistry: Concept of Biomolecules-I

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
1.Water, Standard solutions and Buffers. Structure, Properties and functions: Water. **Preparation of standard Solutions:** Concept and significance of Chemical and Biological solutions. Normality, Molarity, Molality, Mole fraction, Mole concept, Solubility, Weight ratio, Volume ratio, Weight to Volume ratio, ppb, ppm, millimoles, milliequivalents (Numericals expected). Primary and Secondary Standards: Preparation of Standard Solutions, Principle of Volumetric Analysis. **Concept of pH:** Buffer solutions –Concept of Buffers, Derivation of Henderson -Hasselbach equation for Acidic and Basic buffers. Buffering capacity **Biological buffers:** Significance of biological buffers. pH of body fluids like blood and saliva. Blood buffer systems: E.g.: Carbonate, Acetate and Phosphate buffers. Protein buffers (Introduction) Significance of TRIS buffers (Introduction)	UO1: To clear concepts of water, solubility and volumetric analysis. UO2: To learn theories of acids and bases and ionic product of water. UO3: To gain insights about different buffer systems, with its equations and examples.	Course Objective: To acquaint the students with different concepts of biomolecules. CO1: To develop skills towards preparation of standard solutions in the laboratory. CO2: To understand the role of buffers CO3: To discuss the basics of carbohydrate and lipid biochemistry.

2.Basics of Carbohydrate Chemistry. Carbohydrates: Introduction, definition and general formula. **Classification of carbohydrates:** **Monosaccharides:**Two Families of Monosaccharides. Aldo series and keto series;(Triose - Glyceraldehyde and Dihydroxyacetone, Tetrose- Erythrose and Erythrulose, Pentose- Xylose, Xylulose, Ribose,Ribulose, Hexose- Glucose, Galactose, Mannose, Heptose sedoheptose and Sedoheptulose (structures to be taught) Concept of Enantiomers, Mutarotation, Anomeric carbon andEpimers of glucose. **Biologically important Derivatives of Hexoses**: Glucosamine,Gluconic acid, uronic acid, NAGA, NAMA **Chemical reactions of monosaccharides** **Concept of glycosidic bond.** **Disaccharides:**Maltose, Lactose, Sucrose, Cellobiose (structures to be taught, biological significance, structure and bond type)**Polysaccharides:** Homopolysaccharides and Heteropolysaccharides; Structural and Storage Polysaccharides. E.g., of polysaccharides -: starch (amylose and amylopectin),Glycogen, Peptidoglycan, Cellulose, chitin (structure and bond type)Examples of Reducing and non reducing carbohydrates. Industrial applications of carbohydrates: Fermentation, Pharmaceutical and Food industry.	UO1: To study properties and classification of carbohydrates. UO2: To understand structures, properties of various monosaccharides, disaccharides and polysaccharides. UO3: To highlight concept of epimers, enantiomers and mutarotation.	

3.Basics of Lipid Chemistry **Introduction to Lipid Chemistry:** Definition and Biological functions of fats and Lipids, Definition of Fatty acids. **Classification of Fatty acids: Saturated Fatty Acids:** C2- C20 (Examples with trivial name, Biochemical names and Structures) **Unsaturated Fatty Acids:** Definition of MUFA and PUFA. C16- C20, Palmitolic, Oleic, Linoleic, Lenolenic, Arachidonic acid (Structures expected) **Storage Lipids:** AcylGlycerols (Simple and Mixed)Mono, Di and Triacylglycerols. (Structures expected) **Properties of Triacylglycerols:** Hydrolysis, Saponification, Antioxidant, Rancidity, Acid number, RM number, Action of lipase. **Structural lipids:** Phosphatidic acid and Membrane Phospholipids E.g.: Phosphatidylethanolamine, Phosphatidylserine, Phosphatidylcholine, Cardiolipin **Action of Phospholipase** **Steroids:** Definition and functions Eg: Cholesterol	UO1: To learn biological functions of lipids and fatty acids with its classification. UO2: To study structures and properties of storage lipids. UO3: To understand the significance of structural lipids and steroids.	

USBT105 -Core Subject- Genetics

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
1.Genetics fundamentals. **Introduction to genetic and sub-disciplines of genetics:** Transmission genetics, Molecular genetics, Population genetics and Quantitative genetics. **Basic Terminologies in genetics** **Mendelian Genetics:** Monohybrid Crosses and Mendel's Principle of Segregation. Representing crosses with a Branch Diagram. Confirming the principle of Segregation: The use of Test crosses. Dihybrid crosses and Mendel's Principle of Independent Assortment. **Extensions of and Deviations from Mendelian Genetic Principles:** Multiple Alleles - ABO Blood groups Modifications of Dominance Relationships: Incomplete Dominance and Codominance. Essential Genes and Lethal Alleles. Effects of the environment on Gene expression. **Gene Interactions and Modified Mendelian Ratios:** Epistatic and non-epistatic interactions. **Mendelian Genetics in Humans:** Pedigree Analysis. Examples of Human Genetic Traits	UO1 : To introduce Genetics and Sub-disciplines of Genetics. UO2 : To understand Mendelian Genetics UO3 : To know the Extensions and Deviations from Mendelian Genetics Principles. UO4 : To understand Gene Interactions and Mendelian Ratios. UO5 : To study Mendelian Genetics in Humans.	Course Objective: To provide insight to students on fundamental concepts of Mendelian genetics, microbial genetics and population genetics CO1: To develop an understanding of fundamental concepts of mendelian genetics CO2: To discuss the different processes in microbial genetics and their role in mapping genes CO3: To understand the relevance of population genetics.

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2. Microbial genetics **Genetic analysis in Bacteria:**Prototrophs, Auxotrophs. **Genetic Mapping in Bacteria by Conjugation:** Discovery of Conjugation in E.coli. The sex factor F, High-Frequency Recombination Strains of E.coli. F' Factors. Using conjugation to map bacterial genes- **Interrupted-**mating. **Genetic mapping in bacteria by Transformation** **Genetic mapping in Bacteria by Transduction:** Bacteriophages - Lytic and Lysogenic pathway. Transduction Mapping of Bacterial Chromosomes – Generalized Transduction and Specialized Transduction.	UO1 : To study the Genetic Analysis in Bacteria UO2 : To understand the Genetic mapping in Bacteria by Conjugation. UO3 : To understand the Genetic mapping in Bacteria by Transformation. UO4 : To understand the Genetic mapping in Bacteria by Transduction. UO5 : To know the Lytic and Lysogenic Pathway of Bacteriophages. UO6 : To understand the transduction mapping of Bacterial Chromosomes	
3.Population genetics. Genetic Structure of Populations: Genotypic Frequencies and Allelic Frequencies, Hardy- Weinberg Law and its Assumptions , Genetic Variations in Populations. **Forces responsible for change in gene frequencies in population:** Natural Selection., Genetic Drift, Migration, **Speciation** **Role of Population Genetics in Conservation Biology**	UO1 : To understand the Genetic structure of Populations. UO2 : To know the forces responsible for the change in gene frequencies in population. UO3 : To understand Speciation. UO4 : To learn the role of Population Genetics in Conservation Biology	

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USBT106- Core Subject- Molecular biology-I

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
1.Chromosome structure, composition and packing. The Composition and structure of DNA and RNA: Nucleotide and Nucleoside, Structure of nucleotides. Structure of DNA. DNA double helix – Watson and Crick's Model. Structure of RNA. Types of RNA. **Organization of DNA in chromosome:** Viral and Prokaryotic Chromosomes. Eukaryotic Chromosomes. Histone and Non-histone proteins. Nucleosome Structure. Packaging of DNA into chromosomes. Euchromatin and Heterochromatin. Centromeres and Telomeres **Chromosome Banding Techniques.** **Karyotype and Idiogram**	UO1 : To study the composition and structure of DNA and RNA. UO2 : To learn the organization of DNA in chromosomes. UO3 : To know chromosome banding techniques UO4 : To develop Karyotype and Idiogram	Course Objective: To build a firm foundation of molecular biology CO1: To develop an understanding of structure and organization of the hereditary material CO2: To discuss the different processes involved in replication of DNA CO3: To understand the relevance of physical, chemical and biological factors in mutations
2. DNA replication Models of DNA Replication Evidence of Semi-conservative DNA replication-Messelhson and Stahl's experiment, DNA Polymerases and its role. **DNA Replication in Prokaryotes**: E.coli Chromosome Replication, Semi-discontinuous replication. Bidirectional Replication of Circular DNA molecules. Rolling Circle Replication, **DNA Replication in Eukaryotes. Enzymes and proteins involved in DNA replication.**	UO1 : To study the models of DNA replication UO2 : To learn DNA Replication in Prokaryotes. UO3 : To learn DNA Replication in Eukaryotes UO4 : To know enzymes and proteins involved in DNA Replication	
3.Mutation And repair. **Definition and concept of Mutations:** Classification of mutations, Types of Point Mutations, Types of Spontaneous and induced mutations, Mutagenesis and types of Mutagens. (Examples of Physical, Chemical and Biological Mutagens) **DNA repair:** Photoreversal, Base Excision Repair, Nucleotide Excision Repair, Mismatch Repair, SOS Repair.	UO1 : To study the classification of mutations. UO2 : To learn the concept of mutagenesis and types of mutagens UO3 : To learn DNA Repair	

USBT107 - Ability Enhancement Course-Communication skills

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
1. Academic skills **Essentials of Grammar:** Parts of speech, Articles, Modals, Sentences and their types., Punctuation marks **Employment Communication:** Introduction, Resume, Curriculum Vitae, Scannable Resume, Developing an Impressive Resume, Formats of Resume, Job Application or Cover Letter, Email Writing **Professional Presentation:** Nature of Oral Presentation, planning Presentation, Preparing the Presentation, Delivering the Presentation. **Job Interviews:** Introduction, Importance of Resume, Definition of Interview, Background Information, Types of Interviews, Preparatory Steps for Job Interviews, Interview Skill Tips, Changes in the Interview Process, FAQ During Interview **Group Discussion:** Introduction, Ambience/Seating Arrangement for Group Discussion, Importance of Group Discussions, Difference between Group Discussion, Panel Discussion and Debate, Traits, Types of Group Discussions, topic based and Case based Group Discussion, Individual Traits.	UO1: To teach the students about the importance of grammar and its applications in day to day life. UO2: To prepare students for the corporate world by instilling in them skills and etiquettes. UO3: To highlight the importance of communication skills and resume for their help in job interviews.	Course Objective: To acquaint the students with different aspects of communication skills. CO1: To develop an understanding of communication skills required to excel in real work environment and corporate life. CO2: To gain insight into technical and non-technical qualities in career planning CO3: To learn about Leadership, team building, decision making and stress management.
2. Soft skills Introduction to Soft Skills and Hard Skills, **Personality Development:** Knowing Yourself, Positive Thinking, Johari's Window, Communication Skills, Non-verbal Communication, Physical Fitness **Emotional Intelligence:** Meaning and Definition, Need for Emotional Intelligence, Intelligence Quotient versus Emotional Intelligence Quotient, Components of Emotional Intelligence, Competencies of Emotional Intelligence, Skills to Develop Emotional Intelligence **Etiquette and Mannerism:** Introduction, Professional Etiquette, Technology Etiquette **Communication Today:** Significance of Communication, GSC's 3M Model of Communication, Vitality of the Communication Process, Virtues of Listening, Fundamentals of Good Listening, Nature of Non-Verbal Communication, Need for Intercultural Communication, Communicating Digital World	UO1: To assist the students in personality building by guiding them into positive thinking and helping them in polishing their communication skills. UO2: To develop a sense of understanding towards the importance of etiquettes and mannerisms. UO3: To explain to the students about importance of communication skills with the help of models and examples.	

3. Professional skills **Creativity at Workplace**: Introduction, Current Workplaces, Creativity, Motivation, Nurturing Hobbies at Work, The Six Thinking Hat Method **Ethical Values**: Ethics and Society, Theories of Ethics, Correlation between Values and behavior, Nurturing Ethics, Importance of Work Ethics, Problems in the Absence of Work Ethics. **Capacity Building**: Need and Importance of Capacity Building, Elements of Capacity Building Zones of Learning Ideas for Learning Strategies for Capacity Building **Leadership and Team Building:** Leader and Leadership, Leadership Traits, Culture and Leadership, Leadership Styles and Trends, Team Building, Types of Teams **Decision Making and Negotiation**: Introduction to Decision Making, Steps for Decision Making, Decision Making Techniques, Negotiation Fundamentals, Negotiation Styles, Major Negotiation Concepts **Stress and Time Management:** Stress, Sources of Stress, Ways to Cope with Stress	UO1: To teach students ethical values required at the workplace. UO2: To instill in students the need and importance of capacity building. UO3: To develop the qualities of team building and leadership among students. UO4: To help students with stress management in everyday life.	

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F. Y. B.Sc. BIOTECHNOLOGY Semester – II (A.Y. 2022 – 23)

USBT201 Core Subject- Fundamentals of biotechnology-II

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
1. Food Biotechnology **Introduction to food biotechnology:** History of microorganisms in food science and key developments, Applications of biotechnology in fermented food products **Introduction to Unit Operations and Processes:** Basic unit operations, food processing & packaging (canning & bottling), Production of cultures **Fermented food products:** Bread, Vinegar, Sauerkraut, Single Cell Protein (SCP), Probiotics **Food spoilage, food deterioration, food contamination** **and Food Adulteration** **Methods of food preservation** **Indicators of Food Microbial Quality & Safety:** HACCP, FSSAI & FDA	UO1: To study role of biotechnology in food processing and fermented food products. UO2: To learn concepts of food spoilage and contamination. UO3: To study indicators of food microbial quality and safety.	Course Objective: To acquaint students with the applications of biotechnology in the field of food, medicine and Fermentation. CO1: To develop an understanding of the application of biotechnology in the food industry. CO2: To gain insight into details of genetic engineering. CO3: To discuss tools and techniques used in medical biotechnology

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2. Medical biotechnology **Introduction to Medical Biotechnology and its applications** **Vaccines** Types of vaccines General vaccine production Large scale production of vaccine Trends in Vaccines Research Issues related to vaccine research **Synthetic peptides as vaccine** **Antibody Production** **Gene therapy** **Organ transplant cloning** **Stem cells -Sources and applications**	UO1 : To study Vaccines. UO2 : To study Antibody Production. UO3 : To learn Gene Therapy UO4 : To know the Organ Transplant Cloning. UO5 : To introduce to Stem cells	

3.Genetic engineering **What is Genetic engineering:** Definition and developments What is gene cloning? Strategy for cloning How to clone a gene? How to construct r DNA? Source DNA [insert], Isolation of DNA from bacterial cell, Introducing insert into cloning vector **Enzymes in genetic engineering:** Restriction endonuclease; DNA ligase; Enzymes to modify ends of DNA molecules - exonuclease; endonuclease; S1 nuclease; alkaline phosphatase; polynucleotide kinase; DNA polymerase and klenow fragment; reverse transcriptase; terminal deoxynucleotidyl transferase **Vectors:** Role as agents of transfer Features of plasmid vectors, Plasmid vectors - pBR322, pUC BAC Plant virus vectors and Animal virus vectors Shuttle vector; Expression vector **Host cells:** *E. coli; Bacillus subtilis; Saccharomyces cerevisiae*; Xenopus oocytes; Mammalian fertilized egg cell **Introducing vector into host:** Prokaryote Eukaryote **Identification of recombinant clones.**	UO1 : To study Genetic Engineering UO2 : To study enzymes in GE UO3 : To learn Vectors UO4 : To study how to introduce vector into host UO5 : To study identification of rembinant clones.	

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USBT202 Core Subject Cell biology and Microbiology - II

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
1. Ultra-structure ofprokaryoticand eukaryotic cell. Ultrastructure of Prokaryotic Cell: Concept of Cell shape, size and arrangement. Bacterial structures external to cell wall: Flagella,Pilli, Fimbriae, Capsule, Slime Layer, Sheath **Cell Wall (Gram Positive and Negative)** **Structures internal to cell wall:** Cell Membrane, nucleoid, Cytoplasm and cytoplasmicinclusion bodies and vacuoles, Genetic Material spores and cysts. **Ultrastructure of Eukaryotic Cell:**Cell wall; Plasma membrane, Cytoplasmic Matrix,Nucleus –Nuclear Structure, nuclear envelope, nucleoplasm, Nucleolus; cytoplasmic structures –cytoplasmic inclusions, cytoplasmic organelles -Endoplasmic Reticulum; Golgi Apparatus; Mitochondria; Chloroplasts; Ribosomes; Lysosome - Endocytosis, Phagocytosis, Autophagy; Peroxisomes. **External Cell Coverings**, Cilia and Flagella **Comparison of Prokaryotic and Eukaryotic Cells**	UO1: To study structures and cell organelles in prokaryotic cell with its functions. UO2: To understand the structures and cell organelles in eukaryotic cell with its functions. UO3: To diffrentiate between prokaryotic and eukaryotic cells.	Course Objective: To build a firm foundation of concepts related to cell biology and microbiology CO1: To discuss the ultrastructure, function and location of organelles in prokaryotic and eukaryotic cells. CO2: To develop an understanding of microbial growth and enumeration CO3: To gain insight in to the basics of virology
2. Microbiology. **Microbial Growth** Definition of Growth Mathematical and expression of growth Growth curve Measurement of growth Efficiency of growth yield Synchronous growth Effect of nutrient on growth rate Continuous Culture of microorganisms Chemostat and Turbidostat **Enumeration of Microorganisms**- Direct and IndirectMethods **Preservation and Maintenance of cultures**	UO1: To gain indepth knowledge about microbial growth UO2: To study about enumeration of microorganisms UO3: To understand about the preservation and maintenance of cultures	

3. Virology **Introduction to virology:** Historical perspective, **General Characteristics of Viruses:** Host Range, Viral Structure- Nucleic Acid, Capsid and Envelope General Morphology- Helical, Polyhedral, Enveloped, Complex. **Taxonomy of Viruses** **Viral Multiplication:** Multiplication of Bacteriophages and Animal Viruses **Isolation, Cultivation, and Identification of Viruses:** Growing Bacteriophages and animal viruses in the Laboratory, Viral Identification **Case studies-** TMV, Influenza COVID-19 (Self learning)	UO1: To gain knowledge about the general characteristics of viruses UO2: To gain in depth knowledge about taxonomy and multiplication of viruses UO3: To study the isolation, cultivation and identification of viruses	

USBT203 Core Subject Basic Chemistry-II

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
1.Thermodynamics Thermodynamics: System, Surrounding, Boundaries Sign Conventions, State Functions, Internal Energy and Enthalpy: Significance, examples, (Numericals expected.) **Laws of Thermodynamics and its Limitations:** Mathematical expression. Qualitative discussion of Carnot Cycle for ideal Gas and Mechanical Efficiency. Laws of Thermodynamics as applied to Biochemical Systems. **Concept of Entropy, Entropy for Isobaric, Isochoric and Isothermal Processes.**	UO1: To learn concepts of thermodynamics and its laws. UO2: To understand principles of carnot cycle and its limitations. UO3: To study principles of entropy for various processes.	Course Objective: To acquaint the students with some core aspects of physical chemistry CO1:To develop an understanding of thermodynamics CO2: To learn about reaction kinetics and order of reaction. CO3: To gain insight in to the details of oxidation and reduction reactions

2. Chemical Kinetics **Reaction Kinetics:** Rate of Reaction, Rate Constant, Measurement of Reaction Rates Order & Molecularity of Reaction, Integrated Rate Equation of First and Second orderreactions (with equal initial concentration of reactants).(Numericals expected) **Determination of Order of Reaction:** a) Integration Method b) Graphical Method c) Ostwald's Isolation Method d) Half Time Method. (Numericals expected).	UO1: To learn concepts of rate of reaction, order and molecularity. UO2: To understand rate equation. UO3: To study methods for determining order of reaction.	
3.Oxidation Reduction reactions. Principles of Oxidation & Reduction Reactions: Oxidising and Reducing Agents Oxidation Number, Rules to assign Oxidation Numbers with examples Ions like Oxalate, Permanganate and Dichromate. **Balancing Redox Reactions:** Ion Electron Method Oxidation, Reduction, Addition and Substitution & Elimination Reactions.	UO1: To demonstate principles of oxidation and reduction reactions. UO2: To study concept of oxidation number. UO3: To learn to balance redox reactions.	

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USBT204 Core Subject Biochemistry: Concept of Biomolecules – II and Basic analytical techniques

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
1.Proteins and amino acids **Amino acids:** General introduction, Classification and structures, properties (physical & chemical) Amino Acids as drugs, Titration Curve of Amino Acids. Concept of Isoelectric pH, Zwitterion **Reactions of Amino Acids:** Sorenson's Titration, Ninhydrin Test **Proteins:** Introduction, definition and functional classification. **Classification of Proteins:** Simple- Fibrous and Globular Conjugated- Nucleoprotein, Lipoprotein, Glycoprotein, Phosphoprotein, Chromoprotein, Metalloprotein, Derived- Primary and Secondary **Peptide bond:** Features Example of Dipeptide, tripeptide, Nonapeptide e.g., Oxytocin, Vasopressin Amino acid composition of Bovine Cytochrome C andBovine Chymotrypsinogen **Three-dimensional Structure of proteins:** Concept of Monomeric, dimeric and multimeric proteins Primary structure - Peptide linkage, Native Secondary structure - Alpha Pleat and Beta fold; Spatialarrangements of adjacent amino acid residues Tertiary structure – Three Dimensional arrangement Quaternary structure Di and Multimeric proteins E.g., structure of human Insulin **Properties of proteins:** Solubility, Molecular weight, Shape, Iso electric pH, Salting out of proteins for purification. **Protein Denaturation and Folding.** Denaturing agents and properties of denatured proteins.	UO1: To gain insight about classification, properties, structure and function of amino acids. UO2: To understand nature of peptide bond and 3D structure of proteins. UO3: To study concepts of protein denaturation and folding.	Course Objective: To build a firm foundation on the fundamentals of biochemistry and analytical techniques. CO1: To learn about fundamental structures and functions of amino acids & proteins. CO2: To dℓvelop an understanding of protein biochemistry and enzymology. CO3: To develop skills towards the principle, working and applications of different analytical techniques.

2. Introduction to Enzymes **Properties of Enzymes** Substrate, Optimum conditions, Co-substrate, Coenzyme, Cofactors **Classification and Nomenclature** (one reaction per class)Mechanism of Enzyme Action, Active Sites, Enzyme Specificity, **Factors affecting enzyme activity** (Effect of pH, Temperature, Substrate Concentration, Enzyme concentration) **Enzyme Kinetics:** Derivation of Michaelis - Menten Equation, Lineweaver - Burk plot, Concept of km **Types of Enzyme Inhibitions:** Irreversible & Reversible (Competitive, Uncompetitive, Non-Competitive) **Isoenzymes** (LDH, Alkaline Phosphatase, Creatine Phosphokinase) Allosteric Modulators, Co-Factors, Zymogens, Enzymeunits Enzymes as Biomarkers and diagnostic tools. (SGPT,SGOT, LDH, CPK)**Industrial Applications of Enzymes**	UO1: To learn properties, classification and nomenclature system of enzymes. UO2: To demonstrate factors affecting enzyme activity. UO3: To understand concepts of enzyme kinetics and enzyme inhibitors along with industrial applications of enzymes.	
3.Basics **of Analytical techniques** **Methods of Separation:** Precipitation, Filtration, Distillation and SolventExtraction **Analytical Techniques** **Chromatography:**Definition, Principles, Chromatographic performanceparameters, Types Paper Chromatography, Thin Layer Chromatography,Column Chromatography (Principle and Applications)**Spectroscopy - Colorimetry:**Properties of electromagnetic radiation, interaction withmatter, lasersColorimetric assays - Principle, Beer-Lambert's Law,Measurement of Extinction, Derivation of E = kcl, Limitations of Beer-Lambert's Law, Filter Selection, Examples of colorimetric and UV absorption assays **Electrophoresis:** General principles, Factors affecting electrophoresis,Types of support media used, Types of electrophoresis (Agarose gel electrophoresis, PAGE)	UO1: To elaborate principles, working and applications of various separation and purification methods. UO2: To study principles, working of different types of chromatography. UO3: To illustrate concepts of spectroscopy and electrophoresis.	

USBT205 Core Subject Physiology and Immunology

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
1.**Plant Physiology** **Photosynthesis:** Hill's Reaction and its Significance, Light Reactions, Cyclic and Non-Cyclic Photoinduced Electron Flow, Energetics of Photosynthesis, Dark Phase of Photosynthesis, Calvin Cycle, C-3, C-4, CAM pathways, Rubiscooxygenase activity **Plant hormones:** Auxin, Gibberellins, Cytokinins, Ethylene, Abscisic acid **Introduction to Secondary Metabolites**	UO1: To study mechanisms of photosynthesis along with Hill's reaction. UO2: To elaborate light and dark reactions of photosynthesis along with energetics. UO3: To understand the role of plant hormones, types and significance of various secondary metabolites.	Course Objective: To provide an insight in to the different physiological processes of plants and animals. CO1: To gain insights into the Physiological Processes of Plants and functions of plant growth regulators. CO2: To develop a comprehensive and deep understanding of the vital physiological processes of animals. CO3: To understand the concept of immunity and role of antigens and immunoglobulins in the immune system.
2. Animal Physiology **Introduction to physiology:** Concept of homeostasis. **Body fluids:** Major types of Body fluid. **Blood:** Functions of blood, general properties of blood, Composition of blood. Thrombocytes or Platelets. Coagulation of blood. Theories of Coagulation. Haemolysis. **Respiratory system:** Phases of Respiration, Principle of gases exchange, Mechanism of breathing. **Digestion and absorption:** Mode of nutrition, Digestion: Digestion of foodstuffs, Digestion in humans. Absorption. **Excretion:** Organs of excretion. Types of excretory products. Excretion in vertebrates - Human **Kidney:** Structure of kidney, Structure of nephron. Function of kidney. Urine formation. Dialysis	UO1: To explain fundamentals of homeostasis and types of body fluids. UO2: To learn concepts about blood and respiratory system. UO3: To elaborate physiology/mechanism of digestion, absorption and excretion.	

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3.Immunology **Introduction to Immunology:** Overview of Immune Systems, Innate Immunity, Mechanisms of innate immunity, Acquired Immunity, Local and Herd Immunity, Humoral and Cellular Immunity - Factors Influencing and Mechanisms of each. **Antigens:** Immunogenicity Versus Antigenicity, Factors That Influence Immunogenicity, Epitopes, Haptens, Superantigens **Antibodies:** Basic Structure of Antibodies, Antibody-Mediated Effector Functions, Antibody Classes and Biological Activities, Antigenic Determinants on Immunoglobulins.	UO1: To learn the concepts of immunology UO2: To gain in depth knowledge about antigens UO3: To gain insights about the knowledge of antibodies	

USBT206 Core Subject Basic Computers and Biostatistics

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
1.Introduction to computers Overview and functions of a computer system, Input and output devices, Storage devices. Modern computers: The workstation, The Minicomputer, Mainframe Computers, Parallel processing Computer & The Super Computer **Introduction to operating systems:** Operating System concept, Windows, Unix/Linux & servers **Word Processing:** Basic Operations, Creating and Editing documents, Formatting documents. **Spreadsheet:** Creating and editing workbook, Organizing and formatting worksheets; Data analysis and management; Using formulas and functions **Presentation Graphics:** Creating and Editing Presentations, Designing and Enhancing Presentation, Delivering Presentation, Advanced Presentation Graphics.	UO1: To get acquainted with computers UO2: To gain insights into the operating systems UO3: To gain in depth knowledge about word, excel and powerpoint	Course Objective: To develop the students' understanding of computer and biostatistics CO1: To develop an understanding of computer networking and internet CO2: To develop skills to use word processing, spreadsheet, presentation software. CO3: To gain insights about the use of statistics in the field of biotechnology.

2.Computer networking **Introduction to networking:** Various terminologies Associated hardware devices, gadgets (Router, Switch) tools, services, and resources Network Topologies and Protocols, LAN, WAN and MAN World Wide Web (WWW) Network security: fire walls **Computer viruses:** An overview of Computer viruses: What is a virus? Virus signs, how do they get transmitted? What are the dangers? General Precautions **The Internet and Internet Services:** Introduction, History of Internet, Internetworking Protocol, The Internet Architecture, Managing the Internet, Connecting to Internet, Internet Connections: Dial-up Access, Leased Line, Integrated Services Digital Network (ISDN), Digital Subscriber Line (DSL), Cable, Modem Internet Address Internet Services: World Wide Web (WWW), Web Browser, Uniform Resource Locator (URL), Internet Search Engines, WWW Development Languages, Uses of Internet **Electronic Mail**: E-mail Address, E-mail Message Format, E-mail Services, How E-mail Works File Transfer Protocol (FTP), How FTP Works, Terminal Network (Telnet), News, Internet Relay Chat (IRC), MS Outlook.	UO1: To get acquainted with various terms used in networking. UO2: To study types and significance of computer viruses. UO3: To get overview about internet and internet services like email, WWW, URL,, ISDN, DSL, etc.	

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3.Biostatistics **Introduction to Biostatistics:** Definition & Importance of Statistics in Biology Variables, Types of variables (Quantitative & Qualitative) Types of Data and data visualization: Concept of Data, Sources of data, **Types of data** (Quantitative & Qualitative), Representation of Data and Graphs (Bar Diagrams, Pie Charts and Frequency distribution, Histogram, Polygon and Curve) Sampling strategies: Population and Sample, Significance of using samples, Sample size, Random variation, Sampling techniques (Simple random sampling, Systematic sampling, Stratified sampling, Cluster sampling, Multiphase sampling) and Non- probability sampling **Types of Statistics:** Introduction to Descriptive & Inferential statistics **Descriptive statistics:** **Measures of central tendency:** Mean, Mode, Median (Ungrouped & Grouped data) **Measures of dispersion:** Range, Variance, Standard deviation (Ungrouped & Grouped data), Coefficient of variation **Measures of location:** Percentiles, Interquartile range (Box-Whisker plot) **Normal/Gaussian distribution, Standard normal deviate, Sampling variation, Standard error of mean**	UO1: To analyse types of data and data representation. UO2: To understand sampling strategies UO3: To learn types of statistics and measures of central tendency and dispersion.	

USBT207 Ability Enhancement Course Sustainable development and Environmental Biotechnology

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
1. Ecological interactions and Biodiversity. **Concept of Ecosystems:** Definition and Components- Structure and function of ecosystem aspects of ecosystems. Food Chain and Food Web, Ecological Pyramids (Energy, Biomass and Number) Aquatic and Terrestrial Ecosystems, Different Abiotic Factors of ecosystem and adaptations to different abiotic factors **Ecological Interactions:** Commensalism, Mutualism, Predation and Antibiosis, Parasitism, competition **Biodiversity and its conservation:** Introduction – definition: genetic, species, ecosystem diversity, biogeographic classification of India, value of biodiversity, biodiversity at global, national and local levels, India as a mega diversity nation, Hotspots of biodiversity, threats to biodiversity, conservation of biodiversity	UO1: To develop an understanding among the students about the concept of ecosystem. UO2: To acquaint the students with the structure of the ecosystem. UO3: To instill in them the values of safeguarding the ecosystem. UO3: To acquaint the students about different types of factors of ecosystems such as biotic and abiotic. UO4: To introduce the students about the different types of biodiversity at national and global level.	Course Objective: To sensitize and create awareness about Ecology, renewable energy and different Environmental Issues. CO1: To develop an understanding of the structure and functioning of the ecosystems. CO2: To gain insights about the concept of pollution, climate change and sustainable development CO3: To understand the relevance of renewable energy sources and conservation of biodiversity

2. Pollution and climate change **Environmental Pollution:** Definition, Cause, effects and control measures of- Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, nuclear hazards. Role of an individual in prevention of pollution. Pollution case studies. **Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Sustainable development:** Concept, basic principles of sustainable development, post - brundtland world, roots of sustainability, Indicators, paradigm towards new discipline- sustainability science.	UO1: To make the students understand the importance of safeguarding the environment from pollution. UO2: To acquaint the students about types of pollution and measures to control the same. UO3: To make them understand about the severity of climate change and ways to live sustainably.	
3. Renewable Sources of energy **Introduction:** Renewable and Non-renewable resources. The need for a sustainable lifestyle. **Energy resources:** Types of energy Non renewable energy - Oil, coal and its environmental impacts. **Renewable energy:** Hydroelectric power, Solar energy, Biomass energy, Biogas, Wind power and Geothermal energy. **Biogas technology:** Biogas plant & types, biodigester. Biogas- composition, production and factors affecting production and uses. **Biofuels:** Ethanol production, Microbial hydrogen production, Biodiesel, Petrocrops.	UO1: To make the students understand about renewable and non renewable resources. UO2: To explain the importance to students about sustainable living. UO3: To explain the types of renewable resources and use in daily life. UO4: To teach and make them understand about the production and use of biofuels, ethanol production, microbial production, biodiesel, etc.	

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S. Y. B.Sc. BIOTECHNOLOGY Semester – III A.Y. 2023-2024

USBT301 BIOPROCESS TECHNOLOGY

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
UNIT I Fermentor design, media and sterilization	UO1: To understand the types of fermentor. UO2: To highlight roles of media components, carbon and nitrogen source. UO3: To know concepts of sterilization of fermentor and its media.	Course objective: The objective of this course is to understand the basics skills applied in fermentation technology and build a foundation for more advanced studies in bioprocess technology. 1. To develop an understanding of the various aspects of bioprocess technology. 2. To develop skills associated with screening of industrially important strains. 3. To understand principles underlying design of fermenter and fermentation process.
UNIT II Inoculum development and process parameters	UO1: To study concepts of bacterial and fungal inoculums. UO2: To highlight strategies of scaleup and scale down process. UO3: To gain insight into detailed steps in monitoring of variables.	
UNIT III Fermentation processes-1	UO1: To impart knowledge about the design of a fermentor UO2: To gain insight about the fermentation media UO3: To discuss about sterilization and the process parameters UO4: To acquaint students about the types of fermentation. UO5: To study the representative fermentation processes .	

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USBT302 MEDICAL MICROBIOLOGY

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
UNIT I General Bacteriology and Bacteria as Human pathogen, Host parasite interactions	UO1: To discuss the host parasite relationship UO2: To gain insight about infection UO3: To gain knowledge about diseases	Course objective:- The objective of this course is to gain insight into disease factors and processes and diseases caused by microorganisms. 1. To list the factors playing a role in causing a disease gain. 2. To discuss the various aspects of systemic infections including causative agents, symptoms and prophylaxis. 3. To gain the technical capability of handling, isolating and identifying various bacteria.
UNIT II Causative organisms-1	UO1: To acquaint the students with S. aureus UO2: To study S. pyogenes UO3: To discuss respiratory tract infections caused by M. tuberculosis and S. pneumoniae UO4: To gain knowledge about infections caused by E. coli.	
UNIT III Causative organisms – 2	UO1: To study the GI tract infections caused by Salmonella and Shigella UO2: To study the sexually transmitted diseases UO3: To discuss nosocomial infections	

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USBT303 APPLIED CHEMISTRY-I

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
UNIT I Organic chemistry	UO1: To study about the different types of organic reactions and their applications UO2: To study about the role of essential and non essential metal ions in biological systems and their significance. UO3: to understand the difference between enzymes, co-enzymes and apo-enzymes UO4: to understand the biological role of metalloenzymes wrt to myoglobin and haemoglobin. UO5: To study about the metal complexes used in medicines.	Course objective:- The objective of this course is to have a firm foundation in the fundamentals and applications of organic and green chemistry. 1. To develop an understanding of the different aspects of organic and green chemistry. 2. To discuss the role of organic compounds in biology and synthesis of organic compounds. 3. To discuss the role of green chemistry and its application in industry. Understand the basic concept of electrophoresis
UNIT II Chromatography and centrifugation	UO1: To study about the method of separation of Biological compounds and the application of the techniques. UO2: To learn about each of the separation technique based on the principle of chromatography. UO3: To learn about the applications of separation technique for a thorough understanding of the same.	
UNIT III Electrophoresis: Electrophoretic Techniques	UO1: To get an overview about principles of electrophoresis of different types with suitable examples. UO2: To study mechanism of different types of paper and gel electrophoresis with suitable examples. UO3: To gain insight about staining, detection methods and industrial applications of electrophoresis.	

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USBT304 FUNDAMENTALS IN BIOPHYSICS

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
UNIT I Optics and Microscopy	UO1: To learn about the properties of light such as reflection, refraction and their laws and applications. UO2: To learn about the spectroscopic techniques, specifically about the UV region of the electromagnetic spectrum. UO3: To learn about the different analytical techniques such as SEM, TEM, Immuno electron microscopy and Fluorescence microscopy and study about their importance in Biotechnology.	Course objective:- The objective of this course is to have a firm foundation in the fundamentals and applications of current biophysical theories. 1. To develop an understanding of the different aspects of classical physics. 2. To be able to relate principles of physics to applications and techniques in the field of biology such as microscopy, spectroscopy and electrophoresis
UNIT II Heat, Sound, Magnetism and Fluid Dynamics	UO1: To understand the concept of heat and temperature and methods of transfer of heat. Also to study about the different thermometers and their applications. UO2: To study about sound and their types based on their properties such as frequencies and understand the applications. UO3: To study about viscosity, surface tension and other surface phenomenon with their application in Biological Sciences	
UNIT III Spectroscopy	UO1: To study about the principle and instrumentation techniques related to Spectroscopy. UO2: To understand their importance and application in Biology. UO3: To get acquainted with the techniques and understand the future scope of the techniques discussed.	

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USBT305 IMMUNOLOGY

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
UNIT I Cell and organs of immune system, Complement system	UO1: To discuss haematopoiesis UO2: To acquaint students with the cells and organs of the immune system UO3: To discuss complement system - types, biological effects and deficiencies	Course objective:- The objective of this course is to familiarize students with the immune effector mechanisms and various immunotechniques. 1. To understand the role of different types of cells, effector molecules and effector mechanisms in immunology. 2. To understand the principles underlying various immunotechniques.
UNIT II MHC and Antigen presentation pathways, TCR/BCR, T cell and B cell Activation.	UO1: To learn the mechanism of T-cell receptor's activation with its structure. UO2: To demonstrate the antigen presentation pathways by MHC class I and MHC class II. UO3: To study the mechanism of B-cell receptor's activation with its structure and its interaction with T-cell.	
UNIT III Immunotechniques	UO1: To acquaint students with the precipitation reactions UO2: To acquaint students with the agglutination reactions UO3: To discuss alternatives to Antigen-Antibody Reactions	

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USBT306 MOLECULAR BIOLOGY-III

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
UNIT I Transcription	UO1: To study the intricate mechanism of Transcription in both prokaryotes and Eukaryotes UO2: To illustrate the details of initiation, elongation and termination of transcription UO3: To develop a brief understanding of the types of polymerases and promoters UO3: To demonstrate the mechanism of splicing and RNA editing	Course objective:- The objective of this course is to have an insight into the mechanism of gene expression and regulation. 1. To discuss the mechanisms associated with gene expression at the level of transcription and translation. 2. To discuss the mechanisms associated with regulation of gene expression in prokaryotes
UNIT II Translation	UO1: To discuss the genetic code, its nature and how it was deciphered UO2: To study the mechanism of protein synthesis and discuss each step of initiation, elongation, translocation and termination. UO3: To demonstrate the various post-translational modifications	
UNIT III Regulation of gene expression in Prokaryotes and Viruses	UO1: To demonstrate various operons in Prokaryotes, specifically in bacteria such as lac and trp UO2: To analyse the intricate mechanisms of lytic and lysogenic cycles in viruses UO3: To discuss the various operons in Eukaryotes and the methods of gene silencing	

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USBT307 BIOSAFETY

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
UNIT I Introduction to biosafety, GLP	UO1: To study the biological risk assessment and hazardous characteristics of an agent UO2: To acquaint the students with genetically modified agent hazards UO3: To discuss the potential hazards associated with work practices UO4: To gain insight into safety equipment and facility safeguards	Objective: Learner should understand the concept of GLPs. Learn about routes of microbial contaminants and assays to detect contamination. 1. To document laboratory work, calibration records and prepare SOPs. 2. To identify the role of the Biosafety Professional in Biomedical Research Laboratories
UNIT II Biosafety in diagnostics labs	UO1: To demonstrate good diagnostic practices and procedures. UO2: To study strategies involved in decontamination and waste management. UO3: To highlight key features of health transport and maintaining records, training.	
UNIT III Detection and testing of contaminants	UO1: To describe microbial contamination in food products UO2: To study microbial contamination in pharma products UO3: To acquaint the students with microbial assays	

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S. Y. B.Sc. BIOTECHNOLOGY Semester – IV A.Y. 2023-2024

USBT401 MEDICAL BIOTECHNOLOGY

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
UNIT I Viral and fungal diseases	UO1:To study pathogenesis of different viral diseases. UO2:To study pathogenesis of different fungal diseases. UO3:To study diseases of different viral and fungal diseases examples.	Course objective:- Learner should • Comprehend pathogenesis and diagnosis process • Understand mechanism of drug action and mode of drug resistance. 1. To Demonstrate knowledge for infectious agents and drug action mechanisms 2. To identify drug resistance problems in disease treatment.
UNIT II Chemotherapeutic agents I	UO1: To study the discovery and design of antimicrobial agents UO2: To study the mode of action of antimicrobial agents UO3: To study the concepts related to antimicrobial assays like MIC, MLC.	
UNIT III Chemotherapeutic agents II	UO1: To discuss the use and misuse of antimicrobial agents UO2: To acquaint the students with antifungal and antiviral drugs UO3: To gain insight into the mechanisms of drug resistance	

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USBT402 CELL BIOLOGY AND CYTOGENETICS

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
UNIT I Cytoskeleton	UO1: To illustrate significance of microtubules as dynamic cytoskeleton elements with its structure and associated motor proteins. UO2: To study the role of microfilaments as a crucial element with its structure and associated motor protein-myosin. UO3: To demonstrate the structure, function and different types of intermediate filaments.	Course objective:- The objective of this course is to have a firm foundation in the fundamentals of cell biology and cytogenetics. 1. To develop an understanding of the cytoskeleton and cell membrane. 2. To discuss the structure of chromosomes and types of chromosomal aberrations. 3. To discuss the principles underlying sex determination, linkage and mapping.
UNIT II Cell membrane	UO1: To understand the principles of membrane transport with examples. UO2: To study different types of cell-cell and cell extracellular matrix junctions. UO3: To learn the structure and functions of cell coats with suitable examples related to cell recognition.	
UNIT III Cytogenetics	UO1: To develop brief understanding about chromosome, its types and highlight mutations caused change in chromosome number. UO2: To analyze the mechanism of sex determination and linkage. UO3: To illustrate the fundamental concepts of linkage, crossing over and chromosomal mapping.	

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USBT403 APPLIED CHEMISTRY-2

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
UNIT I Synthesis of organic compounds	UO1: To study about the different types of synthesis in organic reactions. UO2: To understand the criteria for synthesis that can provide a good yield. UO3: To study the green methods in organic synthesis.	Course objective:- The objective of this course is to have a firm foundation in the fundamentals and applications of current chemical theories for the physical world. 1. To develop an understanding of the different aspects of analytical chemistry. 2. To gain knowledge of natural product chemistry and related acquired skills. 3. To gain an understanding of basic concepts in polymer chemistry and nanomaterials.
UNIT II Natural product chemistry and green chemistry	UO1: To understand the need for green chemistry in today's day and age. UO2: To study the principles of green chemistry. UO3: To study and understand about the green materials such as reagents, solvents, catalysts.	
UNIT III Nanotechnology	UO1: To study fundamentals of nanomaterials and nanoparticles. UO2: To highlight features of nanofilms and synthesis of nano materials. UO3: To study applications of nanomaterials.	

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USBT404 BIOCHEMISTRY

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
UNIT I Carbohydrate Metabolism, ETS and Energy Rich Compounds Carbohydrate Metabolism :	UO1: To study carbohydrate metabolism with different pathways such as glycolysis, Fermentation, pentose phosphate pathway, TCA and its energetics, regulation and inhibitors. UO2: To learn the principles of electron transport chain and oxidative phosphorylation with its inhibitors. UO3: To demonstrate the significance of ATP and other energy rich molecules.	Course objective:- • Understand the order of reactions involved in carbohydrate, amino acid and lipids metabolism. • Learn how the metabolism pathways are regulated at molecular level. 1. To be able to illustrate the metabolism of carbohydrates, amino acids and lipids through various metabolic pathways. 2. To be able to undertake investigations and perform analysis that provide information about metabolic disorder.
UNIT II Amino acid metabolism	UO1: To highlight catabolism of amino acid pathways and its regulation. UO2: To study biosynthesis of key hormones and regulators from amino acids. UO3: To analyze deamination, transamination and reactions of urea cycle along with regulation and disorders.	
UNIT III Lipid metabolism	UO1: To learn mobilization and transport of fatty acids. UO2: To develop understanding about catabolism pathway of different types of fatty acids and its regulation. UO3: To study ketone body breakdown pathway and highlight catabolism of ketone bodies, odd chain fatty acids	

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USBT405 MOLECULAR DIAGNOSTICS

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
UNIT I Basics of molecular diagnostics	UO1: To develop an in-depth understanding of the brief history of the diagnosis at the molecular level UO2: To demonstrate the various characterisation and analysis technique of nucleic acids and proteins UO3: To analyze and apply the various hybridization techniques such as the blotting methods.	Course objective:- The objective of this course is learning and understanding molecular techniques and utilizing these techniques in diagnosis. 1. To gain an understanding of the basic principles used in molecular diagnosis. 2. To gain critical thinking and analytical skills to understand new diagnostic methods. 3. To apply the knowledge and skills gained in the course should be useful in developing new diagnostic kits.
UNIT II Nucleic acid amplification methods	UO1: To discuss amplification technique such as the working of PCR UO2: To develop a brief understanding on the various modifications of PCR UO3: To understand the concept of ligase chain reaction	
UNIT III Molecular biology based diagnostics	UO1: To study the concept of DNA polymorphism and understand RFLP, sickle cell Anemia as well as parentage technique. UO2: To briefly discuss the various methods of molecular diagnostics for infectious diseases. UO3: To understand the need of genetic counselling by discussing case studies and to also discuss the ethical social and legal issues associated with genetic testing.	

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USBT406 BIOINFORMATICS AND BIOSTATISTICS

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
UNIT I Introduction to Computers and Biological Databases	UO1: To understand the working principles of computers and the internet. UO2: To state the applications biological databases and its classification. UO3: To analyse the applications of genome information resources and protein structure visualization softwares.	Course objective:- The objective of this course is learning and understanding basic concepts of Bioinformatics and Biostatistics. 1. To gain an understanding of the basic concepts of Bioinformatics and Biostatistics. 2. To understand the tools used in bioinformatics. 3. To apply the various statistical tools for analysis of biological data.
UNIT II BLAST and sequence alignment	UO1: To introduce the concepts of sequencing technique such as BLAST and its types UO2: To study the various alignment methods, namely, global and local UO3: To demonstrate the concept of multiple sequencing alignment and it's associated terminologies	
UNIT III Biostatistics	UO1: To understand the theory and solve problems based on correlation and regression analysis. UO2: To study the test in studying statistical hypothesis. UO3: To study and solve problems based on z-test, T-test and Chi square test.	

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USBT407 RESEARCH METHODOLOGY

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
UNIT I Introduction to Research Methodology and Research Problem	UO1: To study the meaning, criteria, and objectives of good research. UO2: To learn different types of research and its significance UO3: To identify good research question, methods involved to solve it and challenges faced by researchers while approaching research problem.	Course objective:- The objective of this course is to develop research aptitude, logical thinking and reasoning. 1. To understand basic principles of research methodology and identify a research problem. 2. To understand a general definition of research design. 3. To identify the overall process of designing a research study from its inception to its report.
UNIT II Research Design, Data Collection and processing	UO1: To understand the necessity of effective research design and its principles. UO2: To demonstrate mechanism of formulating a research plan. UO3: To study different methods of data collection and its applications.	
UNIT III Interpretation and Report Writing	UO1: To introduce the concept of data interpretation. UO2: To learn principles of report writing and its types. UO3: To summarize importance of oral presentation and precautions to be taken while writing scientific report.	

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T. Y. B.Sc. BIOTECHNOLOGY SEMESTER V (A.Y. 2022-23)

USBT501 Cell Biology

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
1. Cell cycle	UO1: To distinguish between the prokaryotic and eukaryotic cell cycle highlighting the role of MPF and discuss early embryonic cell cycle. UO2: To analyse the significance of yeast's genetics in regulation of cell cycle. UO3: To learn different apoptosis pathways along with regulation of cell division in multicellular animals.	By the end of the course the student will be able to: Gain knowledge about the cell multiplication and death at molecular level. CO1. Understand the molecules involved in cell signaling. CO2. Gain an understanding of the basic concepts of events during fertilization and early embryonic development. CO3. Gain insight into the biology of cancer cells.
2. Cell Signaling	UO1: To understand the concepts of cell signaling and its types, and G-protein linked cell surface receptor signaling with suitable examples. UO2: To study signaling via Enzyme linked receptors with suitable examples. UO3: To learn principles of target cell adaptation and co-relating computer based signaling network with biological signaling.	
3. Developmental Biology	UO1: To study the importance of developmental biology as an multidisciplinary science along with model organisms. UO2: To elaborate different stages on development and germ layers. UO3: To gain insights about various mechanisms of differentiation along with different modes of pattern formation and morphogenetic movements.	

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4. Cancer Biology	UO1: To understand the principles of cancer biology highlighting the development of cancer as a microevolutionary process. UO2: To elaborate on molecular genetics of cancer along with the role of viruses in causing cancer. UO3: To gain insights about latest techniques and methodology of cancer diagnosis and cancer prevention.	

USBT502 Medical Microbiology and Instrumentation

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
1. Virology	UO1: To study properties of viruses along with its structure, classification and taxonomy. UO2: To illustrate cultivation methods for studying viruses along with principles of assays/techniques followed for virus purification. UO3: To learn replication cycles of ds DNA phages, animal and plant viruses with suitable examples. UO4: To study mechanisms of cellular destruction caused due to viral infections with suitable examples and highlighting the significance of novel virus-like species; viroids and prions.	By the end of the course the student will be able to: CO1. Learn the different type of virus cultivation and enumeration CO2. Understand the development and mode of action of antimicrobial, antifungal and antiviral drugs. CO3. Get an insight into the various spectroscopic methods used in biological studies. CO4. Understand the principle and applications of chromatographic and tracer techniques.
2. Chemotherapeutic drugs	UO1: To study the discovery and design of antimicrobial agents UO2: To study the mode of action of antimicrobial agents UO3: To gain insight into the mechanisms of drug resistance UO4: To discuss the use and misuse of antimicrobial agents UO5: To acquaint the students with antifungal and antiviral drugs	

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3. Spectroscopy	UO1: To study about the principle and instrumentation techniques related to Spectroscopy. UO2: To understand their importance and application in Biology. UO3: To get acquainted with the techniques and understand the future scope of the techniques discussed.	
4. Bioanalytical techniques	UO1: To study about the method of separation of Biological compounds and the application of the techniques. UO2: To learn about each of the separation technique based on the principle of chromatography. UO3: To learn about the applications of separation technique for a thorough understanding of the same	

USBT503 Genomics and Molecular Biology

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
1. Genetic engineering of plants	UO1: To study the methodologies of genetic engineering with Ti plasmid vectors UO2: To demonstrate the various methods of artificial gene transfer UO3: To learn the types of vectors and how is it used in the improvement of seed quality	By the end of the course the student will be able to: CO1. Use molecular biology tools and techniques in the field of biotechnology. CO2. Gain knowledge regarding recent developments in genome sequencing and editing. CO3. Understand the basis of gene cloning and development of transgenic animals and plants. CO4. Understand more about the science that underlies the methods of gene transfer and development of genetically modified organisms.

2. Transgenic Animals	UO1: To understand the development of transgenic mice with the aid of various techniques such as the retroviral method, DNA microinjection, ES, cre-loxp etc. UO2: To gain insights about the various vectors used for animal UO3: To briefly discuss the method of cloning livestock and the concept of green fluorescent fish as well as transgenic fish	
3. Tools in Molecular biology	UO1: To study in-depth the various cloning vectors, its origin and the applications UO2: To discuss and develop an understanding on the various isolation methods, restriction digestion, blotting techniques etc. UO3: To gain knowledge about the various recombinant selection methods and hybridization techniques UO4: To understand the cloning strategies and the construction of DNA libraries along with the concepts of chromosome walking and jumping UO5: To combine the overall learnings and develop an aptitude for its application in various fields	
4. Gene sequencing and editing	UO1: To study the various sequencing techniques UO2: To focus on the human genome mapping in-depth UO3: To understand the various gene editing tools such ZNF, TALENS, CRISPER/cas	

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USBT 504 Marine Biotechnology

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
1. Marine Biotechnology- Introduction & Bioprospecting	UO1: To develop aptitude in learning the functioning of marine ecosystems, highlighting significance of marine microbial habitats. UO2: To elaborate on the principles of bioprospecting and highlight the role of microbes involved in the same. UO3: To study diversity of compounds obtained from other marine organisms which are of commercial and ecological value.	By the end of the course the student will be able to: 1. Gain insight in the field of marine biotechnology. 2. Describe different marine products which can be used as pharmaceuticals. 3. Discuss marine functional foods and nutraceuticals and its applications. 4. Elaborate on marine bioresources and cosmetics and their applications.
2. Marine Drugs and Enzymes	UO1: To describe different natural products from marine resources and their challenges UO2: To elaborate on marine microbial enzymes. UO3: To describe different pharmaceutical compounds obtained from marine organisms.	
3. Marine Functional foods and Nutraceuticals	UO1: To discuss marine functional foods UO2: To study marine derived ingredients with biological properties UO3: To acquaint the students with marine nutraceuticals	
4. Marine Bioresources and cosmetics	UO1: To gain insight into marine bioresources, marine secondary metabolites, marine proteins, marine lipids UO2: To discuss cosmetics from marine sources UO3: To acquaint the students with products and treatments based on marine resources	

Applied Component: Biosafety

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
1. Introduction to biosafety	UO1: To study the biological risk assessment and hazardous characteristics of an agent UO2: To acquaint the students with genetically modified agent hazards UO3: To discuss the potential hazards associated with work practices UO4: To gain insight into safety equipment and facility safeguards	CO1: To introduce students to the concepts of biosafety. CO2: To discuss the significance of good lab practices used in the biotechnology industry and research. CO3: To state the possible contaminants in different samples. CO4: To study the applications of rDNA technology and importance of bioethics.
2. GLP	UO1: To discuss the concept of GLP UO2: To acquaint the students with the guidelines of GLP UO3: To gain insight into documentation of laboratory work UO4: To gain knowledge about the calibration and validation methods UO5: To acquaint the students with audits and audit reports	
3. Detection and testing of contaminants	UO1: To describe microbial contamination in food products UO2: To study microbial contamination in pharma products UO3: To acquaint the students with microbial assays	
4. Biosafety in Biotechnology	UO1: To study the concepts on biosafety in Biotechnology UO2: To discuss rDNA technology UO3: To acquaint the students with regulation of food and food ingredients UO4: To learn about genetically engineered crops UO5: To study about the contemporary issues in Bioethics	

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T. Y. B.Sc. BIOTECHNOLOGY SEMESTER VI (A.Y. 2022 – 23)

USBT601 Biochemistry

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
1. Protein Biochemistry	UO1: To study protein's structure highlighting the principles of denaturation and folding. UO2: To Study the protein's function with suitable examples along with protein purification methods. UO3: To learn the complementary interactions between proteins and ligands with suitable examples. UO4: To briefly understand the mechanism of how the protein's interaction is affected by energy with suitable examples.	CO1. To explain in detail various metabolic pathways, fate and energy production efficiency of carbohydrate and lipid metabolism. CO2. To understand the mechanism of action of various hormones, their synthesis, storage, release and associated disorders. CO3. To study the importance of vitamins, their sources, functions, bioactivity and associated disorders.
2. Metabolism	UO1: To illustrate pathway of bacterial cell wall synthesis. UO2: To learn the metabolic pathways of starch and sucrose and glycogen synthesis and its regulation by various factors. UO3: To demonstrate the reactions of Cholesterol synthesis pathway, its regulation and highlight the pathology of cardiovascular diseases.	
3. Endocrinology	UO1: To understand the classification of hormones into group i and ii and study characteristics of hormones released by anterior and posterior pituitary glands. UO2: To learn the mode of action, storage, release, transport of hormones secreted by thyroid gland, parathyroid gland, adrenal medulla and adrenal cortex. UO3: To study the functioning, storage, transport of hormones of pancreas, placenta, male and female gonads.	

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4. Nutrition	UO1: To gain key insights about sources, bioactive form, mode of action and disorders associated with vitamins. UO2: To explain functions and mode of action of minerals in metabolism. UO3: To highlight the clinical significance of Malnutrition and overnutrition with suitable examples.	

USBT602 Industrial Microbiology

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
1. Dairy technology	UO1: To study milk - normal flora, changes in raw milk and enumeration UO2: To discuss dairy technology preservation methods UO3: To gain insight into starter cultures UO4: To gain knowledge about the different fermented products	CO1: To introduce to various downstream processing technologies for extraction and purification of biological products produced using Bioprocess technology. CO2: To elaborate on the concept of GMP, implementation, Regulatory certification and SOPs used during QC and QA implementation. CO3: To gain insight in the various processes involved in production of commercially available dairy products. CO4: To have an in-depth understanding of downstream processes.
2. Down-stream Processing (DSP)	UO1: To study DSP UO2: To discuss foam separation and types of precipitation UO3: To gain insight about filtration, centrifugation and chromatography UO4: To describe the cell disruption methods UO5: To acquaint the students about crystallization and whole broth processing	

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3. Fermentation process	UO1: To study inoculation development in bacteria and fungi UO2: To discuss scale up and scale down UO3: To learn fermentation processes of different fermentation products UO4: To discuss biotransformation	
4. QA-QC	UO1: To study the concept of GMP and requirements for GMP implementation UO2: To gain insight into the documentation of GMP practices UO3: To learn the concept of QC and requirements for implementing QC UO4: To acquire knowledge of QA concepts and requirements for implementing the same	

USBT603 Basic Pharmacology and Neurochemistry

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
1. General principles of Pharmacology	UO1: To introduce and develop and in-depth understanding about the basics of pharmacology and the mechanism of drug action UO2: To aid in the understanding of drug receptors and its respective responses UO3: To learn the chemistry of drug-receptor binding, the relationship between dose and response UO4: To study the concept of effective dose and lethal dose UO5: To gain insights about the potency, intrinsic activity and the phenomenon of drug antagonism	CO1. To understand principles of pharmacology and its role related to biological activity of drugs in the system. CO2. To study the significance of drug absorption and distribution in the system, mode of administration of drugs and factors influencing drug absorptivity. CO3. To understand the effect of allergen, pesticide on systemic physiological functions. Also to discuss steps to be taken in case of nonmedical misuses of chemicals and bioterrorism. CO4. To study in details the structure and functions of neurons and glial cells, mechanism of action potential, role of various channels , and effects of neurotransmitters and neurotoxins

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2. Drug Absorption and Distribution	UO1:To learn how the drugs is absorbed from the alimentary tract and the factors affecting it UO2: To study the absorption of through from lungs and skin UO3: To understand the various routes of parenteral administration and the factors that influence the distribution of drug UO4: To demonstrate the binding of drugs and also the various physiological barriers.	
3. Basic Toxicology and Regulatory Toxicology	UO1:To understand all the background definitions in-depth UO2: To understand and distinguish between the allergic responses, side effects and adverse effects UO3: To gain knowledge about poisonings and its types UO4: To demonstrate about specific poisons UO5: To discuss about the non-medical use of drugs and incapacitating agents	
4. Neurochemistry	UO1: To understand the anatomy and functioning of the human brain UO2: To demonstrate about the neuronal pathways and the working of nerve impulses UO3: To understand the mechanism of neuronal excitation and inhibitions UO4: To learn about the gap junctions, synapses and the action of various neuro toxics along with neurotransmitters.	

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USBT604 Environmental Biotechnology

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
1. Renewable sources of energy	UO1: To get an overview of different renewable sources of energy and its applications. UO2: To understand the principles of biogas technology, factors influencing biogas production and its applications. UO3: To study mode of action, advantages and significance of biofuels with suitable examples.	CO1. To impart knowledge regarding management of industrial, storm and hazardous waste. CO2. To study biological processes used to treat effluent from industries. CO3. To study different methodologies to treat solid and liquid waste from different industries. CO4. To understand the importance of biofertilizers, its types, usage and applications in sustainable agriculture.
2. Industrial effluent treatment	UO1: To study various biological processes involved in treatment of industrial effluents with suitable examples. UO2: To learn processes involved in treatment of solid waste and state the applications of biosensors. UO3: To understand principles of biodegradation with suitable examples. UO4: To analyse the applications of enzymes and microbes used for biodegradation.	
3. Wastewater treatment	UO1: To identify the pollutants causing water pollution and to study about the microorganisms used in its treatment. UO2: To learn about the importance and advantage of packaged micro-organisms and their utilities in the treatment of waste. UO3: To learn about the heavy metals that cause pollution in water bodies and study about the micro-organisms used for the treatment along with their mechanism	
4. Hazardous waste management	UO1: To learn about water pollution wrt hazardous waste produced by petrochemicals, and manufacturing Industries, UO2: To study about the methodology of treatment of wastes generated due to dairy, antibiotic and distillery industries. UO3: To highlight the importance of water treatment due to oil spillage, other green deposits	

Applied Component: AgriBiotechnology

UNIT NO. AND NAME	UNIT OUTCOME	COURSE OUTCOME
1. Precision Agriculture and Agriculture systems	UO1: To introduce students to different mechanisms of agriculture systems and greenhouse technology. UO2: To elaborate the design, media and applications of greenhouse irrigation systems. UO3: To discuss the significance of phytotrons and precision cultivation systems.	CO1: To get an overview about precision agriculture and management of agriculture systems. CO2: To discuss significance of abiotic stress, biotic stress, photooxidative stress. CO3: To highlight the applications of molecular markers used in plant breeding. CO4: To state the eco-friendly use of biofertilizers and biopesticides.
2. Plant stress biology	UO1:To study the concept of abiotic stress, its causes, sources and consequences with suitable examples. UO2: To learn the concept of photooxidative stress, its causes, sources and consequences with suitable examples. UO3: To understand the principles of biotic stress, its causes, sources and consequences with suitable examples.	
3. Molecular Markers in Plant Breeding	UO1: To study the various genetic markers used in plant breeding technology UO2: To learn the application of molecular markers UO3: To discuss the techniques used in plant DNA barcoding	
4. Biofertilizers and Biopesticides	UO1: To study biofertilizer UO2: To discuss plant growth promotion by fungi UO3: To gain insight about microbial inoculants UO4: To study function of biopesticides.	

COURSE OUTCOME
F.Y.B.Sc. COMPUTER SCIENCE SEM I
2023-2024 Syllabus

Paper 1: Digital Systems & Architecture

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1) Students are able to understand basic functions of computers. 2) To learn about how computer systems work and underlying principles 3) To understand the basics of digital electronics needed for computers	1) To learn about how computer systems work and underlying principles 2) To understand the basics of digital electronics needed for computers 3) To understand the basics of instruction set architecture for reduced and complex instruction sets 4) To understand the basics of processor structure and operation 5) To understand how data is transferred between the processor and I/O devices
UNIT 2	1) To understand the basics of instruction set architecture for reduced and complex instruction sets 2) Understand types of machine instructions 3) Understand difference between RISC and CISC 4) Understand different types of memory	
UNIT 3	1) To understand the basics of processor structure and operation 2) To learn advanced computer architecture	

Paper 2: Introduction to Programming with Python

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1. Understand structure and model of the Python programming language	1) Ability to store, manipulate and access data in Python 2) Ability to implement basic Input / Output operations in Python 3) Ability to define the structure and components of a Python program. 4) Ability to learn how to write loops and decision statements in Python. 5) Ability to learn how to write functions and pass arguments in Python. 6) Ability to create and use Compound data types in Python
UNIT 2:	1. Understand structure and model of the Python programming language	
UNIT 3	1. Create, run and evaluate Python Programs using core data structures like Lists, Dictionaries and tuples. 2. Interpret the concepts of Object-Oriented Programming as used in Python.	

Paper 3: LINUX Operating System

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT I	1. Gives a basic introduction to Linux. 2. To understand importance of Linux in the real world. 3. Demonstrated various methods to install Linux. 4. Difference between CLI vs GUI. 5. To learn general purpose commands to start with Linux.	1. Work with Linux file system structure, Linux Environment 2. Handle shell commands for scripting, with features of regular expressions, redirections 3. Implement file security permissions 4. Work with vi, sed and awk editors for shell scripting using various control structures 5. Install softwares like compilers and develop programs in C and Python programming languages on Linux Platform
UNIT 2	1. Discussed various text editors in Linux. 2. File system used in Linux. 3. Students have been explained about security in Linux. 4. Discussed networking commands to check network-related tasks in Linux.	
UNIT 3	1. Basic commands to work with file manipulation and shell scripting commands.	

Paper 4: Open Source Technologies

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1. Understand the concept and principles of Open Source Software (OSS). 2. Recognize the need for OSS and its role in software development. 3. Differentiate between Free Software and Open-Source Software. 4. Understand the philosophy of software freedom and the development process of Open- Source Software. 5. Identify and understand various OSS licenses, including Apache, BSD, PL, LGPL. 6. Grasp the concepts of copyrights, copyleft, and patents in relation to OSS.	1. Differentiate between Open Source and Proprietary software and Licensing. 2. Recognize the applications, benefits and features of Open-Source Technologies 3. Gain knowledge to start, manage open-source projects.
UNIT 2	1. Understand the concepts of Open-Source Hardware, Open-Source Design, Open-Source Teaching, and Open-Source Media. 2. Explore collaboration in Open- Source projects, including community building and effective communication. 3. Learn how to contribute to existing Open-Source projects, including utilizing platforms like GitHub, following community etiquette, and engaging in testing and issue reporting. 4. Understand the concepts of shared software and shared source. 5. Recognize the use of Open- Source as a business strategy.	
UNIT 3	1. Understand the Open-Source operating systems and their significance, including GNU/Linux, Android, Free BSD, and Open Solaris. 2. Gain knowledge of Open- Source hardware and its applications. 3. Familiarize themselves with various development tools, IDEs, debuggers, and programming languages used in the Open-Source ecosystem. 4. Understand the LAMP stack (Linux, Apache, MySQL, PHP) and other Open-Source database technologies. 5. Study the developmental models, licensing, and modes of funding for Open-Source projects, including their commercial and non- commercial use.	

Paper 5: Discrete Mathematics

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1) Students are able to understand the concept of functions. 2) Understand types of relation 3) Acquire concept of partially ordered set 4) Implement recurrence relation concepts	1) Define mathematical structures (relations, functions, graphs) and use them to model real life situations. 2) Understand, construct and solve simple mathematical problems. 3) Solve puzzles based on counting principles. 4) Provide basic knowledge about models of automata theory and the corresponding formal languages. 5) Develop an attitude to solve problems based on graphs and trees, which are widely used in software.
UNIT 2	1) Understand concept of counting principle 2) Problem solving based on Permutation and combination 3) Acquire basic knowledge about models of automata theory and the corresponding formal languages.	
UNIT 3	1) Understand the concept of graphs and trees, which are widely used in software. 2) Learn algorithms of operation on Graph 3) Implement Graph traversal techniques 4) Implement tree traversal techniques	

Paper 6: Descriptive Statistics

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1. Provide basic learning about different types of data and presenting tools. 2. Introduction to R Software and basic uses. 3. To understand different centered values like mean, median and mode percentile and decile 4. Learn to represent the data using graphs	1. To provide complete learning about statistical data like attribute, variable and its representation methods using graphs like Frequency distribution, Histogram. 2. Complete understanding of R Software and its uses in Statistical Analysis. 3. To make students familiar with Central tendency like Mean and Median for grouped and ungrouped data. 4. To learn scatteredness of data using methods of skewness, Kurtosis, Quartile, Coefficient of Variance. 5. Concept of Moments 6. To make learner enable to find the correlation between different variables and further apply the regression analysis to find the exact relation between them.
UNIT 2	1. Provide learning of Raw and Central Moments. 2. Students should understand the symmetry in data using skewness value and kurtosis graph.	
UNIT 3	1. Provide learning and understanding of Correlation between 2 variables and its application in analysis 2. Concept of Regression analysis and its use in predicting the future values Concept of Multiple regression and linear regression.	

Paper 7: Soft Skills

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1. Students should understand about knowing self and Johari's Window. 2. Difference between Emotional and Intelligence Quotient. 3. To provide learning about Professional and Personal etiquette. 4. Learn about the 3M Model of communication, Verbal and Nonverbal Communication.	1) To know about various aspects of soft skills and learn ways to develop personality 2) Understand the importance and type of communication in a personal and professional environment. 3) To provide insight into much needed technical and non-technical qualities in career planning. 4) Learn about Leadership, team building, decision making and stress management
UNIT 2	1. Introduction to JOb Interview, Resume and CV. 2. To make the cover letter and Job Application. 3. Learn to Present in professional life. 4. Understand the steps of Interview and FAQ. Group discussion process and arrangement , topics 5. involved in group discussions	
UNIT 3	1. To understand the workplace creativity and get the work completed in innovative ways 2. Develop ethical values. 3. Build the capacity of learning right point and unlearn not required or wrong points. 4. Increase the decision making capabilities. 5. Learn to understand stress and method to overcome by proper time management.	

(B.Sc. CS Co-ordinator)

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COURSE OUTCOME
F.Y.B.Sc. COMPUTER SCIENCE SEM 2
2023-2024 Syllabus

Paper 1: Design & Analysis of Algorithms

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1. To Define the basic concepts of algorithms and analyze the performance of algorithms. 2. Students are able to understand the use of different types of data structure.	1) Students should be able to understand and evaluate efficiency of the programs that they write based on performance of the algorithms used. 2) Students should be able to appreciate the use of various data structures as per need. 3) To select, decide and apply appropriate design principle by understanding the requirements of any real life problems
UNIT 2	1. Students able to understand concept of recursion 2. To Discuss various searching and sorting algorithms.	
UNIT 3	1. Ability to understand and design algorithms using greedy strategy, divide and conquer approach, dynamic programming. 2. Apply dynamic programming approach to solve suitable problems 3. Describe the divide and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide - and-conquer algorithms.	

Paper 2: Advanced Python Programming

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1. Understand how to read/write to files using python. 2. Identify to catch their own errors that happen during execution of programs 3. Remember the concept of pattern matching.	1) Ability to implement OOP concepts in Python including Inheritance and Polymorphism 2) Ability to work with files and perform operations on it using Python. 3) Ability to implement regular expression and concept of threads for developing efficient program 4) Ability to implement exception handling in Python applications for error handling. 5) Knowledge of working with databases, 6) designing GUI in Python and implement networking in Python
UNIT 2	1. Understand how to read/write to files using python. 2. Identify to catch their own errors that happen during execution of programs 3. Remember the concept of pattern matching.	
UNIT 3	1. Apply knowledge to connect to the database to move the data to/from the application. 2. Evaluate and create programs to connect to computers, read from URL and send email.	

Paper 3: Introduction to OOPs using C++

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1. Understand the Object-Oriented Programming (OOP) paradigm and its basic concepts. 2. Gain knowledge of programming tokens, keywords, identifiers, and constants in C++.	1. Work with numeric, character and textual data and arrays. 2. Understand the importance of OOP approach over procedural language. 3. Understand how to model classes and relationships using UML. 4. Apply the concepts of OOPS like encapsulation, inheritance and polymorphism. 5. Handle basic file operations.
UNIT 2	1. Understand the concept of constructors and destructors in object- oriented programming. 2. Gain proficiency in working with objects, including implementing accessor and mutator methods. Explore the concept of arrays of objects in	
UNIT 3	1. Understand the concept of inheritance in object-oriented programming. 2. Learn about runtime polymorphism, dynamic binding, function overriding, and the use of virtual functions.	

Paper 4: Database Systems

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1. To understand the basic use of database. 2. Various models like RDBMS, Network model, etc. 3. To understand the terms of the database for example, tuples, relations, relationship, attributes, entity etc. 4. Constraints used in database management system. 5. To understand how to convert ER to table so that we can implement these tables in database application. 6. Describe fundamental elements of RDBMS. 7. Design E-R diagram to represent simple database applications scenarios.	1. To appreciate the importance of database design. 2. Analyze database requirements and determine the entities involved in the system and their relationship to one another. 3. Write simple queries to MySQL related to String, Maths and Date Functions. 4. Create tables and insert/update/delete data, and query data in a relational DBMS using MySQL commands. 5. Understand the normalization and its role in the database design process. 6. Handle data permissions. 7. Create indexes and understands the role of Indexes in optimization search.
UNIT 2	1. To understand Functional dependencies, schema so that the table relationship is 1. can be understood which will further help to create tables in database. 2. To illustrate DDL statements, DML statements, Joins to update, alter or delete any record from the database without changing other records of tables. 3. Explain the basic concepts of relational data model, relational database design, relational algebra and database language SQL.	
UNIT 3	1. To understand types of in built functions so that they can manipulate database records easily. 2. String functions, math functions, date function, 3. To understand about the DBA, permissions and security Basic of Database protection & Distributed databases	

Paper 5: Calculus

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1) Understand the concept of limit, continuity, derivatives. 2) Problem solving on derivative in graphing and applications	1) Understanding of Mathematical concepts like limit, continuity, derivative, integration of functions. 2) Ability to appreciate real world applications which use these concepts. 3) Skill to formulate a problem through Mathematical modeling and simulation.
UNIT 2	1) Understand the concept of integration 2) Problem solving with different types of integration methods. 3) Problem solving on modeling with differential equation	
UNIT 3	1) Understand the concept partial derivatives 2) Implement partial derivatives on different applications	

Paper 6: Statistical Methods

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1. To learn the concept of Probability and Bayes theorem and its definition 2. To learn about discrete and Continuous data with its related functions like pdf and pmf.	1. Calculate probability, conditional probability and independence. 2. Students should be able to learn about distribution and its application on the basis of example. 3. To Analyze and proof the hypothetical statements using test statistics. 4. Learn to read tabulated values of different functions. 5. Analysis or compare 2 and more samples together and conclude the outcome. 6. Learn to calculate and analyze the Non parametric distribution and CHi square association.
UNIT 2	1. Learn about the Expectation and Variance of Random Variable 2. To understand and use the distribution like BInomial for discrete data, Normal for continuous, F for comparison of variance.	
UNIT 3	1. Definition of Hypothesis and steps to conclude the hypothesis 2. Learn Methods of ANOVA and analyze more than 2 data simultaneously. 3. Learn method of Non parametric tests like sign test, wilcoxon test, kruskal wallis test and Post hoc analysis	

Paper 7: **E-Commerce & Digital Marketing**

UNIT NO. & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1:	1. Understand the concepts of E-commerce and E-business and their impact on business models. 2. Understand the different types of electronic payment systems, such as credit cards, debit cards, smart cards, and internet banking. 3. Analyze the digital advertising market in India. 4. Develop a digital marketing plan.	1. Understand the core concepts of E-Commerce. 2. Understand the various online payment techniques 3. Understand the core concepts of digital marketing and the role of digital marketing in business. 4. Apply digital marketing strategies to increase sales and growth of business 5. Apply digital marketing through different channels and platforms 6. Understand the significance of Web Analytics and Google Analytics and apply the same.
UNIT 2	1. Understand the meaning, purpose, and types of social media websites. 2. Use email marketing tools and automation to improve email deliverability and engagement. 3. Understand the concept of content marketing and its importance in digital marketing.	
UNIT 3	1. Understand the meaning and common techniques of search engine optimization (SEO). 2. Understand the concept of search engine marketing (SEM) and its importance in digital marketing. 3. Understand the basics of Google Analytics, including how to install it on a website and analyze its parameters.	

(B.Sc. CS Co-ordinator)

COURSE OUTCOME
S.Y.B.Sc. COMPUTER SCIENCE SEM 3
2023-2024 Syllabus

Paper 1: Principles of Operating Systems

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1. To understand the services provided by and the design of an operating system. 2. To make aware of different types of Operating System and their services.	1. Work with any type of operating system 2. Handle threads, processes, process synchronization 3. Implement CPU scheduling algorithms 4. Understand the background role of memory management 5. Design file system.
UNIT 2	1. Categorize the operating system's resource management techniques, dead lock management techniques, memory management techniques. 2. Analyze important algorithms eg. Process scheduling and memory management algorithms 3. Students should understand the data structures and algorithms used to implement an OS. 4. To learn different process scheduling algorithms and synchronization techniques to achieve better performance of a computer system. 5. Understanding CPU Scheduling, Synchronization, Deadlock Handling and Comparing CPU Scheduling Algorithms. Solve Deadlock Detection Problems	
UNIT 3	1. To understand the structure and organization of the file system. 2. To understand different approaches to memory management. 3. Describe the role of paging, segmentation and virtual memory in operating systems. 4. Defining I/O systems, Device Management Policies and Secondary Storage Structure and Evaluation of various Disk Scheduling Algorithms.	

Paper 2: Linear Algebra

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1. To understand the fundamental concepts of complex numbers. 2. Introduction to the principles and mechanisms of Support Vector Machines (SVMs) 3. To recognize vectors as functions mapping to mathematical sets. 4. Understanding the concepts of linear combinations and spans.	1. Appreciate the relevance and applications of Linear Algebra in the field of Computer Science. 2. Understand the concepts through program implementation. 3. Instill a computational thinking while learning linear algebra. 4. Express clear understanding of the concept of a solution to a system of equations. 5. Find eigenvalues and corresponding eigenvectors for a square matrix.
UNIT 2	1. To understand matrices as vectors and their properties. 2. Perform matrix-vector and vector-matrix multiplications using linear combinations and dot products. 3. To study linear functions involving matrices. 4. Explore coordinate systems and their significance. 5. Define and calculate the dimension and rank of vector spaces. Perform Gaussian elimination to transform matrices into echelon form.	
UNIT 3	1. To understand the inner product for vectors over the real numbers. 2. Explore the concept of orthogonality and its significance. 3. Perform projection orthogonal to multiple vectors. 4. Analyze the properties and applications of eigenvalues and eigenvectors. Represent vectors in coordinate form using eigenvectors.	

Paper 3: Data Structures

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT I	1. Gain an understanding of various data types and data structures, including their classifications, and learn the concept of Abstract Data Types (ADT) and how to create user-specific ADTs for specific applications. 2. Master and Apply the concept of linked data structures, specifically the ADT for linked lists, and comprehend the advantages and disadvantages of linked lists. 3. Develop the ability to perform operations like traversing, searching, prepending, and removing nodes in singly linked lists, and understand the practical applications of linked lists, such as polynomial equations. 4. Explore the Stack ADT, understand its advantages and disadvantages, and become proficient in applying stack data structures. 5. To solve problems like balanced delimiter checking and conversion from prefix to postfix notation. 6. Familiarize learning with the Queue ADT, its advantages and disadvantages, and learn about linked representations of queues. Develop the skills to perform operations on circular queues and dequeues, and understand the practical applications of queues, including job scheduling queues	1. Create different types of data structures. 2. Understand which data structure to be used based on the type of the problem. 3. Apply combined knowledge of algorithms and data structures to write highly effective programs in various domains.
UNIT 2	1. Develop a comprehensive understanding of doubly linked lists, including their advantages and disadvantages. 2. Gain proficiency in performing insertion and deletion operations at various positions within a doubly linked list. 3. Master the ADT for tree structures and traversal methods. 4. Practical applications of trees, such as Huffman coding. 5. Gain expertise in the Priority Queue ADT. 1. Learn about heaps, including different types of heaps, and develop the ability to heapify elements effectively, facilitating efficient priority queue operations.	
UNIT 3	1. Understanding of graphs and its applications. 2. Gain proficiency in representing graphs using both adjacency matrices and adjacency lists. 3. Learn to perform graph operations. 4. Explore and Implement graph traversal techniques using Breadth-First Search (BFS) and Depth-First Search (DFS) 5. Practical applications of graphs in algorithms like shortest path algorithms. 6. Explore the concept of hashing, hash tables, hash functions, and collision handling techniques. Develop the ability to apply hashing in various practical scenarios, understanding its applications in data storage and retrieval.	

Paper 4: Advanced Database Concepts

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT I	1. Understand the advantages, features and architecture of PL/SQL, . 2. Familiarize with character sets used in PL/SQL. 3. Implement conditional selection statements in PL/SQL. 4. Reference, alter, and drop sequences as needed. 5. Create, execute, alter, and view stored procedures and understand the concept of functions in PL/SQL.	1. Master concepts of stored procedure, functions, cursors and triggers and its use. 2. Learn about using PL/SQL for data management. 3. Use efficiently Collections and records. 4. Understand concepts and implementations of transaction management and crash recovery.
UNIT 2	1. Understand the concepts of associative arrays, Varrays (Variable- Size Arrays), and nested tables in PL/SQL. 2. Explore various collection types defined in package specifications. 3. Identify compile-time warnings and handle them appropriately. 4. Understand the concept of cursors in PL/SQL and their types. Describe static and dynamic SQL and its use in PL/SQL.	
UNIT 3	1. Implement triggers by creating them for various events (e.g., insert, delete, update). 2. Explore the use of triggers for enforcing data integrity in a database. Understanding the need for packages and their benefits. 4. Explore the ACID properties of transactions. 5. Understand the concept of serializability and its importance. 6. Gain knowledge of the ARIES algorithm for crash recovery. Learn how to recover a database system from a system crash, including the Redo and Undo phases.	

Paper 5: Java based Application Development

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1. Understand the JDK, JRE,JVM architecture 2. In depth knowledge of OOPs concept 3. Implement Exception Handling and Multithreading in dynamic programming 4. Usage of Packages in Monolithic and Microservice Architecture	1. Design basic application in java using Graphical User Interface. 2. The learner will be able to develop applications using swings 3. The learner will be able to develop web based applications using servlet and jsp 4. The learner will be able to connect databases with java through 5. The learner will be able to perform programs using JSON objects
UNIT 2	1. Understand the Collection framework. 2. Implement the features of JFC and Swing framework. 3. Solving the connectivity of JDBC using Connectors and API Working of Event Handling in Code	
UNIT 3	1. In depth knowledge of Servlets, JSP frameworks on browser. 2. Passing Data from Front end to backend using HTTP Methods Understand the concept of JSON for API and forms.	

Paper 6: Web Technologies

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1) Understand basic concept of HTML 2) Understand types of CSS how to apply on website	1. Design valid, well-formed, scalable, and meaningful pages using emerging technologies. Understand the various platforms, devices, display resolutions, viewports, and browsers that render websites 3. Develop and implement client-side and server-side scripting language programs. 4. Develop and implement Database Driven Websites. 2. Design and apply XML, to create a markup language for data and document centric applications.
UNIT 2	1) Student learn popup boxes used in JavaScript 2) Understand JavaScript objects 3) Learn Form validation using JavaScript 4) Understand comparison XML and HTML Student learn about XSLT	
UNIT 3:	1) Understand concept AJAX, PHP and jQuery 2) Develop website using database concept with PHP	

Paper 7: Creative Content Writing

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1. Gain a foundational understanding of content writing, including the principles of effective communication and its role in various contexts. 2. Identify different tones and styles in writing and their applications, and recognize and correct common grammatical errors to enhance the quality of written content. 3. Learn best practices for creating web content that is elegant, professional, and engaging, focusing on the importance of tone, attitude, and active verbs. Acquire the skills to structure web content effectively, including the use of lists, chunking information, and creating titles and subtitles tailored to the intended online audience. 5. Understand the significance of content length in various marketing channels, such as blog posts, podcasts, Facebook posts, and tweets, and learn to adapt writing style accordingly. 4. Develop the ability to tailor marketing content to meet specific platform requirements and audience preferences, optimizing the impact of marketing messages in different online spaces.	1. Understand the fundamentals of content creation for Blog, Website etc. 2. Acquire the ability to write and edit in a variety of styles and procedures 3. To develop the creative abilities. 4. To acquire essential language skills for editors.
UNIT 2	1. Develop the skills to write concise and engaging content tailored to specific social media platforms, including Twitter, Facebook, and LinkedIn, while utilizing appropriate hashtags and humor where applicable. 2. Learn effective email writing techniques, create compelling landing pages, craft attention-grabbing headlines, and construct engaging website content, including home pages, About Us pages, and blog posts, to effectively communicate messages in the digital landscape. 3. Gain an understanding of the principles of visual communication and the role of infographics in conveying complex information in a visually appealing manner. Explore the science behind effective data visualization and develop the ability to create purpose-driven infographics by observing, processing ideas, and designing visually compelling graphics for various purposes, including reports and presentations.	
UNIT 3	1. Acquire proficiency in using a variety of research and knowledge management tools to gather and organize information effectively for content creation. 2. Using writing, productivity, and editing tools to enhance the quality and efficiency of content creation, while also becoming familiar with style guides and non-text writing tools for diverse content needs. 3. Develop a comprehensive understanding of legal English and vocabulary as it relates to legal writing, equipping you with the necessary language skills to navigate legal content. 4. Explore intellectual property rights (IPR) laws and copyright regulations relevant to content writing, and understand the legal and ethical implications of plagiarism in content creation and publishing.	

(B.Sc. CS Co-ordinator)

SIR M. V. COLLEGE OF SCIENCE & TECHNOLOGY ANDHERI (EAST) MUMBAI-69.

COURSE OUTCOME
S.Y.B.Sc. COMPUTER SCIENCE SEM 4
2023-2024 Syllabus

Paper 1: Theory of Computation

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1) To understand Automata Theory 2) Identifying DFA and NDFA. 3) Defining Grammer and Languages 4) Distinguish different computing languages and classify their respective types	1. Understand Grammar and Languages 2. Learn about Automata theory and its application in Language Design 3. Learn about Turing Machines and Pushdown Automata 4. Understand Linear Bound Automata and its applications
UNIT 2	1) Analyze and design finite automata, pushdown automata, Turing machines, formal languages, and grammars. 2) To Apply transformation between multiple representations of finite automata. 3) Problem solving based on Regular Sets and Regular Grammar	
UNIT 3	1) To state and explain the Church-Turing thesis and its significance. 2) Problem solving based on Linear Bound Automata	

Paper 2: Computer Networks

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1. Understanding networking standards and administrations and their roles in modern communication systems. 2. To Explain networking models, particularly the OSI model and the TCP/IP protocol suite. 3. Master the fundamentals of the physical layer in networking. 4. Implement digital-to- digital and analog-to- digital conversion processes. 5. Develop an understanding of bandwidth utilization techniques, including multiplexing and spread spectrum methods. Apply the concept of switching in networking.	1. Learn basic networking concepts and layered architecture. 2. 2. Understand the concepts of networking, which are important for them to be known as a 'networking professionals'.
UNIT 2	1. Understanding of the Data Link Layer, addressing and design issues. 2. Explain and Implement concepts of error detection and correction techniques. 3. Gain proficiency in Data Link Control (DLC) services, data link layer protocols, and explore specific protocols such as HDLC and Point-to- Point Protocol (PPP) used for reliable data transfer over network links. 4. Understand the principles of media access control.	
UNIT 3	1. Simulate routing protocols 2. Identify Transport layers protocols and its applications. 3. To implement client server protocol and explore its use. 4. Understand various QoS requirements and standards. 5. Gain insight into wireless local area networks (LANs). To apply knowledge of network layer protocol.	

Paper 3: Software Engineering

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT I	1) Understand the fundamental concepts of Software Engineering Lifecycle models. 2) Summarize the software requirement specifications and the SRS documents. 3) Understanding of different software architectural styles.	1. Plan a software engineering process life cycle, including the specification, design, implementation, and testing of software systems that meet specification, performance, maintenance and quality requirements 2. Analyze and translate a specification into a design, and then realize that design practically, using an appropriate software engineering methodology. 3. Know how to develop the code from the design and effectively apply relevant standards and perform testing, and quality management and practice 4. Able to use modern engineering tools necessary for software project management, time management and software reuse.
UNIT 2	1) Describe software engineering layered technology and Process frame work. 2) Demonstrate the competence in communication, planning, analysis, design, construction, and development of software as per the Requirements. 3) Perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance	
UNIT 3	1) Demonstrate the software project management skills through case studies. 2) Understanding of software testing approaches. 3) Describe software measurement and software risks 4) Understanding on quality control and how to ensure good quality software.	

Paper 4: IoT Technologies

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT I	1. Understand the concept of IoT (Internet of Things) and its significance. 2. Gain insights into the historical development and evolution of IoT. 3. Analyze the structure and components of a typical SoC. 4. Introduce and understand popular IoT platforms such as Raspberry Pi, Arduino, and NodeMCU.	1. understand SoC and IoT 2. use different types of IoT Platforms and interfaces 3. understand and implement an idea of various types of applications built using IoT
UNIT 2	1. Understand basic hardware components like LEDs, buttons, cameras, 8x8 LED grids, motors, etc. 2. Explore communication protocols such as PWM, UART, GPIO, I2C, and SPI for IoT device interaction. 3. Learn to interface various sensors including temperature, humidity, motion, light, and gas sensors. 4. Understand the role of protocols in IoT communication. 5. Explore the importance of security in IoT ecosystems.	
UNIT 3	1. Establish a web server for IoT applications. 2. Learn how to use Node-RED for IoT application development. 3. Explore WSN architectures and the different types of WSNs. 4. Study modern IoT case studies and applications in various sectors, including transportation, agriculture, healthcare, and more. 5. Define the purpose and concept of edge computing in IoT. Evaluate the advantages and disadvantages of each communication model in various IoT scenarios.	

Paper 5: Android Application Development

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1) Students will understand the basics of Kotlin data type, control structure, concept of OOPS, companion, extension, etc. 2) After Basics of Kotlin students will learn advanced concepts of Kotlin, Like. Writing/ Calling of function, lambda expression, Collections and its types, null safety, exception handling. 3) Once Students learn the basic and advanced concept of Kotlin. After that they learn Android Architecture like. (MVC,MVVM). 4) Creating the first Virtual Machine. Setting Android Studio. 5) Students will understand the basic concept of Android different components like. Activity, Fragment, Content Provider, Service, Notification, Etc.	1. Build useful mobile applications using Kotlin language on Android 2. Install and configure Android Studio for application development 3. Master basic to intermediate concepts of Kotlin required for mobile application development 4. Use built-in widgets and components, work with the database to store data 5. Master key Android programming concepts and deploy the application on Google Play
UNIT 2	1) In this unit students will learn the designing of Android UI. Adding different types of Layout, Component, Style 2) Understand the advanced concept of IMageView, ListView, RecyclerView, Writing different types of Adapter, Understanding the use of Activity and Fragment Navigation. 3) Students will learn data binding techniques to avoid binding errors in runtime. Data binding also work with AdapterView Binding	
UNIT 3	1) Create and manipulate graphics using the Drawable class in Android. 2) Understand and apply Android Camera functionalities for capturing photos and videos. 3) Implement Broadcaset Receivers to respond to system events and external triggers.	

Paper 6: Advanced Application Development

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT I	1. Working with the latest framework on Node JS for backend 2. Understand the unstructured database for MongoDB 3. Solving the complex data handling on MongoDB	1. Store the data in NoSQL, document-oriented MongoDB database that brings performance and scalability. 2. Use Node.js and Express Framework for building fast, scalable network applications 3. Use AngularJS framework that offers declarative, two- way data binding for web applications. 4. Integrate the front-end and back-end components of the MEAN stack. Develop robust mobile applications using Flutter.
UNIT 2	1. Working on Front end with Express framework 2. Connecting bridge from front end to back end using API Multiple template handling functions on Node JS	
UNIT 3	1. Understanding the Mobile technology 2. Working on Flutter and Data Programming 3. Implementing business logic in Dart Solving problems on Dart Function	

Paper 7: Research Methodology

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1. Understand the concept of research and its significance in various fields. 2. Identify the, objectives and motivations behind conducting research 3. Differentiate between various types of research, including exploratory, descriptive, and explanatory research. 4. Recognize the role of scientific methods in the research process. 5. Identify the key factors that necessitate the formulation of a research problem. 6. Formulate a well- defined research problem based on a critical review of existing literature. 7. Construct hypotheses that can be tested to address the research questions. 8. Evaluate the necessity of a well- structured research design in the research process. 9. Apply the basic principles of experimental design in research planning and execution.	1. Define research, formulate problem, and describe the research process and research methods. 2. Understand and apply basic research methods including research design, data analysis and interpretation 3. Understand ethical issues in research, write research report, research paper, and publish the paper.
UNIT 2	1. Understand the various methods for collecting primary data, including questionnaires, schedules, and observation techniques. 2. Learn to apply different interview methods and recognize their suitability for specific research scenarios. 3. Evaluate and select appropriate data collection methods based on the research objectives 4. Comprehend the essential steps Involved in designing a sampling plan from defining the target population to selecting a sample 5. Acquire the skills to select a random sample and develop sampling frames for real-world research applications 6. Formulate hypotheses with the characteristics of being specific, testable, and relevant to the research problem 7. Grasp the concept of Type-I and Type-II errors and their implications in the context of hypothesis testing	

UNIT 3	1. Develop the skills to craft a well-structured research proposal, including defining research objectives, formulating hypotheses, and outlining research methods. 2. Learn how to effectively create a compelling title that accurately represents the research and attracts readers. 3. Learn various aspects of writing a research paper, including crafting an effective abstract, creating an engaging introduction, mastering the materials and methods section, presenting results clearly, constructing a thoughtful discussion, acknowledging of Research, Ethical issues in research contributions, and using proper citation styles for references. 4. Understand the rights and permissions related to publishing, including copyright considerations and ethical guidelines for using others' work. 5. Learn when and how to use abbreviations and acronyms in scientific writing. 6. Explore the process of writing a thesis based on research outcomes. 7. Discuss the ethical issues and responsibilities involved in conducting and reporting research, including issues related to plagiarism, authorship, and data Integrity	

(B.Sc. CS Co-ordinator)

COURSE OUTCOME
T.Y.B.Sc. COMPUTER SCIENCE SEM 5
2023-2024 Syllabus

Paper 1: Artificial Intelligence

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1) Identify problems where artificial intelligence techniques are applicable 2) compare AI with human intelligence and traditional information processing and discuss its strengths and limitations as well as its application to complex and human- centred problems 3) To classify the different types of agents	1) After completion of this course, learner should get a clear understanding of AI 2) Different search algorithms used for solving problems. 3) The learner should also get acquainted with different learning algorithms and models used in machine learning.
UNIT 2	1) To formulate and choose best hypothesis 2) To understand and the architecture of Artificial Neural Networks 3) To understand the working of SVM 4) To Justify the use of ensemble learning	
UNIT 3	1) Demonstrate proficiency in applying scientific method to models of probabilistic learning 2) To describe Reinforcement Learning and its type.	

Paper 2: Information & Network Security

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1. Understand security trends, OSI Security Architecture, and security attacks. 2. Learn classical encryption techniques including symmetric ciphers, substitution, and transposition. 3. Explore the principles and strength of DES, AES, and Triple DES. 4. Grasp the basics of public-key cryptography and the RSA algorithm.	1. Analyze and evaluate security trends, attacks, and mechanisms, and propose effective security solutions based on the OSI security architecture. 2. Apply classical encryption techniques, such as substitution and transposition ciphers, to encrypt and decrypt messages and analyze their security implications. 3. Implement public-key cryptography algorithms, including RSA, and demonstrate the ability to securely exchange keys and establish secure communication channels. 4. Design and implement secure authentication mechanisms, including message authentication codes and digital signatures, to ensure data integrity and non-repudiation. 5. Evaluate and implement various security measures, such as IP security, web security protocols (e.g., SSL/TLS), intrusion detection systems, and firewall configurations, to protect networks and systems from unauthorized access and attacks.
UNIT 2	1. Understand key management and the Diffie-Hellman Key Exchange. 2. Learn about message authentication, hash functions, and their security. 3. Explore digital signatures, authentication protocols, and the Digital Signature Standard. 4. Grasp authentication applications like Kerberos, X.509 Authentication, and Public-Key Infrastructure (PKI).	
UNIT 3	1. Learn electronic mail security with Pretty Good Privacy (PGP) and S/MIME. 2. Understand IP security, including architecture, authentication headers, and key management. 3. Explore web security, focusing on SSL/TLS and Secure Electronic Transactions. 4. Grasp intrusion detection, malicious software threats, and firewall design principles.	

Paper 3: Linux Server Administration

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1) Demonstrate proficiency with the Linux command line interface, directory & file management techniques, file system organization, and tools commonly found on most Linux distributions.	1) Learner will be able to develop Linux based systems and maintain. 2) Learner will be able to install appropriate service on Linux server as per requirement. 3) Learner will have proficiency in Linux server administration.
UNIT 2	1) Effectively operate a Linux system inside of a network environment to integrate with existing service solutions. 2) Demonstrate various internet services like DNS, SMTP, FTP, POP, IMAP, SSH, LDAP and DNS.	
UNIT 3	1) Demonstrate the ability to troubleshoot challenging technical problems typically encountered when operating and administering Linux systems. 2) To illustrate various intranet services in Linux and there configuration steps.	

Paper 4: Game Programming

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1) Understand basic concept of mathematics used in computer graphics 2) Acquire knowledge on different types of transformations 3) Understand difference of CPU and GPU	Learner should study Graphics and gaming concepts with present working style of developers where everything remains on internet and they need to review it, understand it, be a part of community and learn.
UNIT 2	1) Understand DIrectX Pipeline 2) Understand trigonometry formulas and types of curves 3) Acquire knowledge of types of interpolation Understand analytical geometry concept	
UNIT 3	1) Understand rendering engines concept 2) Understand difference between AR, VR and MR 3) Understand working in Unity Develop games using Unity concepts	

Paper 5: Project Management

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1. Understand the definition, characteristics, and importance of project management. 2. Learn project selection methods, initiation, and scope management. 3. Master project time management, including activity sequencing and schedule development. 4. Grasp cost management techniques, budget monitoring, and Earned Value Management (EVM).	1. Apply project management principles, processes, and best practices to plan, execute, and control projects effectively. 2. Develop project charters, define project scopes, and create work breakdown structures (WBS) to establish project objectives and deliverables. 3. Create project schedules, estimate resource requirements, and monitor project progress using appropriate project management techniques. 4. Employ quality assurance and control measures to ensure project deliverables meet stakeholder expectations and industry standards. 5. Demonstrate effective leadership and teamwork skills, as well as the ability to manage stakeholders, resolve conflicts, and make ethical decisions in project management settings.
UNIT 2	1. Learn project quality and risk management, including quality assurance, control, and risk assessment. 2. Understand project resource and procurement management, focusing on team development, conflict resolution, and vendor management. 3. Master project integration processes, change management, and project closure. 4. Gain insights into lessons learned and knowledge transfer for future projects.	
UNIT 3	1. Understand Agile principles, methodologies, and their application in project management. 2. Learn effective people management, including leadership, team building, and emotional intelligence. 3. Master project governance structures, ethical considerations, and professional responsibility. 4. Explore technology's role, virtual teams, and tools for project planning and collaboration.	

SIR M. V. COLLEGE OF SCIENCE & COMMERCE • SHETTY EDUCATION SOCIETY
ANDHERI (EAST) MUMBAI

(B.Sc. CS Co-ordinator)

COURSE OUTCOME
T.Y.B.Sc. COMPUTER SCIENCE SEM 6
2023-2024 Syllabus

Paper 1: Data Science

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1. Understand the definition, scope, and applications of Data Science. 2. Learn about different data types and sources. 3. Master data preprocessing techniques like cleaning, transformation, and feature selection. 4. Gain proficiency in data wrangling, feature engineering, and using popular Data Science libraries.	1. Apply data preprocessing techniques to clean and transform raw data, handle missing values and outliers, and merge datasets. 2. Implement machine-learning algorithms to perform tasks such as regression, classification, clustering, and ensemble learning. 3. Evaluate and compare different machine learning models using appropriate evaluation metrics and cross-validation techniques. 4. Create informative and visually appealing data visualizations to communicate insights and patterns in data. 5. Understand the principles and practices of data management, including data governance, data quality assurance, and data privacy considerations.
UNIT 2	1. Master exploratory data analysis (EDA) and data visualization techniques. 2. Understand supervised and unsupervised machine learning concepts. 3. Learn regression analysis and model evaluation techniques. 4. Explore key machine learning algorithms and model optimization methods.	
UNIT 3	1. Understand model evaluation metrics like accuracy, precision, recall, F1-score, and AUC. 2. Learn principles and tools for effective data visualization and storytelling. 3. Master data management activities, including ETL processes and data governance. 4. Grasp data privacy and security considerations.	

Paper 2: Cloud Computing and Web Services

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1) Explain the core concepts of the cloud computing paradigm 2) Describe the principles of Parallel and Distributed Computing and evolution of cloud computing from existing technologies.	1) After successfully completion of this course, learner should be able to articulate the main concepts, key technologies, strengths, and limitations of cloud computing 2) The possible applications for state- of-the-art cloud computing using open source technology. 3) Learner should be able to identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc. 4) They should explain the core issues of cloud computing such as security, privacy, and interoperability.
UNIT 2	1) Implement different types of Virtualization technologies and Service Oriented Architecture systems	
UNIT 3	1) Elucidate the concepts of OpenStack Cloud Computing architecture and its design challenges 2) Illustrate the fundamental concepts of cloud storage	

Paper 3: Wireless and Sensor Networks

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1. Learn the Introduction to WSN and its need in todays world. 2. Understand Deployment architecture, Topology used in deployment. 3. Different components of WSN 4. Hardware and Software requirements of WSN. 5. Learn about MANETS and efficient use of battery.	1) After completion of this course, learner should be able to list various applications of wireless sensor networks, 2) Describe the concepts, protocols, design, 3) implementation and use of wireless sensor networks. 4) Also implement and evaluate new ideas for solving wireless sensor network design issues.
UNIT 2	To PRovide knowledge of MAC Protocols used for WSN and ROuting protocols for route updates. Protocols used for Transport layer like conversion of existing TCP to suite the environment of WSN for efficient use of power.	
UNIT 3	1. To provide knowledge about history of WSN and its application, 2. Learn about Cellular system in telecom 3. How does the HAndover and Takeover of call works 4. Satellite functioning and different architecture. 5. Learn ts application in GEO,LEO and MEO.	

Paper 4: Ethical Hacking

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1) Acquire knowledge on types of attacks and their prevention mechanisms 2) Understand different foot printing and scanning techniques	1) Apply ethical hacking methodologies to conduct comprehensive security assessments and penetration tests. 2) Perform effective foot printing and reconnaissance techniques to gather critical information about target systems. 3) Identify and exploit vulnerabilities in various network and system components using appropriate tools and techniques. 4) Evaluate the security posture of web servers, web applications, and wireless networks, and recommend appropriate countermeasures. 5) Demonstrate an understanding of ethical and legal considerations in conducting ethical hacking activities and adhere to professional codes of conduct.
UNIT 2	1) Learn different password cracking techniques 2) Understand different sniffing techniques and its countermeasures	
UNIT 3	1) Understand SQL injection and Buffer overflow with countermeasures 2) Learn wireless hacking techniques.	

Paper 5: Customer Relationship Management

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT 1	1. Understand CRM basics and contexts. 2. Learn customer acquisition and retention. 3. Enhance customer value with CRM tools. 4. Grasp CRM's impact on business performance.	1. Students will be able to define and explain the various forms of CRM and their relevance to business contexts. 2. Students will acquire the skills to manage the customer journey effectively, including implementing customer acquisition and retention programs. 3. Students will understand the importance of customer-perceived value and its impact on customer satisfaction, loyalty, and business performance. 4. Students will be able to apply strategic and operational CRM approaches, such as customer portfolio management and marketing automation, to enhance organizational effectiveness. 5. Students will develop proficiency in analytical CRM techniques, including data management, analytics for strategy and tactics, and the successful implementation of CRM systems. They will also be able to analyze and draw insights from real-life case studies and success stories related to CRM
UNIT 2	1. Learn customer portfolio management and strategies. 2. Understand marketing automation and its benefits. 3. Explore sales force automation tools. 4. Grasp service automation and its applications.	
UNIT 3	1. Learn to develop and manage customer-related databases and integrate data. 2. Understand analytics, big data, AI, ML, and DL for CRM. 3. Master CRM implementation, from strategy development to performance evaluation. 4. Study case studies and success stories in CRM.	

(B.Sc. CS Co-ordinator)

SHETH L.U.J. & SIR M.V. COLLEGE OF ARTS, SCIENCE & COMMERCE
ANDHERI (EAST)
MUMBAI-69.

Program: Bachelors of Science in (Information Technology)

Program Outcomes:

Students of all undergraduate general degree Programs in Science at the time of graduation will be able to:

PO1: Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

PO2: Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media, and technology.

PO3: Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings.

PO4: Effective Citizenship: Demonstrate empathetic social concern and equality-centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

PO5: Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

PO6: Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

PO7: Self-directed and Life-long Learning: Acquire the ability to engage independent and life-long learning in the broadest context of socio-technological changes.

Programme Specific Outcome

PSO1: Understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2: Apply standard Software Engineering practices and strategies in software project development using an open-source programming environment to deliver a quality product for business success.

PSO3: Be acquainted with contemporary issues, the latest trends in technological development and thereby innovate new ideas and solutions to existing problems.

PSO4: Apply the knowledge of Technology, Mathematics, Networks, and computing in the core information technologies.

PSO5: Identify, design, and analyze complex computer software systems and implement and interpret the results from those systems.

PSO6: Analyze the local and global impact of computing on individuals, organizations, and society.

Course Outcomes
FYBSC IT – SEM 1

Course: USIT101 Programming Principles with C

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT I:	U1-01 - Understand Fundamentals of Programming U1-02 - Exploring C Programming U1-03 - Classifying Data using Data types in C Programming	**CO1** - To develop the programming skills using fundamentals of basic c language. **CO2** - To understand the fundamentals of programming such as condition, iterative execution, variable. **CO3** - To impart the knowledge about pointers which is the backbone of effective memory handling. **CO4** - To teach the basics of pre-processors available with C compiler. **CO5** - To understand the procedural oriented programming concept. **CO6** - To enable Learners to develop the logic of the program.
UNIT II	U2 - 01 - Managing Input and Output Operations U2 - 02 - Performing Mathematical and Logical functions: Operators and Expressions U3 - Understanding the conditional statements	
UNIT III	U3 - 01 - Controlling the Program Order: Decision Making U3 - 02 - Repeating Sequence of Instructions: Loops U3 - 03 - Understand Group of Statements: Functions	
UNIT IV	U4 - 01 - Implementing Pointers. U4 -02 - Learn Characters Arrays	
UNIT V	U5 - 01- Implementing Structures using C U5 - 02 - Learning File operations.	

Course: USIT102 Digital Logic and Applications

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT I:	U1-01 Students learned the difference between Analog System and Digital System U1-02 Understanding different number system and their conversions. U1-03 Understanding weighted codes and non-weighted codes U1-04 Students learnt different codes with examples and performed binary arithmetic. U1-05 Students understood basic gates, universal gates and other gates concepts.	**CO1** - Course Outcomes: concepts and techniques used in digital electronics. **CO2** - Have a detailed understanding of the fundamentals **CO3** - Understand and Convert different type of codes and number systems which are used in digital communication and computer system. **CO4** - Analyze different typs of digital electronic circuit using various mapping and logical tools and know the techniques to prepare simplified circuit using various mapping and mathematical methods. **CO5** - Understand different types of logic gates and the relationship between logic gates. **CO6** - Develop a digital logic and apply it to solve real life problems. **CO7** - Understand, Analyze, design and implement combinational and sequential logic circuits. **CO8** - Enable students to develop skill to build digital circuits.
UNIT II:	U2-01 Understanding and Solving Boolean Algebra problems. U2-02 Understood the concept of principle of Duality. U2-03 Understanding Minterms and Maxtrems U2-04 Understanding and solving reduction techniques using Karnaugh maps.	
UNIT III:	U3-01 Designing and implementing Combinational Logic Circuits U3-02 Understood difference between combinational and sequential circuits. U3-03 Learning different Arithmetic Circuits	
UNIT IV:	U4-01 Designing and implementing S-R Latch. U4-02 Designing and learning various Flipflops U4-03 Learnt Master - Slave Flipflop. U4-04 Designing and learning various Shift Registers.	
UNIT V:	U5-01 Designing and implementing Bit Arithmetic and Logic Unit. U5-02 Learning functioning of Carry Look ahead Counter. U5-03 Understood Binary multiplication. U5-04 Understood Division Algorithm.	

Course: USIT103 Fundamentals of Database Management Systems

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT I:	U1 - 01 - Understanding & learning the introduction of database U1 - 02 - Understanding the basic concept of Relational Database model & algebra.	**CO1** Define and describe the fundamental elements of relational database management systems. **CO2** To relate the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL. **CO3** Design ER-models to represent simple database application scenarios. **CO4** Transform the ER-model to relational tables, populate relational databases and formulate SQL queries on data. **CO5** Improve the database design by normalization.
UNIT – II:	U2 - 01 - Learning about ER diagrams. U2 - 02 - Understand the concepts on ER model U2 - 03 - Learning about UML diagrams.	
UNIT– III	U3 - 01 - Understanding & learning functional dependency. U3 - 02 - Understanding normalization.	
UNIT– IV	U4 - 01 - Learning applications of constraints. U4 - 02 - Learning applications of views and SQL. U4 - 03 - Learning file structures & indexing in files.	
UNIT – V	U5 - 01 - Learning about Transaction Management and Concurrency Control. U5 - 02 - Learning and understanding of different methods of recovery management.	

Course: USIT104 Discrete Mathematics

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT I:	U1 - 01 - Understands the various set operations. U1 - 02 - Remembering the different types of sets. U1 -03 - Applying and analyzing the relation operations.	**CO1** Gain experience in using various techniques of mathematical induction to prove simple mathematical properties of a variety of discrete structures. **CO2** Be able to apply basic counting techniques to solve combinatorial problems. **CO3** Be able to specify and manipulate basic mathematical objects such as sets, functions, and relations and will also be able to verify simple mathematical properties that these objects possess. **CO4** Be skillful in expressing mathematical properties formally via the formal language of propositional logic and predicate logic. **CO5** Have substantial experience to comprehend formal logical arguments.
UNIT II:	U2 - 01 - Understands the Logarithmic and mathematical function U2 - 02- Learning different types of functions on sets. U2 - 03 - Understand the applications of algorithms.	
UNIT III:	U3 - 01 - Learning, understanding and analyzing the Sequences, Mathematical Induction and recursion. U3 -02- Interpreting Counting principle and U3 - 03 - Understanding working of recursion	
UNIT IV:	U4 - 01 - Implementing Different searching algorithms. U4 -02 - Analyzing the Graphs & trees.	
UNIT V:	U5 - 01 - leaning the concept of binary tree. U5 - 02 - Implementing Search tree. U5 -03 - Understand the working of Priority Queue.	

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Course: USIT105 Technical Communication Skills

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT I:	U1 - 01 - Understanding the fundamentals of Communication skills. U1-02- Analyzing and Applying Communication skills.	CO1. Analyze, synthesize and utilize the process and strategies from delivery to solving communication problem. CO2. Learn the communication methodologies at workplace and learning about importance of team collaboration. CO3. Learn about different technical communication such as presentations and interviews. CO4. Understand and apply the art of written communication in writing reports, proposals. CO5. Ground rules of ethical communication and MIS. CO6. Understand the functions of graphs, maps, charts.
UNIT II:	U2 - 01 - Understanding the 7Cs of Communication skills. U2 - 02 - Understanding and remembering the development of Oral communication skills for business through conversations and group discussion. U2 - 01 - Applying and learning the writing of Business messages such as email and its etiquettes.	
UNIT III:	U3 - 01 - Analyzing and Evaluating the importance of Active listening skills. U3 - 02 - Understanding and Remembering specific communication needs U3-03 Applying the skills of presentation through strategies and analyzing how to face a job interview.	
UNIT IV:	U2 - 01 - Applying and learning the writing of Business correspondence, messages and documents. U4 - 01 - Analyzing and Evaluating or Understanding specific communication needs	
UNIT V:	U5 - 01 - Learning and Understanding the different ways of financial communication. U5 - 02 - Creating and applying the business communication ethics. U5 -03 Understanding the importance of visual aids in presentation.	

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Course Outcomes

FYBSC IT – SEM 2

Course: USIT201 Object oriented Programming

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT - I	U1 -01- Learning Object oriented programming. U1 -02- Understands the principles and features of C++. U1 - 03 - Implementing programs using perators and pointers.	CO1: Students will understand the need of object-oriented programming, fundamental concepts and will be able to solve computational problems using basic constructs like if-else, control structures, array, strings in Java environment. CO2: Student will understand how to model the real-world scenario using class diagram and be able to exhibit communication between objects using sequence diagram. CO3: Students will be able to implement relationships between classes. CO4: Students will be able to demonstrate various collection classes. CO5: Students will be able to create and user interfaces and packages CO6: The students will be able to demonstrate programs on exceptions, multithreading and applets.
UNIT - II	U2 -01- Understands the classes and Objects in OOPs. U2 -02- Remembering the Constructors and Destructors. U2 - 03 - Understands the concept of overloading.	
UNIT- III	U3 -01- Understand the concept of formatting. U3 -02- Analyze the Virtual functions. U3 - 03 - Analyze the different types of inheritance.	
UNIT- IV	U4 -01- Understand the concept of file handling. U4 -02- Learning the concept of Exception handling.	
UNIT - V	U5 -01- Understand the concept of Templates. U5 -02- Working and creating programs on string manipulation. U5 - 03 - Summarize the new features of Ansi c++	

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Course: USIT202 Fundamentals of Micro Processor and Microcontrollers

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT - I	U1-O1 Understanding Microprocessor Concepts, Microcomputers. U1-O2 Learning large computers to small chip microcontrollers. U1-O3 Understanding microprocessor internal Architecture and pin configuration. U1-O4 Learnt different types of memory and input and output devices. U1-O5 Learning 8155 memory segment, memory interfacing. U1-O6 Illustration of 8085 based microcomputer.	**CO1:** Describe the architecture & organization of 8085 Microprocessor. **CO2:** Understand and classify the instruction set of 8085 microprocessor and distinguish the use of different instructions and apply it in assembly language programming. **CO3:** Relate the addressing modes used in the instructions. **CO4**. Realize the Interfacing of memory & various I/O devices with 8085 microprocessors. **CO5**. Familiarise the architecture and operation of Programmable Interface Devices and realize the programming & interfacing of it with 8085 microprocessor. **CO6**. Learning different programming techniques of 8085. **CO7** Understanding the concepts of Subroutines. **CO8** Learning embedded systems and general purpose computers. **CO9** Understanding 8051 microcintroller, internal architecture, coding of 8051 programming in C and various applicatio codes. **CO10** Studying design and development of embedded systems and IDE.
UNIT - II	U2-01 Learning interfacing of IO Devices Concepts, U2-02 Distinguishing memory mapped IO and peripheral mapped IO. U2-03 Programming using 8085 assembly language. U2-4 Learning Programming model and 8085 Instruction Set. U2-05 Understanding various debugging techniques.	
UNIT -III	U3-01 Laerning Instruction Classifications U3-02Learning various assembly language programs and coding techniques. U3-03 Illustartion of counters and time dalys U3-04 Demonstation of stacks and subroutines. U3-05 Learning advanced subroutine concepts. U3-06 Learnt various software and hardware interrupts.	
UNIT-IV	U4-01 Learning embedded systems and general purpose computers. U4-02 Understaning Memory map, I/O map & Interrupt map Concepts. U4-03 Learning applications of different types of memories. U4-04 Understanding 8051 microcintrollers and its internal architecture. U4-05 Learnt coding of 8051 programming in C and applications of 8051.	
UNIT - V	U5-01 Designing different applications of 8051 microcontrollers. U5-02 Learning various factors required to select a microcontroller. U5-03 Understanding structure of embedded program. U5-04 Understanding design and development of embedded systems and IDE. U5-05 Learning cross compilation concept, embedded product development life cycle.	

Course: USIT203 Web Applications Development

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT – I	U1 - 01 - Understanding and introduction of the internet and its application. U1 - 02 - Understanding and introduction of the world wide web and its evolution,resources,servers and navigators . U1 - 03 - Learning and application of HTML5, LINKS, TAGS, CSS and FORMATTING.	• Analyze working of the Internet. • Gain an insight into designing web pages. • Use different ways of styling web pages using CSS. • Implement basic and complex functionalities of JavaScript in a web page. • Employ PHP Scripts to execute dynamic tasks in a web page. • Perform various database tasks using PHP.
UNIT - II	U2 - 01 - Learning the creation of navigational aids , bars , image map , semantic tags , semantic layouts, formatting and positioning . U2 - 02 - Creating and application of tables , cells , boxes, buttons and many more . U2 - 03 - Learning of incorporating sound and video in HTML5 , HTML .	
UNIT -III	U3 - 01 - Understanding and learning of Java Scripts and its objective , operations and values . U3 - 02 - Understanding and learning statements and various functions . U3 - 03 - Learning and application of documents and its objects .	
UNIT – IV	U4 - 01 -Understanding , learning and application of PHP and MySql its syntax and variables , functions , arrays , expression and error handling .	
UNIT – V	U5 - 01 - Understanding and learning of advanced PHP . U5-02- Analyzing and implementing connection between PHP with MYSQL to work with database.	

Course: USIT204 Numerical Methods

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT – I	U1 - 01 - The overall objective is to learn Error solving , handling and to apply various formulas of any mathematical models U1 - 02 -Learning different types of errors that take place in problem solving .	CO1 Understand numerical techniques to find the roots of nonlinear equations and solution of systems of linear equations. CO2 Understand the difference operators and the use of interpolation CO3 Understand numerical differentiation and integration and numerical solutions of ordinary and partial differential equations.
UNIT – II	U2 - 01 - Learning and Understanding various methods such as The Regula-falsi method , Newton - Raphson method U2 - 02 - Learning of different Interpolation .	
UNIT -III	U3 - 01 - Solving and Analyzing the solutions for various algebraic equation, numerical differentiation and Integration U3 - 02 - Learning Taylor's series and Simpson's rule .	
UNIT – IV	U4 - 01 - Understanding and learning of many types of regressions U4-02- Understanding and learning squares , non linear regression	
UNIT – V	U5 - 01- Detailed study of linear programming problems & graphical solutions. U5 - 02 - Understanding of Partial differential equations. U5 - 03 - Understanding and learning Laplace, Bender-Schmidt's equations. U5 - 04 - Understanding of hyperbolic equations.	

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Course: USIT205 Green IT

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT - I	U1-01: To learn various toxins present in electronic products. U1-02: Detailed study of Company's Carbon Footprint. U1-03: To study Initiatives taken by UN, Implementation of Basel Conventions. U1-04: To know the significance of WEEE Directives. U1-05: To learn the non-regulatory government initiatives.	CO1 :To learn overview and issues addressed in Green Computing. CO2 : To learn Initiatives and standards adopted by different countries towards Green Computing. CO3: To illustrate steps taken to increase power efficiency by reducing power consumption. CO4: Explanation of methods to reduce cooling costs. CO5: Addressing the power usage problems, storage problems and virtualization CO6: Implementation of Steps to measure the cooling costs. CO7: To improve the way of work culture in offices in order to use energy efficiently. CO8: To understand cooling demands and steps taken to minimze the cooling costs. CO9: To learn how to green IT infrastructure in our surroundings CO10: To know the role of Chief Green Officer in an organisation and fulfilment of SMART goals by set by him.
UNIT - II	U2-01: To illustrate power problems and issues to overcome these problems. U2-02: To Study virtualization and managing power issues with low cost. U2-03: To explain Usage of energy efficient drives. U2-04: To make students aware of cooling techniques, cooling costs and learning HP solutions for the same U2-05: Designing centralised cooling system and its impact on cooling system.	
UNIT -III	U3 -01- Learning and analyzing the Global Impact of local actions. U3-02 - Understanding green data storage, green software and green networking and communications. U3 -02- Learning to use electronic device instead of paper and going paperless.	
UNIT - IV	U4-01- Understanding the concept of why recycling and refurbishing is important. U4 -02- Analyze the use of hardware products. U4 -03- Learning hard drive, CD and DVD recycling and disposal. U$ -04 Understanding energy star programs and Remote Desktops.	
UNIT - V	U5 -01- Learning about the use of IS to achieve environmental objectives. U5 -02- Analyzing the green supply chain concepts. U5 -03- Understanding the role of Chief Green Officer and CEO. U5 -04 - Understanding various things about data such as tracking, Analysing and conducting audits.	

Course Outcomes

SYBSC IT – SEM 3

Course: USIT301 Python Programming

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT – I	U1 -01- Understand the concept of Python Programming. U1 -02- Learning to install the python. U1 -03- Understanding the error which occurs while executing. U1 -04- Learning about various keywords and variables in python.	CO1 Comprehend the basics of python programming CO2 Ability to implement modular approach using python CO3 Efficiently implement various data structures provided by python CO4 Develop applications based on object oriented concept CO5 Develop application using GUI and databases
UNIT – II	U2 -01- Understand the concept of functions and type conversion. U2 -02- Learning and understanding the concept of looping and counting.	
UNIT – III	U3 -01- Understand how to work with list U3 -02- Learning how to access the value in tuple U3 -03- Learning basic tuple operations U3 -04- Analyze the Text Files, The File Object Attributes, Directories	
UNIT – IV	U4 -01- Understanding the concept of Regular Expressions. U4 -02- Learning the overview of OOP U4 -03- Learning and creating a thread and synchronizing thread. U4 -04- Creating Modules and understand the different type of module.	
UNIT -V	U5 -01- Creating the GUI Form and Adding Widgets U5 -02- Analyzing the Widgets such as buttons, menu, radio button. U5 -03- Learning how to design GUI applications with proper layout management features.	

Course: USIT302 Data Structures

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT – I	U1 -01- Understand the concept of Data Structure and classification of data structure. U1 -02- Learning about data types, algorithms and arrays. U1 -03- Learning about various type of notations.	CO1 Ability to analyze algorithms and algorithm correctness. CO2 Ability to summarize searching and sorting techniques. CO3 Ability to describe stack, queue and linked list operation. CO4 Ability to gain knowledge of tree and graph concepts. CO5 Ability to analyze and choose appropriate data structure and algorithm for program development. CO6 Efficiently use sorting and searching algorithm and know their complexities. CO7 Improve coding skills by applying most suitable data structure for storage and access. CO8 Ability to use trees and graph structures for representing and using complex and non-line data organization. CO9 Demonstrate advantages and disadvantages of specific algorithms and data structures. CO10 Select basic data structures and algorithms for autonomous realization of simple programs or program parts. CO11 Determine and demonstrate bugs in progrsm, recognize neededbasic operation with data structures. CO12 Evaluate algorithms and data structures in terms of time and memory complexity of basic operations. CO13 To use appropriate algorithmic strategy for better efficiency.
UNIT – II	U2 -01- Understand types of linked lists. U2 -02- Learning about the concept of linked list.	
UNIT – III	U3 -01- Understand the concepts of Stack Memory Representation U3 - 02- Learning about what exactly Queue is.	
UNIT – IV	U4 -01- Understanding about binary trees like property, algorithms and representation. U4 -02- Learning about Advanced Tree Structures.	
UNIT -V	U5 -01- Understand about hashing techniques. U5 -02- Learning about the introduction of graph and representation of graph.	

Course: USIT303 Computer Networks

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT – I	U1 -01- Learning about Data communications. U1 -02- Understanding Physical Layers. U1 -03- Learning about Digital and Analog transmission.	CO1 Understand the importance of computer network and communications. CO2 Learn about transmission media and their characteristics CO3 Learn about role of various layers of ISO OSI Model in communications CO4 Analyze data flow between TCP/IP model using Application, Transport and Network Layer Protocols. CO5 Demonstrate design issues, flow control and error control. CO6 Illustrate applications of Computer Network capabilities, selection and usage for various sectors of user community. CO7 Knowledge about various protocols used in computer network. CO8 Demonstrate different routing and switching algorithms.
UNIT – II	U2 -01- Understanding about Bandwidth Utilization U2 -02- Learning about Switching. U2 -03- Learning about Data Link Layer	
UNIT – III	U3 -01- Understand the concept of Data Link Control. U3 -02- Learning about what media access control is. U3 -03- Get to know about wireless LANs.	
UNIT – IV	U4 -01- Understand the basic concept of Network Layer. U4 -02- Get to know about Unicast Routing. U4 -03- Learning about Next generation IP.	
UNIT -V	U5 -01- Understanding the basic concepts of Transport layer. U5 -02- Learning Standard Client0Server Protocols	

Course: USIT304 Database Management Systems

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT – I	U1 - 01 - Understanding and learning the Introduction of Database and transaction . U1 - 02 - Understanding and application of Data Models . . U1 - 03 - Learning about ER diagram.	CO1 Understand the need of modelling data and then storing the data in organized manner CO2 Ability to create appropriate structure to map with specific type of data. CO3 Understand and apply the query processing knowledge for creation, manipulation, deletion and retrieval of data. CO4 Use latest methods of storage and retrieval of data as desired by the user. CO5 Develop models and management information systems as per requirements of clients.
UNIT – II	U2 -01- Understanding the basic concept of Relational database model. U2 - 02 - Understanding the basic concept of Relational database design. U2 - 03 - Learning and understanding calculus .	
UNIT – III	U3 - 01 - Learning the application of constraints , views and sql . U3 - 02 - Understanding the concept of functions and values .	
UNIT – IV	U4 - 01 - Learning about Transaction management and Concurrency Control. U4 -02 - Learning and Application of different methods and database recovery management	
UNIT -V	U5 - 01 - Learning and Understanding the basic concept of PL-SQL U5 - 02 - Application of different data types , procedures and clauses .	

Course: USIT305 Applied Mathematics

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT – I	U1 -01- Get to know about Inverse of a matrix, Properties of matrices. U1 -02- Learning and Understanding about complex numbers and its different application .	CO1 Enhancing the Logic building capability. CO2 Compute a given integral using the most efficient method. CO3 Use integrals to formulate and solve application problems in science and engineering. CO4 Matrices will help them better understand computer graphics. CO5 Laplace will be helpful in understanding Digital Signal systems.
UNIT – II	U2 - 01 - Get to know about the concept of equation of the first order and the first degree , with it different methods . U2 - 02 - Understanding and application of Linear Differential Equations with Constant Coefficients. U2 - 03 - Understanding and application of Particular integral	
UNIT – III	U3 - 01 - Introduction to The Laplace Transform and its different theories and methods U3 - 02 - Understanding and application of Inverse Laplace Transform , with its different functions and equations .	
UNIT – IV	U4 - 01 - Application and learning of Multiple Integrals with its different types and properties .	
UNIT -V	U5 - 01 - Understanding and learning the Beta and Gamma Functions , along with its formula and error functions	

SYBSC IT – SEM 4

Course: USIT401 Core Java

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT – I	U1 - 01 - Introduction to History, architecture and its components,Java Class U1 - 02 - Understanding and Learning of Data Types and its different operators and properties .	CO1 Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc. CO2 Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc. CO3 Be aware of the important topics and principles of software development. CO4 Have the ability to write a computer program to solve specified problems. CO5 Be able to use the Java SDK environment to create, debug and run simple Java programs CO6 Identify classes, objects, members of a class and relationships among them needed for a specific problem CO7 Write Java application programs using OOP principles and proper program structuring CO8 Demonstrate the concepts of polymorphism and inheritance CO9 Write Java programs to implement error handling techniques using exception handling
UNIT – II	U2 - 01 - Understanding and Learning of Control Flow Statements . U2 - 02 - Learning and application of Iterations i.e loops and statements . U2 - 02 - Learning about the classes and its different objects , methods , attributes , and values .	
UNIT – III	U3 - 01 - Detailed study of Interance and understanding its object , classes and interfaces . U3 - 02 - Learning and understanding the concept of creating packages and importing it .	
UNIT – IV	U4 - 01 - Detailed study of arrays and introduction and understanding its types . U4 - 02 - Understanding and learning of multi threading and its various properties , U4 - 03 - Application and Understanding of exception handling .	
UNIT -V	U5 - 01 - Understanding and learning of event handling and its models . U5 -02 - Learning of Abstract Window Toolkit in detail . U5 - 03 - Detailed study of layouts .	

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Course: USIT402 Introduction to Embedded Systems

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT – I	U1 - 02 - Understanding and introduction to Embedded system and its application . U1 - 02 - Learning of the concept of Core of embedded systems. U1 - 03 - Detailed study of Characteristics and quality attributes of embedded systems.	CO1 To have knowledge about the basic working of a microcontroller system and its programming in assembly language. CO2 To provide experience to integrate hardware and software for microcontroller applications systems. CO3 Understand what is microcontroller, microcomputer and embedded system. CO4 Become familier with programming environment used to develop embedded systems. CO5 Understand key concepts of embedded systems like IO, timers, interrupts, interaction with peripheral devices. CO6 Learn debugging techniques for an embedded systems CO7 Ability to understand the internal architecture and interfacing of different peripheral devices with Microcontrollers. CO8 Ability to write the programs for microcontroller. CO9 Ability to understand the role of embedded systems in industry. CO10 Ability to understand the design concept of embedded systems.
UNIT – II	U2 - 01 - Study of Embedded systems and its application . U2 - 02 - Understanding the concept of Embedded Hardware and types of memory . U2 - 03 - Detailed study of the concept called peripherals .	
UNIT – III	U3 - 01 - Studying and Understanding the The 8051 Microcontrollers. U3 - 02 - Learning and application of 8051 Programming in C and its logic.	
UNIT – IV	U4 - 01 - Learning the application of Designing Embedded System with 8051 Microcontroller . U4 - 02 - Learning the concept of Programming embedded systems and the structure .	
UNIT -V	U5 - 01 - Understanding and learning the concept Real Time Operating System (RTOS) and its characteristic . U5 - 02 - Analyzing the Design and Development: Embedded system of the development Environment and the types of files	

Course: USIT403 Computer Oriented Statistical Techniques

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT – I	U1 - 01 - Learning the concept of tendencies and its different types of notation . U1 - 02 - The detailed study of The Standard Deviation and Other Measures of Dispersion . U1 - 03 - Learning and understanding the concept of deviation and studying the same in dtail.	CO1 Recognize the error in the number generated by the solution. CO2 Compute solution of algebraic and transcendental equation by numerical methods like Bisection method and Newton Rapshon method. CO3 Apply method of interpolation and extrapolation for prediction. CO4 Recognize elements and variable in statistics and summarize qualitative and quantitative data. CO5 Calculate mean, median and mode for individual series. CO6 Outline properties of correlation and compute Karl-Pearson's coefficient of correlation. CO7 How to apply discrete and continuous probability distributions to various businessproblems. CO8 Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases. Understand the concept of p-values. CO9 Learn non-parametric test such as the Chi-Square
UNIT – II	U2 - 01 - Understanding and Learning the concept of Moments, Skewness, and Kurtosis . U2 - 02 - Detailed study of the concept Software Computation of Skewness and Kurtosis. U2 - 03 - Analyzing the concept of Euler or Venn Diagrams and Probability and Elementary Sampling Theory	
UNIT – III	U3 - 01 - Learning and understanding the concept of Statistical Estimation Theory. U3 - 02 - Remembering and Learning and the theory of Statistical Decision .	

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	U3 - 03 - Detailed study of Statistics in R and its distribution .	test for Independence as well as Goodness of Fit.
UNIT – IV	U4 - 01 - Understanding and Analyzing the Small Sampling Theory . U4 - 02 - Remembering the concept of The Chi-Square Test and its properties .	CO10 Compute and interpret the results of Bivariate and Multivariate Regression and Correlation Analysis, for forecasting and also perform ANOVA and F-test. Further, understand both the meaning and applicability of a dummy variable and the assumptions which underline a regression model. Be able to perform a multiple regression using computer software.
UNIT -V	U5 - 01 - Understanding and learning of Curve Fitting and the Method of Least Squares . U5 - 02 - The detailed study of correlation and its concept of theories and regression .	

Course: USIT404 Software Engineering

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT – I	U1 - 01 - The learning and Introduction to Software engineering . U1 - 02 - Analyzing and creating the software requirements and its requirements . U1 - 03 - Learning and understanding different types of Software Development Process Models. U1 - 04 - Understanding the Agile software development .	CO1 Knowledge of basic SW engineering methods and practices, and their appropriate application. CO2 Describe software engineering layered technology and Process frame work. CO3 A general understanding of software process models such as the waterfall and evolutionary models. CO4 Understanding of software requirements and the SRS documents. CO5 Understanding of the role of project management including planning, scheduling, risk management, etc. CO6 Describe data models, object models, context models and behavioural models. CO7 Understanding of different software architectural styles.
UNIT – II	U2 - 01 - Learning in detailed of the concept Socio-technical system and its Essential characteristics of socio technical systems and more U2 - 02 - Introduction and Learning of critical system and types of it . U2 - 03 - Understanding and learning of Requirements engineering Processes and its objectives and system types also models .	
UNIT – III	U3 - 01 - Introduction to Architectural Design and its system and styles . U3 - 02 - Learning and Understanding of User Interface Design . U3 - 03 - Analyzing and creating Quality Management .	
UNIT – IV	U4 - 01 - Understanding and learning about the Verification and Validation. U4 - 02 - Analyze and creating testing components and its functions .	
UNIT -V	U5 - 01 - Analyze and creating the process of Improvement i.e product , quality etc .	

Course: USIT405 Computer Graphics and Animation

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT – I	U1 - 01 - Introduction to Computer graphics and its application and software description . U1 - 02 - Learning and understanding the concepts of scan conversion , algorithms , ellipse , and clipping .	CO1 To familiarize students with basic principles and techniques for computer graphics. CO2 To Provide knowledge of interactive computer graphics with techniques of clipping, three dimensional graphics and three dimensional transformations. CO3 To gain in-depth learning of various concepts and features such as: 2D viewing, 3D viewing, perspective, lighting, and geometry. CO4 This course will introduce students to all aspects of computer graphics including hardware, software and applications. CO5 To Provide knowledge of computer graphics system, design algorithms and two dimensional transformations.
UNIT – II	U2 - 01 - Understanding and learning of Two-Dimensional Transformations and matrices . U2 - 02 - Learning and creating Three-Dimensional Transformations and many of its working and objectives . U2 - 03 - Understanding the concepts of Vanishing Points, the Perspective Geometry and camera models, Orthographic Projections, Axonometric Projections etc .	
UNIT – III	U3 - 01 - Understanding and learning the concepts of Viewing in 3D and its objective . U3 - 02 - Remembering and learning light and color and its various components .	
UNIT – IV	U4 - 01 - Understanding and Learning Visible-Surface Determination and its different techniques . U4 - 02 - Creating and Learning the planes and curves and surfaces along with its different working and drawings .	
UNIT -V	U5 - 01 - Learning and understanding the concept of Computer Animation in detail . U5 - 02 - Creating and analyzing Image Manipulation and Storage in detail .	

FYBSC IT – SEM 5

Course: USIT501 Software Project Management

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT – I	U1 -01- Understanding Why is Software Project Management Important. U1 -02- Learning the basic concept of project. U1 -03- Understanding and learning about what is management. U1 -04- Learning about Overview of Project Planning.	CO1 Professional terminologies of software industry. CO2 Problem solving algorithms and techniques. CO3 Understand the development work environment CO4 To make students realize software project management is not just theory subject to pass, instead it will help them live their professional life with ease. CO5 This subject makes a student realize that whether a student becomes a project manager in future or not, still even as an employee he/she should learn to be an efficient team player.
UNIT – II	U2 -01- Analyzing the Appropriate Project Approach. U2 -02- How to choose proper methods and technologies for software development U2 -03- Analyzing the most Appropriate Process Model. U2 -04- Understanding about Software Effort Estimation Techniques.	
UNIT – III	U3 -01- Learning about how to plan, when to plan and proper project schedules. U3 -02- Understanding about risk management. U3 -03- Analyzing the Resource Allocation. U3 -04- Analyzing the Cost Schedules	
UNIT – IV	U4 -01- Understanding Monitoring and Control. U4 -02- Learning about how to manage contracts. U4 -03- Understanding Behaviour, Organizational Behaviour	
UNIT – V	U5 - Learning about how to work in teams. U5 -02- Analyzing how good the software quality should be U5 -03- Learning about how the project closure should be.	

Course: USIT502 Internet of Things

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT – I	U1 -01- Understanding what is Internet Of Things. U1 -02- Learning Flavour of the Internet of Things. U1 -03- Understanding the principles of internet. U1 -04- Understanding different types of IP addresses.	CO1 This course focuses on the latest microcontrollers with application development, product design and prototyping. CO2 Ideally suited for engineering students and graduates with a basic understanding of electronics and microprocessors. CO3 The Internet of Things (IOT) is the next wave, world is going to witness. CO4 Today we live in an era of connected devices (mobile phones, computers etc.), the future is of connected things (Eg: home appliances, vehicles, lamp-posts, personal accessories, your pets, industrial equipment's and everything which you use in day-to-day life). CO5 Internet of Things is a term given to the attempt of connecting objects to the internet and also to each other - allowing people and objects themselves to analyze data from various sources in realtime and take necessary actions in an intelligent fashion.
UNIT – II	U2 -01- Learning about Costs versus Ease of Prototyping. U2 -02- Understanding what is open and closed source. U3 -03- learning about Arduino and Raspberry Pi.	
UNIT – III	U3 -01- Understanding how to prototype the physical design. U3 -02- Learning the basic concept of Laser cutting. U3 -03- Understanding the concept of Scrapping, comet. polling and other protocols.	
UNIT – IV	U4 -01- Understanding what is memory management. U4 -02- Learning the basic concept of Business Model. U4 -03- Learning about Venture Capital, Government Funding, Crowdfunding, Lean Startups.	
UNIT – V	U5 -01- Understanding about Manufacturing Printed Circuit Boards, Etching Boards. U5 -02- Learning about Ethics. U5 -03- Analyzing the Correctness and Maintainability, Security, Performance	

Course: USIT503 Advanced Web Programming

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT – I	U1 -01- Understanding .NET framework . U1 -02- Learning about Types, Objects, and Namespaces. U3 - 03- Learning about values types and reference type.	CO1 To familiarize students with Microsoft .Net, C#, and ASP.NET technologies. CO2 Enable learners to use Visual Studio -an advanced design tool CO3 To gain in-depth learning of various concepts and features of NET coding and developing of web applications. CO4 To Provide knowledge of different State management techniques CO5 To explore ADO.NET- a model for interacting with databases. CO6 Using XML various security fundamentals will be explored
UNIT – II	U2 -01- Understanding the basic concept of Web form fundamentals. U2 -02- Learning about Form controls. U2 -03- Understanding Validation and how to Use Validation Controls.	
UNIT – III	U3 -01- Learning and understanding about the basic concept of Error Handling, Logging, and Tracing. U3 -02- Learning State Management. U3 -03- Learning about how to apply Themes and master pages.	
UNIT – IV	U4 -01- Understanding the fundamentals of ADO.NET. U4 -02- Learning about Data Binding. U4 -03- Learning about the basic concept of Data controls.	
UNIT – V	U5 -01- Understanding what is XML. U5 -02- Learning about what is Security Fundamentals. U5 -03- Understanding Ajax, Using Partial Refreshes.	

Course: USIT505 Linux System Administration

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT – I	U1 -01- Understanding about Red Hat Enterprise Linux. U1 -02- Analyzing and Working with the Bash Shell. U1 -03- Learning about System Administration Tasks	CO1 To familiarize students with Linux Installation. CO2 Enable Students to Install RPM and use Red hat Package Management CO3 To Make Students Install Samba Server and the use of Samba Server CO4 To make Students Install Apache, Send Mail. CO5 Write Shell Scripts in Linux.
UNIT – II	U2 -01- Learning about how to configure and manage storage. U2 -02- Understanding NetworkManager, Working with Services and Runlevels. U2 -03- Learning about how to troubleshoot the network. U2 -04- Learning the basic concept of SSH. U2 -05- Learning about Permissions.	
UNIT – III	U3 -01- Learning about Securing Server with iptables U3 -02- Learning how to set up a firewall.	
UNIT – IV	U4 -01- Understanding how to configure DNS and DHCP. U4 -02- Learning how to configure authentication and setting up authentication with .htpasswd.	
UNIT – V	U5 -01- Learning about Bash Shell Scripting. U5 -02- Understanding Variables, Variables, Subshells, and Sourcing. U5 -03- Learning High-Availability Clustering.	

Course: USIT506 Enterprise Java

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT – I	U1 -01- Understanding what is Java EE. U1 -02- Learning about the basic concept of Java servlets. U2 -03- Understanding how to work with database.	CO1 Identify advance concepts of java programming with database connectivity. CO2 Design and develop platform independent applications using a variety of component based frameworks. CO3 Able to implement the concepts of Hibernate, XML& EJB for building enterprise applications. CO4 The objective is to equip the students with the advanced feature of contemporary java which would enable them to handle complex programs relating to managing data and processes over the network. CO5 The major objective of this course is to provide a sound foundation to the students on the concepts, precepts and practices, in a field that is of immense concern to the industry and business.
UNIT – II	U2 -01- learning the concept of Request Dispatcher. U2 -02- Learning about cooking. U2 -03- Learning how to work with files.	
UNIT – III	U3 -01- Understand about Java Server pages. U3 -02- Learning about LifeCycle of a JSP Page. U3 -03- Understanding about Action Element.	
UNIT – IV	U4 -01- Understanding Enterprise java Bean. U4 -02- Learning about types of Java bean U4 - 04 - Introducing and explanation of Java Naming and Directory Interface in detail .	
UNIT – V	U5 - 01 -Introduction and learning about Persistence, Object/Relational Mapping And JPA in detail with its meaning . U5 - 02 - Understanding and learning of JavaPersistence API with its objective and specifications . U5 - 03 - Creating and learning of JSPS, The JPA ApplicationStructure, along with this learning how to run the program . U5 - 04 - Learning how to write and hiber net application in details with all the information required .	

TYBSC IT – SEM 6

Course: USIT601 Software Quality Assurance

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT – I	U1 - 01 - Describe fundamental concepts of software quality assurance. U1 - 02 - Explore test planning and its management.	CO1 Ability to identify and apply modern software testing methods in software development CO2 Understand testing strategies and defect management CO3 Recognise the importance of software quality assurance CO4 Know about quality improvement, cost control and contribute toward efficient delivery of software solutions
UNIT – II	U2 - 01 - To learn the basic testing techniques. U2 - 02 - Develop knowledge of testing process and features.	
UNIT – III	U3 - 01 - To learn Boundary value analysis. U3 - 02 - Develop knowledge of the Testing techniques.	
UNIT – IV	U4 - 01 - Analyze Verfication and Validation. U4 - 02 - Introduce V - Model and Testing during test	
UNIT – V	U5 - 01 - understanding the levels of testing's.	

Course: USIT602 Security in Computing

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT – I	U1 - 01 - simplify Information Security Overview U1 - 02 - determine Secure Design Principles	CO1 Insight into secure design principles and defense models. CO2 Knowledge about storage and database security. CO3 Implement IDS, Firewalls and wireless security. CO4 Skills to implement secure cloud environment for web and application security CO5 Ability to implement physical security for implementing secure information environment.
UNIT – II	U2 - 01 - classify Authentication and Authorization U2 - 02 - analyze cryptography, Public Key Cryptography, Public Key Infrastructure.	
UNIT – III	U3 - 01 - Learn Firewall Capabilities, Firewall Design. U3 - 02 - Learn Practices and Recommendations, Wireless Intrusion Detection and Prevention, Wireless Network Positioning and Secure Gateways.	
UNIT – IV	U4 - 01 - Learn Operating System Security Models. U4 - 02 - Learn Intrusion Detection and Prevention Systems	
UNIT – V	U5 - 01 - Introduce Cloud computing. U5 - 02 - Analyze application Security, Remote Administration Security.	

Course: USIT603 Business Intelligence

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT – I	U1 - 01 - Describe the concepts and components of Business Intelligence (BI). U1 - 02 -Critically evaluate use of BI for supporting decision making in an organization. U1 - 03 - Understand and use the technologies and tools that make up BI.	CO1 Ability to use decision support system for BI Applications CO2 Ability to develop and use mathematical models for data mining and data preparations
UNIT – II	U2 - 01 - define development of a model, representation of input data ,data mining process, analysis methodologies, data validation, data transformation, data reduction U2 - 02 - To develop knowledge of data mining.	

	U2 - 03 - Analyze Data Validation and data preparation.	CO3 Know how and when to apply classification and clustering techniques for solving BI problems CO4 Explore insights into important emerging applications of BI CO5 Developing skills to design expert system solutions for business applications
UNIT – III	U3 - 01 -evaluate classification models, Bayesian methods, Clustering methods, Partition methods, Hierarchical methods U3 - 02 - Explain Clustering and classification model.	
UNIT – IV	U4 - 01 -study relational marketing, sales force management, optimization models for logistics planning, efficiency measures, efficient frontier, The CCR model U4 - 02 - Identify marketing models and production models.	
UNIT – V	U5 - 01- To be well-versed with Organizational Learning and Transformation, Knowledge Management Activities, Artificial Intelligence Versus Natural Intelligence, basic structure and development of expert systems. U5 - 02 - generate knowledge of AI and other Automation techniques. U5 - 03 - Develop Knowledge of expert system.	

Course: USIT604 Principles of Geographic Information Systems

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT – I	U1 - 01 -Comprehend fundamental concepts and practices of Geographic Information Systems (GIS) and advances in Geospatial Information Science and Technology (GIS&T). U1 - 02 -Apply basic graphic and data visualization concepts such as color theory, symbolization, and use of white space.	CO1 Explore mapped data, Spatial Data Types, Data Creation, Georeferencing, Spatial Analysis CO2 Relate GIS with remote sensing technologies with recent trends in geospatial analysis CO3 Analyze spatial data, using QGIS analysis tools CO4 Develop and Manage Geodatabases for real world data CO5 Create maps, images and apps to communicate spatial data in a meaningful way to others
UNIT – II	U2 - 01 -Demonstrate organizational skills in file and database management. U2 - 02 -Give examples of interdisciplinary applications of Geospatial Information Science and Technology.	
UNIT – III	U3 - 01 -Apply GIS analysis to address geospatial problems and/or research questions. U3 - 02 -Demonstrate proficiency in the use of GIS tools to create maps that are fit-for-purpose and effectively convey the information they are intended to.	
UNIT – IV	U4 - 01 -Effectively communicate and present project results in oral, written, and graphic forms. U4 - 02 -Demonstrate confidence in undertaking new (unfamiliar) analysis using GIS, troubleshoot problems in GIS, and seek help from software/website help menus and the GIS community to solve problems.	
UNIT – V	U5 - 01 -Apply mathematical concepts, including statistical methods, to data to be used in geospatial analysis. U5 - 02 -Gather and process original data using a Global Positioning System (GPS) or other Global Navigation Satellite Systems (GNSS).	

Course: USIT605 IT Service Management

UNIT NO & NAME	UNIT OUTCOMES	COURSE OUTCOMES
UNIT – I	U1 - 01 - To develop knowledge and critical understanding of the fundamental principles of ITSM U1 - 02 - understand how ITSM can operate in an organisation to improve processes U1 - 03 - understand best management practice from a technical and non-technical perspective	CO1 Ability to deal with the convergence, interoperability and design of heterogeneous networks with local, access and core networks, as well as with service
UNIT – II	U2 - 01 - communicate management theories and ideas in writing U1 - 02 - problem solve through the lens of management theories U1 - 03 - critically evaluate information from a variety of sources	

UNIT – III	U3 - 01 - Students will be able to develop and evaluate alternate managerial choices and identify optimal solutions U3 - 02 - Analyse the role of 'services' and their implications within both service-dominant and product-dominant firms and businesses. U3 - 03 - Understand and evaluate the role of co-production within the services process and design of services systems.	integration. CO2 Ability to model, design, implement, manage, operate, administrate and maintain networks, services and contents CO3 Ability to plan networks and decision-making about services. CO4 Learn about service transition and service operations. CO5 Ability to apply Continual Service Improvement in an organization.
UNIT – IV	U4 - 01 - Assess the options for delivering effective service quality as the basis for sound business performance by a service firm in the private or public sector. U4 - 02 - Identify the strengths and weaknesses of a services system within a case study exercise and draw out implications for services management in general. U4 - 03 - Learn of to assess real-time service delivery and generate options for enhancing performance.	
UNIT – V	U5 - 01 -Interpret, use and evaluate a wide range of numerical and graphical data to set, manage and achieve service management targets. U5 - 02 -Locate and access appropriate sources of information in order to be able to make informed decisions about effective services delivery. U5 - 03 -Work individually and in project teams to analyse case study material and create effective service business scenarios.	

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