Faculty of Engineering & Technology

Syllabus

For

Bachelor of Technology (B. Tech.)

in

Computer Science & Engineering

(Program Code: ET0141)

(2019-20)

(Approved by the Academic Council vide Resolution No. 34.26 dated 20.06.2019)

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1. Program Educational Objectives (PEOs):

The program educational objectives are set in line with Institutional and Departmental mission statements. The program educational objectives of Bachelor of Technology is to produce engineers who later take the responsibility of engineering professionals and researchers with following qualities:

- **PEO1.** Apply basic knowledge of mathematics, principles of physics and chemistry, and interdisciplinary engineering for the design and development.
- **PEO2.** Demonstrate the application of exploration practices and engineering principles through development of innovative tools that are beneficial in production.
- **PEO3.** Exhibit skills of design and construct machineries based on requirement and need of Technology operations.
- **PEO4.** Exhibit strong, independent learning, analytical and problem solving skills with special emphasis on design, communication, and ability to work in teams.
- **PEO5.** To have successful career as engineering professional or a researcher through lifelong learning in the field of Bachelor of Technology.

2. Graduation Attributes (GAs)

The graduate attributes in B. Tech. are the summation of the expected course learning outcomes mentioned in the end of each course. Some of them are stated below.

GA1: Discipline-specific Knowledge: Capability of demonstrating comprehensive knowledge of B. Tech. program and understanding of core branch so that it forms a foundation for a graduate program of study.

GA2: Critical Thinking & Analytical Reasoning: Ability to employ critical thinking in understanding the concepts relevant to the various branches of engineering. Ability to analyze the results and apply them in various problems appearing in different streams.

GA3: Problem Solving:

Capability to solve problems by using research-based knowledge and research methods including innovative thinking, design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

GA4: Research-related skills:

To develop a sense of inquiry and capability for asking relevant and intelligent questions, problem identification, synthesizing and articulating; ability to recognize and establish cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyze, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.

GA5: Usage of Modern Tools (Information/digital literacy):

To create, select, and apply appropriate techniques, resources, and modern science and IT tools including prediction and modeling to complex science activities with an understanding of the limitations.

GA6: Social Responsibilities:

Ability to work with contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

GA7: Self-directed learning with environment:

Ability to work independently and doin-depth study of various problems and requirements of society with natural available resources which leads to sustainable development.

GA8. Moral and ethical awareness/reasoning:

Ability to identify unethical behavior such as falsification or misrepresentation of data and adopting objective, unbiased and truthful actions in all aspects of their program.

GA9. Leadership Readiness/Qualities:

Capability for mapping out the tasks in a team or an organization, self-motivating and inspiring team members to engage with the team objectives/vision; and using management skills to follow the mapped path to the destination in a smooth and efficient way.

GA10: Communication skills:

a. Ability to communicate various concepts of technical education effectively using practical approach and their geometrical visualizations.
b. Ability to use courses as a precise language of communication in other branchesof human knowledge.
c. Ability to resolve unsolved problems and requirements of industries and societies.
d. Ability to show the importance of their technical knowledge as precursor to various scientific developments since the beginning of the civilization.

GA11: Project Management and Finance:

Ability to demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

GA12: Lifelong learning:

Ability to think, acquire knowledge and skills through logical reasoning and to inculcate the habit of self-learning.

3. Program Outcomes (POs)

Students graduating with the B. Tech. degree should be able to acquire with following POs

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. **Lifelong learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Mapping of Graduate Attributes (GAs) and Program Outcomes (POs):

	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11	GA12
PO1	■											
PO2		■										
PO3			■									
PO4				■								
PO5					■							
PO6						■						
PO7							■					
PO8								■				
PO9									■			
PO10										■		
PO11											■	
PO12												■

4. Program Specific Outcomes (PSOs) :

PSO1: Professionally empowering the student as technical manpower in industry or an entrepreneur for production analytics and innovation.

PSO2: Able to excel in various technological challenges and contribute for self-reliant society.

5. Course-Wise Learning Objectives, Structures and Outcomes (CLOSOs)

BACHELOR OF TECHNOLOGY

Semester I and II common for All

B.Tech. (CSE) Course Structure (2019-20)

Semester – I

THEORY PAPERS		**No. of Teaching Hours**			**Marks Allocation**			
Code	**Subject/Paper**	L	T	P	IA	EA	Total	**Credits**
BTBSC 101	Engineering Mathematics-I	3	1	-	30	70	100	4
BTBSC 102	Engineering Physics	3	1	-	30	70	100	4
BTHSMC 103	Communication Skills	2	-	-	30	70	100	2
BTESC 104	Programming for Problem Solving	2	-	-	30	70	100	2
BTESC 105A/ BTESC 105B	Basic Electrical Engineering/ Basic Civil Engineering	2	-	-	30	70	100	2
PRACTICALS/ VIVA VOCE		**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BTBSC 106	Engineering Physics Lab	-	-	2	30	20	50	1
BTHSMC 107	Language Lab	-	-	2	30	20	50	1
BTESC 108	Computer Programming Lab	-	-	2	30	20	50	1
BTESC109A/ BTESC109B	Basic Electrical Engineering Lab/ Basic Civil Engineering Lab	-	-	2	30	20	50	1
BTESC 110	Computer Aided Engineering Graphics	-	-	2	30	20	50	1
BTSODECA111	Social Outreach, Discipline & Extra Curricular Activities	-	-	-	-	-	50	1
	Total	**12**	**2**	**10**	**300**	**450**	**800**	**20**

Semester - II

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	L	T	P	IA	EA	Total	**Credits**
BTBSC 201	Engineering Mathematics-II	3	1	-	30	70	100	4
BTBSC 202	Engineering Chemistry	3	1	-	30	70	100	4
BTHSMC 203	Human Values	2	-	-	30	70	100	2
BTESC 204	Basic Mechanical Engineering	2	-	-	30	70	100	2
BTESC205A/ BTESC205B	Basic Electrical Engineering/ Basic Civil Engineering	2	-	-	30	70	100	2
BTHSMC 206	Advanced English	2	-	-	30	70	100	2
PRACTICALS/ VIVA VOCE		No. of Teaching Hours			Sessional	Practical	Total	Credits
BTBSC 207	Engineering Chemistry Lab	-	-	2	30	20	50	1
BTHSMC 208	Human Values Activities	-	-	2	30	20	50	1
BTESC 209	Manufacturing Practices Workshop	-	-	2	30	20	50	1
BTESC210A/ BTESC 210B	Basic Electrical Engineering Lab/ Basic Civil Engineering Lab	-	-	2	30	20	50	1
BTESC 211	Computer Aided Machine Drawing	-	-	2	30	20	50	1
BTSODECA212	Social Outreach, Discipline & Extra Curricular Activities	-	-	-	-	-	50	1
	Total	**14**	**2**	**12**	**330**	**520**	**900**	**22**

Semester –III

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCSBSC301	Advanced Engineering Mathematics	3	-	-	30	70	100	3
BTCSHSMC302	Managerial Economics and Financial Accounting	2	-	-	30	70	100	2
BTCSESC303	Digital Electronics	3	-	-	30	70	100	3
BTCSPCC 304	Data Structures and Algorithms	3	-	-	30	70	100	3
BTCSPCC 305	Object Oriented Programming	3	-	-	30	70	100	3
BTCSPCC 306	Software Engineering	3	-	-	30	70	100	3
BTCSPCC 307	Data Structures and Algorithms Lab	-	-	2	30	20	50	1
BTCSPCC 308	Object Oriented Programming Lab	-	-	2	30	20	50	1
BTCSPCC 309	Software Engineering Lab	-	-	2	30	20	50	1
BTCSPCC 310	Digital Electronics Lab	-	-	2	30	20	50	1
BTCSPSIT 311	Industrial Training/ Seminar	-	-	-	-	-	50	1
BTCSSODECA 312	Social Outreach, Discipline & Extra Curricular Activities	-	-	-	-	-	50	1
	TOTAL	17	-	8	300	500	900	23

Semester -IV

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	L	**T**	**P**	**IA**	**EA**	**Total**	**Credits**

BTCSBSC 401	Discrete Mathematics Structure	3	1	0	30	70	100	4
BTCSHSMC 402	Technical Communication	3	0	0	30	70	100	3
BTCSESC 403	Microprocessor & Interfaces	3	0	0	30	70	100	3
BTCSPCC 404	Database Management System	3	0	0	30	70	100	3
BTCSPCC 405	Theory of Computation	3	1	0	30	70	100	4
BTCSPCC 406	Data Communication and Computer Networks	3	0	0	30	70	100	3
BTCSPCC 407	Microprocessor & Interfaces Lab	0	0	2	30	20	50	1
BTCSPCC 408	Database Management System Lab	0	0	2	30	20	50	1
BTCSPCC 409	Network Programming Lab	0	0	2	30	20	50	1
BTCSPCC 410	Linux Shell Programming Lab	0	0	2	30	20	50	1
BTCSPCC 411	Java Lab	0	0	2	30	20	50	1
BTCSSODECA 412	Social Outreach, Discipline & Extra Curricular Activities						50	1
	TOTAL	**18**	**2**	**10**	**330**	**520**	**900**	**26**

Semester –V

THEORY PAPERS		**No. of Teaching Hours**			**Marks Allocation**			
Code	**Subject/Paper**	L	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCSESC 501	Information Theory & Coding	3	-	-	30	70	100	3
BT CSPCC 502	Compiler Design	3	-	-	30	70	100	3
BT CSPCC 503	Operating System	3	-	-	30	70	100	3
BTCSPCC 504	Computer Graphics & Multimedia	3	-	-	30	70	100	3

BTCSPCC 505	Analysis of Algorithms	3	-	-	30	70	100	3
BTCSPEC 506A	Wireless Communication	3	-	-	30	70	100	3
BTCSPEC 506B	Human-Computer Interaction	3	-	-	30	70	100	3
BTCSPEC 506C	Bioinformatics	3	-	-	30	70	100	3
LABS								
BTCSPCC 507	Computer Graphics & Multimedia Lab	-	-	2	30	20	50	1
BTCSPCC 508	Compiler Design Lab	-	-	2	30	20	50	1
BTCSPCC 509	Analysis of Algorithms Lab	-	-	2	30	20	50	1
BTCSPCC 510	Advance Java Lab	-	-	2	30	20	50	1
BTCSPSIT 511	Industrial Training	-	-	2	30	20	50	1
BT CSSODE CA 512	Social Outreach, Discipline & Extra Curricular Activities						50	1
	TOTAL	**24**	**-**	**10**	**330**	**520**	**900**	**24**

Semester –VI

THEORY PAPERS		**No. of Teaching Hours**			**Marks Allocation**			
Code	**Subject/Paper**	L	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCSESC 601	Digital Image Processing	3	-	-	30	70	100	3
BTCSPCC 602	Machine Learning	3	0	0	30	70	100	3
BTCSPCC 603	Information Security System	3	0	0	30	70	100	3
BTCSPCC 604	Computer Architecture and Organization	3	0	0	30	70	100	3
BTCSPCC 605	Artificial Intelligence	3	-	0	30	70	100	3
BTCSPCC 606	Cloud Computing	3	0	0	30	70	100	3

ELECTIVE SUBJECT								
BTCSPEC 607A	Distributed System	3	0	0	30	70	100	3
BTCSPEC 607B	Software Defined Network	3	0	0	30	70	100	3
BTCSPEC 607C	Ecommerce & ERP	3	0	0	30	70	100	3
LABS								
BTCSPCC 608	Digital Image Processing Lab	0	0	2	30	20	50	1
BTCSPCC 609	Machine Learning Lab	0	0	2	30	20	50	1
BTCSPCC 610	Python Lab	0	0	2	30	20	50	1
BTCSPCC 611	Mobile Application Development Lab	0	0	2	30	20	50	1
BT CSSODE CA 612	Social Outreach, Discipline & Extra Curricular Activities						50	1
	TOTAL	**21**	**2**	**8**	**330**	**570**	**950**	**26**

Semester –VII

THEORY PAPERS		**No. of Teaching Hours**			**Marks Allocation**			
Code	**Subject/Paper**	L	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCSPCC 701	Internet of Things	3	1	-	30	70	100	4
ELECTIVE SUBJECT								
BTCSOE 702A	Principle of Electronic Communication	3	1	0	30	70	100	4
BTCSOE 702B	Micro and Smart System Technology	3	1	0	30	70	100	4
BTCSOE 702C	Optimization Techniques	3	1	0	30	70	100	4

LABS								
BTCSPCC 703	Internet of Things Lab	0	0	2	30	20	50	1
BTCSPCC 704	Cyber Security Lab	0	0	2	30	20	50	1
BTCSPSIT 705	Industrial Training	0	0	2	30	20	50	1
BTCSPSIT 706	Seminar	0	0	2	30	20	50	1
BTCSSODE CA 707	Social Outreach, Discipline & Extra Curricular Activities						50	1
	TOTAL	**6**	**2**	**8**	**180**	**220**	**450**	**13**

Semester –VIII

THEORY PAPERS		**No. of Teaching Hours**			**Marks Allocation**			
Code	**Subject/Paper**	L	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCSPCC 801	Big Data Analytics	3	-	-	30	70	100	3
ELECTIVE SUBJECT								
BTCSOE 802A	Soft Computing	3	0	0	30	70	100	3
BTCSOE 802B	Robotics and Control	3	0	0	30	70	100	3
BTCSOE 802C	Simulation Modeling and Analysis	3	0	0	30	70	100	3
LABS								

BTCSPCC 803	Big Data Analytics Lab	0	0	2	30	20	50	1
BTCSPCC 804	Software Testing and Validation Lab	0	0	2	30	20	50	1
BTCSPSIT 805	Project	0	0	0	120	80	200	4
BTCSSODE CA 806	Social Outreach, Discipline &Extra Curricular Activities						50	1
	TOTAL	**6**	**0**	**4**	**240**	**260**	**550**	**13**

Semester I

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	L	T	P	IA	EA	Total	**Credits**
BTBSC 101	Engineering Mathematics-I	3	1	-	30	70	100	4
BTBSC 102	Engineering Physics	3	1	-	30	70	100	4
BTHSMC 103	Communication Skills	2	-	-	30	70	100	2
BTESC 104	Programming for Problem Solving	2	-	-	30	70	100	2
BTESC 105A/ BTESC 105B	Basic Electrical Engineering/ Basic Civil Engineering	2	-	-	30	70	100	2
PRACTICALS/ VIVA VOCE		**No. of Teaching Hours**			**Sessional**	**Practical**	**Total**	**Credits**
BTBSC 106	Engineering Physics Lab	-	-	2	30	20	50	1
BTHSMC 107	Language Lab	-	-	2	30	20	50	1
BTESC 108	Computer Programming Lab	-	-	2	30	20	50	1
BTESC109A/ BTESC109B	Basic Electrical Engineering Lab/ Basic Civil Engineering Lab	-	-	2	30	20	50	1
BTESC 110	Computer Aided Engineering Graphics	-	-	2	30	20	50	1
BTSODECA111	Social Outreach, Discipline & Extra Curricular Activities	-	-	-	-	-	50	1
	Total	**12**	**2**	**10**	**300**	**450**	**800**	**20**

BTBSC101: Engineering Mathematics-I

Course Objectives:

- To familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra.
- To equip the students with standard concepts and tools at an intermediate to advanced level
- To understand Fourier series representation of Periodic signals and to introduce with Fourier Series.

Unit I: ***Calculus:***

Improper integrals (Beta and Gamma functions) and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

Unit II: Sequences and Series:

Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions.

Unit III: Fourier Series:

Periodic functions, Fourier series, Euler's formula, Change of intervals, Half range sine and cosine series, Parseval's theorem.

Unit IV: Multivariable Calculus (Differentiation):

Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence.

Unit V: Multivariable Calculus (Integration):

Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to), Applications: areas and volumes, Centre of mass and Gravity constant and variable densities); Triple integrals (Cartesian), Simple applications involving cubes, sphere and rectangular parallelepipeds; Scalar line integrals, vector line integrals, scalar surface integrals, surface integrals, Theorems of Green, Gauss and Stokes.

Textbooks/References:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edit ion, John Wiley & Sons, 2006. F201
3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36 Edition, 2010.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Understand the calculation and Applications of definite integrals.

CO2: Solve problems related to Sequences and Series.

CO3: Interpret the concept of s series as the sum of a sequence and able to solve problems related to Fourier series.

CO4: Interpret the concept of s series as the sum of a sequence and use the sequence of partial sums to determine divergence of a series.

CO5: Understand the calculation and Applications of Multivariable integrals.

Mapping between Objectives and Outcomes

Course	Bloo	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PS O1	PS O2

Outcomes	m's Level	1	2	3	4	5	6	7	8	9	10	11	12		
CO1	L2	H	M	L	M	L	-	-	-	-	M	-	L	H	M
CO2	L3	-	M	H	M	-	-	-	-	-	M	-	L	M	L
CO3	L4	H	L	M	L	-	-	-	-	-	-	-	L	H	M
CO4	L4	H	L	M	L	-	-	-	-	-	-	-	L	H	M
CO5	L2	H	M	L	M	L	-	-	-	-	M	-	L	M	M

H- High, M- Moderate, L- Low, '-' for No correlation

BTBSC102: Engineering Physics

Course Objective:

- To understand the concepts of interference, Diffraction and Polarization.
- To know about wave particle duality.
- To know applications of Optical fibre.
- To know applications of Lasers in Science, engineering and medicine.
- To know classification of Solid.

Unit I: Wave Optics

Newton's Rings, Michelson's Interferometer, Fraunhofer Diffraction from a Single Slit. Diffraction grating: Construction, theory and spectrum, Resolving power and Rayleigh criterion for limit of resolution, Resolving power of diffraction grating, X-Ray diffraction and Bragg's Law.

Unit II: Quantum Mechanics

Introduction to quantum Mechanics, Wave-particle duality, Matter waves, Wave function and basic postulates, Time dependent and time independent Schrodinger's Wave Equation, Physical interpretation of wave function and its properties, Applications of the Schrodinger's Equation: Particle in one dimensional and three dimensional boxes.

Unit III: Coherence and Optical Fibers

Spatial and temporal coherence: Coherence length; Coherence time and 'Q' factor for light, Visibility as a measure of Coherence and spectral purity, Optical fiber as optical wave guide, Numerical aperture; Maximum angle of acceptance and applications of optical fiber.

Unit IV: Laser

Einstein's Theory of laser action; Einstein's coefficients; Properties of Laser beam, Amplification of light by population inversion, Components of laser, Construction and working of He-Ne and semiconductor lasers, Applications of Lasers in Science, engineering and medicine.

Unit V: Material Science & Semiconductor Physics

Bonding in solids: covalent and metallic bonding, Energy bands in solids: Classification of solids as Insulators, Semiconductors and Conductors, Intrinsic and extrinsic semiconductors, Fermi dirac distribution function and Fermi energy, Conductivity in semiconductors, Hall Effect: Theory, Hall Coefficient and applications.

References:

1. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc. (1995).

2. B. E. A. Saleh and M. C. Teich, Fundamentals of Photonics, John Wiley & Sons, Inc., (2007).
3. S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley (2008).
4. A. Yariv and P. Yeh, Photonics: Optical Electronics in Modern Communications, Oxford University Press, New York (2007).
5. P. Bhattacharya, Semiconductor Optoelectronic Devices, Prentice Hall of India (1997).
6. Online course: “Semiconductor Optoelectronics” by M R Shenoy on NPTEL
7. Online course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Guptaon NPTEL

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Enhance the basic skills required to understand, develop, and design various engineering applications involving Wave Optics.

CO2: Understand Quantum Mechanics and apply them to diverse engineering problems.

CO3: Analyze the nature of light propagation in guided medium for engineering applications and study in Coherence and Optical Fibers.

CO4: Describe different Laser problems.

CO5: Describe Material Science & Semiconductor Physics.

Table: Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom’s Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	H	M	H	-	H	-	M	-	-	-	-	L	H	M
CO2	L3	H	H	H	H	-	M	-	-	-	-	-	-	M	M
CO3	L4	M	L	M	-	L	-	L	-	-	-	-	-	H	H
CO4	L2	H	M	H	H	M	-	M	L	-	L	-	L	H	M
CO5	L2	H	M	H	H	M	-	M	L	-	L	-	L	M	H

H- High, M- Moderate, L- Low, ‘-’ for No correlation

BTHSMC103: Communication Skills

Course Objective:

- To improve communication skills with Basic English.
- To know different types of communication.
- To develop basic skills needed for writing short stories and poems.

Detailed contents :

Unit I: Communication

Meaning, Importance and Cycle of Communication. Media and Typesof Communication. Verbal and Non-Verbal Communication.Barriers to communication. Formal and Informal Channels ofCommunication (Corporate Communication). Divisions of HumanCommunication and Methods to improve InterpersonalCommunication. Qualities of good communication.

Unit II: Grammar

Passive Voice. Reported Speech. Conditional Sentences. Modal Verbs. Linking Words (Conjunctions)

Unit III: Composition

Job Application and Curriculum-Vitae Writing. Business LetterWriting. Paragraph Writing. Report Writing.

Unit IV: Short Stories

"Luncheon" by Somerset Maugham."How Much Land Does a ManNeed?" by Count Leo Tolstoy. "The Night Train at Deoli" by RuskinBond.

Unit V: Poems

"No Men are Foreign" by James Kirkup. "If" by Rudyard Kipling."Where the Mind is without Fear" by Rabindranath Tagore.

Text / Reference Books Suggested Readings:

(i) Practical English Usage. Michael Swan. OUP. 1995.
(ii) Remedial English Grammar. F.T. Wood. Macmillan.2007
(iii) On Writing Well. William Zinsser. Harper Resource Book. 2001
(iv) Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
(v) Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
(vi) Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Understand Communication and Types of Communication.

CO2: Know Grammar of Passive Voice, Reported Speech.

CO3: Understand different ways of writing Job Application and Curriculum-Vitae.
CO4: Describe different Short Stories for effective Learning.
CO5: Describe different poems for improving communication skills.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom's Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	-	-	-	-	L	M	-	-	-	H	-	M	M	L
CO2	L1	-	-	-	-	-	H	-	-	-	H	-	L	M	M
CO3	L2	-	-	-	-	-	M	-	-	M	H	-	M	M	L
CO4	L2	-	-	-	-	-	M	-	-	-	H	-	L	M	M
CO5	L2	-	-	-	-	-	M	-	-	-	H	-	L	M	M

H- High, M- Moderate, L- Low, '-' for No correlation

BTESC104: Programming for Problem Solving

Course Objective:

- To learn the fundamentals of computers.
- To understand the various steps in program development.
- To learn the syntax and semantics of C programming language.
- To learn the usage of structured programming approach in solving problems.

Syllabus

UNIT I:Fundamentals of Computer:

Stored program architecture of computers, Storage device- Primarymemory, and Secondary storage, Random, Direct, Sequential access methods.

UNIT II:

Concepts of High-level, Assembly and Low-level languages,Representing algorithms through flowchart and pseudo code.

UNIT III:Number system:

Data representations, Concepts of radix and representation ofnumbers in radix r with special cases of r=2, 8, 10 and 16 withconversion from radix r1 to r2, r's and (r-1)'s complement, Binaryaddition, Binary subtraction, Representation of alphabets.

UNIT IV:C Programming:

Problem specification, flow chart, data types, assignment statements,input output statements, developing simple C programs, Ifstatement, for loops, while loops, do-while loops, switch statement,break statement, continue statement.

UNIT V:Development of C programs using

Arrays, functions, parameter passing,recursion, Programming in C using these statements, Structures,files, pointers and multi file handling.

Text / Reference Books

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

Course Outcomes:

At the end of the course, the student will be able to:

CO1: know and understand the conventions of Fundamentals of Computer.

CO2: represent algorithms through flowchart and pseudo code.

CO3: learn Number system and apply these skills in developing new products.

CO4: understand and learn C Programming.

CO5: Comprehend the Development of C programs using- Arrays, functions.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom's Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO1	L2	H	H	M	-	M	L	-	-	-	-	-	L	H	M
CO2	L2	H	H	M	L	M	L	-	-	-	L	-	L	M	M
CO3	L3	H	L	M	L	M	L	-	-	-	L	-	L	H	H
CO4	L2	M	H	L	M	H	-	-	-	-	M	-	M	H	M
CO5	L2	M	H	H	M	H	-	-	-	-	M	-	M	M	H

H- High, M- Moderate, L- Low, '-' for No correlation

BTESC 105A : Basic Electrical Engineering

Course Objective:

- To Understand the basic concept of Electrical engineering instruments for engineering applications.
- To Understand the basic electrical engineering parameters and their importance.
- To Understand the concept of various laws and principles associated with electrical systems.
- To Develop the knowledge to apply concepts in the field of electrical engineering, projects and research.

Detailed contents

UNIT I:DC Circuits:

Electrical circuit elements (R, L and C), voltage and current sources,Kirchhoff current and voltage laws, Series-Parallel circuits, Nodevoltage method, Mesh current method, Superposition, Thevenin's,Norton's and Maximum power transfer theorems.

UNIT II:AC Circuits:

Representation of sinusoidal waveforms, peak and r.m.s values,phasor representation, real power, reactive power, apparent power,power factor. Analysis of single-phase AC circuits consisting of R, L,C, RL, RC and RLC combinations (series and parallel), resonance.Three phase balanced circuits, voltage and current relations in starand delta connections.

UNIT III:Transformers:

Ideal and practical transformer, EMF equation, equivalent circuit,losses in transformers, regulation and efficiency.

UNIT IV:Electrical Machines:

Generation of rotating magnetic fields, Construction and working ofa three-phase induction motor, Significance of torque-slipcharacteristic. Starting and speed control of induction motor, singlephaseinduction motor. Construction, working, torque-speedcharacteristic and speed control of separately excited DC motor.Construction and working of synchronous generators.

UNIT V:Power Converters:

Semiconductor PN junction diode and transistor (BJT).Characteristics of SCR, power transistor and IGBT. Basic circuits ofsingle phase rectifier with R load, Single phase Inverter, DC-DCconverter.

Suggested Text / Reference Books

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill,2010.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. L. S. Bobrow, " Fundamentals of Electrical Engineering", Oxford University Press, 2011.
4. Hughes, "Electrical and Electronics Technology", Pearson, 2010.

5. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Apply basic skills for designing various instruments for engineering applications.

CO2: Determine error in laboratory measurements and techniques used to minimize such error.

CO3: Gain knowledge regarding the various laws and principles associated with electrical systems.

CO4: Understand electrical machines and apply them for practical problems.

CO5: Understand the concepts in the field of electrical engineering, projects and research.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom ’s Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L3	H	M	M	M	-	-	-	-	-	M	-	L	M	M
CO2	L5	L	M	H	M	L	-	-	-	-	M	-	M	M	M
CO3	L1	M	H	H	H	-	-	-	-	-	H	-	M	M	M
CO4	L2	H	L	M	L	-	-	-	-	-	L	-	L	H	M
CO5	L2	M	H	H	H	-	-	-	-	-	H	-	M	H	M

H- High, M- Moderate, L- Low, ‘-’ for No correlation

BTESC105B: Basic Civil Engineering

Course Objective:

- To inculcate the essentials of Civil Engineering field to the students of all branches of Engineering.
- To provide students the significance of the Civil Engineering Profession in satisfying societal needs.

Detailed contents:

Unit I: Introduction to objective, scope and outcome the subject

Unit II: Introduction

Scope and Specialization of Civil Engineering, Role of civil Engineer in Society, Impact of infrastructural development on economy of country.

Unit III: Surveying Object, Principles & Types of Surveying; Site Plans, Plans& Maps; Scales & Unit of different Measurements. Linear Measurements: Instruments used. Linear Measurement by Tape, Ranging out Survey Lines and overcoming Obstructions; Measurements on sloping ground; Tape corrections, conventional symbols. Angular Measurements: Instruments used; Introduction to Compass Surveying, Bearings and Longitude & Latitude of a Line, Introduction to total station. Levelling : Instrument used, Object of leveling, Methods of leveling in brief, and Contour maps.

Unit IV: Buildings

Selection of site for Buildings, Layout of Building Plan, Types of buildings, Plinth area, carpet area, floor space index, Introduction to building byelaws, concept of sun light and ventilation. Components of Buildings & their functions, Basic concept of R.C.C., Introduction to types of foundation.

Unit V: Transportation

Introduction to Transportation Engineering; Traffic and Road Safety: Types and Characteristics of Various Modes of Transportation; Various Road Traffic Signs, Causes of Accidents and Road Safety Measures.

TEXTBOOKS:

1. Gopi, S., Basic Civil Engineering, Pearson Publishers
2. Kandya, A. A., Elements of Civil Engineering, Charotar Publishing house
3. Rangwala, S. C., Essentials of Civil Engineering, Charotar Publishing House
4. Rangwala, S. C. and Dalal, K. B., Engineering Materials, Charotar Publishing house

References Books:

1. Chudley, R., Construction Technology, Vol. I to IV, Longman Group, England
2. Chudley, R. and Greeno, R., Building Construction Handbook, Addison Wesley, Longman Group, England
3. McKay, W. B. and McKay, J. K., Building Construction Volumes 1 to 4, Pearson India Education Services
4. Minu, S., Basic Civil Engineering, Karunya Publications

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Illustrate the fundamental aspects of Civil Engineering.

CO2: Understand the scope of civil engineering.

CO3: Explain the concepts of surveying for making horizontal and vertical measurements.

CO4: Describe plan and set out of a building, also illustrate the uses of various building materials and explains the method of construction of different components of a building.

CO5: Understand the modes of Traffic and Road Safety and Road Safety Measures

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom's Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	H	-	-	-	-	M	L	-	-	-	-	M	M	M
CO2	L2	H	M	M	L	-	M	L	-	-	L	-	L	M	M
CO3	L2	M	H	M	L	H	-	H	-	-	L	-	L	L	L
CO4	L2	M	H	M	L	H	-	H	-	-	L	-	L	M	M
CO5	L2	M	M	L	H	M	L	-	H	-	H	-	H	L	L

H- High, M- Moderate, L- Low, '-' for No correlation

BTBSC106: Engineering Physics Lab

Course Objective:

- To understand the concepts of interference.
- To know about wavelength of light.
- To know about depletion layer and band gap of semiconductor.
- To know dispersion of light through prism.
- To know principle of Hall Effect.

LIST OF EXPERIMENTS :

1. To determine the wave length of monochromatic light with the help of Michelson's interferometer.
2. To determine the wave length of sodium light by Newton's Ring.
3. To determine the wave length of prominent lines of mercury by plane diffraction grating with the help of spectrometer.
4. Determination of band gap using a P-N junction diode.
5. To determine the height of given object with the help of sextant.
6. To determine the dispersive power of material of a prism with the help of spectrometer.
7. To study the charge and discharge of a condenser and hence determine the same constant both current and voltage graphs are to be plotted.
8. To determine the coherence length and coherence time of laser using He – Ne laser.
9. To measure the numerical aperture of an optical fibre.
10. To study the Hall Effect and determine the Hall Voltage and Hall coefficients.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Understand the usage of common Ammeter, voltmeter and Multimeter.

CO2: Formulate and solve complex AC, DC circuits.

CO3: Understand the usage of common electrical measuring instruments.

CO4: Identify the type of electrical machine used for that particular application.

CO5: Understand the usage of optical instruments.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom's Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	H	M	M	-	H	-	M	-	-	H	-	L	H	L
CO2	L6	H	H	-	H	-	M	-	-	-	-	-	-	M	M
CO3	L2	M	L	-	-	L	-	L	-	-	L	-	-	M	L
CO4	L2	H	M	-	H	M	-	M	L	-	M	-	L	M	M
CO5	L2	H	M	-	H	M	-	M	L	-	M	-	L	M	M

H- High, M- Moderate, L- Low, '-' for No correlation

BTHSMC107: Language Lab

Course Objective:

- To understand concepts of basic English language fundamentals.
- To understand the communication skills.
- To develop Dialogue Writing and Listening comprehension.

Detailed Syllabus

1. Phonetic Symbols and Transcriptions.
2. Extempore.
3. Group Discussion.
4. Dialogue Writing.
5. Listening comprehension.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: understand the Phonetic Symbols and Transcriptions.

CO2: Understand the skills required in Extempore.

CO3: improve their communication skills for Group Discussion.

CO4: improve their technical communication skills.

CO5: Understand Dialogue Writing and Listening skills.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom's Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	H	-	-	-	H	M	-	-	-	H	-	M	H	M
CO2	L2	M	-	-	-	-	M	-	-	H	H	-	L	M	L
CO3	L6	M	-	-	-	-	M	-	-	H	H	-	M	M	L
CO4	L6	M	-	-	-	M	M	-	-	-	H	-	M	M	M
CO5	L2	M	-	-	-	M	M	-	-	M	H	-	H	M	M

H- High, M- Moderate, L- Low, '-' for No correlation

BTESC 108: Computer Programming Lab

Course Objective(s):

- To understand the various steps in program development.
- To learn the syntax and semantics of C programming language.
- To learn the usage of structured programming approach in solving problems.

LIST OF EXPERIMENTS :

1. To learn about the C Library, Preprocessor directive, Input-outputstatement.
2. Programs to learn data type, variables, If-else statement
3. Programs to understand nested if-else statement and switch statement
4. Programs to learn iterative statements like while and do-while loops
5. Programs to understand for loops for iterative statements
6. Programs to learn about array and string operations
7. Programs to understand sorting and searching using array
8. Programs to learn functions and recursive functions
9. Programs to understand Structure and Union operation
10. Programs to learn Pointer operations
11. Programs to understand File handling operations
12. Programs to input data through Command line argument

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Learn about the C Library, Preprocessor directive, Input-output statement.

CO2: Learn data type, variables, and conditional statement.

CO3: Learn about array and string operations.

CO4: Understand File handling operations.

CO5: learn programs related to C Programming and apply them to solve real world problems.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom's Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	H	H	-	-	M	L	-	-	-	L	-	L	M	L
CO2	L2	H	H	M	L	M	L	-	-	-	L	-	L	M	M
CO3	L2	H	L	M	L	M	L	-	-	-	L	-	L	H	M
CO4	L2	M	H	L	M	H	L	L	-	-	L	-	M	H	M
CO5	L3	M	H	H	M	H	M	L	-	-	M	-	M	M	L

H- High, M- Moderate, L- Low, '-' for No correlation

BTESC 109A: Basic Electrical Engineering Lab

Course Objectives:

- To understand training on different trades like Fitting, Carpentry and Casting
- To learn various joints are made using wood and other metal pieces.
- To develop machining skills in students.

List of Experiments

1. Basic safety precautions. Introduction and use of measuring instruments –voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
2. Transformers: Observation of the no-load current waveform on anoscilloscope. Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
3. Three-phase transformers: Star and Delta connections. Voltage and Currentrelationships (line-line voltage, phase-to-neutral voltage, line and phasecurrents).Phase-shifts between the primary and secondary side.
4. Demonstration of cut-out sections of machines: dc machine (commutate or brush arrangement), induction machine (squirrel cage rotor), synchronous(field winging - slip ring arrangement) and single-phase induction
5. Torque Speed Characteristic of separately excited dc motor.
6. Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform (c) the use of dc-ac converter for speed control of an induction motor and (d)Components of LT switchgear.

Course Outcomes:

At the end of the course, the student will be able to:

CO1. Adapt knowledge regarding the various laws and principles associated with electrical systems.

CO2: Adapt knowledge regarding electrical machines and apply them for practical problems.

CO3: Understand various types' Electrical Equipments.

CO4: Understanding digital measuring equipments.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom's Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L3	H	M	M	M	M	-	-	-	-	M	-	L	H	M
CO2	L3	L	M	H	M	M	-	-	-	-	M	-	M	M	M
CO3	L2	M	H	H	H	M	-	-	-	-	H	-	M	H	H
CO4	L2	H	L	M	L	M	-	-	-	-	L	-	L	H	M

H- High, M- Moderate, L- Low, '-' for No correlation

BTESC109B: Basic Civil Engineering Lab

Course Objective(s):

- To Introduce The Various Activities Regarding Measurement And Leveling
- To Water Supply Procedure And Various Discharge And Pressure Measuring Apparatuses

LIST OF EXPERIMENTS:

1. Linear Measurement by Tape:
   a) Ranging and Fixing of Survey Station along straight line and across obstacles.
   b) Laying perpendicular offset along the survey line
2. Compass Survey: Measurement of bearing of linesusing Surveyor's and Prismatic compass
3. Levelling: Using Tilting/ Dumpy/ Automatic Level
   a) To determine the reduced levels in closed circuit.
   b) To carry out profile levelling and plot longitudinal and cross sections for road by Height of Instrument and Rise & Fall Method.
4. To study and take measurements using various electronic surveying instruments like EDM, Total Station etc.
5. To determine pH, hardness and turbidity of the given sample of water.
6. To study various water supply Fittings.
7. To determine the pH and total solids of the given sample of sewage.
8. To study various Sanitary Fittings.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Conduct survey and collect field data.

CO2: Review field notes from survey data.

CO3: Interpret survey data and compute areas and volumes.

CO4: Describe Total station and measurement

CO5: Describe various water fittings and find out the various fluids properties

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom's Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L4	H	L	L	L	H	M	L	-	L	L	-	M	H	M
CO2	L2	H	M	M	M	-	M	L	-	L	M	-	L	M	L
CO3	L4	M	H	M	H	H	M	H	-	L	H	-	L	L	H
CO4	L2	M	H	M	H	H	M	H	-	L	H	-	L	-	M

CO5	L2	M	M	L	H	M	M	-	-	L	H	-	H	L	L

H- High, M- Moderate, L- Low, '-' for No correlation

BTESC110: Computer Aided Engineering Graphics

Course Objectives:

- To Increase ability to communicate with people
- To Learn to sketch and take object dimensions.
- To Learn to take data and transform it into graphic drawings.

Introduction: Principles of drawing, lines, type of lines, usage of Drawinginstruments, lettering, Conic sections including parabola, hyperbola, RectangularHyperbola (General method only); Scales-Plain, Diagonal and Vernier Scales.

Projections of Point & Lines: Position of Point, Notation System, SystematicApproach for projections of points, front view & Top view of point, Position ofstraight lines, line parallel to Both the RPs, Line perpendicular to either of the RPs,Line inclined to one RP and parallel to the other, Line inclined to Both the RPs,Traces of a line (One drawing sheet, one assignment in sketch book).

Projection of Planes: Positions of planes, Terms used in projections of planes,plane parallel to RP, plane inclined to one RP and perpendicular to the other RP,plane perpendicular to Both the RPs, plane Inclined to Both the RPs, True shape ofthe plane, Distance of a point from plane, Angle between two planes.

Projections of Regular Solids: frustum and truncated solids, those inclined toboth the Planes-Auxiliary Views.

Section of Solids: Theory of sectioning, section of prisms and cubes, section ofpyramids and Tetrahedron section of Cylinders, section of cones, section ofspheres (One drawing sheet, one assignment in sketch book)

Overview of Computer Graphics : Covering theory of CAD software [such as: Themenu System, Toolbars (standard, Object Properties, Draw, Modify andDimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialogboxes and windows, Shortcut menus (Button Bars), Command Line (whereapplicable), The Status Bar, Different methods of zoom as used in CAD, Select anderase objects.: Isometric Views of lines, Planes, Simple and compound Solids.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Know and understand the conventions and the method of engineering drawing.
CO2: Interpret engineering drawings using fundamentals of different views to construct basic and intermediate geometry.
CO3: Know the Theory of sectioning and Section of Solids.
CO4: Comprehend the theory of projection.
CO5: Improve their drawing skill in the form of Computer Graphics.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcome	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO1	L2	H	M	L	M	L	L	-	-	L	M	-	L	L	M
CO2	L4	H	M	L	M	L	L	-	-	-	M	-	L	L	M
CO3	L1	H	M	L	M	L	L	-	-	L	M	-	L	L	L
CO4	L2	H	H	M	H	L	L	-	-	L	H	-	M	M	M
CO5	L2	H	M	M	M	L	L	-	-	L	M	-	M	L	L

H- High, M- Moderate, L- Low, '-' for No correlation

BTCSSODECA 111: Social Outreach, Discipline & Extra Curricular Activities

Course Objectives:

- To allowing students to explore strengths and talents outside of academics.
- To helping students develop stronger time-management and organizational skills.
- To giving students the opportunity to build friendships and participate in group activities outside of the tight circle of the regular classroom.
- To helping to build confidence and self-esteem.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Develop their self-confidence, leadership qualities, and their responsibilities towards the community.

CO2: Have an impact on academic development, personal development, and civic responsibility

CO3: Understand the value of Social Work.

CO4: Understand the Significance of Discipline in student's Life

CO5: Contribute towards in social up-gradation by social organization like, Art of Living, Yoga etc., Blood donation, Awareness programs, personality development programs,

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcome	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	P0 11	PO 12	PS O1	PS O2
CO1	L2	-	-	-	-	-	M	L	M	M	-	-	-	-	-
CO2	L4	-	-	-	-	-	M	M	M	L	-	-	-	-	-
CO3	L1	-	-	-	-	-	M	L	M	L	-	-	-	-	-
CO4	L2	-	-	-	-	-	M	M	M	M	-	-	-	-	-
CO5	L2	-	-	-	-	-	M	M	L	M	-	-	-	-	-

H- High, M- Moderate, L- Low, '-' for No correlation

SECOND SEMESTER

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	L	T	P	IA	EA	Total	**Credits**
BTBSC 201	Engineering Mathematics-II	3	1	-	30	70	100	4
BTBSC 202	Engineering Chemistry	3	1	-	30	70	100	4
BTHSMC 203	Human Values	2	-	-	30	70	100	2
BTESC 204	Basic Mechanical Engineering	2	-	-	30	70	100	2
BTESC205A/ BTESC205B	Basic Electrical Engineering/ Basic Civil Engineering	2	-	-	30	70	100	2
BTHSMC 206	Advanced English	2	-	-	30	70	100	2
PRACTICALS/ VIVA VOCE		No. of Teaching Hours			Sessional	Practical	Total	Credits
BTBSC 207	Engineering Chemistry Lab	-	-	2	30	20	50	1
BTHSMC 208	Human Values Activities	-	-	2	30	20	50	1
BTESC 209	Manufacturing Practices Workshop	-	-	2	30	20	50	1
BTESC210A/ BTESC 210B	Basic Electrical Engineering Lab/ Basic Civil Engineering Lab	-	-	2	30	20	50	1
BTESC 211	Computer Aided Machine Drawing	-	-	2	30	20	50	1
BTSODECA212	Social Outreach, Discipline & Extra Curricular Activities	-	-	-	-	-	50	1
	Total	**14**	**2**	**12**	**330**	**520**	**900**	**22**

BTBSC201 : Engineering Mathematics-II

Course Objective:

- To provide detailed of **matrices** which is applied for solving system of linear equations and useful in various fields of technology.
- To understand the course is an introduction to ordinary differential equations.
- To understand the collection of methods and techniques used to find solutions to several types of differential equations, including first order scalar equations.

Unit I: Matrices:

Rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.

Unit II: First order ordinary differential equations:

Linear and Bernoulli's equations, Exact equations, Equations not of first degree: equations solvable for *p*, equations solvable for *y*, equations solvable for *x* and Clairaut's type.

Unit III: Ordinary differential equations of higher orders:

Linear Differential Equations of Higher order with constant coefficients, Simultaneous Linear Differential Equations, Second order linear differential equations with variable coefficients: Homogenous and Exact forms, one part of CF is known, Change of dependent and independent variables, method of variation of parameters, Cauchy- Euler equation; Power series solutions including Legendre differential equation and Bessel differential equations.

Unit IV: Partial Differential Equations – First order: Order and Degree, Formation; Linear Partial differential equations ofFirst order, Lagrange's Form, Non Linear Partial Differential equationsof first order, Charpit's method, Standard forms.

Unit V: Partial Differential Equations– Higher order : Classification of Second order partial differential equations, Separation of variables method to simple problems in Cartesian coordinates including two dimensional Laplace, one dimensional Heat and one dimensional Wave equations.

Textbooks/References:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint, 2002.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9thEdit ion, John Wiley & Sons, 2006.
3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36 Edition, 2010.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Understand the matrices, Rank of a matrix, rank-nullity theorem; System of linear equations.

CO2: Identify, analyze and subsequently solve physical situations whose behavior can be described by First order and First degree ordinary differential.

CO3: Determine solutions to second order linear differential equations with variable coefficients.

CO4: Solve Engineering problems using different methods and techniques.

CO5: Evaluate the first order and second order partial differential equations

Mapping between Objectives and Outcomes

Course Outcomes	Bloom's Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	L2	H	M	L	M	-	-	-	-	L	M	-	M	M	M
CO2	L4	M	M	H	M	-	-	-	-	L	M	-	M	M	M
CO3	L4	H	M	M	M	-	-	-	-	-	M	-	L	M	L
CO4	L6	H	M	M	M	L	-	-	-	-	M	-	L	L	M
CO5	L5	H	M	L	M	L	-	-	-	L	M	-	M	M	M

H- High, M- Moderate, L- Low, '-' for No correlation

BTBSC202 : Engineering Chemistry

Course Objective:

- To acquire the knowledge about impurities in water, their determination and purification.
- To learn about different types of fuel and lubricant and their applications.
- To gain the basic knowledge, applications and control methods of corrosion.
- To get the knowledge of preparation and significance of explosives, cement, refractories and glass.
- To get the knowledge of organic reaction mechanism and their uses with different types of drugs

Detailed contents:

Unit I: Water

Common impurities, hardness, determination of hardness by complexometric (EDTA method), Degree of hardness, Units of hardness Municipal water supply: Requisite of drinking water, Purification of water; sedimentation, filtration, disinfection, breakpoint chlorination. Boiler troubles: Scale and Sludge formation, Internal treatment methods, Priming and Foaming, Boiler corrosion and Caustic embrittlement Water softening; Lime-Soda process, Zeolite (Permutit) process, Demineralization process. Numerical problems based on Hardness, EDTA, Lime-Soda and Zeolite process.

Unit II: Organic Fuels

Solid fuels: Coal, Classification of Coal, Proximate and Ultimate analyses of coal and its significance, Gross and Net Calorific value, Determination of Calorific value of coal by Bomb Calorimeter. Metallurgical coke, Carbonization processes; Otto-Hoffmann byproduct oven method. Liquid fuels : Advantages of liquid fuels, Mining, Refining and Composition of petroleum, Cracking, Synthetic petrol, Reforming, Knocking, Octane number, Anti-knocking agents, Cetane number Gaseous fuels; Advantages, manufacturing, composition and Calorific value of coal gas and oil gas, Determination of calorific value of gaseous fuels by Junker's calorimeter Numerical problems based on determination of calorific value (bomb calorimeter/Junkers calorimeter/Dulongs formula, proximate analysis & ultimate and combustion of fuel.

Unit III: Corrosion and its control

Definition and significance of corrosion, Mechanism of chemical (dry) and electrochemical (wet) corrosion, galvanic corrosion, concentration corrosion and pitting corrosion. Protection from corrosion; protective coatings-galvanization and tinning, cathodic protection, sacrificial anode and modifications in design.

Unit IV: Engineering Materials

Portland Cement; Definition, Manufacturing by Rotary kiln. Chemistry of setting and hardening of cement. Role of Gypsum. Glass: Definition, Manufacturing by tank furnace, significance of annealing, Types and properties of soft glass, hard glass, borosilicate glass, glass wool, safety glass Lubricants: Classification, Mechanism, Properties; Viscosity and viscosity index, flash and fire point, cloud and pour point. Emulsification and steam emulsion number.

Unit V: Organic reaction mechanism and introduction of drugs

Organic reaction mechanism: Substitution; SN1, SN2, Elecrophilic aromatic substitution in benzene, free radical halogenations of alkanes, Elimination; elimination in alkyl halides, dehydration of alcohols, Addition: electrophilic and free radical addition in alkenes, nucleophilic addition in aldehyde and ketones, Rearrangement; Carbocation and free radical rearrangements Drugs : Introduction, Synthesis, properties and uses of Aspirin, Paracetamol

Suggested Text / Reference Books

1. Morrison R.T & Boyn R. N ; Organic Chemistry; Prentice Hall of India 1999
2. Lee J. D. ; Inorganic Chemistry ;Blackwell Science
3. Gopalan R., Venkappayya D., Nagarajan S. "Engineering Chemistry" Vikas Publishing House Pvt Ltd 2000.
4. Jain & Jain " Engineering Chemistry" Dhanpat Rai publishing company
5. Dara S. S. , " A Text Book of Engineering Chemistry" S. Chand and Company Ltd, 2008
6. Keeler J and Wolhess P, Why Chemical Reaction Happen Oxford Press.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: gain knowledge about impurities in water, their determination and purification.

CO2: understand organic fuels and various emerging new areas of organic chemistry.

CO3: learn about Corrosion and its control.

CO4: Get knowledge about the chemistry of some Engineering Materials like Portland Cement.

CO5: understand and study Organic reaction mechanisms.

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Bloom's Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	L2	H	-	M	-	-	-	-	-	-	M	-	H	M	M
CO2	L2	M	-	-	-	L	-	-	-	-	L	-	M	M	M
CO3	L1	M	-	-	-	-	-	-	-	-	L	-	M	M	L
CO4	L2	M	-	-	-	-	-	-	-	-	L	-	M	H	M
CO5	L2	M	-	-	-	-	-	-	-	-	-	-	L	M	L

H- High, M- Moderate, L- Low, '-' for No correlation

BTHSMC203: Human Values

Course Objective:

- To Know the basic guidelines, content and Process for Value Education
- To develop understanding different Harmony concept.
- To understand professional ethics and natural acceptance of human values.

Detailed contents:

Unit I: Course Introduction - Need, Basic Guidelines, Content andProcess for Value Education

Understanding the need, basic guidelines, Self Exploration – itscontent and process; 'Natural Acceptance' and Experiential Validation,Continuous Happiness and Prosperity- Human Aspirations, Rightunderstanding, Relationship and Physical Facilities,UnderstandingHappiness and Prosperity correctly- A critical appraisal of the currentscenario.Method to fulfill the above human aspirations: understanding andliving in harmony at various levels

Unit II: Understanding Harmony in the Human Being - Harmony in Myself

Understanding human being as a co-existence of the sentient 'I' andthe material 'Body'Understanding the needs of Self ('I') and 'Body' - Sukh and SuvidhaUnderstanding the Body as an instrument of 'I',Understanding thecharacteristics and activities of 'I' and harmony in 'I' Understandingthe harmony of I with the Body: Sanyam and Swasthya; correctappraisal of Physical needs, meaning of Prosperity in detail, Programsto ensure Sanyam and Swasthya.

Unit III: Understanding Harmony in the Family and Society- Harmony inHuman-Human Relationship

Understanding harmony in the Family, Understanding values inhuman-human relationship; meaning of Nyaya and program for itsfulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect(Samman) , meaning of Vishwas; Difference between intention and competence, meaning of Samman, Difference between respect and differentiation; the other salient values in relationship, harmony in the society , Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals ,Visualizing a universal harmonious order in society- Undivided Society (AkhandSamaj), Universal Order (SarvabhaumVyawastha)- from family to world family.

Unit IV: Understanding Harmony in the Nature and Existence – Whole existence as Coexistence

Understanding the harmony in the Nature. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature. Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in allpervasive Space. Holistic perception of harmony at all levels of existence

Unit V: Implications of the above Holistic Understanding of Harmony on Professional Ethics. Natural acceptance of human values

Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in Professional Ethics: a) Ability to utilize the professional competence for augmenting universal human order, b) Ability to identify

the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management

models. Strategy for transition from the present state to Universal Human Order: At the level of individual: as socially and ecologically responsible engineers, technologists and managers. Case studies related to values in professional life and individual life.

Suggested Text / Reference Books

1. Gaur R.R., Sangal R. and. Bagaria, G.P: "A Foundation Course in Human Values Professional Ethics," Excel Books, 2010.
2. Sadri S & Sadri, J Business Excellence Through Ethics & Governance, 2ndedition, 2015.
3. Mathur, U C CorporateGovernance and business ethics,MacMillan India Ltd, 2009.
4. Baxi, C V: CorporateGovernance, Excel Books, 2009
5. Sadri S, Sinha A K and Bonnerjee, P: Business Ethics: concepts and cases, TMH, 1998.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: understand and analyze Basic Guidelines, Content and Process for Value Education.

CO2: understand Harmony in the Human Being - Harmony in Myself.

CO3: Understand Harmony in the Family and Society- Harmony in Human-Human Relationship.

CO4: understand Harmony in the Nature and Existence – Whole existence as Coexistence.

CO5: Understand of Harmony on Professional Ethics. Natural acceptance of human values.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom's Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	-	-	-	-	L	L	M	H	L	M	-	L	M	M
CO2	L2	-	-	-	-	-	L	M	M	M	M	-	L	M	M
CO3	L2	-	-	-	-	-	L	M	H	L	M	-	L	M	L
CO4	L2	-	-	-	-	L	L	L	M	M	L	L	H	M	M
CO5	L2	L	-	-	-	-	M	M	H	L	M	-	L	M	L

H- High, M- Moderate, L- Low, '-' for No correlation

BTESC 204: Basic Mechanical Engineering

Course Objectives:

- To Increase ability to understand machine working
- To Learn to understand fundamentals of mechanical systems
- To Learn to make different mechanical aspects of engineering

Unit I: Fundamentals:

Introduction to mechanical engineering, concepts of thermalengineering, mechanical machine design, industrial engineering andmanufacturing technology.Steam Boilers classification and types of steam boilers and steamturbines. Introduction and Classification of power plants.

Unit II: Pumps and IC Engines:

Applications and working of Reciprocating and Centrifugal pumps.Introduction, Classification of IC Engines, Main Components of ICEngines, Working of IC Engines and its components.

Unit III: Refrigeration and Air Conditioning:

Introduction, classification and types of refrigeration systems andair-conditioning. Applications of refrigeration and Air-conditioning.

Unit IV: Transmission of Power:

Introduction and types of Belt and Rope Drives, Gears.

Unit V:

Primary Manufacturing Processes:Metal Casting Process: Introduction to Casting Process, Patterns,Molding, Furnaces. Metal Forming Processes: Introduction toForging, Rolling, Extrusion, Drawing. Metal Joining Processes:Introduction to various types of Welding, Gas Cutting, Brazing, andSoldering.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: know and understand the Fundamentals of thermal engineering, mechanical machine design, industrial engineering and manufacturing technology.

CO2: understand the Refrigeration and Air Conditioning.

CO3: understand the Applications and working of Reciprocating and Centrifugal pumps.

CO4: know the Transmission of Power through Belt and Rope Drives, Gears.

CO5: understand of Primary Manufacturing Processes.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcome	Bloom level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO1	L2	H	M	L	M	L	-	-	-	-	M	-	L	M	M
CO2	L2	H	M	L	M	L	-	L	-	-	M	-	L	M	M
CO3	L2	H	L	L	L	M	-	-	-	-	L	-	L	M	M
CO4	L2	H	L	L	L	L	-	L	-	-	L	-	L	M	M
CO5	L2	M	L	L	L	-	-	-	-	-	L	-	L	M	M

H- High, M- Moderate, L- Low, '-' for No correlation

BTESC205A : Basic Electrical Engineering

Course Objective:

- To Understand the basic concept of Electrical engineering instruments for engineering applications.
- To Understand the basic electrical engineering parameters and their importance.
- To Understand the concept of various laws and principles associated with electrical systems.
- To Develop the knowledge to apply concepts in the field of electrical engineering, projects and research.

Detailed contents

UNIT I:DC Circuits:

Electrical circuit elements (R, L and C), voltage and current sources,Kirchhoff current and voltage laws, Series-Parallel circuits, Nodevoltage method, Mesh current method, Superposition, Thevenin's,Norton's and Maximum power transfer theorems.

UNIT II:AC Circuits:

Representation of sinusoidal waveforms, peak and r.m.s values,phasor representation, real power, reactive power, apparent power,power factor. Analysis of single-phase AC circuits consisting of R, L,C, RL, RC and RLC combinations (series and parallel), resonance.Three phase balanced circuits, voltage and current relations in starand delta connections.

UNIT III:Transformers:

Ideal and practical transformer, EMF equation, equivalent circuit,losses in transformers, regulation and efficiency.

UNIT IV:Electrical Machines:

Generation of rotating magnetic fields, Construction and working ofa three-phase induction motor, Significance of torque-slipcharacteristic. Starting and speed control of induction motor, singlephaseinduction motor. Construction, working, torque-speedcharacteristic and speed control of separately excited DC motor.Construction and working of synchronous generators.

UNIT V:Power Converters:

Semiconductor PN junction diode and transistor (BJT).Characteristics of SCR, power transistor and IGBT. Basic circuits ofsingle phase rectifier with R load, Single phase Inverter, DC-DCconverter.

Suggested Text / Reference Books

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill,2010.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. L. S. Bobrow, " Fundamentals of Electrical Engineering", Oxford University Press, 2011.
4. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
5. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Apply basic skills for designing various instruments for engineering applications.

CO2: Determine error in laboratory measurements and techniques used to minimize such error.

CO3: Gain knowledge regarding the various laws and principles associated with electrical systems.

CO4: Understand electrical machines and apply them for practical problems.

CO5: Understand the concepts in the field of electrical engineering, projects and research.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom's Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L3	H	M	M	M	-	-	-	-	-	M	-	L	M	M
CO2	L5	L	M	H	M	L	-	-	-	-	M	-	M	M	M
CO3	L1	M	H	H	H	-	-	-	-	-	H	-	M	M	M
CO4	L2	H	L	M	L	-	-	-	-	-	L	-	L	H	M
CO5	L2	M	H	H	H	-	-	-	-	-	H	-	M	H	M

H- High, M- Moderate, L- Low, '-' for No correlation

BTESC 205B : Basic Civil Engineering

Course Objective:

- To inculcate the essentials of Civil Engineering field to the students of all branches of Engineering.
- To provide students the significance of the Civil Engineering Profession in satisfying societal needs.

Detailed contents:

Unit I: Introduction to objective, scope and outcome the subject

Unit II: Introduction

Scope and Specialization of Civil Engineering, Role of civil Engineer in Society, Impact of infrastructural development on economy of country.

Unit III: Surveying Object, Principles & Types of Surveying; Site Plans, Plans& Maps; Scales & Unit of different Measurements. Linear Measurements: Instruments used. Linear Measurement by Tape, Ranging out Survey Lines and overcoming Obstructions; Measurements on sloping ground; Tape corrections, conventional symbols. Angular Measurements: Instruments used; Introduction to Compass Surveying,Bearings and Longitude & Latitude of a Line, Introduction to total station. Levelling: Instrument used, Object of leveling, Methods of leveling in brief, and Contour maps.

Unit IV: Buildings

Selection of site for Buildings, Layout of Building Plan, Types of buildings, Plinth area, carpet area, floor space index, Introduction to building byelaws, concept of sun light and ventilation. Components of Buildings & their functions, Basic concept of R.C.C., Introduction to types of foundation.

Unit V: Transportation

Introduction to Transportation Engineering; Traffic and Road Safety: Types and Characteristics of Various Modes of Transportation; Various Road Traffic Signs, Causes of Accidents and Road Safety Measures.

TEXTBOOKS:

5. Gopi, S., Basic Civil Engineering, Pearson Publishers
6. Kandya, A. A., Elements of Civil Engineering, Charotar Publishing house
7. Rangwala, S. C., Essentials of Civil Engineering, Charotar Publishing House
8. Rangwala, S. C. and Dalal, K. B., Engineering Materials, Charotar Publishing house

References Books:

5. Chudley, R., Construction Technology, Vol. I to IV, Longman Group, England
6. Chudley, R. and Greeno, R., Building Construction Handbook, Addison Wesley, Longman Group, England
7. McKay, W. B. and McKay, J. K., Building Construction Volumes 1 to 4, Pearson India Education Services
8. Minu, S., Basic Civil Engineering, Karunya Publications

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Illustrate the fundamental aspects of Civil Engineering.

CO2: Understand the scope of civil engineering.

CO3: Explain the concepts of surveying for making horizontal and vertical measurements.

CO4: Describe plan and set out of a building, also illustrate the uses of various building materials and explains the method of construction of different components of a building.

CO5: Understand the modes of Traffic and Road Safety and Road Safety Measures

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom's Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	H	-	-	-	-	M	L	-	-	-	-	M	M	M
CO2	L2	H	M	M	L	-	M	L	-	-	L	-	L	M	M
CO3	L2	M	H	M	L	H	-	H	-	-	L	-	L	L	L
CO4	L2	M	H	M	L	H	-	H	-	-	L	-	L	M	M
CO5	L2	M	M	L	H	M	L	-	H	-	H	-	H	L	L

H- High, M- Moderate, L- Low, '-' for No correlation

BTHSMC206: Advanced English

Course Objective:

- To Develop basic communication concept for social environment.
- To Improve conversation skills to increase confidence and proficiency.
- To understand the concept of English in 'real life' situations.
- To apply grammar knowledge for growing according to environment.

Detailed contents

Unit-I (Grammar)

1. Modal
2. Preposition
3. Conjunction

Unit-II (Composition)

1. Resume writing
2. Report writing
3. Advertisement

Unit-III (Personality)

1. Define Personality
2. Types of Personality
3. How to develop one's personality

Unit-IV (Elements of Communication)

1. Meaning
2. Barriers to communication
3. Functions / Objectives of Communication

Unit-V (Poems)

1. 'No men are foreign' – by James Kirk up
2. 'Death, Be not Proud' – by John Donne

Course Outcomes:

At the end of the course, the student will be able to:

CO 1: Understand Communicate in a variety of social, travel and work-related situations
CO 2: Understand conversation skills and Widen vocabulary skills
CO 3: Apply proficiency in all major skills
CO 4: Apply Practice English in 'real life' situations
CO 5: Learn how to apply grammar knowledge

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom's Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	-	-	-	-	L	M	-	-	-	H	-	M	M	M
CO2	L2	-	-	-	-	-	H	-	-	-	H	-	-	M	M
CO3	L3	-	-	-	-	L	-	-	-	M	H	-	M	M	L
CO4	L3	-	-	-	-	L	H	-	-	-	H	-	-	H	L
CO5	L1	-	-	-	-	-	H	-	-	-	H	-	-	M	L

H- High, M- Moderate, L- Low, '-' for No correlation

BTBSC 207: Engineering Chemistry Lab

Course Objective:

- To understand the method for the determination of hardness in water and purification process.
- To understand about different types of volumetric analysis.
- To learn about properties of lubricant oil.
- To Synthesize a small drug molecule and analyse a salt sample

List of Experiments:

1. Determination the hardness of water by EDTA method
2. Determination of residual chlorine in water
3. Determination of dissolved oxygen in water
4. Determination of the strength of Ferrous Ammonium sulphate solution with the help of K2Cr2O7 solution by using diphenyl amine indicator
5. Determination of the strength of CuSO4 solution iodometrically by using hypo solution
6. Determination of the strength of NaOH and Na2CO3 in a given alkali mixture
7. Proximate analysis of Coal
8. Determination of the flash & fire point and cloud & pour point of lubricating oil
9. Determination of the kinematic viscosity of lubricating oil by Redwood viscometer no. 1 at different temperature
10. Synthesis of Aspirin/ Paracetamol

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Understand the method for the determination of hardness in water and purification process.

CO2: understand about different types of volumetric analysis.

CO3: learn about properties of lubricant oil.

CO4: Synthesize a small drug molecule and analyse a salt sample

Mapping of Course Outcomes onto Program Outcomes

Course Outcome	Bloom's Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	L2	H	M	-	M	-	-	L	-	-	M	-	-	M	L
CO2	L1	L	H	M	H	-	-	L	-	-	H	-	-	M	M
CO3	L1	M	L	H	L	L	-	M	-	-	L	-	L	M	M
CO4	L3	L	L	H	L	L	-	L	-	-	L	-	L	M	L

H- High, M- Moderate, L- Low, '-' for No correlation

BTHSM208 : Human Values Activities

Course Objective:

- **To Understand the** basic guidelines, content and process for value education.
- To develop understanding different Harmony concept.
- To understand professional ethics and natural acceptance of human values.

Detailed contents

PS 1:

Introduce yourself in detail. What are the goals in your life? How do you set your goals in your life? How do you differentiate between right and wrong? What have been your salient achievements and shortcomings in your life? Observe and analyze them.

PS 2:

Now-a-days, there is a lot of talk about many technogenic maladies such as energy and material resource depletion, environmental pollution, global warming, ozone depletion, deforestation, soil degradation, etc. - all these seem to be manmadeproblems, threatening the survival of life Earth - What is the root cause of these maladies & what is the way out in opinion? On the other hand, there is rapidly growing danger because of nuclear proliferation, arms race, terrorism, breakdown of relationships, generation gap, depression & suicidal attempts etc. - what do you think, is the root cause of these threats to human happiness and peace - what could be the way out in your opinion?

PS 3:

1. Observe that each of us has the faculty of 'Natural Acceptance', based on which one can verify what is right or not right for him. (As such we are not properly trained to listen to our 'Natural Acceptance' and may a time it is also clouded by our strong per-conditioning and sensory attractions). Explore the following:
   (i) What is Naturally Acceptable' to you in relationship the feeling of respect or disrespect for yourself and for others?
   (ii) What is 'naturally Acceptable' to you - to nurture or to exploit others? Is your living in accordance with your natural acceptance or different from it?
2. Out of the three basic requirements for fulfillment of your aspirations – right understanding, relationship and physical facilities - observe how the problems in your family are related to each. Also observe how much time & effort you devote for each in your daily routine.

PS 4:

List down all your important desires. Observe whether the desire is related to Self (I) the Body. If it appears to be related to both, visualize which part of it is related to Self (I) and which part is related to Body.

PS 5:

1. a. Observe that any physical facility you use, follows the given sequence with time: Necessary and tasteful - unnecessary but still tasteful - unnecessary and tasteless - intolerable

b. In contrast, observe that any feeling in you is either naturally acceptable or not acceptable at all. If not acceptable, you want it continuously and if not acceptable, you do not want it any moment!

2. List down all your important activities. Observe whether the activity is of 'I' or of Body or with the participation of both or with the participation of both 'I' and Body.
3. Observe the activities within 'i'. Identify the object of your attention for different moments (over a period of sy 5 to 10 minutes) and draw a line diagram connecting these points. Try observe the link between any two nodes.

PS 6:

1. Chalk out some programs towards ensuring your harmony with the body – in terms of nurturing, protection and right utilization of the body.
2. Find out the plants and shrubs growing in and around your campus, which can be useful in curing common diseases.

PS 7:

Form small groups in the class and make them carry out a dialogue focusing on the following eight questions related to 'TRUST';

1a. Do I want to make myself happy?

2a. Do I want to make the other happy?

3a. Does the other want to make himself/herself happy?

4a. Does the other want to make me happy?

What is the answer?

Intention (Natural Acceptance)

1b. Am I able to always make myself happy?

2b. Am I able to always make the other happy?

3b. Is the other able to always make himself/herself happy?

What is the answer?

Let each student answer the questions for himself and everyone else. Discuss the difference between intention and competence. Observe whether you evaluate yourself and others on the basis of intention/competence.

PS 8:

1. Observe, on how many occasions, you are able to respect your related ones (by doing the right evaluation) and on how many occasions you are disrespecting by way of under-evaluation, over-evaluation or otherwise evaluation.
2. Also, observe whether your feeling of respect is based on treating the other as you would treat yourself or on differentiations based on body, physical facilities or belieds.

PS 9:

1. Write a narration in the form of a story, poem, skit or essay to clarify a salient Human Value to the children.

2. Recollect and narrate an incident in your life where you were able to exhibit willful adherence to values in a difficult situation.

PS 10:

List down some common units (things) of Nature which you come across in your daily life and classify them in the four orders of Nature. Analysis and explain the aspect of mutual fulfillment of each unit with other orders.

PS 11:

Make a chart to show the whole existence as co-existence. With the help of this chart try to identify the role and the scope of some of the courses of your study. Also indicate the areas which are being either over-emphasized or ignored in the present context.

PS 12:

Identify any two important problems being faced by the society today and analyze the root cause of these problems. Can these be solved on the basic of natural acceptance of human values. If so, how should one proceed in this direction from the present situation?

PS 13:

1. Suggest ways in which you can use your knowledge of Science/Technology/Management etc. for moving towards a universal human order.
2. Propose a broad outline for humanistic Constitution at the level of Nation.

PS 14:

The course is going to be over now. It is time to evaluate what difference in your thinking it has made. Summarize the core massage of this course grasped by you. How has this affected you in terms of;

a. Thought
b. Behavior
c. Work and
d. Relization

What practical steps are you able to visualize for the transition of the society from its present state.

Project:

Every student required to take-up a social project e.g. educating children in needy/weaker section, services in hospitals, NGO's and other such work i.e. social work at villages adopted by respective institute/ college.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Analyze Basic Guidelines, Content and Process for Value Education.

CO2: Understanding Harmony in the Human Being - Harmony in Myself.

CO3: Understand Harmony in the Family and Society- Harmony in Human-Human Relationship. Recollect and narrate an incident in your life.

CO4: Understand Harmony in the Nature and Existence – Whole existence as Coexistence. Summarize the core massage of this course grasped by you.

CO5: List ac and Implicate the above Holistic Understanding of Harmony on Professional Ethics. Natural acceptance of human values.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom's Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L4	-	-	-	-	L	L	M	H	L	M	-	L	M	L
CO2	L2	-	-	-	-	-	L	M	M	M	M	-	L	M	M
CO3	L2	-	-	-	-	L	L	M	H	L	M	-	L	M	M
CO4	L2	-	-	-	-	L	L	L	M	M	L	L	H	M	L
CO5	L1	-	-	-	-	L	M	M	H	L	M	-	L	M	L

H- High, M- Moderate, L- Low, '-' for No correlation

BTESC 209: Manufacturing Practices Workshop

Course Objectives:

- To discuss the modules include training on different trades like Fitting, Carpentry and Casting
- To learn various joints are made using wood andother metal pieces.
- To develop machining skills in students.

Carpentry Shop

1. T – Lap joint
2. Bridle joint

Foundry Shop

3. Mould of any pattern
4. Casting of any simple pattern

Welding Shop

5. Lap joint by gas welding
6. Butt joint by arc welding
7. Lap joint by arc welding
8. Demonstration of brazing, soldering & gas cutting

Machine Shop Practice

9. Job on lathe with one step turning and chamfering operations

Fitting and Sheet Metal Shop

10. Finishing of two sides of a square piece by filing
11. Making mechanical joint and soldering of joint on sheet metal
12. To cut a square notch using hacksaw and to drill a hole and tapping

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Describe cast different parts through Carpentry.

CO2: Define control manufacturing via computers.

CO3: Understanding use power tools and fitting tools.

CO4: Knowledge of various welding operations

CO5: Understanding different metallic and non-metallic objects.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcome	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO1	L2	H	L	L	L	L	-	-	-	L	L	-	L	H	M
CO2	L2	H	M	L	M	M	-	-	-	-	M	-	L	M	L
CO3	L2	H	M	L	M	M	-	-	-	-	M	-	L	H	M
CO4	L2	H	M	L	M	M	-	L	-	L	M	-	L	H	M
CO5	L2	H	M	L	M	M	-	L	-	L	M	-	L	M	M

H- High, M- Moderate, L- Low, '-' for No correlation

BTESC210A Basic Electrical Engineering Lab

Course Objectives:

- To understandtraining on different trades like Fitting, Carpentry and Casting
- To learn various joints are made using wood andother metal pieces.
- To develop machining skills in students.

List of Experiments

1. Basic safety precautions. Introduction and use of measuring instruments –voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitorsand inductors.
2. Transformers: Observation of the no-load current waveform on anoscilloscope. Loading of a transformer: measurement of primary andsecondary voltages and currents, and power.
3. Three-phase transformers: Star and Delta connections. Voltage and Currentrelationships (line-line voltage, phase-to-neutral voltage, line and phasecurrents).Phase-shifts between the primary and secondary side.
4. Demonstration of cut-out sections of machines: dc machine (commutate orbrusharrangement), induction machine (squirrel cage rotor), synchronous(field winging - slip ring arrangement) and single-phase induction
5. Torque Speed Characteristic of separately excited dc motor.
6. Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform (c) the use of dc-ac converter for speed control of an induction motor and (d)Components of LT switchgear.

Course Outcomes:

At the end of the course, the student will be able to:

CO1. Adapt knowledge regarding the various laws and principles associated with electrical systems.

CO2: Adapt knowledge regarding electrical machines and apply them for practical problems.

CO3: Understand various types' Electrical Equipments.

CO4: Understanding digital measuring equipments.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom's Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L3	H	M	M	M	M	-	-	-	-	M	-	L	H	M
CO2	L3	L	M	H	M	M	-	-	-	-	M	-	M	M	M
CO3	L2	M	H	H	H	M	-	-	-	-	H	-	M	H	H
CO4	L2	H	L	M	L	M	-	-	-	-	L	-	L	H	M

H- High, M- Moderate, L- Low, '-' for No correlation

BTESC 210B: Basic Civil Engineering Lab

Course Objective(s):

- To Introduce The Various Activities Regarding Measurement And Leveling
- To Water Supply Procedure And Various Discharge And Pressure Measuring Apparatuses

LIST OF EXPERIMENTS:

1. Linear Measurement by Tape:
   a) Ranging and Fixing of Survey Station along straight line and across obstacles.
   b) Laying perpendicular offset along the survey line
2. Compass Survey: Measurement of bearing of linesusing Surveyor's and Prismatic compass
3. Levelling: Using Tilting/ Dumpy/ Automatic Level
   a) To determine the reduced levels in closed circuit.
   b) To carry out profile levelling and plot longitudinal and cross sections for road by Height of Instrument and Rise & Fall Method.
4. To study and take measurements using various electronic surveying instruments like EDM, Total Station etc.
5. To determine pH, hardness and turbidity of the given sample of water.
6. To study various water supply Fittings.
7. To determine the pH and total solids of the given sample of sewage.
8. To study various Sanitary Fittings.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Conduct survey and collect field data.

CO2: Review field notes from survey data.

CO3: Interpret survey data and compute areas and volumes.

CO4: Describe Total station and measurement

CO5: Describe various water fittings and find out the various fluids properties

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom's Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L4	H	L	L	L	H	M	L	-	L	L	-	M	H	M
CO2	L2	H	M	M	M	-	M	L	-	L	M	-	L	M	L
CO3	L4	M	H	M	H	H	M	H	-	L	H	-	L	L	H
CO4	L2	M	H	M	H	H	M	H	-	L	H	-	L	-	M
CO5	L2	M	M	L	H	M	M	-	-	L	H	-	H	L	L

H- High, M- Moderate, L- Low, '-' for No correlation

BTESC 211: Computer Aided Machine Drawing

Course Objective:

- To design, develop and analyze simple linear and non linear computer based drawing.
- To identify and apply the suitable knowledge of computers to understand the shape and size of Drawing Objects.

Syllabus

Introduction: Principles of drawing, conventional representation of machine components and materials, lines, types of lines, dimensioning types, rules ofdimensioning.

Conversion of pictorial views into orthographic views: (1 drawing sheet)Introduction to orthographic prdcojection, concept of first angle and third angleprojection, drawing of simple machine elements in first angle projection, missingview problems covering Principles of Orthographic Projections.

Sectional views of mechanical components: (1 drawing sheet) Introduction,cutting plane line, type of sectional views-full section, half section, partial orbroken section, revolved section, removed section, offset section, sectioningconventions-spokes, web rib, shaft, pipes, different types of holes, conventions ofsection lines for different metals and materials.

Fasteners and other mechanical components: (Free hand sketch) Temporaryand permanent fasteners, thread nomenclature and forms, thread series,designation, representation of threads, bolted joints, locking arrangement of nuts,screws, washers, foundation bolts etc., keys, types of keys, cotter and knucklejoints. Riveted joints, rivets and riveting, type of rivets, types of riveted joints etc.Bearing: Ball, roller, needle, foot step bearing. Coupling: Protected type, flange, andpin type flexible coupling. Other components: Welded joints, belts and pulleys,pipes and pipe joints, valves etc.

Overview of Computer Graphics: (2 drawing sheets) Covering theory of CADsoftware such as: The menu System, Toolbars (Standard, Object Properties, Draw,Modify and Dimension), Drawing Area (Background, Crosshairs, CoordinateSystem), Dialog boxes and windows, Shortcut menus (Button Bars), CommandLine (Where applicable), The Status Bar, Different methods of zoom as used inCAD, Select and erase objects.: Isometric Views of Lines, Planes, Simple andcompound Solids.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Understand the conventions and the method of engineering drawing.

CO2: Interpret engineering drawings using fundamentals of different views to construct basic and intermediate geometry.

CO3: Adapt theory of sectioning and Section of Solids.

CO4: Classify the theory of projection.

CO5: Understand drawing skill in the form of Computer Graphics.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	H	L	L	L	L	-	-	-	L	L	-	L	L	M
CO2	L4	H	L	H	L	L	-	-	-	-	L	-	L	L	L
LCO3	L3	H	H	H	H	L	-	-	-	-	H	-	L	L	M
CO4	L4	H	M	H	M	L	-	-	-	L	M	-	L	M	L
CO5	L2	H	M	H	M	L	-	-	-	L	M	-	L	M	L

H- High, M- Moderate, L- Low, '-' for No correlation

BTCSSODECA 212: Social Outreach, Discipline & Extra Curricular Activities

Course Objectives:

- To allowing students to explore strengths and talents outside of academics.
- To helping students develop stronger time-management and organizational skills.
- To giving students the opportunity to build friendships and participate in group activities outside of the tight circle of the regular classroom.
- To helping to build confidence and self-esteem.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Develop their self-confidence, leadership qualities, and their responsibilities towards the community.

CO2: Have an impact on academic development, personal development, and civic responsibility

CO3: Understand the value of Social Work.

CO4: Understand the Significance of Discipline in student's Life

CO5: Contribute towards in social up-gradation by social organization like, Art of Living, Yoga etc., Blood donation, Awareness programs, personality development programs,

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcome	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	P0 11	PO 12	PS O1	PS O2
CO1	L2	-	-	-	-	-	M	L	M	M	-	-	-	-	-
CO2	L4	-	-	-	-	-	M	M	M	L	-	-	-	-	-
CO3	L1	-	-	-	-	-	M	L	M	L	-	-	-	-	-
CO4	L2	-	-	-	-	-	M	M	M	M	-	-	-	-	-
CO5	L2	-	-	-	-	-	M	M	L	M	-	-	-	-	-

H- High, M- Moderate, L- Low, '-' for No correlation

Semester –III

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	**L**	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCSBSC301	Advanced Engineering Mathematics	3	-	-	30	70	100	3
BTCSHSMC302	Managerial Economics and Financial Accounting	2	-	-	30	70	100	2
BTCSESC303	Digital Electronics	3	-	-	30	70	100	3
BTCSPCC 304	Data Structures and Algorithms	3	-	-	30	70	100	3
BTCSPCC 305	Object Oriented Programming	3	-	-	30	70	100	3
BTCSPCC 306	Software Engineering	3	-	-	30	70	100	3
BTCSPCC 307	Data Structures and Algorithms Lab	-	-	2	30	20	50	1
BTCSPCC 308	Object Oriented Programming Lab	-	-	2	30	20	50	1
BTCSPCC 309	Software Engineering Lab	-	-	2	30	20	50	1
BTCSPCC 310	Digital Electronics Lab	-	-	2	30	20	50	1
BTCSPSIT 311	Industrial Training/ Seminar	-	-	-	-	-	50	1
BTCSSODECA 312	Social Outreach, Discipline & Extra Curricular Activities	-	-	-	-	-	50	1
	TOTAL	17	-	8	300	500	900	23

BTCSBSC301: Advanced Engineering Mathematics

Course Objectives:

- To introduce students with ordinary differential equations and the methods for solving these equations.
- To use differential equations as models for real world phenomena
- To integrate the knowledge accumulated in the calculus sequence to solve applied problems
- To introduce the fundamentals of Linear Algebra and Complex Analysis
- To provide a rigorous introduction to upper level mathematics which is necessary for students of engineering, physical sciences and mathematics

Unit-1

Random Variables:

Discrete and Continuous random variables, Joint distribution, Probability distribution function, conditional distribution.

Mathematical Expectations: Moments, Moment Generating Functions, variance and correlation coefficients, Chebyshev's Inequality, Skewness and Kurtosis.

Unit-2

Binomial distribution, Normal Distribution, Poisson Distribution and their relations, Uniform Distribution, Exponential Distribution.: Karl Pearson's coefficient, Rank correlation. Curve fitting. Line of Regression.

Unit-3

Historical development, Engineering Applications of Optimization, Formulation of Design Problems as a Mathematical Programming Problems, Classification of Optimization Problems

Unit-4

Cassical Optimization using Differential Calculus: Single Variable and Multivariable Optimization with & without Constraints, Langrangian theory, Kuhn Tucker conditions

Unit-5 Linear Programming: Simplex method, Two Phase Method and Duality in Linear Programming. Application of Linear Programming: Transportation and Assignment Problems.

References Books:

1. Advanced Engineering Mathematicsby Erwin Kreyszig.
2. Advanced Engineering Mathematicsby Dennis G Zill and Warren S Wright.
3. Advance Engineering Mathematicsby Zill D G
4. Advanced Engineering Mathematics by Jain R K

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Acquire knowledge about Fourier series

CO2: Understand Laplace's equation in two dimensions

CO3: Know the Functions of a complex variable

CO4: Know Z Transforms.

CO5: Gain the knowledge about boundary value problems.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L1	M	M	H	M	-	L	-	-	-	M	-	L	L	M
CO2	L2	M	M	M	M	M	-	-	-	-	M	-	L	L	M
CO3	L1	M	M	L	M	M	-	-	-	-	L	-	L	M	M
CO4	L1	M	M	M	M	M	-	-	-	-	M	-	L	L	M
CO5	L1	H	H	H	H	L	M	-	-	-	L	-	L	M	L

BTCSHSMC302: Managerial Economics and Financial Accounting

Course Objective:-

- To discuss the economic concepts, theories, tools, and methodologies to solve practical problems in a business.
- To provide the student with basic understanding of financial accounting that can be used in decision making techniques.

UNIT -1

Basic economic concepts-Meaning, nature and scope of economics,deductive vs inductive methods, static and dynamics, Economicproblems: scarcity and choice, circular flow of economic activity, nationalincome-concepts and measurement.

UNIT -2

Demand and Supply analysis-Demand-types of demand, determinants of demand, demand function, elasticity of demand, demand forecasting – purpose, determinants and methods, Supply-determinants of supply, supply function, elasticity of supply.

UNIT- 3

Production and Cost analysis-Theory of production- production function, law of variable proportions, laws of returns to scale, production optimization, least cost combination of inputs, isoquants. Cost concepts explicit and implicit cost, fixed and variable cost, opportunity cost, sunk costs, cost function, cost curves, cost and output decisions, cost estimation

UNIT -4

Market structure and pricing theory-Perfect competition, Monopoly, Monopolistic competition, Oligopoly.

UNIT- 5

Financial statement analysis-Balance sheet and related concepts, profit and loss statement and related concepts, financial ratio analysis, cash flow analysis, funds-flow analysis, comparative financial statement, analysis and interpretation of financial statements, capital budgeting techniques.

Text Books

1. Managerial Economics and Financial Accounting, M. KASI REDDY, S. SARASWATHI, PHI Learning Pvt. Ltd

2. Managerial Economics and Financial Accounting, Prof. B.K. Garg,Dr. Surabhi Garg, Dr.Kusumlata Bhardwaj , Ashirwad Publication, ISBN- 9788193796207

Reference Books:

1. Managerial Economics, R.L.Varshney & K.L Maheswari",. 5th Edition, S.Chand Publishers,
2. Managerial Economics And Financial Analysis, Kumar, P. Vijaya & Rao

Course Outcomes:

At the end of the course, the student will be able to:

CO1. Understand the conceptual knowledge of accounting

CO2. Sharpen the analytical skills through integrating their knowledge of economic theories with decision making techniques.

CO3. Analyze different market structures and pricing theories.

CO4. Discuss the accounting process and preparation of final accounts of sole trader

CO5. Understand the mechanism of demand and supply.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	-	-	-	-	-	-	-	-	-	L	M	L	L	M
CO2	L3	-	-	-	-	-	-	-	L	L	-	M	M	L	L
CO3	L4	-	L	L	-	-	L	-	M	-	L	H	M	M	L
CO4	L5	-	-	-	-	-	-	-	L	L	-	M	M	L	M
CO5	L2	-	L	L	-	-	M	-	L	-	-	M	M	M	L

H- High, M- Moderate, L- Low, '-' for No correlation

BTCSESC 303 : Digital Electronics

Course Objectives:

- To Convert different type of codes and number systems which are used in digital transmission and computer systems.
- To Apply the codes and number systems converting circuits and Compare different types of logic families which are the basic unit of different types of logic gates in the domain of economy,performance and efficiency.
- To Analyze different types of digital electronic circuit using various mapping and logical tools and know the techniques to prepare the most simplified circuit using various mapping andmathematical methods.
- To Design different types of with and without memory element digital electronic circuits for particular operation, within the real time of economic, performance, efficiency, user friendly and environmental constraints.
- To Assess the nomenclature and technology in the area of various memory devices used and apply the memory devices in different types of digital circuits for real world application.

Unit-1

Fundamental concepts: Number systems and codes, Basic logic Gates and Boolean algebra:Sign & magnitude representation, Fixed point representation,complement notation, various codes & arithmetic in different codes &their inter conversion. Features of logic algebra, postulates of Booleanalgebra. Theorems of Boolean algebra.

Unit-2

Minimization Techniques and Logic Gates: Principle of Duality - Boolean expression - Minimization of Booleanexpressions — Minterm – Maxterm - Sum of Products (SOP) – Productof Sums (POS) – Karnaugh map Minimization – Don't care conditions– Quine - McCluskey method of minimization.

Unit-3

Digital Logic Gate Characteristics:

TTL logic gate characteristics. Theory & operation of TTL NAND gatecircuitry. Open collector TTL. Three state output logic. TTLsubfamilies. MOS& CMOS logic families. Realization of logic gates inRTL, DTL, ECL, C-MOS & MOSFET.

Unit-4

Combinational Circuits:

Combinational logic circuit design, adder, subtractor, BCD adder,encoder, decoder, BCD to 7-segment decoder, multiplexer,demultiplexer.

Unit-5

Sequential Circuits:

Latches, Flip-flops - SR, JK, D, T, and Master-Slave Characteristictable and equation, counters and their design, Synchronous counters– Synchronous Up/Down counters – Programmable counters – Statetable and state transition diagram ,sequential circuits designmethodology. Registers –shift registers.

Textbooks/References:

- M. Morris Mano: Digital Logic and Computer Design, PHI, India
- Malvino and Leach: Digital Principles
- Tocci R.J., Digital Systems- Principles & Applications, PHI 1997
- loyd, Digital Fundamentals, PHI, 1997
- Salivahanan A, Digital Circuit and Design, TMH

Course Outcomes:

At the end of the course, the student will be able to:

CO1. Understand working of logic families and logic gates.

CO2. Design and implement Combinational and Sequential logic circuits.

CO3. Classification and characteristics of memories

CO4. Understand the process of Analog to Digital conversion and Digital to Analog Conversion

CO5. Use PLDs to implement the given logical problem

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	H	L	H	M	-	L	M	-	L	M	-	M	M	M
CO2	L6	H	L	M	L	M	-	-	-	M	L	-	M	M	M
CO3	L4	H	M	L	M	M	-	M	-	H	M	-	M	M	M
CO4	L2	M	L	M	L	M	-	-	-	M	L	-	M	H	M
CO5	L3	H	H	H	H	L	L	L	-	L	H	-	L	H	M

BTCSPCC 304 : Data Structures and Algorithms

Course objectives:

- To impart the basic concepts of data structures and algorithms.
- To understand concepts about searching and sorting techniques.
- To understand basic concepts about stacks, queues, lists, trees and graphs.
- To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures.

Unit-1

Stacks: Basic Stack Operations, Representation of a Stack using StaticArray and Dynamic Array, Multiple stack implementation using singlearray, Stack Applications: Reversing list, Factorial Calculation, Infix topostfix Transformation, Evaluating Arithmetic Expressions and Towersof Hanoi.

Unit-2

Queues: Basic Queue Operations, Representation of a Queue usingarray, Implementation of Queue Operations using Stack, Applicationsof Queues- Round Robin Algorithm. Circular Queues, DeQueue PriorityQueues.

Linked Lists: Introduction, single linked list, representation of a linkedlist in memory, Different Operations on a Single linked list, Reversing asingle linked list, Advantages and disadvantages of single linked list,circular linked list, double linked list and Header linked list.

Unit-3

Searching Techniques: Sequential and binary search. SortingTechniques: Basic concepts, Sorting by: bubble sort, Insertion sort,selection sort, quick sort, heap sort; merge sort, radix sort and countingsorting algorithms.

Unit-4

Trees: Definition of tree, Properties of tree, Binary Tree, Representationof Binary trees using arrays and linked lists, Operations on a BinaryTree, Binary Tree Traversals (recursive), Binary search tree, B-tree , B+tree, AVL tree, Threaded binary tree.

Unit-5

Graphs: Basic concepts, Different representations of Graphs, GraphTraversals (BFS & DFS), Minimum Spanning Tree(Prims &Kruskal),Dijkstra's shortest path algorithms. Hashing: Hash function, Addresscalculation techniques, Common hashing functions, Collisionresolution: Linear and Quadratic probing, Double hashing.

Textbooks/References:

- Schaum Series, "Introduction *to Data Structures*", TMH.
- R.B. Patel, "*Expert Data Structures with C*", Second Edition, Khanna Book publishing Co (P) Ltd.
- Tenenbaum, "*Data Structure using C++*", PHI.
- Chattopadhyay S., Dastidar d G.and Chattopadhyay Matangini., "*Data Structure through C language*", BPB publications.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Analyze the algorithms to determine the time and Computation complexity and justify the correctness.

CO2: implement given Search problem (Linear Search and Binary Search).

CO3: Implement Stack and Queue and analyze the same to determine the time and computation complexity.

CO4: Write an algorithm Selection Sort, Bubble Sort, Insertion Sort, QuickSort, Merge Sort, Heap Sort and compare their performance in term of Space and Timecomplexity.

CO5: Implement Graph search and traversal algorithms and determine the time and computation complexity.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO1	L4	H	H	H	H	-	L	-	-	L	M	-	L	M	M
CO2	L3	H	H	M	H	M	-	-	-	L	M	-	M	H	L
CO3	L3	H	M	L	M	M	-	-	-	L	M	M	L	M	M
CO4	L6	M	H	M	H	M	L	-	-	L	M	M	M	H	M
CO5	L3	H	M	H	M	L	L	-	-	L	M	M	L	H	L

BTCSPCC305 : Object Oriented Programming

Course Objective:

- To Perform object oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O. and other standard language constructs.
- To Demonstrate adeptness of object oriented programming in developing solutions to problems demonstrating usage of data abstraction, encapsulation, and inheritance.
- To Demonstrate ability to implement one or more patterns involving realization of an abstract interface and utilization of polymorphism in the solution of problems which can take advantage of dynamic dispatching.
- To Learn syntax, features of, and how to utilize the Standard Template Library. Learn other features of the C++ language including templates, exceptions, forms of casting, conversions, covering all features of the language.

Unit-1

Introduction to different programming paradigm, characteristics of OOP, Class, Object, data member, member function, structures inC++, different access specifiers, defining member function inside andoutside class, array of objects.

Unit-2

Concept of reference, dynamic memory allocation using new and deleteoperators, inline functions, function overloading, function with defaultarguments, constructors and destructors, friend function and classes,using this pointer.

Unit-3

Inheritance, types of inheritance, multiple inheritance, virtual baseclass, function overriding, abstract class and pure virtual function

Unit-4

Constant data member and member function, static data member andmember function, polymorphism, operator overloading, dynamic bindingand virtual function

Unit-5

Exception handling, Template, Stream class, File handling.

Textbooks/References:

- E. Balagurusamy, Object Oriented programming, Tata McGraw Hill.
- K R Venugopal, Rajkumar, T Ravishankar, Mastering C++, Tata McGraw Hill.
- C. Thomas Wu, An Introduction to OOP with Java, McGraw Hill.
- Timothy Wood, An Introduction to Object Oriented Programming, Addison Wesley.
- John R. Hubbard, Programming with C++, McGraw Hill International.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Understand the features of C++ supporting object oriented programming.

CO2: Understand the relative merits of C++ as an object oriented programming language.

CO3: Understand how to produce object-oriented software using C++.

CO4: Understand how to apply the major object-oriented concepts to implement object oriented programs in C++, encapsulation, inheritance and polymorphism.

CO5: Understand advanced features of C++ specifically stream I/O, templates and operator Overloading.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	H	M	H	M	H	-	-	-	L	M	L	L	L	L
CO2	L2	H	M	M	M	M	-	-	-	L	M	-	M	M	L
CO3	L2	H	M	L	M	M	-	-	-	L	M	L	L	M	L
CO4	L2	M	M	M	M	M	L	-	-	L	M	-	M	L	M
CO5	L2	H	M	H	H	L	L	-	-	L	M	-	L	M	L

BTCSPCC 306 : Software Engineering

Course Objectives:

- To help students to develop skills that will enable them to construct software of high quality – software that is reliable, and that is reasonably easy to understand, modify and maintain.
- To foster an understanding of why these skills are important.

Unit-1

Introduction, software life-cycle models, software requirements specification, formal requirements specification, verification and validation.

Unit-2

Software Project Management: Objectives, Resources and theirestimation, LOC and FP estimation, effort estimation, COCOMOestimation model, risk analysis, software project scheduling.

Unit-3

Requirement Analysis: Requirement analysis tasks, Analysis principles.Software prototyping and specification data dictionary, Finite StateMachine (FSM) models. Structured Analysis: Data and control flowdiagrams, control and process specification behavioral modeling

Unit-4

Software Design: Design fundamentals, Effective modular design: Dataarchitectural and procedural design, design documentation.

Unit-5

Object Oriented Analysis: Object oriented Analysis Modeling, Datamodeling. Object Oriented Design: OOD concepts, Class and objectrelationships, object modularization, Introduction to Unified ModelingLanguage.

Text/ Reference Books:

- R. S. Pressman, "Software Engineering – A practitioner's approach", McGraw Hill Int. Ed.
- I. Sommerville, "Software Engineering", Addison Wesley, 2004
- Rajib Mall, "Fundamental of Software Engineering", 3rd Edition, PHI Learning Private Limited
- K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers
- K. K. Aggarwal & Yogesh Singh, "Software Engineering", 2nd Ed., New Age International, 2005.
- James Peter, W. Pedrycz, "Software Engineering: An Engineering Approach", John Wiley & Sons.
- Pankaj Jalote, "An Integrated Approach to Software Engineering", Narosa, 3rd Ed., 2005.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Understand large scale software development from a broader perspective, and function in multidisciplinary teams.

CO2: Apply knowledge gained in the course to practical software development situations.

CO3: Design software systems to meet desired needs with realistic constraints.

CO4: Describe software development activities.

CO5: Discuss contemporary issues in Software development and engage in life-long learning, understand professional and ethical responsibility

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	H	M	H	M	-	-	-	-	L	L	L	M	H	M
CO2	L3	H	L	M	L	M	-	-	-	M	L	L	M	M	H
CO3	L6	H	M	L	M	M	-	-	-	H	M	-	M	M	M
CO4	L2	M	L	M	L	M	-	-	-	M	L	L	M	H	M
CO5	L2	H	H	H	H	L	-	-	-	M	L	L	L	M	H

BTCSPCC 307: Data Structures and Algorithms Lab

Course Objectives:

1 To impart the basic concepts of data structures and algorithms.

2 To understand concepts about searching and sorting techniques.

3 To Understand basic concepts about stacks, queues, lists, trees and graphs.

List of Experiments:

S.No.	***List of Exercises***
1	Write a program to insert an element at desire position in the array.
2	Write a program to delete an element at desire position from the array.
3	Write a program to replace an element at desire position in the array.
4	Write a program to search (linear search) an element in the array.
5	Write a program to search (binary search) an element in the array.
6	Write a program to addition and multiply of two matrices.
7	Write a program to implementation of stack using array.
8	Write a program to implementation of queue using array.
9	Write a program to implementation link list.
10	Write a program that sorts the array through Bubble sort.
11	Write a program that sorts the array through Quick sort.
12	Write a program that sorts the array through Merge sort.
13	Write a program that sorts the array through Insertion sort.
14	Write a program to BST (binary search tree) addition, deletion and searching.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Select appropriate data structures as applied to specified problem definition.

CO2: Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.

CO3: Implement Linear and Non-Linear data structures.

CO4: Implement appropriate sorting/searching technique for given problem.

CO5: Determine and analyze the complexity of given Algorithms.

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L1	H	M	H	M	M	-	-	-	L	M	L	L	M	L
CO2	L3	M	M	H	M	L	-	-	-	-	M	L	M	M	L
CO3	L3	M	M	H	M	L	-	-	-	L	M	-	L	H	M
CO4	L3	H	L	H	L	L	-	-	-	-	L	-	M	M	M
CO5	L4	H	M	H	M	M	-	-	-	M	M	L	L	M	L

BTCSPCC 308 : Object Oriented Programming Lab

Course Objective:

- To Perform object oriented programming for develop solutions to problems, demonstrating usage of control structures, modularity, I/O and other standard language constructs.
- To Demonstrate adeptness of object oriented programming in developing solutions to problems demonstrating usage of data abstraction, encapsulation, and inheritance.

List of Experiments :

1 Understand the basics of C++ library, variables, data input-output.

2 C++ program using with the concept of structures.

3 Implement class and object concepts and function overloading.

4 Write programs to understand dynamic memory allocation and array of objects.

5 Program to understand different types of constructors and destructor.

6. Implement friend function to access private data of a class and usage of this Pointer.

7.Write programs to understand the usage of constant data member and memberfunction, static data member and member function in a class.

8.Implement different types of inheritance, function overriding and virtual function

9.Implement Operator overloading concepts.

10 .Write programs to understand function template and class template.

11.Write programs to understand exception handling techniques.

12.Write programs to understand file handling techniques.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Understand the features of C++ supporting object oriented programming.

CO2: Understand the relative merits of C++ as an object oriented programming language.

CO3: Understand how to produce object-oriented software using C++.

CO4: Understand how to apply the major object-oriented concepts to implement object oriented programs in C++, encapsulation, inheritance and polymorphism.

CO5: Understand advanced features of C++ specifically stream I/O, templates and operator overloading.

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	H	M	H	M	M	-	-	-	L	L	-	L	M	M
CO2	L2	M	M	H	M	L	-	-	-	M	L	-	L	M	M
CO3	L2	M	M	H	M	L	-	-	-	L	M	-	L	H	L
CO4	L2	H	H	H	H	-	-	-	-	M	M	-	L	M	M
CO5	L2	H	M	H	M	M	-	-	-	M	L	-	L	M	M

BTCSPCC 309 : Software Engineering Lab

Course Objective:

- To help students to develop skills that will enable them to construct software of high quality software that is reliable and reasonably also easy to understand, modify and maintain.
- To foster an understanding of why these skills are important.

Tool Required: Rational Rose Enterprise Edition

List of Experiments:

1. Development of requirements specification, function oriented design usingSA/SD, object-oriented design using UML, test case design, implementationusing Java and testing. Use of appropriate CASE tools and other tools such asconfiguration management tools, program analysis tools in the software lifecycle.
2. Develop Software Requirements Specification (SRS) for a given problem in IEEE template.
3. Develop DFD model (level-0, level-1 DFD and Data dictionary) of the project.
4. Develop structured design for the DFD model developed.
5. Developed all Structure UML diagram of the given project.
6. Develop Behavior UML diagram of the given project.
7. Manage file, using ProjectLibre project management software tool.

Course Outcomes:

At the end of the course, the student will be able to:

CO1. Create models for software applications.
CO2. Create DFD's for software applications.
CO3. Understand the different UML notations for designing software.

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L6	H	M	H	M	M	L	-	-	-	M	L	L	H	M
CO2	L6	M	M	H	M	M	L	-	-	-	M	L	M	H	M
CO3	L2	M	M	H	M	L	L	-	-	-	M	L	L	M	M

BTCSPCC 310 : Digital Electronics Lab

Course Objectives:

- Students will learn and understand the Basics of digital electronics and able to design basic logic circuits, combinational and sequential circuits.

List of Experiments:

1. To verify the truth tables of basic logic gates: AND, OR, NOR, NAND, NOR. Alsoto verify truth table of Ex-OR, Ex-NOR (For 2, 3, & 4 inputs using gateswith 2, 3,& 4 inputs).
2. To verify the truth table of OR, AND, NOR, Ex-OR, Ex-NOR realized usingNAND& NOR gates.
3. To realize an SOP and POS expression.
4. To realize Half adder/ Subtractor& Full Adder/ Subtractor using NAND & NORgatesand to verify their truth tables.
5. To realize a 4-bit ripple adder/ Subtractor using basic Half adder/ Subtractor&basic Full Adder/ Subtractor.
6. To verify the truth table of 4-to-1 multiplexer and 1-to-4 demultiplexer. Realizethe multiplexer using basic gates only. Also to construct and 8-to-1 multiplexerand 1-to-8 demultiplexer using blocks of 4-to-1 multiplexer and 1-to-4demultiplexer.
7. Design & Realize a combinational circuit that will accept a 2421 BCD code anddrive a TIL - 312 seven-segment display.
8. Using basic logic gates, realize the R-S, J-K and D-flip flops with and withoutclock signal and verify their truth table.
9. Construct a divide by 2,4& 8 asynchronous counter. Construct a 4-bit binarycounter and ring counter for a particular output pattern using D flip flop.
10. Perform input/output operations on parallel in/Parallel out and Serial in/Serialout registers using clock. Also exercise loading only one of multiple values intothe register using multiplexer. Note: As far as possible, the experiments shall beperformed on bread board. However, experiment Nos. 1-4 are to be performed onbread board only.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Convert different type of codes and number systems which are used in digital transmission and computer systems.

CO2: Apply the codes and number systems converting circuits and Compare different types of logic families which are the basic unit of different types of logic gates in the domain of economy, performance and efficiency.

CO3: Analyze different types of digital electronic circuit using various mapping and logical tools and know the techniques to prepare the most simplified circuit using various mapping and mathematical methods.

CO4: Design different types of with and without memory element digital electronic circuits for particular operation, within the real time of economic, performance, efficiency, user friendly and environmental constraints.

CO5: Assess the nomenclature and technology in the area of various memory devices used and apply the memory devices in different types of digital circuits for real world application.

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	H	M	H	M	M	-	-	-	-	L	-	L	H	M
CO2	L3	M	M	H	M	L	-	-	-	-	L	-	M	M	M
CO3	L4	M	M	H	M	L	-	-	-	-	M	-	L	H	M
CO4	L6	H	L	H	L	L	-	-	-	-	L	-	M	H	M
CO5	L5	H	M	H	M	M	-	-	-	-	M	-	L	M	M

BTCSPSIT 311: Industrial Training / Seminar

Course Objectives:

- To acquire and apply fundamental principles of engineering.
- To update with all the latest changes in technological world.
- To identify, formulate and model problems and find engineering solution based on a systems approach.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Capability to acquire and apply fundamental principles of engineering.

CO2: Become master in one's specialized technology

CO3: Become updated with all the latest changes in technological world.

CO4: Ability to identify, formulate and model problems and find engineering solution based on a systems approach.

Table: Mapping of Course Outcomes with Program Outcomes

Course Outcome	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	P011	PO 12	PSO1	PSO2
CO1	L2	M	H	L	H	L	-	-	-	-	L	-	L	M	M
CO2	L3	M	L	H	H	L	-	-	-	-	L	-	M	H	M
CO3	L6	M	H	M	M	L	-	-	-	-	L	-	M	M	M
CO4	L2	M	M	M	M	L	-	-	-	-	M	-	L	M	H

H- High, M- Moderate, L- Low, '-' for No correlation

BTCSSODECA 312: Social Outreach, Discipline & Extra Curricular Activities

Course Objectives:

- To allowing students to explore strengths and talents outside of academics.
- To helping students develop stronger time-management and organizational skills.
- To giving students the opportunity to build friendships and participate in group activities outside of the tight circle of the regular classroom.
- To helping to build confidence and self-esteem.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Develop their self-confidence, leadership qualities, and their responsibilities towards the community.

CO2: Have an impact on academic development, personal development, and civic responsibility

CO3: Understand the value of Social Work.

CO4: Understand the Significance of Discipline in student's Life

CO5: Contribute towards in social up-gradation by social organization like, Art of Living, Yoga etc., Blood donation, Awareness programs, personality development programs,

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcome	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	P0 11	PO 12	PS O1	PS O2
CO1	L2	-	-	-	-	-	M	L	M	M	-	-	-	-	-
CO2	L4	-	-	-	-	-	M	M	M	L	-	-	-	-	-
CO3	L1	-	-	-	-	-	M	L	M	L	-	-	-	-	-
CO4	L2	-	-	-	-	-	M	M	M	M	-	-	-	-	-
CO5	L2	-	-	-	-	-	M	M	L	M	-	-	-	-	-

H- High, M- Moderate, L- Low, '-' for No correlation

Semester -IV

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	L	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCSBSC 401	Discrete Mathematics Structure	3	1	0	30	70	100	4
BTCSHSMC 402	Technical Communication	3	0	0	30	70	100	3
BTCSESC 403	Microprocessor & Interfaces	3	0	0	30	70	100	3
BTCSPCC 404	Database Management System	3	0	0	30	70	100	3
BTCSPCC 405	Theory of Computation	3	1	0	30	70	100	4
BTCSPCC 406	Data Communication and Computer Networks	3	0	0	30	70	100	3
BTCSPCC 407	Microprocessor & Interfaces Lab	0	0	2	30	20	50	1
BTCSPCC 408	Database Management System Lab	0	0	2	30	20	50	1
BTCSPCC 409	Network Programming Lab	0	0	2	30	20	50	1
BTCSPCC 410	Linux Shell Programming Lab	0	0	2	30	20	50	1
BTCSPCC 411	Java Lab	0	0	2	30	20	50	1
BTCSSODECA 412	Social Outreach, Discipline & Extra Curricular Activities						50	1
	TOTAL	**18**	**2**	**10**	**330**	**520**	**900**	**26**

BTCSBSC401 : Discrete Mathematics Structure

Course Objectives:

- To introduce a number of Discrete Mathematical Structures (DMS) found to be serving as tools even today in the development of theoretical computer science.
- To solve problems occurred in the development of programming languages.
- To familiarize students with concepts and techniques of graph theory, and sets apart from languages of logic and proof methods.

Syllabus

Unit 1: **Introduction:**

Objective, scope and outcome of the course

Unit 2: **Set Theory:**

Definition of sets, countable and uncountable sets, Set operations, Partition of set, Cardinality (Inclusion- Exclusion & Addition Principles) Venn Diagrams, proofs of some general identities on sets.

Relation: Definition, types of relation, composition of relations, Pictorial representation of relation, Equivalence relation, Partial ordering relation, Job - Scheduling problem.

Function: Definition, type of functions, one to one, into and onto function, inverse function, composition of functions, recursively defined functions, pigeonhole principle. Theorem proving Techniques: Mathematical induction, Proof by contradiction. Composition of Functions. The Pigeonhole and Generalized Pigeonhole Principles.

Unit 3: **Propositional Logic:**

Proposition, First order logic, Basic logical operation, truth tables, tautologies, Contradictions, Algebra of Proposition, logical implications, logical equivalence, predicates, Normal Forms, Universal and existential quantifiers. 2 way predicate logic. Introduction to finite state machine Finite state machines as models of physical system equivalence machines, Finite state machines as language recognizers

Unit 4:

Posets, Hasse Diagram and Lattices: Introduction, ordered set, Hasse diagram of partially, ordered set, isomorphic ordered set, well ordered set, properties of Lattices, bounded and complemented lattices.

Combinatorics: Introduction, Permutation and combination, Binomial Theorem, Multimodal Coefficients Recurrence Relation and Generating Function: Introduction to Recurrence Relation and Recursive algorithms, linear recurrence relations with constant coefficients, Homogen

eous solutions, Particular solutions, Total solutions, Generating functions, Solution by method of generating functions.

Unit 5:

Algebraic Structures: Definition, Properties, types: Semi Groups, Monoid, Groups, Abelian group, properties of groups, Subgroup, cyclic groups, Cosets, factor group, Permutation groups, Normal subgroup, Homomorphism and isomorphism of Groups, example and standard results, Rings and Fields: definition and standard results

Unit 6:

Graph Theory: Introduction and basic terminology of graphs, Planer graphs, Multigraphs and weighted graphs, Isomorphic graphs, Paths, Cycles and connectivity, Shortest path in weighted graph, Introduction to Eulerian paths and circuits, Hamiltonian paths and circuits, Graph coloring, chromatic number, Isomorphism and Homomorphism of graphs, matching, vertex/edge covering

References:

1. Richard, Johnsonbaugh (2000) *Discrete Mathematics*, Prentice Hall , NJ.
2. Epp, Susanna (1996) *Discrete Mathematics with Applications*, Brooks Cole , Pacific Grove, CA.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Recognize the random variables, Find mean, variance and learned some discrete and continuous probability distributions with practical exposure.

CO2: Understand the all distributions .Acquainted with the principle of least squares method for fitting the curve to the given data points.

CO3: Understanding how solve and analyzing problems using linear programming and other mathematical programming algorithms.

CO4: Understand classical optimization using differential calculus.

CO5: Understand the application of Linear programming like Transportation and Assignment problem.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	H	L	H	L	-	-	-	-	-	L	-	L	M	L
CO2	L2	H	L	M	L	M	-	-	-	-	L	-	L	L	L
CO3	L2	H	M	L	M	M	-	-	-	-	M	-	L	L	M
CO4	L2	M	L	M	L	M	-	-	-	-	L	-	L	L	L
CO5	L2	H	H	H	H	L	-	-	-	-	H	-	L	M	L

BTCSHSMC402 : Technical Communication

Course Objectives: -

- To understand the characteristics of technical writing
- To understandcomplex engineering ideas for targeted audiences.
- To understand the advance technical writing in professional documents.
- To write effective technical and business documents that are grammatically and stylistically correct

Detailed Contents

UNIT1

Introduction to Technical Communication- Definition of technical communication, Aspects of technical communication, forms of technical communication, importance of technical communication, technical communication skills (Listening, speaking, writing, reading writing), linguistic ability, style in technical communication.

UNIT 2

Comprehension of Technical Materials/Texts and Information Design & development- Reading of technical texts, Reading andcomprehending instructions and technical manuals, Interpreting andsummarizing technical texts, Note-making. Introduction of differentkinds of technical documents, Information collection, factors affectinginformation and document design, Strategies for organization,Information design and writing for print and online media.

UNIT 3

Technical Writing, Grammar and Editing- Technical writing process, forms of technical discourse, Writing, drafts and revising, Basics of grammar, common error in writing and speaking, Study of advanced grammar, Editing strategies to achieve appropriate technical style, Introduction to advanced technical communication. Planning, drafting and writing Official Notes, Letters, E-mail, Resume, Job Application, Minutes of Meetings.

UNIT4

Technical Reports, types of technical reports, Characteristics and formats and structure of technical reports. Technical Project Proposals, types of technical proposals,

UNIT 5

Advanced Technical Writing- Characteristics and formats and structure of technical proposals. Technical Articles, types of technical articles, Writing strategies, structure and formats of technical articles.

Text/Reference Books:

1. David F. Beer and David McMurrey, Guide to writing as an Engineer, John Willey. New York, M004

2. M. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, M003. (ISBN 031M406843)

3. Shiv Khera, You Can Win, Macmillan Books, New York, M003.

4. Raman Sharma, Technical Communications, Oxford Publication, London, M004.

5. Dale Jungk, Applied Writing for Technicians, McGraw Hill, New York, M004. (ISBN: 078M8357-4)
6. Sharma, R. and Mohan, K. Business Correspondence and Report Writing, TMH New Delhi M00M.
7. Xebec, Presentation Book, TMH New Delhi, M000. (ISBN 040MM13)

Course Outcomes:

At the end of the course, the student will be able to:

CO1 :- Understand basic communication skills used in technical areas.

CO2 :- Understand technical materials, texts and information design & development.

CO3:- Adapt an effective oral presentation, displaying the ability to engage the audience by employing a suitable delivery style, appropriate language and quality visual aids.

CO4:-Interpret Technical Reports and its types & features

CO5:- Understand thestructure and formats of technical articles and proposals

Table: Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	-	-	-	-	L	L	-	-	L	M	L	H	M	M
CO2	L2	-	-	-	-	M	L	-	-	L	M	L	H	L	M
CO3	L3	-	-	-	-	L	L	-	-	L	M	L	H	M	M
CO4	L4	-	-	-	-	L	L	-	-	L	M	L	H	L	M
CO5	L2	-	-	-	-	M	L	-	-	L	M	L	M	M	L

H- High, M- Moderate, L- Low, '-' for No correlation

BTCSESC 403: Microprocessor & Interfaces

Course Objectives:

- To understand the various fundamentals of microprocessor including 16-bit and 32-bit microcontrollers
- To understand the 8085 Architecture and timing diagrams and execution cycles.
- To understand the 8051, 8255 etc. Architecture and timing diagrams and execution cycles.
- To know the various instructions used in programming, and about external communication interface.

Unit 1: **Introduction:** Objective, scope and outcome of the course.

Unit 2: Introduction to Microprocessors, microcontroller; 8085 Microprocessor Architecture, pin description, Bus concept and organization; concept of multiplexing and de-multiplexing of uses; concept of static and dynamic RAM, type of ROM, memory map.

Unit 3: Software architecture registers and signals, Classification of instruction, Instruction set, addressing modes, Assembly Language Programming and Debugging, Programming Technique, instruction Format and timing.

Unit 4: Advance Assembly Language Programming, Counter and time delay; types of Interrupt and their uses, RST instructions and their uses, 8259 programmable interrupt controller; Macros, subroutine; Stack -implementation and uses with examples; Memory interfacing.

Unit 5: 8085 Microprocessor interfacing:, 8255 Programmable Peripheral Interface, 8254 programmable interval timer, interfacing of Input/output device, 8279 Key board/Display interface.

Unit 6 : Microprocessor Application: Interfacing scanned multiplexed display and liquid crystal display, Interfacing and Matrix Keyboard, MPU Design; USART 8251,RS232C and RS422A, Parallel interface- Centronics and IEEE 488.

References:

1. Ramesh.S.Gaonkar "Microprocessor architecture, programming & applications with 8085.

2.Kenneth J.Ayala "The 8051 Microcontroller Architecture, Programming & Applications"-Penram International publishing.

3.D.V.Hall "Microprocessor and Digital system"-McGraw Hill Publishing Company.

4 .Ajit Pal "Microprocessor Principles and Applications"-Tata McGraw Hill.

5.Kenneth "Microprocessor and programmed logic" PHI.

Course Outcomes:

At the end of the course, the student will be able to:

CO-1: Understand the architecture of microprocessor and concept of microcontroller.

CO-2: Know Concept of assembly language programming.

CO-3: Know Concept of interfacing design of peripherals like I/O, A/D, D/A, timer, counter and memory devices etc.

CO-4: Develop systems using different microcontrollers

CO-5: Describe Synchronous and Asynchronous Communication. RS232, SPI, I2C, Stepper motor interfacing and its applications.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO 6	PO 7	PO 8	PO 9	PO1 0	P01 1	PO1 2	PSO 1	PSO 2
CO1	L 2	H	M	M	M	M	-	-	-	-	M	-	M	M	L
CO2	L 1	H	H	H	H	L	-	-	-	-	H	-	L	M	M
CO3	L 1	H	L	L	L	L	-	-	-	-	L	-	H	H	M
CO4	L 6	H	H	H	H	L	-	-	-	-	H	-	L	M	L
CO5	L 2	H	L	L	L	M	-	-	-	-	L	-	M	M	L

BTCSPCC 404 : Database Management System

Course objectives:

- To understand the different issues involved in the design and implementation of a database system.
- To study the physical and logical database designs, database modeling, relational, hierarchical, and network models
- To understand and use data manipulation language to query, update, and manage a Database
- To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency, distributed database, and intelligent database, Client/Server (Database Server), Data Warehousing.
- To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

UNIT I: Introduction: Objective, scope and outcome of the course.

UNIT II:Introduction to database systems: Overview and History of DBMS. File System v/s DBMS.Advantage of DBMS Describing and Storing Data in a DBMS.Queries in DBMS. Structure of a DBMS.

Entity Relationship model: Overview of Data Design Entities, Attributes and Entity Sets, Relationship and Relationship Sets. Features of the ER Model- Key Constraints, Participation Constraints, Weak Entities, Class Hierarchies, Aggregation, Conceptual Data Base, and Design with ER Model- Entity v/s Attribute, Entity vs Relationship Binary vs Ternary Relationship and Aggregation v/s ternary Relationship Conceptual Design for a Large Enterprise.

UNIT III: Relationship Algebra and Calculus: Relationship Algebra Selection and Projection, Set Operations, Renaming, Joints, Division, Relation Calculus, Expressive Power of Algebra and Calculus.

SQL queries programming and Triggers: The Forms of a Basic SQL Query, Union, and Intersection and Except, Nested Queries, Correlated Nested Queries, Set-Comparison Operations, Aggregate Operators, Null Values and Embedded SQL, Dynamic SQL, ODBC and JDBC, Triggers and Active Databases.

UNIT IV: Schema refinement and Normal forms: Introductions to Schema Refinement, Functional Dependencies, Boyce-Codd Normal Forms, Third Normal Form, Normalization-Decomposition into BCNF Decomposition into 3-NF.

UNIT V: Transaction Processing: Introduction-Transaction State, Transaction properties, Concurrent Executions. Need of Serializability, Conflict vs. View Serializability, Testing for Serializability, Recoverable Schedules, Cascadeless Schedules.

UNIT VI: Concurrency Control: Implementation of Concurrency: Lock-based protocols, Timestamp-based protocols, Validation-based protocols, Deadlock handling,

Database Failure and Recovery: Database Failures, Recovery Schemes: Shadow Paging and Log-based Recovery, Recovery with Concurrent transactions.

References:

1 Date C J, "An Introduction to Database System", Addision Wesley.
2 Korth, Silbertz, Sudarshan, "Database Concepts", McGraw Hill
3 Elmasri, Navathe, "Fundamentals of Database Systems", Addision Wesley
4 Leon & Leon, "Database Management System", Vikas Publishing House.
5 Bipin C. Desai, "An introduction to Database Systems", Galgotia Publication
6 Ramakrishnan, Gehrke, "Database Management System", McGraw Hill
7 Kroenke, "Database Processing: Fundamentals, Design and Implementation", Pearson.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Understand given query write relational algebra expressions for that query and optimize the developed expressions

CO2: Understand given specification of the requirement design the databases using E-R method and normalization.

CO3: Understand given specification construct the SQL queries for Open source and Commercial DBMS -MYSQL, ORACLE, and DB2.

CO4: Demonstrate given query optimize its execution using Query optimization algorithms

CO5: Discuss a given transaction-processing system, determine the transaction atomicity, consistency, isolation, and durability.

Course Outcomes	**Bloom Level**	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	P01 1	PO1 2	PSO 1	PSO 2
CO1	L2	H	L	M	L	H	-	-	-	L	L	L	M	M	M
CO2	L2	H	M	M	M	M	-	-	-	-	M	L	L	M	M
CO3	L2	H	L	M	L	H	-	-	-	-	L	L	M	M	M
CO4	L3	H	H	H	H	M	-	-	-	L	H	L	L	H	M
CO5	L2	H	H	M	H	M	-	-	-	L	H	M	L	H	M

Table: Mapping of Course Outcomes with Program Outcomes

BTCSPCC 405 : Theory of Computation

Course Objectives:

- To Develop a formal notation for strings, languages and machines.
- To Design finite automata to accept a set of strings of a language.
- To Prove that a given language is regular and apply the closure properties of languages.
- To Design context free grammars to generate strings from a context free language and convert them into normal forms.
- To Prove equivalence of languages accepted by Push Down Automata and languages generated by context free grammars
- To Identify the hierarchy of formal languages, grammars and machines.
- To Distinguish between computability and non-computability and Decidability and un-decidability.

UNIT I:Introduction: Objective, scope and outcome of the course.

UNIT II: Finite Automata & Regular Expression: Basic machine, Finite state machine, Transition graph, Transition matrix, Deterministic and nondeterministic finite automation, Equivalence of DFA and NDFA, Decision properties, minimization of finite automata, Mealy & Moore machines.

Alphabet, words, Operations, Regular sets, relationship and conversion between Finite automata and regular expression and vice versa, designing regular expressions, closure properties of regular sets, Pumping lemma and regular sets, Myhill- Nerode theorem , Application of pumping lemma, Power of the languages.

UNIT III: Context Free Grammars (CFG), Derivations and Languages, Relationship between derivation and derivation trees, leftmost and rightmost derivation, sentential forms, parsing and ambiguity, simplification of CFG, normal forms, Greibach and Chomsky Normal form , Problems related to CNF and GNF including membership problem.

UNIT IV: Nondeterministic PDA, Definitions, PDA and CFL, CFG for PDA, Deterministic PDA, and Deterministic PDA and Deterministic CFL , The pumping lemma for CFL's, Closure Properties and Decision properties for CFL, Deciding properties of CFL.

UNIT V: Turing Machines: Introduction, Definition of Turing Machine, TM as language Acceptors and Transducers, Computable Languages and functions, Universal TM & Other modification, multiple tracks Turing Machine.

Hierarchy of Formal languages: Recursive & recursively enumerable languages, Properties of RL and REL, Introduction of Context sensitive grammars and languages, The Chomsky Hierarchy.

UNIT VI: Tractable and Untractable Problems: P, NP, NP complete and NP hard problems, Un-decidability, examples of these problems like vertex cover problem, Hamiltonian path problem, traveling sales man problem.

References:

1. K.L.P. Mishra and N.Chandrasekaran, “Theory of Computer Science, PHI
2. Martin J. C., “Introduction to Languages and Theory of Computations”, TMH
3. Hopcroft, Ullman, “Introduction to Automata Theory, Language and Computation”, Nerosa Publishing House, 3rd Edition.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Calculate formal notation for strings, languages and machines.

CO2: Design finite automata to accept a set of strings of a language.

CO3: Understand language determine whether the given language is regular or not.

CO4: Design context free grammars to generate strings of context free language.

CO5: Determine equivalence of languages accepted by Push Down Automata and languages generated by context free grammars

CO6: Contrast the hierarchy of formal languages, grammars and machines.

Table: Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	H	L	M	L	-	-	-	-	-	L	-	M	L	L
CO2	L6	H	M	M	M	-	-	-	-	-	L	-	L	L	L
CO3	L2	H	L	M	L	-	-	-	-	-	L	-	M	M	L
CO4	L6	H	H	H	H	-	-	-	-	-	L	-	L	L	M
CO5	L5	H	H	M	H	-	-	-	-	-	L	-	L	M	L
CO6	L4	H	M	H	M	-	-	-	-	-	L	-	L	M	M

BTCSPCC 406: Data Communication and Computer Networks

Course objectives:

- To Understand about the evolution of data communication and networking paradigms
- To Understand the principles of data communication, channel characteristics, signaling, modulation and encoding, and multiplexing (SONET/SDH)
- To Know about the various transmission media, their comparative study.
- To Understand about the channel error detection and correction, MAC protocols, Ethernet and WLAN
- To Understand the operations of TCP/UDP, FTP, HTTP, SMTP, SNMP, etc.

UNIT I: Introduction: Objective, scope and outcome of the course.

UNIT II: Introductory Concepts: Network hardware, Network software, topologies, Protocols and standards, OSI model, TCP model, TCP/IP model, Physical Layer: Digital and Analog Signals, Periodic Analog Signals, Signal Transmission, Limitations of Data Rate, Digital Data

Transmission, Performance Measures, Line Coding, Digital Modulation, Media and Digital Transmission System.

UNIT III: Data Link Layer: Error Detection and Correction, Types of Errors, Two dimensional parity check, Detection verses correction, Block Coding, Linear Block Coding, Cyclic Codes, Checksum, Standardized Polynomial Code, Error Correction Methods, Forward Error Correction, Protocols: Stop and wait, Go-back-N ARQ, Selective Repeat ARQ, Sliding window, Piggy backing, Pure ALOHA, Slotted ALOHA, CSMA/CD, CSMA/CA.

UNIT IV: Network Layer: Design issues, Routing algorithms: IPV4, IPV6, Address mapping: ARQ, RARQ, Congestion control, Unicast, Multicast, Broadcast routing protocols, Quality of Service, Internetworking.

UNIT V: Transport Layer: Transport service, Elements of transport protocols,User Datagram Protocol, Transmission Control Protocol, Quality of service, Leaky Bucket and Token Bucket algorithm.

UNIT VI: Application Layer: WWW, DNS, Multimedia, Electronic mail, FTP, HTTP, SMTP, Introduction to network security

References:

1. Computer Networking; J. F. Kurose and K.W.Ross, Pearson education
2. Data Communications and Networking; B.A. Forouzon, Tata-McGraw-Hill
3. Computer Networks; A.S. Tannenbaum
4. Communication Networks; Garcia and Widija, Tata-McGraw-Hill.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Explain the functions of the different layer of the OSI Protocol.

CO2: Draw the functional block diagram of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) describe the function of each block.

CO3: Calculate requirement (small scale) of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) design it based on the market available component

CO4: Calculate problem related TCP/IP protocol developed the network programming.

CO5: Discuss DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	H	L	M	L	-	-	-	-	-	L	-	M	L	L
CO2	L3	H	M	M	M	-	-	-	-	-	M	-	L	L	L
CO3	L3	H	L	M	L	-	-	-	-	-	L	-	M	M	M
CO4	L3	H	H	H	H	-	-	-	-	-	H	-	L	L	M
CO5	L2	H	H	M	H	-	-	-	-	-	M	-	L	M	M

Mapping between CO and CD

BTCSPCC 407: Microprocessor & Interfaces Lab

Course objectives:

- To expose students for operation of typical microprocessor (8085) trainer kit.
- To prepare the students to solve different problems by developing different Programs.
- To develop the quality of assessing and analyzing the obtained data.

List of Experiments:

1. Add the contents of memory locations XX00 &XX01 & place the result in memory location XX02.
2. Add the 16 bit numbers stored in memory location & store the result in another memory location.
3. Transfer a block of data from memory location XX00 to another memory location XX00 in forward & reverse order.
4. Write a program to swap two blocks of data stored in memory.
5. Write a program to find the square of a number.
6. Write a main program and a conversion subroutine to convert Binary to its equivalent BCD.
7. Write a program to find largest & smallest number from a given array.
8. Write a program to Sort an array in ascending & descending order.
9. Write a program to multiply two 8 bit numbers whose result is 16 bit.
10. Write a program of division of two 8 bit numbers.
11. Generate square wave from SOD pin of 8085 & observe on CRO.
12. Write a program to perform traffic light control operation.
13. Write a program to control the speed of a motor

Course Outcomes:

At the end of the course, the student will be able to:

CO-1: Identify relevant information to supplement to the Microprocessor and Microcontroller course**.**

CO-2: Understand strategies and select proper mnemonics and run their program on thetraining boards.

CO-3: Understand and Practice different types of programming keeping in mind technical issues and evaluate possible causes of discrepancy in practical experimental observations in comparison.

CO-4: Develop testing and experimental procedures on Microprocessor and Microcontroller analyze their operation under different cases.

CO-5: Prepare professional quality textual and computational results, incorporating accepted data analysis and synthesis methods, simulation software, and word-processing tools.

Mapping between Programme outcomes (POs) and Course Outcomes (COs):

	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO 6	PO 7	PO 8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	L 2	M	H	L	H	L	-	-	-	L	L	-	H	M	L
CO 2	L 2	H	H	L	H	H	-	-	-	L	L	-	-	M	L
CO 3	L 2	H	M	L	M	L	-	-	-	L	L	-	M	H	M
CO 4	L 6	H	M	M	M	H	-	-	-	L	M	-	-	H	M
CO 5	L 6	H	M	M	M	L	-	-	-	L	M	-	H	H	M

H- High, M- Moderate, L- Low, '-' for No correlation

BTCSPCC 408 : Database Management System Lab

Course objectives:

- To Understand Tables with necessary constraints ,keys and data types, Inserting data and manipulating data as per needs
- To Understand SQL Queries to retrieve required information from single/multiple tables , Creating views and manipulating them as needed
- To Implementing Operations on relations (tables) using PL/SQL
- To Writing triggers for implementing automatic operations and implementing constraints

List of Experiments:

1. Design a Database and create required tables. For e.g. Bank, College Database
2. Apply the constraints like Primary Key, Foreign key, NOT NULL to the tables.
3. Write a SQL statement for implementing ALTER, UPDATE and DELETE.
4. Write the queries to implement the joins.
5. Write the query for implementing the following functions: MAX (), MIN (), AVG () and COUNT ().
6. Write the query to implement the concept of Integrity constrains.
7. Write the query to create the views.
8. Perform the queries for triggers.
9. Perform the following operation for demonstrating the insertion , updation and deletion
10. Using the referential integrity constraints.
11. Write the query for creating the users and their role.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Design a Database without anomalies as per requirements

CO2: Construct complex queries to retrieve required information from database

CO3: Understand SQL for generating necessary reports.

CO4: Design procedures and functions for required database tasks.

CO5: Demonstrate assertions to implement integrity constraints on multiple tables

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L6	H	M	H	M	M	-	-	-	L	M	-	L	M	M
CO2	L6	M	M	H	M	L	-	-	-	L	M	-	M	M	M
CO3	L2	M	M	H	M	L	-	-	-	L	M	-	L	H	M
CO4	L6	H	H	H	H	L	-	-	-	L	H	-	M	H	M
CO5	L3	H	M	H	M	M	-	-	-	M	M	-	L	H	M

BTCSPCC 409 : Network Programming Lab

Course Objectives:

- To introduce Network related commands and configuration files in Linux Operating System.
- To introduce tools for Network Traffic Analysis and Network Monitoring
- To practice Network Programming using Linux System Calls.
- To design and deploy Computer Networks.

List of Experiments:

1. Study of Different Type of LAN& Network Equipments.
2. Study and Verification of standard Network topologies i.e. Star, Bus, Ring etc.
3. LAN installations and Configurations.
4. Write a program to implement various types of error correcting techniques.
5. Write a program to implement various types of framing methods.
6. Write two programs in C: hello_client and hello_server
   a. The server listens for, and accepts, a single TCP connection; it reads all the data it can from that connection, and prints it to the screen; then it Closes the connection
   b.The client connects to the server, sends the string "Hello, world!", then closes the connection 7.
7. Write an Echo_Client and Echo_server using TCP to estimate the round trip time from client to the server. The server should be such that it can accept multiple connections at any given time.
8. Repeat Exercises 6 & 7 for UDP.
9. Repeat Exercise 7 with multiplexed I/O operations.
10. Simulate Bellman -Ford Routing algorithm in NS2

Course Outcomes:

At the end of the course, the student will be able to:

CO1: apply knowledge of different techniques of error detection and correction to detect and solve error bit during data transmission.

CO2: Understand and building the skills of routing mechanisms.

CO3: Explain how a collision occurs and how to solve it.

CO4: Explain familiar with network tools and network programming.

CO5: Adapt with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO1	L3	H	M	H	M	M	_	-	-	-	M	L	L	M	M
CO2	L2	M	M	H	M	L	-	-	-	-	M	L	M	M	M
CO3	L2	M	M	H	M	L	-	-	-	-	M	L	L	H	M
CO4	L2	H	H	H	H	-	-	-	-	-	H	L	M	H	M
CO5	L3	H	M	H	M	M	-	-	-	-	M	L	L	H	M

BTCSPCC 410 : Linux Shell Programming Lab

Course Objectives:

- study the basic and administration concepts in Linux

List of Experiments:

1. Use of Basic Unix Shell Commands: ls, mkdir, rmdir, cd, cat, banner, touch, file, wc,sort, cut, grep, dd, dfspace, du, ulimit.
2. Commands related to inode, I/O redirection and piping, process control commands, mails.
3. Shell Programming: Shell script based on control structure -If-then-fi, if-then-else-if, nested if -else, to find:
   3.1 Greatest among three numbers.
   3.2 To find a year is leap year or not.
   3.3 To input angles of a triangle and find out whether it is valid triangle or not.
   3.4 To check whether a character is alphabet, digit or special character.
   3.5 To calculate profit or loss.
4. Shell Programming Looping-while, until, for loops
   4.1 Write a shell script to print all even and odd number from 1 to 10.
   4.2 Write a shell script to print table of a given number
   4.3 Write a shell script to calculate factorial of a given number.
   4.4 Write a shell script to print sum of all even numbers from 1 to 10.
   4.5 Write a shell script to print sum of digit of any number.
5. Shell Programming - case structure, use of break
   5.1 Write a shell script to make a basic calculator which performs addition, subtraction, Multiplication, division
   5.2 Write a shell script to print days of a week.
   5.3 Write a shell script to print starting 4 months having 31 days.
6. Shell Programming -Functions
   6.1 Write a shell script to find a number is Armstrong or not.
   6.2 Write a shell script to find a number is palindrome or not.
   6.3 Write a shell script to print Fibonacci series.
   6.4 Write a shell script to find prime number.
   6.5 Write a shell script to convert binary to decimal and decimal to binary
7. Write a shell script to print different shapes -Diamond, triangle, square, rectangle, hollow square etc.
8. Shell Programming –Arrays
   8.1 Write a C program to read and print elements of array.
   8.2 Write a C program to find sum of all array elements.

8.3 Write a C program to find reverse of an array.

8.4 Write a C program to search an element in an array.

8.5 Write a C program to sort array elements in ascending or descending order.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Make students able to implement CPU scheduling algorithms and Bankers algorithm used for deadlock avoidance and prevention.

CO2: Implement page replacement and memory management algorithms.

CO3: Apply UNIX/LINUX operating system commands.

CO4: Understand different UNIX/LINUX shell scripts and execute various shell programs.

CO5: Implement virtualization by installing Virtual Machine software.

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L3	H	M	H	M	M	-	-	-	M	M	-	L	M	M
CO2	L3	M	M	H	M	L	-	-	-	L	M	-	M	H	M
CO3	L3	M	M	H	M	L	-	-	-	M	M	-	L	H	M
CO4	L2	H	H	H	H	L	-	-	-	L	H	-	M	M	M
CO5	L3	H	M	H	M	M	-	-	-	M	M	-	L	H	M

BTCSPCC 411 : Java Lab

Course Objectives:

- To understand Object Oriented Programming concepts and basic characteristics of Java
- To know the principles of packages, inheritance and interfaces
- To define exceptions and use I/O streams
- To develop a java application with threads and generics classes

List of Experiments:

1. Develop an in depth understanding of programming in Java: data types, variables, operators, operator precedence, Decision and control statements, arrays, switch statement, Iteration Statements, Jump Statements, Using break, Using continue, return.

2. Write Object Oriented programs in Java: Objects, Classes constructors, returning and passing objects as parameter, Inheritance, Access Control, Using super, final with inheritance Overloading and overriding methods, Abstract classes, Extended classes.

3. Develop understanding to developing packages & Interfaces in Java: Package, concept of CLASSPATH, access modifiers, importing package, Defining and implementing interfaces.

4. Develop understanding to developing Strings and exception handling: String constructors, special string operations, character extraction, searching and comparing strings, string Buffer class. Exception handling fundamentals, Exception types, uncaught exceptions, try, catch and multiple catch statements. Usage of throw, throws and finally.

5. Develop applications involving file handling: I/O streams, File I/O.

6. Develop applications involving concurrency: Processes and Threads, Thread Objects, Defining and Starting a Thread, Pausing Execution with Sleep, Interrupts, Joins, and Synchronization.

7. Programs to demonstrate basic concepts e.g. operators, classes, constructors, control & iteration statements, recursion etc. such as complex arithmetic, matrix arithmetic, tower of Hanoi problem etc.

8. Development of programs/projects to demonstrate concepts like inheritance, exception handling, packages, interfaces etc. such as application for electricity department, library management, ticket reservation system, payroll system etc.

9. Development of a project to demonstrate various file handling concepts.

10. Develop applications involving Applet: Applet Fundamentals, using paint method and drawing polygons. It is expected that each laboratory assignments to given to the students with an aim to In order to achieve the above objectives.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Understand the features of C++ supporting object oriented programming

CO2: Understand the relative merits of C++ as an object oriented programming language

CO3: Create object-oriented software using C++

CO4: Apply object-oriented concepts to implement object oriented programs in C++, encapsulation, inheritance and polymorphism

CO5: Understand advanced features of C++ specifically stream I/O, templates and operator overloading

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	H	M	H	M	M	-	-	-	-	M	-	L	M	M
CO2	L2	M	M	H	M	L	-	-	-	-	M	-	M	M	M
CO3	L6	M	M	H	M	L	-	-	-	-	M	-	L	H	H
CO4	L3	H	H	H	H	L	-	-	-	-	H	-	M	H	H
CO5	L2	H	M	H	M	M	-	-	-	-	M	-	L	H	M

BTCSSODECA 412: Social Outreach, Discipline & Extra Curricular Activities

Course Objectives:

- To allowing students to explore strengths and talents outside of academics.
- To helping students develop stronger time-management and organizational skills.
- To giving students the opportunity to build friendships and participate in group activities outside of the tight circle of the regular classroom.
- To helping to build confidence and self-esteem.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Develop their self-confidence, leadership qualities, and their responsibilities towards the community.

CO2: Have an impact on academic development, personal development, and civic responsibility

CO3: Understand the value of Social Work.

CO4: Understand the Significance of Discipline in student's Life

CO5: Contribute towards in social up-gradation by social organization like, Art of Living, Yoga etc., Blood donation, Awareness programs, personality development programs,

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcome	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	P0 11	PO 12	PS O1	PS O2
CO1	L2	-	-	-	-	-	M	L	M	M	-	-	-	-	-
CO2	L4	-	-	-	-	-	M	M	M	L	-	-	-	-	-
CO3	L1	-	-	-	-	-	M	L	M	L	-	-	-	-	-
CO4	L2	-	-	-	-	-	M	M	M	M	-	-	-	-	-
CO5	L2	-	-	-	-	-	M	M	L	M	-	-	-	-	-

H- High, M- Moderate, L- Low, '-' for No correlation

Semester –V

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	L	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCSESC 501	Information Theory & Coding	3	-	-	30	70	100	3
BT CSPCC 502	Compiler Design	3	-	-	30	70	100	3
BT CSPCC 503	Operating System	3	-	-	30	70	100	3
BTCSPCC 504	Computer Graphics & Multimedia	3	-	-	30	70	100	3
BTCSPCC 505	Analysis of Algorithms	3	-	-	30	70	100	3
BTCSPEC 506A	Wireless Communication	3	-	-	30	70	100	3
BTCSPEC 506B	Human-Computer Interaction	3	-	-	30	70	100	3
BTCSPEC 506C	Bioinformatics	3	-	-	30	70	100	3
LABS								
BTCSPCC 507	Computer Graphics & Multimedia Lab	-	-	2	30	20	50	1
BTCSPCC 508	Compiler Design Lab	-	-	2	30	20	50	1
BTCSPCC 509	Analysis of Algorithms Lab	-	-	2	30	20	50	1
BTCSPCC 510	Advance Java Lab	-	-	2	30	20	50	1
BTCSPSIT 511	Industrial Training	-	-	2	30	20	50	1
BT CSSODE CA 512	Social Outreach, Discipline & Extra Curricular Activities						50	1
	TOTAL	**24**	**-**	**10**	**330**	**520**	**900**	**24**

BTCSESC 501: Information Theory & Coding

Course Objective:

- To study how information is measured in terms of probability and entropy, and the relationships among conditional and joint entropies.
- To study coding schemes, including error correcting codes.

UNIT I: Introduction to information theory: Uncertainty, Information and Entropy, Information measures for continuous random variables, source coding theorem. Discrete Memory less channels, Mutual information, Conditional entropy.

UNIT II: Source coding schemes for data compaction: Prefix code,Huffman code, Shanon-Fane code &Hempel-Ziv coding channel capacity. Channel coding theorem. Shannon limit.

UNIT III : Linear Block Code: Introduction to error connecting codes, coding & decoding of linear block code, minimum distance consideration,conversion of non-systematic form of matrices into systematic form.

UNIT IV : Cyclic Code: Code Algebra, Basic properties of Galois fields (GF) polynomial operations over Galois fields, generating cyclic code by generating polynomial, parity check polynomial. Encoder &decoder for cyclic codes.

UNIT V: Convolutional Code: Convolutional encoders of different rates. Code Tree, Trllis and state diagram. Maximum likelihood decoding of convolutional code: The viterbi Algorithm fee distance of a convolutional code.

Text/Reference Books:

- K. Sam Shanmugam-"Digital and Analog Communication System", John Wiley Sons.
- HerborTaub Donald Schilling- "Principal of Communication System". Tata Mc-Graw Hill.

COURSE OUTCOMES

At the end of the course, a student will be able to:

CO1: Design the channel performance using Information theory.

CO2: Comprehend various error control code properties

CO3: Apply linear block codes for error detection and correction

CO4: Apply convolution codes for performance analysis & cyclic codes for error detection and correction.

CO5: Design BCH & RS codes for Channel performance improvement against burst errors.

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO1	L6	H	M	M	M	-	-	-	-	M	L	-	L	L	L
CO2	L4	H	H	M	H	-	-	-	-	L	L	-	L	L	L
CO3	L3	H	H	M	H	-	-	-	-	M	L	-	L	M	M
CO4	L3	H	H	L	H	-	-	-	-	L	L	-	M	M	M
CO5	L6	M	H	H	H	-	-	-	-	L	L	-	M	H	M

H- High, M- Moderate, L- Low, '-' for No correlation

BTCSPCC 502 : Compiler Design

Course Objective:

- To understand and list the different stages in the process of compilation.
- To Identify different methods of lexical analysis
- To Design top-down and bottom-up parsers
- To Identify synthesized and inherited attributes
- To Develop syntax directed translation schemes
- To Develop algorithms to generate code for a target machine

UNIT I: Introduction: Objective, scope and outcome of the course. Compiler, Translator, Interpreter definition, Phase of compiler,Bootstrapping, Review of Finite automata lexical analyzer, Input,Recognition of tokens, Idea about LEX: A lexical analyzer generator, Error handling.

UNIT II : Review of CFG Ambiguity of grammars: Introduction to parsing.Top down parsing, LL grammars & passers error handling of LL parser, Recursive descent parsing predictive parsers, Bottom up parsing, Shift reduce parsing, LR parsers, Construction of SLR, Conical LR & LALR parsing tables, parsing with ambiguous grammar. Operator precedence parsing, Introduction of automatic parser generator: YACC error handling in LR parsers.

UNIT III : Syntax directed definitions; Construction of syntax trees, S Attributed Definition, L-attributed definitions, Top down translation. Intermediate code forms using postfix notation, DAG,Three address code, TAC for various control structures, Representing TAC using triples and quadruples, Boolean expression and control structures.

UNIT IV : Storage organization; Storage allocation, Strategies, Activation records, Accessing local and non-local names in a block structured language, Parameters passing, Symbol table organization, Data structures used in symbol tables.

UNIT V: Definition of basic block control flow graphs; DAG representation of basic block, Advantages of DAG, Sources of optimization, Loop optimization, Idea about global data flow analysis, Loop invariant computation, Peephole optimization, Issues in design of code generator, A simple code generator, Code generation from DAG.

Text/Reference Books:

- 'Compilers Principles, Techniques and Tools',Aho, Pearson Education.
- 'Modern Compiler Design', Galles, Pearson Education.
- 'The Essence of Compilers', Hunter, Pearson Education

COURSE OUTCOMES

At the end of the course, the student will be able to:

CO1: Understand grammar specification to develop the lexical analyzer

CO2: Understand parser specification design top-down and bottom-up Parsers

CO3: Develop syntax directed translation schemes

CO4: Develop algorithms to generate code for a target machine

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	H	M	H	M	-	-	-	-	L	M	-	L	M	M
CO2	L2	H	M	M	M	L	-	-	-	-	M	-	L	M	M
CO3	L6	H	M	M	M	L	-	-	-	L	M	-	L	H	M
CO4	L6	H	M	M	M	L	-	-	-	-	M	-	L	H	M

H- High, M- Moderate, L- Low, '-' for No correlation

BT CSPCC 503 : Operating System

Course Objective:

- To learn the mechanisms of Operating System to handle processes and threads.
- To learn the mechanisms involved in memory management in OS.
- To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
- To know the components and management aspects

UNIT I: Introduction and History of Operating systems: Structure and operations; processes and files Processor management: inter process communication, mutual exclusion, semaphores, wait and signal procedures, process scheduling and algorithms, critical sections, threads, multithreading

UNIT II: Memory management: contiguous memory allocation, virtual memory,paging, page table structure, demand paging, page replacement policies,thrashing, segmentation, case study

UNIT III : Deadlock: Shared resources, resource allocation and scheduling,resource graph models, deadlock detection, deadlock avoidance, deadlock prevention algorithms.

Device management: devices and their characteristics, device drivers,device handling, disk scheduling algorithms and policies

UNIT IV : : File management: file concept, types and structures, directory structure,

cases studies, access methods and matrices, file security, user authentication

UNIT V: UNIX and Linux operating systems as case studies; Time OS and case

studies of Mobile OS

Text/Reference Books:

- Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
- Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.
- Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
- Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley
- Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India
- Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates

COURSE OUTCOMES

At the end of the course, the student will be able to:

CO1: Analyze the structure of OS and basic architectural components involved in OS design

CO2: Analyze and design the applications to run in parallel either using process or thread models of different OS

CO3: Analyze the various device and resource management techniques for timesharing and distributed systems

CO4: Understand the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L4	H	M	M	M	-	-	-	-	M	M	-	L	M	M
CO2	L4	H	H	M	H	-	-	-	-	M	M	-	M	M	M
CO3	L4	H	H	M	H	-	-	-	-	M	L	-	L	H	M
CO4	L2	H	H	L	H	-	-	-	-	L	L	-	M	H	M

H- High, M- Moderate, L- Low, '-' for No correlation

BTCSPCC 504: Computer Graphics & Multimedia

Course Objective:

- To understand contemporary graphics principles and graphics hardware.
- To introduce comprehensive introduction to computer graphics leading to the ability to understand contemporary terminology, progress, issues, and trends.
- To go thorough introduction to computer graphics techniques, focusing on 3D modeling, image synthesis, and rendering.

UNIT I: Basic of Computer Graphics: Basic of Computer Graphics, Applications of computer graphics, Display devices, Random and Raster scan systems, Graphics input devices, Graphics software and standards

UNIT II: Graphics Primitives Points, lines, circles and ellipses as primitives, scan conversion algorithms for primitives, Fill area primitives including scanline polygon filling, inside-outside test, boundary and flood-fill, character generation, line attributes, area-fill attributes, character attributers. Aliasing, and introduction to Anti Aliasing (No anti aliasing algorithm).

UNIT III : Two Dimensional Graphics: Transformations (translation, rotation, scaling), matrix representation, homogeneous coordinates, composite transformations, reflection and shearing, viewing pipeline and coordinates system, window-to-viewport transformation, clipping including point clipping, line clipping (cohen-sutherland, liang- bersky, NLN), polygon clipping

UNIT IV : Three Dimensional Graphics:3D display methods, polygon surfaces, tables, equations, meshes, curved lies and surfaces, quadric surfaces, spline representation, cubic spline interpolation methods, Bazier curves and surfaces, B-spline curves and surfaces.3D scaling, rotation and translation, composite transformation, viewing pipeline and coordinates,

parallel and perspective transformation, view volume and general (parallel and perspective) projection transformations.

UNIT V: Illumination and Colour Models: Light sources – basic illumination models – halftone patterns and dithering techniques; Properties of light – Standard primaries and chromaticity diagram; Intuitive colour concepts –RGB colour model – YIQ colour model – CMY colour model – HSV colour model – HLS colour model; Colour selection.

UNIT VI: Animations &Realism: Design of Animation sequences – animation function – raster animation – key frame systems – motion specification – morphing – tweening.

Computer Graphics Realism: Tiling the plane – Recursively defined curves – Koch curves – C curves – Dragons – space filling curves – fractals – Grammar based models – fractals – turtle graphics – ray tracing.

Text/Reference Books:

- Foley et.al, Computer Graphics Principles & Practice, Addision , 1999
- David F.Rogers, Procedural Elements for Computer Graphics, McGraw Hill Book Company
- D.Heam and P.Baker, Computer Graphics, Prentice Hall 1986
- R.Plastock and G.Kalley, Theory and Problems of Computer Graphics, Schaum's Series., McGraw Hill.
- Ralf Steinmetz &KlaraNahrstedt - Multimedia : computing, Communication & Applications, Pearson Education Asia.
- PrabhatK.Andleigh-Multimedia System Design, Prentice Hall,KiranThaukrar.

COURSE OUTCOMES

At the end of the course, the student will be able to:

CO1: List the basic concepts used in computer graphics.

CO2: Implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.

CO3: Describe the importance of viewing and projections.

CO4: Define the fundamentals of animation, virtualreality and its related technologies.

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L1	H	M	M	M	-	-	-	-	-	M	-	L	M	M
CO2	L3	H	L	M	L	L	-	-	-	-	L	-	M	M	M
CO3	L2	H	H	M	H	L	-	-	-	-	H	-	L	M	M
CO4	L1	H	M	L	M	-	-	-	-	-	M	-	M	H	M

H- High, M- Moderate, L- Low, '-' for No correlation

BTCSPCC 505: Analysis of Algorithms

Course Objective:

- To Analyze the asymptotic performance of algorithms.
- To Write rigorous correctness proofs for algorithms.
- To Demonstrate a familiarity with major algorithms and data structures.
- To Apply important algorithmic design paradigms and methods of analysis.
- To Synthesize efficient algorithms in common engineering design situations.

UNIT I: Background: Review of Algorithm, Complexity Order Notations: definitions and calculating complexity .Divide And Conquer Method: Binary Search, Merge Sort, Quick sort and Strassen's matrix multiplication algorithms.

UNIT II: Greedy Method: Knapsack Problem, Job Sequencing, Optimal Merge Patterns and Minimal Spanning Trees. Dynamic Programming: Matrix Chain Multiplication. Longest CommonSubsequence and 0/1 Knapsack Problem.

UNIT III : Branch And Bound: Traveling Salesman Problem and Lower Bound Theory.

Backtracking Algorithms and queens problem.Pattern Matching Algorithms: Naïve and Rabin Karp string matching algorithms, KMP Matcher and Boyer Moore Algorithms.

UNIT IV : Assignment Problems: Formulation of Assignment and Quadratic Assignment

Problem. Randomized Algorithms- Las Vegas algorithms, Monte Carlo algorithms, randomized algorithm for Min-Cut, randomized algorithm for 2- SAT. Problem definition of Multicommodity flow, Flow shop scheduling and Network capacity assignment problems.

UNIT V: Problem Classes Np, Np-Hard And Np-Complete: Definitions of P, NP-Hard and NP-Complete Problems. Decision Problems.Cook's Theorem.Proving NPComplete Problems - Satisfiability problem and Vertex Cover Problem.Approximation Algorithms for Vertex Cover and Set Cover Problem.

Text/Reference Books:

- Design and Analysis of Algorithm; Horowitz and Sahani
- Introduction to Algorithm Design ; Corman
- Design and Analysis of Computer Algorithms ; Aho, Pearson

COURSE OUTCOMES

At the end of the course, the student will be able to:

CO1: Discuss Algorithms based on asymptotic analysis and justify the correctness of algorithms.

CO2: Describe the greedy paradigm and explain when an algorithmic design situation calls for it.

CO3: Describe the divide-and-conquer paradigm

CO4: Describe the dynamic-programming paradigm and analyze it to determine its computational complexity.

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L6	H	M	H	M	L	-	-	-	L	M	-	L	M	L
CO2	L2	H	H	M	H	L	-	-	-	L	H	-	L	M	L
CO3	L2	L	M	H	M	L	-	-	-	L	M	-	M	M	L
CO4	L2	M	H	M	H	L	-	-	-	L	H	-	M	M	M

H- High, M- Moderate, L- Low, '-' for No correlation

BTCSPEC 506A : Wireless Communication

COURSE OBJECTIVE:

• To understand the architecture of Wireless Networks.

• To identify the functionalities of layers in architecture.

• To analyze the working of main protocols of all layers.

UNIT I: Wireless Channels: Large scale path loss – Path loss models: Free Space and Two-Ray models -Link Budget design – Small scale fading- Parameters of mobile multipath channels – Time dispersion parameters-Coherence bandwidth – Doppler spread & Coherence time, Fading due to Multipath time delay spread – flat fading – frequency selective fading – Fading due to Doppler spread – fast fading – slow fading.

UNIT II: Cellular Architecture: Multiple Access techniques - FDMA,TDMA, CDMA – Capacity calculations–Cellular concept- Frequency reuse - channel assignment- hand off- interference & system capacity- trunking& grade of service – Coverage and capacity Improvement.

UNIT III : Digital Signaling For Fading Channels: Structure of a wireless communication link, Principles of Offset-QPSK, p/4-DQPSK, Minimum Shift Keying, Gaussian Minimum Shift Keying, Error performance in fading channels, OFDM principle – Cyclic prefix, Windowing, PAPR.

UNIT IV : Multipath Mitigation Techniques: Equalisation – Adaptive equalization, Linear and Non-Linear equalization, Zero forcing and LMS Algorithms. Diversity – Micro and Macrodiversity, Diversity combining techniques, Error probability in fading channels with diversity reception, Rake receiver,

UNIT V: Multiple Antenna Techniques: MIMO systems – spatial multiplexing -System model - Pre-coding - Beam forming - transmitter diversity, receiver diversity- Channel state information capacity in fading and non-fading channels.

Text/Reference Books:

- Rappaport T.S, "Wireless Communications: Principles and Practice", 2nd Edition, Pearson Education, 2007
- Wayne Tomasi, “Advanced Electronic Communication Systems”, 6th Edition, Pearson Education, 2009.
- Simon Haykin, “Communication Systems”, 4th Edition, John Wiley & Sons, 2004
- H.Taub, D L Schilling and G Saha, “Principles of Communication”, 3rd Edition, Pearson Education, 2007.
- B. P.Lathi, “Modern Analog and Digital Communication Systems”, 3rd Edition, Oxford University Press, 2007.

COURSE OUTCOMES

At the end of the course, the student will be able to:

CO1: Explain the Classification of mobile communication systems

CO2: Analyze the radio channel characteristics and the cellular principle

CO3: Analyze the measures to increase the capacity in GSM systems- sectorization and Spatial Filtering for Interference Reduction

CO4: Adapt and analyze improved data services in cellular communication.

Mapping between Objectives and Outcomes

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	H	M	M	M	L	-	-	-	-	M	M	L	M	L
CO2	L4	H	L	M	L	L	-	-	-	-	L	L	M	M	M
CO3	L4	H	H	M	H	L	-	-	-	-	H	L	L	M	M
CO4	L3	H	M	-	M	M	-	-	-	-	M	L	M	M	M

H- High, M- Moderate, L- Low, '-' for No correlation

BTCSPEC 506B
Human Computer Interaction

COURSE OBJECTIVE:-

• To know what the user-centered design cycle and how to practice this approach to design your own website or other interactive software systems

• To critique existing website and other interactive software using guidelines from human factor theories

• To analyze one after another the main features of a GUI: the use of colors, organization and layout of content, filling the interface with useful and relevant information, and communication techniques; and to critique designs in order to provide better solutions

UNIT I: Historical evolution of the field, Interactive system design, Concept of usability - definition and elaboration, HCI and software Engineering, GUI design and Aesthetics, Prototyping techniques.

Model-based Design and evaluation: Basic idea, introduction to different types of models, GOMS family of models (KLM and CMNGOMS), BFitts' law and Hick-Hyman's law, Model-based design case studies,

UNIT II: Guidelines in HCI:Shneiderman's eight, golden rules, Norman's seven principles, Norman's model of interaction, Nielsen's ten heuristics with example of its use Heuristic evaluation, Contextual inquiry, Cognitive walkthrough

UNIT III : Empirical research methods in HCI: Introduction (motivation, issues, research question formulation techniques), Experiment design and data analysis (with explanation of one-way ANOVA)

UNIT IV : Task modelling and analysis: Hierarchical task analysis (HTA), Engineering task models and Concur Task Tree (CTT),I introduction to formalism in dialog design, design using FSM (finite state machines) State charts and (classical) Petri Nets in dialog design

UNIT V: Introduction to CA, CA types, relevance of CA in IS design Model

Human Processor (MHP), OOP- Introduction OOM- Object Oriented Modeling of User Interface Design.

Text/Reference Books:

- The essential guide to user interface design, Wilbert O Galitz, Wiley DreamaTech.
- Designing the user interface. 3rd Edition Ben Shneidermann , Pearson Education Asia.
- Human – Computer Interaction. ALAN DIX, JANET FINCAY, GRE GORYD, ABOWD, RUSSELL BEALG, PEARSON.
- Interaction Design PRECE, ROGERS, SHARPS. Wiley Dreamtech, 3. User Interface Design, SorenLauesen , Pearson Education.

COURSE OUTCOMES

At the end of the course, the student will be able to:

CO1: Describe what interaction design is and how it relates to human computer interaction and other fields.

CO2: Describe the social mechanisms that are used by people to communicate and collaborate.

CO3: Prepare the nature of user frustration and how to reduce it.

CO4: Describe how technologies can be designed to change people's attitudes and behavior.

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	H	H	L	H	L	-	-	-	-	H	-	H	L	L
CO2	L2	H	H	H	H	M	-	-	-	-	H	-	H	L	L
CO3	L6	H	M	H	M	M	-	-	-	-	M	-	L	L	M
CO4	L2	L	M	H	M	L	-	-	-	-	M	-	H	H	M

H- High, M- Moderate, L- Low, '-' for No correlation

BTCSPEC506C: Bioinformatics

Course Objectives:

- To use bioinformatics in your own work.
- To Build a solid foundation and acquire the vocabulary you need to supervise or to communicate with others who use these tools.

UNIT I: Introduction: Basics of biology.

UNIT II Sequences: Problem Statement, Edit distance and substitution matrices, HMMs and pairwise HMMs, Global and local alignments, Spliced alignment, Space-efficient sequence alignment, multiple alignment, Database searching tools, Sequence by hybridization, Profile HMMs

UNIT III : Structures: Protein structure alignment, Protein structure prediction

UNIT IV : Phylogenetic trees: Large parsimony and small parsimony problems, Probabilistic approaches, Grammar-based approaches

UNIT V: Miscellaneous topics: Pathways and networks, Microarrays, Biomedical images

Text/Reference Books:

- Ghosh Z. and Bibekanand M. (2008) Bioinformatics: Principles and Applications. Oxford University Press.
- Pevsner J. (2009) Bioinformatics and Functional Genomics. II Edition. Wiley-Blackwell. Campbell A. M., Heyer L. J. (2006)
- Discovering Genomics, Proteomics andBioinformatics. II Edition. Benjamin Cummings.

COURSE OUTCOMES

At the end of the course, a student will be able to:

CO1: Discuss the basic concepts of Bioinformatics and its significance in Biological data analysis.

CO2: Describe the history, scope and importance of Bioinformatics and role of internet in Bioinformatics.

CO3: Explain about the methods to characterize and manage the different types of Biological data.

CO4 : Classify different types of Biological Databases.

CO5 : Discuss basics of sequence alignment and analysis.

CO6 : Explain biological macromolecular structures and structure prediction methods.

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	H	M	M	M	L	-	-	-	-	M	-	L	L	L
CO2	L2	H	L	M	L	L	-	-	-	-	L	-	M	L	L
CO3	L2	H	H	M	H	L	-	-	-	-	H	-	L	L	M
CO4	L4	H	M	-	M	L	-	-	-	-	M	-	M	M	M
CO5	L2	H	L	M	L	L	-	-	-	-	L	-	M	M	L
CO6	L2	H	H	M	H	L	-	-	-	-	H	-	L	M	L

H- High, M- Moderate, L- Low, '-' for No correlation

BTCSPCC 507: Computer Graphics & Multimedia Lab

Course Objective:

- To Implement different computer graphics algorithms, this algorithm make them learn about the creation of primitives of graphics, storage and generation.
- To Create interactive graphics applications in C++ using one or more graphics application programming interfaces.
- To Write programs that demonstrate geometrical transformations.

List of Experiments:

1. Implementation of Line, Circle and ellipse attributes
2. To plot a point (pixel) on the screen
3. To draw a straight line using DDA Algorithm
4. Implementation of mid-point circle generating Algorithm
5. Implementation of ellipse generating Algorithm
6. Two Dimensional transformations - Translation, Rotation, Scaling, Reflection, Shear
7. Composite 2D Transformations
8. Cohen Sutherland 2D line clipping and Windowing
9. Sutherland – Hodgeman Polygon clipping Algorithm
10. Three dimensional transformations - Translation, Rotation, Scaling
11. Composite 3D transformations
12. Drawing three dimensional objects and Scenes
13. Generating Fractal images

COURSE OUTCOMES

At the end of the course, a student will be able to:

CO1: List the basic concepts used in computer graphics.

CO2: Implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.

CO3:Describe the importance of viewing and projections.

CO4: Define the fundamentals of animation, virtualreality and its related technologies.

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L3	H	H	M	H	L	-	-	-	-	H	-	L	M	M
CO2	L3	H	L	M	L	M	-	-	-	-	L	-	M	H	M
CO3	L2	H	H	M	H	L	-	-	-	-	H	-	L	H	M
CO4	L1	H	M	H	M	H	-	-	-	-	M	-	L	H	M

BTCSPCC 508 : Compiler Design Lab

Course Objective:

- To Deepen the understanding of compiler design - Develop problem solving ability using programming - Develop ability to design and analyze a compiler
- To implement Lexical Analyzer using Lex tool & Syntax Analyzer or parser using YACC Tool
- To implement front end of the compiler by means of generating Intermediate codes.
- To implement code optimization techniques.

List of Experiments:

1. Introduction: Objective, scope and outcome of the course.
2. To identify whether given string is keyword or not.
3. Count total no. of keywords in a file. [Taking file from user]
4. Count total no of operators in a file. [Taking file from user]
5. Count total occurrence of each character in a given file. [Taking file from user]
6. Write a C program to insert, delete and display the entries in Symbol Table.
7. Write a LEX program to identify following:
    1) Valid mobile number
    2) Valid url
    3) Valid identifier
    4) Valid date (dd/mm/yyyy)
    5) Valid time (hh:mm:ss)
8. Write a lex program to count blank spaces,words,lines in a given file.
9. Write a lex program to count the no. of vowels and consonants in a C file.
10. Write a YACC program to recognize strings aaab,abbb using a^nb^n, where b>=0.
11. Write a YACC program to evaluate an arithmetic expression involving operators +,-,* and /.
12. Write a YACC program to check validity of a strings abcd,aabbcd using grammar a^nb^nc^md^m, where n , m>0
13. Write a C program to find first of any grammar.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Discuss grammar specification develop the lexical analyzer

CO2: Discuss parser specification design top-down and bottom-up Parsers

CO3: Develop syntax directed translation schemes

CO4: Develop algorithms to generate code for a target machine

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	H	L	H	L	L	-	-	-	-	L	-	L	M	M
CO2	L2	H	M	H	M	L	-	-	-	-	M	-	M	H	M
CO3	L6	H	M	H	M	M	-	-	-	-	M	-	M	H	M
CO4	L6	H	L	M	L	M	-	-	-	-	L	-	M	H	M

BTCSPCC509: Analysis of Algorithms Lab

Course Objective:

- To Design and implement efficient algorithms for a specified application.
- To Strengthen the ability to identify and apply the suitable algorithm for the given real world problem.

List of Experiments:

1. Sort a given set of elements using the Quicksort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
2. Implement a parallelized Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
3. a. Obtain the Topological ordering of vertices in a given digraph. b. Compute the transitive closure of a given directed graph using Warshall's algorithm.
4. Implement 0/1 Knapsack problem using Dynamic Programming.
5. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.
6. Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm.
7. a. Print all the nodes reachable from a given starting node in a digraph using BFS method. b. Check whether a given graph is connected or not using DFS method.
8. Find Minimum Cost Spanning Tree of a given undirected graph using Prim's algorithm.
9. Implement All-Pairs Shortest Paths Problem using Floyd's algorithm.
10. Implement N Queen's problem using Back Tracking.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Discuss algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.

CO2: Describe the greedy paradigm and explain when an algorithmic design situation calls for it. For a given problem develop the greedy algorithms.

CO3: Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation.

CO4: Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. For a given problems of dynamic-programming and develop the dynamic programming algorithms, and analyze it to determine its computational complexity.

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	H	M	H	M	M	-	-	-	-	M	L	H	M	M
CO2	L2	H	M	L	H	H	-	-	-	-	H	-	M	H	M
CO3	L2	H	L	M	H	H	-	-	-	-	H	-	M	H	M
CO4	L2	H	L	H	L	M	-	-	-	-	L	L	L	H	H

BTCSPCC510: Advance Java Lab

Course Objective:

- To Using Graphics, Animations and Multithreading for designing Simulation and Game based applications.
- To Design and develop GUI applications using Abstract Windowing Toolkit (AWT), Swing and Event Handling.
- To Design and develop Web applications
- To Designing Enterprise based applications by encapsulating an application's business logic.
- To Designing applications using pre-built frameworks.

List of Experiments:

1. Introduction To Swing, MVC Architecture, Applets, Applications and Pluggable Look and Feel, Basic swing components : Text Fields, Buttons, Toggle Buttons, Checkboxes, and Radio Buttons
2. Java database Programming, java.sql Package, JDBC driver, Network Programming With java.net Package, Client and Server Programs, Content And Protocol Handlers
3. RMI architecture, RMI registry, Writing distributed application with RMI, Naming services, Naming And Directory Services, Overview of JNDI, Object serialization and Internationalization
4. J2EE architecture, Enterprise application concepts, n-tier application concepts, J2EE platform, HTTP protocol, web application, Web containers and Application servers
5. Server side programming with Java Servlet, HTTP and Servlet, Servlet API, life cycle, configuration and context, Request and Response objects, Session handling and event handling, Introduction to filters with writing simple filter application
6. JSP architecture, JSP page life cycle, JSP elements, Expression Language, Tag Extensions, Tag Extension API, Tag handlers, JSP Fragments, Tag Files, JSTL, Core Tag library, overview of XML Tag library, SQL Tag library and Functions Tag library

COURSE OUTCOMES

At the end of the course, the student will be able to:

CO1: learn to access database through Java programs, using Java Data Base Connectivity (JDBC)

CO2: create dynamic web pages, using Servlets and JSP.

CO3: make a reusable software component, using Java Bean.

CO4: invoke the remote methods in an application using Remote Method Invocation (RMI)

CO5: understand the multi-tier architecture of web-based enterprise applications using Enterprise JavaBeans (EJB).

Mapping between Objectives and Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L1	H	H	H	H	-	-	-	-	-	H	-	M	M	M
CO2	L6	M	M	H	M	M	-	-	-	-	M	-	L	M	M
CO3	L6	H	M	M	M	M	-	-	-	-	M	-	H	H	M
CO4	L3	M	H	H	H	M	-	-	-	-	H	-	L	H	M
CO5	L2	H	H	H	H	-	-	-	-	-	H	-	H	H	M

BTCSPSIT 511: Industrial Training & Seminar

Course Objectives:

- To acquire and apply fundamental principles of engineering.
- To update with all the latest changes in technological world.
- To identify, formulate and model problems and find engineering solution based on a systems approach.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Capability to acquire and apply fundamental principles of engineering.

CO2: Become master in one's specialized technology

CO3: Become updated with all the latest changes in technological world.

CO4: Ability to identify, formulate and model problems and find engineering solution based on a systems approach.

Table: Mapping of Course Outcomes with Program Outcomes

Course Outcome	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	P01 1	PO 12	PS O1	PS O2
CO1	L2	M	H	L	H	L	-	-	-	-	L	-	L	M	M
CO2	L3	M	L	H	H	L	-	-	-	-	L	-	M	H	M
CO3	L6	M	H	M	M	L	-	-	-	-	L	-	M	M	M
CO4	L2	M	M	M	M	L	-	-	-	-	M	-	L	M	H

H- High, M- Moderate, L- Low, '-' for No correlation

BTCSSODECA 512: Social Outreach, Discipline & Extra Curricular Activities

Course Objectives:

- To allowing students to explore strengths and talents outside of academics.
- To helping students develop stronger time-management and organizational skills.
- To giving students the opportunity to build friendships and participate in group activities outside of the tight circle of the regular classroom.
- To helping to build confidence and self-esteem.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Develop their self-confidence, leadership qualities, and their responsibilities towards the community.

CO2: Have an impact on academic development, personal development, and civic responsibility

CO3: Understand the value of Social Work.

CO4: Understand the Significance of Discipline in student's Life

CO5: Contribute towards in social up-gradation by social organization like, Art of Living, Yoga etc., Blood donation, Awareness programs, personality development programs,

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcome	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	P0 11	PO 12	PS O1	PS O2
CO1	L2	-	-	-	-	-	M	L	M	M	-	-	-	-	-
CO2	L4	-	-	-	-	-	M	M	M	L	-	-	-	-	-
CO3	L1	-	-	-	-	-	M	L	M	L	-	-	-	-	-
CO4	L2	-	-	-	-	-	M	M	M	M	-	-	-	-	-
CO5	L2	-	-	-	-	-	M	M	L	M	-	-	-	-	-

H- High, M- Moderate, L- Low, '-' for No correlation

Semester –VI

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	L	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCSESC 601	Digital Image Processing	3	-	-	30	70	100	3
BTCSPCC 602	Machine Learning	3	0	0	30	70	100	3
BTCSPCC 603	Information Security System	3	0	0	30	70	100	3
BTCSPCC 604	Computer Architecture and Organization	3	0	0	30	70	100	3
BTCSPCC 605	Artificial Intelligence	3	-	0	30	70	100	3
BTCSPCC 606	Cloud Computing	3	0	0	30	70	100	3
ELECTIVE SUBJECT								
BTCSPEC 607A	Distributed System	3	0	0	30	70	100	3
BTCSPEC 607B	Software Defined Network	3	0	0	30	70	100	3
BTCSPEC 607C	Ecommerce & ERP	3	0	0	30	70	100	3
LABS								
BTCSPCC 608	Digital Image Processing Lab	0	0	2	30	20	50	1
BTCSPCC 609	Machine Learning Lab	0	0	2	30	20	50	1
BTCSPCC 610	Python Lab	0	0	2	30	20	50	1
BTCSPCC 611	Mobile Application Development Lab	0	0	2	30	20	50	1
BT CSSODE CA 612	Social Outreach, Discipline & Extra Curricular Activities						50	1
	TOTAL	**21**	**2**	**8**	**330**	**570**	**950**	**26**

BTCSESC 601: Digital Image Processing

COURSE OBJECTIVES:

- To learn digital image fundamentals.
- To be exposed to simple image processing techniques.
- To be familiar with image compression and segmentation techniques.
- To learn to represent image in form of features.

UNIT I:

Introduction to Image Processing: Digital Image representation, Sampling & Quantization, Steps in image Processing, Image acquisition, color image representation.

UNIT II:

Image Transformation & Filtering: Intensity transform functions,histogram processing, Spatial filtering, Fourier transforms and its properties, frequency domain filters, colour models, Pseudocolouring, colour transforms, Basics of Wavelet Transforms

UNIT III:

Image Restoration: Image degradation and restoration process, Noise Models, Noise Filters, degradation function, Inverse Filtering, Homomorphism Filtering.

UNIT IV:

Image Compression: Coding redundancy, Interpixel redundancy, Psychovisual redundancy, Huffman Coding, Arithmetic coding, Lossy compression techniques, JPEG Compression.

UNIT V:

Image Segmentation & Representation: Point, Line and Edge Detection, Thresholding, Edge and Boundary linking, Hough transforms, Region Based Segmentation, Boundary representation, Boundary Descriptors.

REFERENCES /TEXT BOOK:

1. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, “Digital Image Processing Using MATLAB”, Third Edition Tata Mc Graw Hill Pvt. Ltd., 2011.
2. Rafael C. Gonzales, Richard E. Woods, “Digital Image Processing”, Third Edition, Pearson Education, 2010.
3. Anil Jain K. “Fundamentals of Digital Image Processing”, PHI Learning Pvt. Ltd., 2011.
4. Willliam K Pratt, “Digital Image Processing”, John Willey, 2002.
5. Malay K. Pakhira, “Digital Image Processing and Pattern Recognition”, First Edition, PHI Learning Pvt. Ltd., 2011.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Discuss digital image fundamentals.

CO2: Apply image enhancement and restoration techniques.

CO3: Use image compression and segmentation Techniques.

CO4: Discuss features of images.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	H	L	H	L	-	-	-	-	-	L	-	L	L	L
CO2	L3	H	L	M	L	L	-	-	-	-	L	-	L	L	L
CO3	L3	M	M	M	M	M	-	-	-	-	M	-	L	M	L
CO4	L2	M	H	M	H	-	-	-	-	-	H	-	M	M	M

BTCSPCC 602: Machine Learning

Course Objectives:

- To introduce students to the basic concepts and techniques of **Machine Learning**.
- To develop skills of using recent **machine learning** software for solving practical problems.
- To gain experience of doing independent study and research.

UNIT I:

Supervised learning algorithm: Introduction, types of learning, application, Supervised learning: Linear Regression Model, Naïve Bayes classifier Decision Tree, K nearest neighbor, Logistic Regression, Support Vector Machine, Random forest algorithm

UNIT II:

Unsupervised learning algorithm: Grouping unlabelled item susing k-means clustering, Hierarchical Clustering, Probabilistic clustering, Association rule mining, Apriori Algorithm, f-p growth algorithm, Gaussian mixture model.

UNIT III:

Introduction to Statistical Learning Theory, Feature extraction-Principal component analysis, Singular value decomposition. Feature selection–feature ranking and subset selection, filter, wrapper and embedded methods, Evaluating Machine Learning algorithms and Model Selection.

UNIT IV:

Semi supervised learning, Reinforcement learning : Markov decision process (MDP), Bellman equations, policy evaluation using Monte Carlo, Policy iteration and Value iteration, Q-Learning, State-Action-Reward-State-Action (SARSA), Model-based Reinforcement Learning.

UNIT V:

Recommended system, Collaborative filtering, Content-based filtering Artificial neural network, Perceptron, Multilayer network, Back propagation, Introduction to Deep learning.

Refrence/Text Books:

- Tom M Mitchell, Machine Learning, McGraw Hill Education
- Bishop, C. (2006). Pattern Recognition and Machine Learning. Berlin: Springer-Verlag.
- Duda, Richard, Peter Hart, and David Stork. Pattern Classification. 2nd ed. New York, NY: Wiley-Interscience, 2000. ISBN: 9780471056690.
- Bishop, Christopher. Neural Networks for Pattern Recognition. New York, NY: Oxford University Press, 1995. ISBN: 9780198538646.
- Introduction to MachineLearning - Ethem Alpaydin, MIT Press, Prentice hall of India.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Create intelligent agents for search and games

CO2: Solve AI problems through programming with Python

CO3: Learning optimization and inference algorithms for model learning

CO4: Design and develop programs for an agent to learn and act in a structured environment.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L6	H	M	M	M	M	M	-	-	-	M	-	M	M	M
CO2	L4	M	M	H	M	L	-	-	-	-	M	-	L	M	M
CO3	L1	M	H	M	H	-	-	-	-	-	H	-	L	H	M
CO4	L6	H	M	H	M	M	-	M	-	-	M	-	L	H	M

Mapping between CO and CD

BTCSPCC 603: Information Security System

Course Objectives:

- To enhance knowledge and techniques for enforcement of security with some emphasis on cryptography.
- To develop an understanding of security policies (such as authentication, integrity and confidentiality).

UNIT I:

Introduction to security attacks: services and mechanism, classical encryption techniques-substitution ciphers and transposition ciphers, cryptanalysis, stream and block ciphers.

UNIT II:

Modern block ciphers: Block Cipher structure, Data Encryption standard (DES) with example, strength of DES, Design principles of block cipher, AES with structure, its transformation functions, key expansion, example and implementation. Multiple encryption and triple DES, Electronic Code Book, Cipher Block Chaining Mode, Cipher Feedback mode, Output Feedback mode, Counter mode.

UNIT III:

Public Key Cryptosystems with Applications: Requirements and Cryptanalysis, RSA cryptosystem, Rabin cryptosystem, Elgamal crypto system, Elliptic curve cryptosystem

UNIT IV:

Cryptographic Hash Functions, their applications: Simple hash functions, its requirements and security, Hash functions based on Cipher Block Chaining, Secure Hash Algorithm (SHA).Message Authentication Codes, its requirements and security, MACs based on Hash Functions, Macs based on Block Ciphers .Digital Signature, its properties, requirements and security, various digital signature schemes (Elgamal and Schnorr), NIST digital Signature algorithm.

UNIT V:

Key management and distribution: symmetric key distribution using symmetric and asymmetric encryptions, distribution of public keys, X.509 certificates, Public key infrastructure. Remote user authentication with symmetric and asymmetric encryption, Kerberos Web Security threats and approaches, SSL architecture and protocol, Transport layer security, HTTPS and SSH

Text/ Reference Books:

- Stalling Williams: Cryptography and Network Security: Principles and Practices, 4th Edition, Pearson Education, 2006.
- Kaufman Charlie et.al; Network Security: Private Communication in a Public World, 2nd Ed., PHI/Pearson.
- Pieprzyk Josef and et.al; Fundamentals of Computer Security, Springer-Verlag, 2008.
- Trappe & Washington, Introduction to Cryptography, 2nd Ed. Pearson.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Understand key terms and concepts in cyber law, intellectual property and cyber crimes, trademarks and domain theft.

CO2: Determine computer technologies, digital evidence collection, and evidentiary reporting in forensic acquisition.

CO3: Understand approaches for incident analysis and response.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO1	L2	H	M	M	M	-	-	-	-	-	M	-	M	M	M
CO2	L6	M	M	H	M	-	-	-	-	-	M	-	L	M	M
CO3	L2	M	H	M	H	-	-	-	-	-	H	-	L	H	M

BTCSPCC 604: Computer Architecture and Organization

Course Objective:

- To discuss the basic concepts and structure of computers.
- To understand concepts of register transfer logic and arithmetic operations.
- To explain different types of addressing modes and memory organization.
- To learn the different types of serial communication techniques.
- To summarize the Instruction execution stages.

UNIT I:

Computer Data Representation: Basic computer data types, Complements, Fixed point representation, Register Transfer and Micro-operations: Floating point representation, Register Transfer language, Register Transfer, Bus and Memory Transfers (Tree-State Bus Buffers, Memory Transfer), Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logical shift unit. Basic Computer Organization and Design Instruction codes, Computer registers, computer instructions, Timing and Control, Instruction cycle, Memory-Reference Instructions, Input-output and interrupt, Complete computer description, Design of Basic computer, design of Accumulator Unit

UNIT II:

Programming The Basic Computer: Introduction, Machine Language, Assembly Language, assembler, Program loops, Programming Arithmetic and logic operations, subroutines, I-O Programming. Micro programmed Control: Control Memory, Address sequencing, Micro program Example, design of control

UNIT III:

Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction format, Addressing Modes, data transfer and manipulation, Program Control, Reduced Instruction Set Computer (RISC) Pipeline And Vector Processing, Flynn's taxonomy, Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction, Pipeline, RISC Pipeline, Vector Processing, Array Processors

UNIT IV:

Computer Arithmetic: Introduction, Addition and subtraction, Multiplication Algorithms (Booth Multiplication Algorithm), Division Algorithms, Floating Point Arithmetic operations, Decimal Arithmetic Unit. Input-Output Organization, Input-Output Interface, Asynchronous Data Transfer, Modes Of Transfer, Priority Interrupt, DMA, Input-Output Processor (IOP), CPU IOP Communication, Serial communication

UNIT V:

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory. Multiprocessors: Characteristics of Multiprocessors, Interconnection Structures, Inter-processor Arbitration, Inter-processor Communication and Synchronization, Cache Coherence, Shared Memory Multiprocessors.

Text & References books:

1. Computer Organization and Architecture - William Stallings (Pearson Education Asia)
2. Computer Organization and Architecture -John P. Hayes (McGraw-Hill)
3. Computer Organization -V. Carl. Hamsacher (McGraw-Hill)
4. Computer System Architecture-M. Morris Mano (PHI)

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Evaluate performance of the computer system and decode machine language

CO2: Design arithmetic and logic unit

CO3: Design and analyze pipelined control units

CO4: Design parallel processing architectures.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L5	H	L	H	L	L	-	-	-	-	L	-	L	M	L
CO2	L6	H	L	M	L	L	-	-	-	-	L	-	L	M	L
CO3	L6	M	H	M	H	M	-	-	-	-	H	-	M	M	M
CO4	L6	H	M	H	M	M	-	-	-	-	M	-	L	M	M

BTCSPCC 605: Artificial Intelligence

Course Objective:

- To introduce the basic principles, techniques, and applications of **Artificial Intelligence**.
- To become familiar with basic principles of **AI** toward problem solving, inference, perception, knowledge representation, and **learning**.

UNIT I:

Introduction to AI and Intelligent agent: Different Approach of AI, Problem Solving : Solving Problems by Searching, Uninformed search, BFS, DFS, Iterative deepening, Bi directional search, Hill climbing, Informed search techniques: heuristic, Greedy search, A* search, AO* search, constraint satisfaction problems.

UNIT II:

Game Playing: Minimax, alpha-beta pruning, jug problem, chess problem, tiles problem

UNIT III:

Knowledge and Reasoning: Building a Knowledge Base: Propositional logic, first order logic, situation calculus. Theorem Proving in First Order Logic. Planning, partial order planning. Uncertain Knowledge and Reasoning, Probabilities, Bayesian Networks

UNIT IV:

Learning: Overview of different forms of learning, Supervised base learning: Learning Decision Trees, SVM, Unsupervised based learning, Market Basket Analysis, Neural Networks.

UNIT V:

Introduction to Natural Language Processing: Different issue involved in NLP, Expert System, Robotics.

Text/ Reference Books:

- E.Rich,K Knight-Artificial Intelligence,Tata McGraw Hills.
- S.Russell,P.Norving-Artificial Intelligence-A Modern Approach,Pearson Education,Asia.
- Thomas Dean-Artificial Intelligence-Theory & Practice,Pearson Education,Asia.
- Alison Caursey - The Essence of Artificial Intelligence, Pearson Education, Asia.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.

CO2: Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.

CO3: Demonstrate proficiency developing applications in an 'AI language', expert system shell, or data mining tool.

CO4: Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L3	H	L	H	L	-	M	-	-	L	L	-	M	M	M
CO2	L3	H	L	M	L	-	-	-	-	L	L	-	L	M	M
CO3	L3	M	H	M	H	-	L	-	-	L	H	-	M	H	M
CO4	L3	M	M	H	M	-	L	-	-	L	M	-	L	H	M

BTCSPCC 606: Cloud Computing

Course Objectives:

- To understand the basics of Cloud Computing.
- To understand the movement from a traditional network infrastructure to a Cloud solution.

UNIT I:

Introduction: Objective, scope and outcome of the course. Introduction Cloud Computing: Nutshell of cloud computing, Enabling Technology, Historical development, Vision, feature Characteristics and components of Cloud Computing. Challenges ,Risks and Approaches of Migration into Cloud. Ethical Issue in Cloud Computing, Evaluating the Cloud's Business Impact and economics, Future of the cloud. Networking Support for Cloud Computing. Ubiquitous Cloud and the Internet of Things

UNIT II:

Cloud Computing Architecture: Cloud Reference Model, Layer and Types of Clouds, Services models, Data centre Design and inter connection Network, Architectural design of Compute and Storage Clouds. Cloud Programming and Software: Fractures of cloud programming, Parallel and distributed programming paradigms-Map Reduce, Had oop, High level Language for Cloud. Programming of Google App engine.

UNIT III:

Virtualization Technology: Definition, Understanding andBenefits of Virtualization. Implementation Level of Virtualization, Virtualization Structure/Tools and Mechanisms, Hypervisor VMware, KVM, Xen. Virtualization: of CPU, Memory, I/O Devices,Virtual Cluster and Resources Management, Virtualization of Server, Desktop, Network, and Virtualization of data-centre

UNIT IV:

Securing the Cloud: Cloud Information security fundamentals, Cloud security services, Design principles, Policy Implementation, Cloud Computing Security Challenges, Cloud Computing Security Architecture . Legal issues in cloud Computing. Data Security in Cloud: Business Continuity and Disaster Recovery , Risk Mitigation, Understanding and Identification of Threats in Cloud, SLA-Service Level Agreements, Trust Management

UNIT V:

Cloud Platforms in Industry: Amazon web services , Google App Engine, Microsoft Azure Design, Aneka: Cloud Application Platform-Integration of Private and Public Clouds Cloud applications: Protein structure prediction, Data Analysis, Satellite Image Processing, CRM

Text/ Reference Books:

- " Distributed and Cloud Computing " By Kai Hawang , Geofrey C.Fox, Jack J. Dongarra Pub: Elservier
- Cloud Computing ,Principal and Paradigms, Edited By Rajkumar Buyya, Jemes Broberg, A. Goscinski,

- Pub.- Wiley
- Kumar Saurabh, “Cloud Computing” , Wiley Pub
- Krutz , Vines, “Cloud Security “ , Wiley Pub
- Velte, “Cloud Computing- A Practical Approach” ,TMH Pub

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Analyze the Cloud computing setup with it's vulnerabilities and applications using different architectures.

CO2: Design different workflows according to requirements and apply map reduce programming model.

CO3: Apply and design suitable Virtualization concept, Cloud Resource Management and design scheduling algorithms.

CO4: Create combinatorial auctions for cloud resources and design scheduling algorithms for computing clouds

CO5:.Assess cloud Storage systems and Cloud security, the risks involved, its impact and develop cloud application

CO6: know the impact of engineering on legal and societal issues involved in addressing the security issues of cloud computing.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L4	H	L	H	L	-	-	-	-	-	L	-	M	M	L
CO2	L6	H	L	M	L	-	-	-	-	-	L	-	L	M	L
CO3	L3	H	M	L	M	-	-	-	-	-	M	-	L	M	M
CO4	L6	M	H	M	H	-	-	-	-	-	H	-	M	H	M
CO5	L3	H	H	H	H	-	-	-	-	-	H	-	L	H	M
CO6	L1	M	M	H	M	-	-	-	-	-	M	-	L	H	H

BTCSPEC 607A: Distributed System

Course Objectives

- To provide an introduction to the fundamentals of distributed computer systems, assuming the availability of facilities for data transmission.
- To demonstrate the knowledge of the core architectural aspects of distributed systems.

UNIT I:

Distributed Systems :Features of distributed systems, nodes of a distributed system, Distributed computation paradigms, Model ofdistributed systems, Types of Operating systems: Centralized Operating System, Network Operating Systems, Distributed Operating Systems and Cooperative Autonomous Systems, design issues in distributed operating systems. Systems Concepts and Architectures: Goals, Transparency, Services, Architecture Models, Distributed Computing Environment (DCE).Theoretical issues in distributed systems: Notions of time and state, states and events in a distributed system, time, clocks and event precedence, recording the state of distributed systems.

UNIT II:

Concurrent Processes and Programming: Processes and Threads, Graph Models for Process Representation, Client/Server Model, Time Services, Language Mechanisms for Synchronization, Object Model Resource Servers, Characteristics of Concurrent Programming Languages (Languagenot included).Inter-process Communication and Coordination: MessagePassing, Request/Reply and Transaction Communication, Name and Directory services, RPC and RMI case studies

UNIT III:

Distributed Process Scheduling:A System Performance Model, StaticProcess Scheduling with Communication, Dynamic Load Sharing andBalancing, Distributed Process Implementation. Distributed File Systems:Transparencies and Characteristics of DFS, DFS Design andimplementation, Transaction Service and Concurrency Control, Data andFile Replication. Case studies: Sun network file systems, General Parallelfile System and Window's file systems. Andrew and Coda File Systems

UNIT IV:

Distributed Shared Memory: Non-Uniform Memory Access Architectures, Memory Consistency Models, Multiprocessor Cache Systems, Distributed Shared Memory, Implementation of DSM systems. Models of Distributed Computation: Preliminaries, Causality, Distributed Snapshots, Modelling a Distributed Computation, Failures in a Distributed System, Distributed Mutual Exclusion, Election, Distributed Deadlock handling, and Distributed termination detection.

UNIT V:

Distributed Agreement: Concept of Faults, failure and recovery, Byzantine Faults, Adversaries, Byzantine Agreement, Impossibility of Consensus and Randomized Distributed Agreement. Replicated Data Management: concepts and issues, Database Techniques, Atomic Multicast, and Update Propagation. CORBA case study: Introduction, Architecture, CORBA RMI, CORBA Services

Reference/Text Books:

1. Tannenbaum, A, Van Steen. Distributed Systems, Principles and Paradigm, Prentice Hall India, 2002
2. Tannenbaum, A. Distributed Operating Systems, Pearson Education. 2006
3. Attiya, Welch, "Distributed Computing", Wiley India, 2006
4. Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, "Introduction to parallel computing", 2nd Edition, Pearson Education, 2007

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Distinguish distributed computing paradigm from other computing paradigms

CO2: Identify the core concepts of distributed systems

CO3: Illustrate the mechanisms of inter process communication in distributed system

CO4: Apply appropriate distributed system principles in ensuring transparency, consistency and fault-tolerance in distributed file system

CO5: Compare the concurrency control mechanisms in distributed transactional environment

CO6: Discuss the need for mutual exclusion and election algorithms in distributed systems

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L4	H	L	H	L	L	-	-	-	L	L	-	L	L	M
CO2	L2	H	L	M	L	L	-	-	-	M	L	-	L	L	M
CO3	L3	M	M	M	M	L	-	-	-	L	M	-	L	M	M
CO4	L3	M	H	M	H	L	-	-	-	M	H	-	M	L	M
CO5	L4	H	H	H	H	L	-	-	-	L	H	-	L	M	M
CO6	L2	M	H	M	H	M	-	-	-	L	H	-	L	M	M

BTCSPEC 607B: Software Defined Network

Course Objective:

- To learn the fundamentals of software defined networks.
- To understand the separation of the data plane and the control plane.
- To study about the SDN Programming.
- To study about the various applications of SDN

UNIT I:

History and Evolution of Software Defined Networking (SDN):Separation of Control Plane and Data Plane, IETF Forces, Active Networking. Control and Data Plane Separation: Concepts, Advantages and Disadvantages, the Open Flow protocol..

UNIT II:

033Network Virtualization: Concepts, Applications, Existing Network Virtualization Framework (VMWare and others), Mininet based examples. Control Plane: Overview, Existing SDN Controllers including Floodlight and Open Daylight projects

UNIT III:

054Customization of Control Plane: Switching and Firewall Implementation using SDN Concepts. Data Plane: Software-based and Hardware-based; Programmable Network Hardware..

UNIT IV:

075Programming SDNs: Northbound Application Programming Interface, Current Languages and Tools, Composition of SDNs. Network Functions Virtualization (NFV) and Software Defined Networks: Concepts, Implementation and Applications

UNIT V:

076DataCenter Networks: Packet, Optical and Wireless Architectures, Network Topologies.Use Cases of SDNs: Data Centers, Internet Exchange Points, Backbone Networks, Home Networks, Traffic Engineering. Programming Assignments forimplementing some of the theoretical concepts listed above.

References /Text Books:

1. Paul Goransson and Chuck Black, Software Defined Networks: A Comprehensive Approach, First Edition, Morgan Kaufmann, 2014.
2. Thomas D. Nadeau, Ken Gray, SDN: Software Defined Networks, OReilly Media, 2013
3. Siamak Azodolmolky, Software Defined Networking with Open Flow, Packet Publishing, 2013.
4. Vivek Tiwari, SDN and Open Flow for Beginnersll, Amazon Digital Services, Inc., 2013.
5. Fei Hu, Editor, Network Innovation through Open Flow and SDN: Principles and Design, CRC Press, 2014.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Examine the challenges and opportunities associated with adopting SDN compared to traditional approaches to networking.

CO2: Analyze the functions and components of the SDN architecture.

CO3: Discuss the major requirements of the design of an SDN protocol.

CO4: Design and create an SDN network consisting of SDN switches and a centralized controller.

CO5: Analyze the performance of the SDN network by using verification and troubleshooting techniques.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L4	H	L	H	L	L	-	-	-	L	L	-	M	L	L
CO2	L4	H	L	M	L	L	-	-	-	M	L	-	L	L	M
CO3	L2	M	H	H	H	M	-	-	-	M	H	-	M	M	M
CO4	L6	M	M	H	M	M	-	-	-	L	M	-	L	M	M
CO5	L4	M	H	H	H	M	-	-	-	-	M	-	L	M	M

BTCSPEC607C: Ecommerce & ERP

Course Objective:

- To give student an overview of all aspects of E-Commerce. Topics include development of the Internet and E-Commerce.
- To give them awareness about options available for doing business on the Internet, features of Web sites and the tools used to build an E-Commerce web site, marketing issues, payment options, security issues, and customer service.

UNIT I:

Introduction toE-Commerce:Defining Commerce; Main Activities ofElectronic Commerce; Benefits of E-Commerce; Broad Goals of ElectronicCommerce; Main Components of E-Commerce; Functions of ElectronicCommerce–Communication, Process Management, Service Management,Transaction Capabilities; Process of E-Commerce; Types of E-Commerce;Role of Internet and Web in E-Commerce; Technologies Used; E-Commerce Systems; Pre-requisites of E-Commerce; Scope of E-Commerce; E-Business Models.

UNIT II:

E-Commerce Activities:VariousActivities of E-Commerce; VariousModes of Operation Associated with E-Commerce; Matrix of E-CommerceTypes; Elements and Resources Impacting E-Commerce and Changes;Types of E-Commerce Providers and Vendors; Man Power Associated withE-Commerce Activities; Opportunity Development for E-CommerceStages; Development of E-Commerce Business Case; Components andFactors for the Development of the Business Case; Steps to Design andDevelop an E-Commerce Website.

UNIT III:

Internet–The Backbone for E-Commerce:Early Ages of Internet;Networking Categories; Characteristics of Internet; Components ofInternet–Internet Services, Elements of Internet, Uniform ResourceLocators, Internet Protocol; Shopping Cart, Cookies and E-Commerce;Web Site Communication; StrategicCapabilities of Internet.

UNIT IV:

SP, WWW and Portals:Internet Service Provider (ISP); World Wide Web(WWW); Portals–Steps to build homepage, Metadata; Advantages ofPortal; Enterprise Information Portal (EIP).E-Commerce & OnlinePublishing:This unit explains the concept of online publishing, strategiesand approaches of online publishing, and online advertising

UNIT V:

XML and Data Warehousing:Definition of eXtensible MarkupLanguage(XML); XML Development Goals; Comparison between HTML and XML;Business importance in using XML Based Technology; Advantages,Disadvantages and Applications of XML; Structure of an XML Document;XHTML and X/Secure; Data Warehousing; Data Marts and OperationalData Stores.E-Marketing:Traditional Marketing; E-Marketing; Identifying WebPresence Goals–Achieving web presence goals, Uniqueness of the web,Meeting the needs of website visitors, Site Adhesion: Content, format andaccess; Maintaininga Website; Metrics Defining Internet Units ofMeasurement; Online Marketing; Advantages of Online Marketing.

Refrence/Text Books:

1. A. Lexis Leon, “Enterprise Resource Planning”, TMH
2. Brady, Manu, Wegner, “Enterprise Resource Planning”, TMH

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Demonstrate an understanding of the foundations and importance of E-commerce.

CO2: Demonstrate an understanding of retailing in E-commerce by: analyzing branding and pricing strategies, using and determining the effectiveness of market research assessing the effects of disintermediation.

CO3: Analyze the impact of E-commerce on business models and strategy.

CO4: Describe Internet trading relationships including Business to Consumer, Business-to-Business, Intra-organizational.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L3	H	L	H	L	-	-	-	-	L	L	-	M	L	L
CO2	L3	H	L	M	L	L	-	-	-	M	L	-	L	M	L
CO3	L4	M	H	H	H	M	-	-	-	M	H	-	M	M	M
CO4	L2	M	M	H	M	M	-	-	-	L	M	-	L	M	M

BTCSPCC 608: Digital Image Processing Lab

Course Objective:

- To work effectively alone or as a member of a small group working on some programming tasks.
- To prepare and deliver coherent and structured verbal and written technical reports
- To use laboratory equipment effectively.

List of Experiments

1. Point-to-point transformation. This laboratory experiment provides for thresholding an image and the evaluation of its histogram. Histogram equalization. This experiment illustrates the relationship among the intensities (gray levels) of an image and its histogram.
2. Geometric transformations. This experiment shows image rotation, scaling, and translation. Two-dimensional Fourier transform
3. Linear filtering using convolution. Highly selective filters.
4. Ideal filters in the frequency domain. Non Linear filtering using convolutional masks. Edge detection. This experiment enables students to understand the concept of edge detectors and their operation in noisy images.
5. Morphological operations: This experiment is intended so students can appreciate the effect of morphological operations using a small structuring element on simple binary images. The operations that can be performed are erosion, dilation, opening, closing, open-close, close-open.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Create and write programs in Matlab language for digital manipulation of images; image acquisition; preprocessing; segmentation; Fourier domain processing; and compression.

CO2: Plan and undertake a major individual image processing project.

CO3: Working of laboratory equipment effectively

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L6	H	M	H	M	M	-	-	-	L	M	-	L	M	M
CO2	L6	M	M	H	M	L	-	-	-	M	M	-	M	M	M
CO3	L3	M	M	H	M	L	-	-	-	L	M	-	L	H	H

BTCSPCC 609: Machine Learning Lab

Course Objective:

- To Make use of Data sets in implementing the machine learning algorithms
- To Analyse and evaluate simple algorithms for pattern classification.
- To Implement the machine learning concepts and algorithms in any suitable language of choice.

List of Experiments

1. Implement and demonstrate the FIND-Salgorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample
4. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets
5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.
7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.
9. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Build intelligent agents for search and games

CO2: Solve AI problems through programming with Python

CO3: Learning optimization and inference algorithms for model learning

CO4: Design and develop programs for an agent to learn and act in a structured environment.

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L6	H	M	H	M	M	-	-	-	L	M	-	L	M	M
CO2	L5	M	M	H	M	L	-	-	-	L	M	-	M	H	M
CO3	L1	H	L	H	L	L	-	-	-	L	L	-	M	H	H
CO4	L6	H	M	H	M	M	-	-	-	M	M	-	L	H	H

BTCSPCC 610: Python Lab

Course Objective:

- To Describe the need for Object-oriented programming concepts in Python.
- To Infer the supported data structures like lists, dictionaries and tuples in Python.
- To Illustrate the application of matrices and regular expressions in building the Python programs.
- To Discover the use of external modules in creating excel files and navigating the file systems.

List of Experiments

1. Write a program to demonstrate basic data type in python.
2. Write a program to compute distance between two points taking input from the user Write a program add.py that takes 2 numbers as command line arguments and prints its sum.
3. Write a Program for checking whether the given number is an even number or not. Using a for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, . . . , 1/10
4. Write a Program to demonstrate list and tuple in python. Write a program using a for loop that loops over a sequence. Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.
5. Find the sum of all the primes below two million. By considering the terms in the Fibonacci sequence whose values do not exceed four million, WAP to find the sum of the even-valued terms.
6. Write a program to count the numbers of characters in the string and store them in a dictionary data structure Write a program to use split and join methods in the string and trace a birthday of a person with a dictionary data structure
7. Write a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file? Write a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?
8. Write a program to print each line of a file in reverse order. Write a program to compute the number of characters, words and lines in a file.
9. Write a function nearly equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on. Write function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line.
10. Write a program to implement Merge sort. Write a program to implement Selection sort, Insertion sort.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Create, Test and Debug Python Programs

CO2: Implement Conditionals and Loops for Python Programs

CO3: Use functions and represent Compound data using Lists, Tuples and Dictionaries

CO4: Read and write data from & to files in Python and develop Application using Python

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L6	H	M	M	M	M	-	-	-	L	M	L	L	M	M
CO2	L3	M	M	M	M	L	-	-	-	M	M	L	M	H	M
CO3	L2	H	L	H	L	M	-	-	-	L	L	L	M	H	H
CO4	L6	H	M	H	M	M	-	-	-	M	M	M	L	H	H

BTCSPCC 611: Mobile Application Development Lab

Course Objective:

- To demonstrate the android features and create ,develop using android
- To demonstrate and Understanding anatomy of an Android application
- To Apply the android geo location based services

List of Experiments

1. To study Android Studio and android studio installation. Create “Hello World” application.
2. To understand Activity, Intent, Create sample application with login module.(Check username and password).
3. Design simple GUI application with activity and intents e.g. calculator.
4. Develop an application that makes use of RSS Feed.
5. Write an application that draws basic graphical primitives on the screen
6. Create an android app for database creation using SQLite Database.
7. Develop a native application that uses GPS location information
8. Implement an application that writes data to the SD card.
9. Design a gaming application
10. Create an application to handle images and videos according to size.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Demonstrate the android features and create, develop using android

CO2: Demonstrate and Understanding anatomy of an Android application

CO3: Apply the android geo location based services

CO4: Illustrate the android wifi features and advance android development

CO5: Demonstrate the linux security and implement ADL interface

Mapping of Course Outcomes onto Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L3	H	M	M	M	M	-	-	-	L	M	-	L	M	M
CO2	L3	M	M	M	M	L	-	-	-	L	M	-	M	H	M
CO3	L4	H	L	H	L	L	-	-	-	L	L	-	M	H	H
CO4	L3	H	M	H	M	M	-	-	-	L	M	-	L	H	H
CO5	L3	M	M	H	M	M	-	-	-	M	M	-	L	H	H

BTCSSODECA 612: Social Outreach, Discipline & Extra Curricular Activities

Course Objectives:

- To allowing students to explore strengths and talents outside of academics.
- To helping students develop stronger time-management and organizational skills.
- To giving students the opportunity to build friendships and participate in group activities outside of the tight circle of the regular classroom.
- To helping to build confidence and self-esteem.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Develop their self-confidence, leadership qualities, and their responsibilities towards the community.

CO2: Have an impact on academic development, personal development, and civic responsibility

CO3: Understand the value of Social Work.

CO4: Understand the Significance of Discipline in student's Life

CO5: Contribute towards in social up-gradation by social organization like, Art of Living, Yoga etc., Blood donation, Awareness programs, personality development programs.

Table : Mapping of Course Outcomes with Program Outcomes

Cours	Bloom	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	P0	PO	PS	PS

e Outcome	Level	1	2	3	4	5	6	7	8	9	10	11	12	O1	O2
CO1	L2	-	-	-	-	-	M	L	M	M	-	-	-	-	-
CO2	L4	-	-	-	-	-	M	M	M	L	-	-	-	-	-
CO3	L1	-	-	-	-	-	M	L	M	L	-	-	-	-	-
CO4	L2	-	-	-	-	-	M	M	M	M	-	-	-	-	-
CO5	L2	-	-	-	-	-	M	M	L	M	-	-	-	-	-

H- High, M- Moderate, L- Low, '-' for No correlation

Semester –VII

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	L	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCSPCC 701	Internet of Things	3	1	-	30	70	100	4
ELECTIVE SUBJECT								
BTCSOE 702A	Principle of Electronic Communication	3	1	0	30	70	100	4
BTCSOE 702B	Micro and Smart System Technology	3	1	0	30	70	100	4
BTCSOE 702C	Optimization Techniques	3	1	0	30	70	100	4
LABS								
BTCSPCC 703	Internet of Things Lab	0	0	2	30	20	50	1
BTCSPCC 704	Cyber Security Lab	0	0	2	30	20	50	1
BTCSPSIT 705	Industrial Training	0	0	2	30	20	50	1
BTCSPSIT 706	Seminar	0	0	2	30	20	50	1
BTCSSODE CA 707	Social Outreach, Discipline & Extra Curricular Activities						50	1
	TOTAL	**6**	**2**	**8**	**180**	**220**	**450**	**13**

BTCSPCC 701: Internet of Things

Course Objectives:

- To explore to the interconnection and integration of the physical world and the cyber space.
- To be able to design & develop IOT Devices.

UNIT-1 Introduction: Objective, scope and outcome of the course.

UNIT-2 Introduction to IoT: Definition and characteristics of IoT, Design of IOT: Physical design of IOT, Logical Design of IOT- Functional Blocks, communication models, communication APIs, IOT enabling Technologies- Wireless Sensor Networks, Cloud computing, big data analytics, embedded systems. IOT Levels and deployment templates.

UNIT-3 IoT Hardware and Software: Sensor and actuator, Humidity sensors, Ultrasonic sensor, Temperature Sensor, Arduino, Raspberry Pi, LiteOS, RIoTOS, Contiki OS, Tiny OS.

UNIT-4 Architecture and Reference Model: Introduction, Reference Model and architecture, Representational State Transfer (REST) architectural style, Uniform Resource Identifiers (URIs). Challenges in IoT- Design challenges, Development challenges, Security challenges, Other challenges.

UNIT-5 IOT and M2M: M2M, Difference and similarities between IOT and M2M, Software defined networks, network function virtualization, difference between SDN and NFV for IoT. Case study of IoT Applications: Domain specific IOTs- Home automation, Cities, environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyles.

REFERENCE BOOKS:

1. Adrian McEwen, “Designing the Internet of Things”, Wiley Publishers, 2013, ISBN: 978-1-118-43062-0 2. Daniel Kellmereit, “The Silent Intelligence: The Internet of Things”. 2013, ISBN 0989973700

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Understand the application areas of IOT

CO2: Discuss the revolution of Internet in Mobile Devices, Cloud & Sensor Networks

CO3: Understand building blocks of Internet of Things and characteristics.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	H	L	H	L	-	-	-	-	L	L	-	M	M	M
CO2	L2	H	L	L	L	-	-	-	-	M	L	-	M	H	M
CO3	L2	H	M	L	M	-	-	-	-	H	M	-	M	H	H

BTCSOE 702A : Principle of Electronic Communication

Course Objectives:

- To Apply the knowledge of statistical theory of communication and explain the conventional digital communication system.
- To understand and analyze the signal flow in a digital communication system. To understand concept of spread spectrum communication system.

UNIT-1 Introduction: Objective, scope and outcome of the course.

UNIT-2 Introduction: Need for Modulation, Frequency translation, Electromagnetic spectrum, Gain, Attenuation and decibels. Simple description on Modulation: Analog Modulation-AM, Frequency modulation-FM, Pulse Modulation-PAM, PWM, PCM, Digital Modulation Techniques-ASK, FSK, PSK, QPSK modulation and demodulation schemes.

UNIT-3 Telecommunication Systems: Telephones Telephone system, Paging systems, Internet, Telephony. Networking and Local Area Networks: Network fundamentals, LAN hardware, Ethernet LANs, Token Ring LAN.

UNIT-4 Satellite Communication: Satellite Orbits, satellite communication systems, satellite subsystems, Ground Stations Satellite Applications, Global Positioning systems. Optical Communication: Optical Principles, Optical Communication Systems, Fiber –Optic Cables, Optical Transmitters & Receivers, Wavelength Division Multiplexing.

UNIT-5 Cellular and Mobile Communications: Cellular telephone systems, AMPS, GSM, CDMA and WCDMA. Wireless Technologies: Wireless LAN, PANs and Bluetooth, Zig Bee and Mesh Wireless networks,

Text/Reference Books:

1. Principles of Electronic Communication Systems, Louis E. Frenzel, 3e, McGrawHill publications, 2008.

2. Electronic Communications systems, Kennedy, Davis 4e, MC GRAW HILL EDUCATION, 1999

3. Theodore Rapp port, Wireless Communications - Principles and practice, Prentice Hall, 2002.

4. Haykin S., "Communications Systems", John Wiley and Sons, 2001.

5. Roger L. Freeman, Fundamentals of Telecommunications, 2e, Wiley publications.

6. Introduction to data communications and networking, Wayne Tomasi, Pearson Education, 2005.

7. Taub H. and Schilling D.L, "Principles of Communication Systems" Tata McGraw Hill, 2001

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Understand and Gain the knowledge of AM and FM signals

CO2: Knowledge about using PAM, PWM, PCM

CO3: Understand concept of LAN, PAN

CO4: Gain the knowledge about Satellite and Fiber –Optic Cables

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	H	M	H	M	-	-	-	-	-	M	-	L	M	M
CO2	L1	H	H	M	H	-	-	-	-	-	H	-	L	M	M
CO3	L2	H	M	L	M	-	-	-	-	-	M	-	M	M	M
CO4	L1	H	M	H	M	-	-	-	-	-	M	-	L	M	M

BTCSOE 702B: Micro and Smart System Technology

Course Objectives:

- To Gain knowledge of Smart Materials, Sensors & Actuators, Microsystems.
- To Understand the Operation of Smart Devices & Systems, Electronic Circuits & Control for MEMS, Methodology of Micro-manufacturing.

UNIT-1 Introduction: Objective, scope and outcome of the course.

UNIT-2 INTRODUCTION TO MICRO AND SMART SYSTEMS: (a) Smart-material systems- History, Introduction and evolution of smart materials, structures and systems. Components of a smart system. Application areas. Commercial products. (b) Microsystems- Introduction, History and their evolution, Feynman's vision. Micromachined transducers. Evolution of micro-manufacturing. Multi-disciplinary aspects. Applications areas. Commercial products.

UNIT-3 MICRO AND SMART DEVICES AND SYSTEMS: PRINCIPLES AND MATERIALS: a) Definitions and salient features of sensors, actuators, and systems. b) Sensors: silicon capacitive accelerometer, piezo-resistive pressure sensor, blood analyzer, conductometric gas sensor, fiber-optic gyroscope and surface-acoustic-wave based wireless strain sensor. c) Actuators: silicon micro-mirror arrays, piezo-electric based inkjet print head, electrostatic comb-drive and micromotor, magnetic micro relay, shape memory-alloy based actuator, electro-thermal actuator. d) Systems: micro gas turbine, portable clinical analyzer, active noise control in a helicopter cabin.

UNIT-4 MICROMANUFACTURING AND MATERIAL PROCESSING: a. Silicon wafer processing, lithography, thin-film deposition, etching (wet and dry), wafer-bonding, and metallization. b. Silicon micromachining: surface, bulk, moulding, bonding based process flows. c. Thick-film processing: d. Smart material processing: e. Processing of other materials: ceramics, polymers and metals f. Emerging trends.

UNIT-5 MODELING: a. Scaling issues. b. Elastic deformation and stress analysis of beams and plates. Residual stresses and stress gradients. Thermal loading. Heat transfer issues. Basic fluids

issues. c. Electrostatics. Coupled electromechanics. Electromagnetic actuation. Capillary electro-phoresis. Piezoresistive modeling. Piezoelectric modeling. Magnetostrictive actuators.

UNIT-6 INTEGRATION AND PACKAGING OF MICROELECTRO MECHANICAL SYSTEMS: Integration of microelectronics and micro devices at wafer and chip levels. Microelectronic packaging: wire and ball bonding, flip-chip. Low temperature-cofired-ceramic (LTCC) multi-chip-module technology. Microsystem packaging examples. Examples from smart systems and micromachined accelerometer or a thermal cycler BEL pressure sensor, thermal cycler for DNA amplification, and active vibration control of a beam

Text/Reference Books:

1. MEMS & Microsystems: Design and Manufacture, Tai-Ran Tsu,Tata Mc- Graw-Hill.

2. "Micro and Smart Systems" by Dr. A.K.Aatre, Prof. Ananth Suresh, Prof.K.J.Vinoy, Prof. S. Gopalakrishna,, Prof.K.N.Bhat., John Wiley Publications.

3. Microsystems Design, S. D. Senturia, 2001, Kluwer Academic Publishers, Boston, USA. ISBN 0-7923-7246-8.

4. Analysis and Design Principles of MEMS Devices, Minhang Bao, Elsevier, Amsterdam, The Netherlands, ISBN 0-444-51616-6.

5. Design and Development Methodologies, Smart Material Systems and MEMS: V. Varadan, K. J. Vinoy, S. Gopalakrishnan, Wiley.

6. MEMS- Nitaigour Premchand Mahalik, The Mc-GrawHill 2007.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Classify micro sensors and actuators and design smart systems.

CO2: Understand the role of smart actuators in micro machining.

CO3: Construct models of micro systems using conventional modelling techniques

CO4: Understand methods for integration of micro and smart systems.

CO5: Define the reliability of electronic circuits and control methods used to develop micro and smart systems.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	**Bloom Level**	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L4	M	M	M	M	-	-	-	-	-	M	-	L	M	M
CO2	L2	M	M	L	M	-	-	-	-	-	M	-	L	M	M
CO3	L6	H	L	H	L	-	-	-	-	-	L	-	M	M	M
CO4	L2	M	L	H	L	-	-	-	-	-	L	-	M	H	M
CO5	L1	H	H	M	H	-	-	-	-	-	H	-	M	H	M

BTCSOE 702C: Optimization Techniques

Course Objectives:

- To understand the theory of optimization methods and algorithms developed for solving various types of optimization problems
- To develop and promote research interest in applying optimization techniques in problems of Engineering and Technology
- To apply the mathematical results and numerical techniques of optimization theory to concrete Engineering problems.

UNIT-1 Introduction Objective, scope and outcome of the course.

UNIT-2 Introduction and Classification Basic concept of optimization, Mathematical formulation of optimization problems; applications of optimization in chemical engineering. Classification of Optimization Problems - single variable problems, Multivariable problems without constraints, Multivariable problems with constraints, Maximization and minimization problems. Single Variable Optimization Necessary and sufficient conditions for optimum; interpolation method quadratic. Region elimination methods-internal halving, Fibonacci.

UNIT-3 Multivariable Optimization Optimization of Functions One Dimensional Search: Analytical Methods: classification, stationary points, direct substitution, constrained variation, penalty function, Lagrangian Multiplier, Kuhn-Tucker theorem. Numerical methods general principles of numerical search, direction of search, final stage in search, direct search, pattern search.

UNIT-4 Other Optimization Technics Introduction to geometric, dynamic and integer programming and genetic algorithms. Application of Geometric Programming: chemical engineering problems with degree of difficulty equal to zero or one with constraints.

UNIT-5 Applications of Optimization Optimization of staged and discrete processes. Optimal shell-tube heat exchanger design. Optimal pipe diameter.

Text/Reference Books:

1. Hiller and Lieberman, Introduction to Operation Research (Seventh Edition) Tata McGrawHill Publishing Company Ltd

2. Ravindren Philips and Solberg, Operation Research Principles and Practice (Second Edition) John Wiley & Sons.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Formulate and solve linear Programming Problems

CO2: Determine the optimum solution to constrained and unconstrained

CO3: Apply dynamic programming principle to Linear programming problems.

CO4: Determine the integer solutions to Linear Programming Problems

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	**Bloom Level**	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L6	H	L	H	L	-	-	-	-	-	L	-	L	M	M
CO2	L5	H	M	H	M	-	-	-	-	-	M	-	M	M	M
CO3	L3	H	M	H	M	-	-	-	-	-	M	-	M	M	M
CO4	L5	H	L	M	L	-	-	-	-	-	L	-	M	M	M

BTCSPCC 703: Internet of Things Lab

Course Objectives:

- To Focus on research – design and development of IoT enabled technologies which are cost effective and socially relevant.
- To develop trained manpower (through student projects/research) in the field of IoT based application development.

List of Exercises

1 Start Raspberry Pi and try various Linix commands in command terminal window:
ls, cd, touch, mv, rm, man, mkdir, rmdir, tar, gzip, cat, more, less, ps, sudo, cron, chown, chgrp, ping etc.

2 Run some python programs on Pi like:
a) Read your name and print Hello message with name
b) Read two numbers and print their sum, difference, product and division.
c) Word and character count of a given string.
d) Area of a given shape (rectangle, triangle and circle) reading shape and appropriate values from standard input.

3 Run some python programs on Pi like:
a) Print a name 'n' times, where name and n are read from standard input, using for and while loops.
b) Handle Divided by Zero Exception.
c) Print current time for 10 times with an interval of 10 seconds.
d) Read a file line by line and print the word count of each line.

4 a) Light an LED through Python program
b) Get input from two switches and switch on corresponding LEDs
c) Flash an LED at a given on time and off time cycle, where the two times are taken from a file.

5 a) Flash an LED based on cron output (acts as an alarm)
b) Switch on a relay at a given time using cron, where the relay's contact terminals are connected to a load.
c) Get the status of a bulb at a remote place (on the LAN) through web.

6 The student should have hands on experience in using various sensors like temperature, humidity, smoke, light, etc. and should be able to use control web camera, network, and relays connected to the Pi.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Run and implement different types of commands ls, cd, touch, mv, rm, man, mkdir, rmdir, tar, gzip, cat, more, less, ps, sudo, cron, chown,bchgrp, ping

CO2: Understand to run the programs on Pi

CO3: Implement the programs using different logics

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	**Bloom Level**	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L6	H	M	H	M	M	-	-	-	L	M	-	L	H	H
CO2	L2	H	L	M	L	M	-	-	-	L	L	-	L	H	H
CO3	L3	M	M	M	M	L	-	-	-	L	M	-	M	H	H

BTCSPCC 704: Cyber Security Lab

Course Objectives:

- To Protect data and respond to threats that occur over the Internet
- To Design and implement risk analysis, security policies, and damage assessment

List of Exercises

1 Implement the following Substitution & Transposition Techniques concepts:

a) Caesar Cipherb) Rail fence row & Column Transformation

2 Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript. Consider the end user as one of the parties (Alice) and the JavaScript application as other party (bob).

3 Implement the following Attack:

a) Dictionary Attack b) Brute Force Attack

4 Installation of Wire shark, tcpdump, etc and observe data transferred in client server communication using UDP/TCP and identify the UDP/TCP datagram.

5 Installation of rootkits and study about the variety of options.

6 Perform an Experiment to Sniff Traffic using ARP Poisoning.

7 Demonstrate intrusion detection systems using any tool (snort or any other s/w).

8 Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures.

PROJECT: In a small area location such as a house, office or in a classroom, there is a small network called a Local Area Network (LAN). The project aims to transfer a file peer-to-peer from one computer to another computer in the same LAN. It provides the necessary authentication for file transferring in the network transmission. By implementing the Server-Client technology, use a File Transfer Protocol mechanism and through socket programming, the end user is able to send and receive the encrypted and decrypted file in the LAN. An additional aim of the project is to transfer a file between computers securely in LANs. Elements of security are needed in the project because securing the files is an important task, which ensures files are not captured or altered by anyone on the same network. Whenever you transmit files over a network, there is a good chance your data will be encrypted by encryption technique.

Any algorithm like AES is used to encrypt the file that needs to transfer to another computer. The encrypted file is then sent to a receiver computer and will need to be decrypted before the user can open the file.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Install, configure, use and manage anti malware software on a working network

CO2: Review and practice computer and network etiquette and ethics found in working environments

CO3: Evaluate best practices in security concepts to maintain confidentiality, integrity and availability of computer systems

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	**Bloom Level**	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L3	H	M	H	M	L	-	-	-	-	M	-	L	M	M
CO2	L2	H	H	M	H	L	-	-	-	-	H	-	L	H	H
CO3	L5	H	M	L	M	M	-	-	-	-	M	-	M	H	H

BTCSPSIT 705: Industrial Training

Course Objectives:

- To acquire and apply fundamental principles of engineering.
- To identify, formulate and present model problems.
- To identify, formulate and model problems and find engineering solution based on a systems approach.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Capability to acquire and apply fundamental principles of engineering.

CO2: Become master in one's specialized technology

CO3: Become updated with all the latest changes in technological world.

CO4: Ability to identify, formulate and model problems and find engineering solution based on a systems approach.

Table: Mapping of Course Outcomes with Program Outcomes

Course Outcome	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	P011	PO 12	PSO1	PSO2
CO1	L2	M	H	L	H	L	-	-	-	-	L	-	L	M	M
CO2	L3	M	L	H	H	L	-	-	-	-	L	-	M	H	M
CO3	L6	M	H	M	M	L	-	-	-	-	L	-	M	M	M
CO4	L2	M	M	M	M	L	-	-	-	-	M	-	L	M	H

H- High, M- Moderate, L- Low, '-' for No correlation

BTCSPSIT 706: Seminar

Course Objectives:

- To Awareness of how to use values in improving your own professionalism.
- To Learning about personal and communication styles for team building.
- To identify, formulate and present model problems.
- To Learning management of values.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Personalize and create a communication style for individual & team building.

CO2: Use values in improving one's own professionalism

CO3: Develop the higher cognitive abilities that are analysis, synthesis and evaluation.

CO4: Ability to identify, formulate and present model problems.

Table: Mapping of Course Outcomes with Program Outcomes

Course Outcome	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	P011	PO 12	PSO1	PSO2
CO1	L2	M	H	L	H	L	-	-	-	-	L	-	L	M	M
CO2	L3	M	L	H	H	L	-	-	-	-	L	-	M	H	M
CO3	L6	M	H	M	M	L	-	-	-	-	L	-	M	M	M
CO4	L2	M	M	M	M	L	-	-	-	-	M	-	L	M	H

H- High, M- Moderate, L- Low, '-' for No correlation

BTCSSODECA 707: Social Outreach, Discipline & Extra Curricular Activities

Course Objectives:

- To allowing students to explore strengths and talents outside of academics.
- To helping students develop stronger time-management and organizational skills.
- To giving students the opportunity to build friendships and participate in group activities outside of the tight circle of the regular classroom.
- To helping to build confidence and self-esteem.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Develop their self-confidence, leadership qualities, and their responsibilities towards the community.

CO2: Have an impact on academic development, personal development, and civic responsibility

CO3: Understand the value of Social Work.

CO4: Understand the Significance of Discipline in student's Life

CO5: Contribute towards in social up-gradation by social organization like, Art of Living, Yoga etc., Blood donation, Awareness programs, personality development programs,

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcome	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	P0 11	PO 12	PS O1	PS O2
CO1	L2	-	-	-	-	-	M	L	M	M	-	-	-	-	-
CO2	L4	-	-	-	-	-	M	M	M	L	-	-	-	-	-
CO3	L1	-	-	-	-	-	M	L	M	L	-	-	-	-	-
CO4	L2	-	-	-	-	-	M	M	M	M	-	-	-	-	-
CO5	L2	-	-	-	-	-	M	M	L	M	-	-	-	-	-

H- High, M- Moderate, L- Low, '-' for No correlation

Semester –VIII

THEORY PAPERS		No. of Teaching Hours			Marks Allocation			
Code	**Subject/Paper**	L	**T**	**P**	**IA**	**EA**	**Total**	**Credits**
BTCSPCC 801	Big Data Analytics	3	-	-	30	70	100	3
ELECTIVE SUBJECT								
BTCSOE 802A	Soft Computing	3	0	0	30	70	100	3
BTCSOE 802B	Robotics and control	3	0	0	30	70	100	3
BTCSOE 802C	Simulation Modeling and Analysis	3	0	0	30	70	100	3
LABS								
BTCSPCC 803	Big Data Analytics Lab	0	0	2	30	20	50	1
BTCSPCC 804	Software Testing and Validation Lab	0	0	2	30	20	50	1
BTCSPSIT 805	Project	0	0	0	120	80	200	4
BTCSSODE CA 806	Social Outreach, Discipline &Extra Curricular Activities						50	1
	TOTAL	**6**	**0**	**4**	**240**	**260**	**550**	**13**

BTCSPCC 801: Big Data Analytics

Course Objectives:

- To provide an overview of an exciting growing field of big data analytics.
- To introduce the tools required to manage and analyze big data like Hadoop, NoSql MapReduce.
- To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.
- To enable students to have skills that will help them to solve complex real-world problems in for decision support

UNIT-1

Introduction to Big Data: Big data features and challenges, Problems with Traditional Large-Scale System , Sources of Big Data, 3 V's of Big Data, Types of Data. Working with Big Data: Google File System. Hadoop Distributed File System (HDFS) - Building blocks of Hadoop (Namenode. Data node. Secondary Namenode. Job Tracker. Task Tracker), Introducing and Configuring Hadoop cluster (Local. Pseudodistributed mode, Fully Distributed mode). Configuring XML files.

UNIT-2

Writing MapReduce Programs: A Weather Dataset. Understanding Hadoop API for MapReduce Framework (Old and New). Basic programs of Hadoop MapReduce: Driver code. Mapper code, Reducer code. Record Reader, Combiner, Partitioner.

UNIT-3

Hadoop I/O: The Writable Interface. Writable Comparable and comparators. Writable Classes: Writable wrappers for Java primitives. Text. Bytes Writable. Null Writable, Object Writable and Generic Writable. Writable collections. Implementing a Custom Writable: Implementing a Raw Comparator for speed, Custom comparators.

UNIT-4

Pig:Hadoop Programming Made Easier Admiring the Pig Architecture, Going with the Pig Latin Application Flow. Working through the ABCs of Pig Latin. Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin.

UNIT-5

Applying Structure to Hadoop Data with Hive: Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive. Examining the Hive Clients. Working with Hive Data Types. Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data.

References :

1. “Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data” by EMC Education Services

2. “Big Data: Does Size Matter?” by Timandra Harkness

3. “Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today’s Businesses” by Michael Minelli

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Understand the key issues in big data management and its associated applications in intelligent business and scientific computing.

CO2: Discuss fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce and NO SQL in big data analytics.

CO3: Interpret business models and scientific computing paradigms, and apply software tools for big data analytics.

CO4: Interpret adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	**Bloom Level**	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**P011**	**PO12**	PSO 1	PSO 2
CO1	L4	M	L	H	L	-	-	-	-	L	L	-	M	M	M
CO2	L2	H	M	M	M	-	-	-	-	M	M	-	M	M	M
CO3	L4	H	M	L	M	-	-	-	-	H	M	-	M	M	M
CO4	L4	M	L	M	L	-	-	-	-	M	L	-	M	H	M

BTCSOE802A: Soft Computing

Course Objectives:

- To conceptualize the working of human brain using ANN.
- To become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inference systems.
- To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience.
- To provide the mathematical background for carrying out the optimization and familiarizing genetic algorithm for seeking global optimum in self-learning situation.

Unit-1 INTRODUCTION TO SOFT COMPUTING:

Aims of Soft Computing-Foundations of Fuzzy Sets Theory-BasicConcepts and Properties of Fuzzy Sets-Elements of Fuzzy Mathematics-Fuzzy Relations-Fuzzy Logic

Unit-2 APPLICATION OF FUZZY SETS:

Applications of Fuzzy Sets-FuzzyModeling–Fuzzy DecisionMaking-Pattern Analysis and Classification-Fuzzy ControlSystems-Fuzzy Information Processing-Fuzzy Robotics.

Unit-3

ARTIFICIAL NEURAL NETWORKS:Artificial Neural Networks-Models of Neuron-Architecture of FeedForward Neural Networks, Recurrent Neural Networks-Learningmethods-supervised and unsupervised learning-Time DelayNeural Networks-Radial Basis Function Neural Networks-Adaptive Resonance Theory (ART) Neural Networks-AssociativeNeural Memory Models-Application of ANN

Unit-4

GENETIC ALGORITHMS:

Main Operators-Genetic Algorithm Based Optimization-Principleof Genetic Algorithm-Genetic Algorithm with Directed Mutation-Comparison of Conventional and Genetic Search Algorithms-Issues of GA in practical implementation.Introduction to Particleswarm optimization-PSO operators-GA and PSO in engineeringapplications

Unit-5

NEURO-FUZZY TECHNOLOGY:

Fuzzy Neural Networks and their learning-Architecture of Neuro-Fuzzy Systems-Generation of Fuzzy Rules and membership functions- Fuzzification and Defuzzyfication in Neuro-Fuzzy Systems- Neuro-Fuzzy Identification- Neuro Fuzzy Control-Combination of Genetic Algorithm with Neural Networks-Combination of Genetic Algorithms and Fuzzy Logic-Neuro-Fuzzyand Genetic Approach in engineering applications.

PROGRAMMING USING MATLAB: Using Neural Network toolbox–Using Fuzzy Logic toolbox-Using Genetic Algorithm & directed search toolbox.

TEXT BOOKS:

1. Sivanandam.S.N, Deepa.S.N, "Principles of soft computing",2nd Edition,Wiley India Pvt Limited, 2011

.2. Juh Shing Roger Jang, Cheun Tsai Sun, Eiji Mizutani, "Neuro fuzzy andsoft computing", Prentice Hall, 1997.

REFERENCES:

1. Aliev,R.A, Aliev,R.R, "Soft Computing and its Application", WorldScientific Publishing Co. Pvt. Ltd., 2001.

2. Mehrotra.K, Mohan.C.K, Ranka.S, "Elements of Artificial NeuralNetworks", The MIT Press, 1997.

3. Juh Shing Roger Jang,Cheun Tsai Sun,Eiji Mizutani, "Neuro fuzzy andsoft computing", Prentice Hall, 1997.

4. Ronald R.Yager, Lofti Zadeh, "An Introduction to fuzzy logic applicationsin intelligent Systems", Kluwer Academic, 1992.

5. Cordón.O, Herrera.F, Hoffman.F, Magdalena.L "Genetic Fuzzy systems", WorldScientific Publishing Co. Pvt. Ltd., 2001.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Analyze and appreciate the applications which can use fuzzy logic.

CO2: Analyze design inference systems.

CO3.Understand the difference between learning and programming and explore practical applications of Neural Networks (NN).

CO4. Analyze and appreciate the importance of optimizations and its use in computer engineering fields and other domains.

CO5. Understand the efficiency of a hybrid system and how Neural Network and fuzzy logic can be hybridized to form a Neuro-fuzzy network and its various applications.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L4	H	M	H	M	-	-	-	-	L	M	-	M	L	M
CO2	L4	M	H	M	H	-	-	-	-	M	H	-	M	L	M
CO3	L2	H	M	L	M	-	-	-	-	H	M	-	M	M	M
CO4	L4	M	H	M	H	-	-	-	-	M	H	-	M	M	M
CO5	L2	H	H	L	H	-	-	-	-	L	H	-	H	H	M

BTCSOE 802B: Robotics and control

Course Objectives:

- To provide an introductory understanding of robotics.
- To a broad range of topics in robotics with emphasis on basics of manipulators, coordinate transformation and kinematics, trajectory planning, control techniques, sensors and devices, robot applications and economics analysis

Unit-1

Introduction:

Introduction to control problem-Industrial Control examples.Transfer function. System response. Control hardware and their models: potentiometers, synchros, LVDT, dc and acservo motors, tacho-generators, electro hydraulic valves, hydraulic servomotors, electropneumatic valves, pneumatic actuators. Closed-loop systems. Blockdiagram and signal flow graph analysis. Stability, steady-state accuracy,transient accuracy, disturbance rejection, insensitivity and robustness.proportional, integral and derivative systems. Feedforward and multi-loop control configurations, stability concept, relative stability, Routhstability criterion

Unit-2

Time response of second-order systems-steady-state errors and errorconstants. Performance specifications in time-domain. Lead and lagcompensation.Frequency-response analysis-Polar plots, Bode plot, stability infrequency domain, Nyquist plots. Nyquist stability criterion. Performance specifications in frequency-domain.. Lead and Lag compensation.07

Unit-3

ROBOT ARM KINEMATICS: Introduction, The direct KinematicsProblem, Rotation Matrices, Composite Rotation Matrix, Rotation matrixabout an arbitrary axis, Rotation matrix with Euler anglerepresentation,Geometric interpretation of Homogeneous transformation matrices,composite homogeneous transformation matrix, Links joints and theirparameters. The Denavit Hartenberg representation. Kinematicequations for manipulators, Otherspecifications of the locations of theEnd-Effector, Classification of Manipulators, The inverse Kinematicsproblem, Inverse Transform Technique for Euler Angles Solution08

Unit-4

Planning of Manipulator Trajectories: Introduction, General considerations on Trajectory planning, joint-interpolated Trajectories, calculation of a 4-3-4 Joint trajectory, Cubic Spline Trajectory. Sensing: Range sensing, Triangulation, Structured Lighting Approach, Time-of-Flight range finders.

Proximity sensing, Inductive sensors, Hall effect sensors, Capacitive Sensors, Ultrasonic sensors, Optical Proximity Sensors, Touch sensors, Binary sensors, Analog sensors, Force and Torque sensing, Elements ofa Wrist sensor. LOW-LEVEL VISION: Image acquisition, illumination Techniques, imaging geometry, some basic transformations, perspective transformations. Higher-Level Vision: Segmentation, Edge Linking and Boundary detection,

Unit-5

Camera model, camera calibration, stereo imaging, some basicrelationships between pixels, Neighbours of a Pixel, connectivity,distance measures, Preprocessing, Spatial-Domain methods, Frequency-Domain methods, Smoothing, Enhancement, Edge detection,Thresholding.Thresholding. Region-oriented segmentation, the use of motion, description, Boundary descriptors, Regional descriptors.

Text/Reference Books:

1. Robotics control sensing Vision and Intelligence-K.S.Fu, R.C.Gonzalez,C.S.G. Lee, McGraw Hill, 1987.

2.Ogata, K., "Modern Control Engineering", Prentice Hall, secondedition,1991.

3.Introduction to Robotics Mechanics and control–John J. Craig,2nd Edition, Pearson education, 2003.

4.Nagrath&Gopal, "Modern Control Engineering", New Age International, NewDelhi

5.James G.Keramas, "Robot Technology Fundamentals",Cengage learning

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Discuss the history, concepts and key components of robotics technologies.

CO2: Describe and compare various robot sensors and their perception principles that enable a robot to analyse their environment, reason and take appropriate actions toward the given goal.

CO3: Analyse and solve problems in spatial coordinate representation and spatial transformation, robot locomotion, kinematics, motion control, localization and mapping, navigation and path planning.

CO4: Apply and demonstrate the learned knowledge and skills in practical robotics applications.

CO5: Plan, design and implement robotic systems, algorithms and software capable of operating in complex and interactive environments.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L2	M	H	M	H	-	-	-	-	L	M	-	M	M	M
CO2	L2	H	H	M	H	-	-	-	-	M	M	-	M	M	M
CO3	L4	M	M	L	M	-	-	-	-	H	M	L	M	M	M
CO4	L3	H	H	M	H	-	-	-	-	M	H	-	M	H	M
CO5	L6	H	M	L	M	-	-	-	-	L	M	M	H	H	M

BTCSOE 802C: Simulation Modeling and Analysis

Course Objective:

- To study modeling, design, simulation, planning, verification and validation.
- To learn the simulation techniques, the students are expected to be able to solve real world problems which cannot be solved strictly by mathematical approaches.

Unit-1

Physicalmodeling:Conceptofsystemandenvironment,continuousanddiscretesystem,linearandnonlinearsystem,stochasticactivities,staticanddynamicmodels,principlesusedinmodeling,Basicsimulationmodeling,4Roleofsimulationinmodelevaluationandstudies,AdvantagesandDisadvantagesofsimulation.ModelingofSystems,iconicanalog.MathematicalModeling

Unit-2

Computersystemsimulation:Techniqueofsimulation,MonteCarlomethod,experimentalnatureofsimulation,numericalcomputationtechniques,continuoussystemmodels,analogandhybridsimulation,feedbacksystems4Buildingssimulationmodelsofwaitinglinesystem,Jobshop,materialhandlingandflexiblemanufacturingsystems.

Unit-3

Probability concepts in simulation: Stochastic variables, discrete and continuous probability functions mainly Normal, log normal, Weibull, exponential, Uniform, Poisson, Binomial, Triangular, Erlang etc.

Unit-3

RandomNumbers:Properties,Generationsmethods,TestsforRandomnumber-Frequencytest,Runstest,Autocorrelationtest.RandomVariateGeneration:InverseTransformTechnique-Exponential,Uniform,Weibull,Triangulardistributions,DirecttransformationforNormalandlognormalDistributions,convolutionmethods-Erlangdistribution, Acceptance Rejection Technique

Unit-4

Input Modeling: Data collection, Identification and distribution with data, parameter estimation, Goodness of fit tests, Selection of input models without data, Multivariate and time series analysis.Verification and validation: Design of simulation experiments, validation of experimental models, testing and analysis.

Unit-5

Output Analysis–Types of Simulations with Respect to Output Analysis, Stochastic Nature of outputdata,MeasuresofPerformanceandtheirestimation,Outputanalysisofterminatingsimulation,Output analysis of steady state simulations.SelectionofSimulationSoftware,Simulationpackages,TrendinSimulation. Do modeling using ARENA software which is freely available. Some more suggested simulation packages arePromodel, Quest, Witness, Extend, Simio etc. Students can learn

TEXTBOOK

1. Simulation Modeling and Analysis, Law A.M.,McGrawHill

REFERENCEBOOKS

1. Event System Simulation, Banks and Carsan, Prentice Hall of India
2. Simulation Modeling and Analysis with ARENA, Altiokand Melamed, Academic Press
3. Simulation with ARENA, Keltan, Sadowskiand Turrock, McGrawHil
4. Simulation Modeling and ARENA, Rossetti and Taha,John Wiley and Sons

5Systems Simulation with Digital Computer, Narsingh Deo, PHI Publication (EEE)

Course Outcomes

At the end of the course, the student will be able to:

CO1: Create a relevant model for a multitude of problems from science and engineering, by extracting the necessary and relevent information regarding the problem.

CO2: Define the different modeling terms by analyzing the system or the data that is present.

CO3: Implement the model on the computer and from the results check for the validity of the model and correctness of the assumptions present in the model.

CO4: Analyze the outcomes (mostly through visualizations) and make predictions.

Table: Mapping of Course Outcomes with Program Outcomes

Course Outcomes	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	P011	PO12	PSO 1	PSO 2
CO1	L6	M	H	M	H	M	-	-	-	L	H	-	M	M	M
CO2	L1	H	M	M	M	L	-	-	-	M	M	-	L	M	M
CO3	L3	H	M	L	M	M	-	-	-	H	M	-	M	M	M
CO4	L4	H	M	M	M	L	-	-	-	M	M	-	M	M	M

BTCSPCC 803: Big Data Analytics Lab

Course Objectives:

- To introduce the tools required to manage and analyze big data like Hadoop, NoSql Map Reduce.
- To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.
- To enable students to have skills that will help them to solve complex real-world problems in for decision support.

Lab Experiments:

1 Implement the following Data structures in Java i) Linked Lists ii) Stacks iii) Queues iv) Set v) Map

2 Perform setting up and Installing Hadoop in its three operating modes: Standalone, Pseudo distributed, Fully distributed.

3 Implement the following file management tasks in Hadoop:

- Adding files and directories
- Retrieving files
- Deleting files Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.

4 Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.

5 Write a Map Reduce program that mines weather data. Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with MapReduce, since it is semi structured and record-oriented.

6 Implement Matrix Multiplication with Hadoop Map Reduce

7 Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.

8 Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes.

9 Solve some real life big data problems.

Course Outcomes :

At the end of the course, Students will be able to:

CO1: Understand the key issues in big data management and its associated applications in intelligent business and scientific computing.

CO2: Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce and NO SQL in big data analytics.

CO3: Interpret business models and scientific computing paradigms, and apply software tools for big data analytics.

CO4: Apply adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	**Bloom Level**	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**P011**	**PO12**	PSO 1	PSO 2
CO1	L2	M	H	H	H	L	-	-	-	L	M	-	M	M	M
CO2	L5	H	H	M	H	M	-	-	-	M	M	-	M	H	M
CO3	L3	H	M	L	M	M	-	-	-	H	M	-	M	H	M
CO4	L3	M	H	M	H	M	-	-	-	M	M	-	M	H	M

BTCSPCC 804: Software Testing and Validation Lab

Course Objectives

- To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.
- To discuss various software testing issues and solutions in software unit test; integration, regression, and system testing.
- To learn how to planning a test project, design test cases and data, conduct testing operations, manage software problems and defects, generate a testing report.
- To expose the advanced software testing topics, such as object-oriented software testing methods, and component-based software testing issues, challenges, and solutions.
- To gain software testing experience by applying software testing knowledge and methods to practice-oriented software testing projects.

Lab Experiments

1 a) Write a program that calculates the area and perimeter of the circle. And find the Coverage & Test Cases of that program using JaButi Tool.

b) Write a program which read the first name and last name from console and matching with expected result by using JaBuTi.

c) Write a program that takes three double numbers from the java console representing , respectively, the three coefficients a,b, and c of a quadratic equation.

d) Write a program that reads commercial website URL from a url from file .you should expect that the URL starts with www and ends with .com. retrieve the name of the site and output it. For instance, if the user inputs www.yahoo.com, you should output yahoo. After that find the test cases and coverage using JaButi.

e) Write a program for a calculator and find the test case and coverage and Def-use-graph.

f) Write a program that reads two words representing passwords from the java console and outputs the number of character in the smaller of the two. For example, if the words are open and sesame, then the output should be 4, the length of the shorter word, open. And test this program using JaButi

2 Analyze the performance of following website using JMeter.

Site	Website	Type
Amazon	Amazon.com	shopping
Flip kart	Flipkart.com	shopping
Railway reservation	Irctc.co.in	Ticket booking site
Train searching	Erail.in	Train searching

3 Calculate the mutation score of programs given in 1(a) to 1 (f) using jumble Tool.

4 Calculate the coverage analysis of programs given in 1 (a) to 1 (f) using Eclemma Free open source Tool.

5 Generate Test sequences and validate using Selenium tool for given websites below:

Site	Website	Type
Amazon	Amazon.com	shopping
Flip kart	Flipkart.com	shopping
Railway reservation	Irctc.co.in	Ticket booking site
Train searching	Erail.in	Train searching

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Apply software testing knowledge and engineering methods.

CO2 : Design and conduct a software test process for a software testing project.

CO3: Identify the needs of software test automation, and define and develop a test tool to support test automation.

CO4: Understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods.

CO5: understand various communication methods and skills to communicate with their teammates to conduct their practice-oriented software testing projects.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcomes	**Bloom Level**	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**P011**	**PO12**	PSO 1	PSO 2
CO1	L3	M	H	H	H	L	-	-	-	L	H	-	M	M	M
CO2	L6	H	H	M	H	M	-	-	-	M	H	-	M	M	M
CO3	L1	H	M	L	M	M	-	-	-	H	M	-	M	M	M
CO4	L2	M	H	M	H	L	-	-	-	M	H	-	M	H	M
CO5	L2	L	M	M	M	L	-	-	-	L	M	M	L	H	M

BTCSPSIT 805: PROJECT

Course Objective:

- To introduce the concept and methods required for the construction of large software intensive system.
- To develop a broad understanding of the discipline of software engineering and management of software system.
- To provide an understanding of both theoretical and methodological issues involve in modern software engineering project management and focus strongly on practical techniques.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Capability to acquire and apply fundamental principles of engineering.

CO2: Be a multi-skilled engineer with good technical knowledge, management, leadership and entrepreneurship skills.

CO3: Identify, formulate and model problems and find engineering solution based on a systems approach.

CO4: Capability and enthusiasm for self-improvement through continuous professional development and life-long learning

Table: Mapping of Course Outcomes with Program Outcomes

Course Outcome	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	P011	PO 12	PSO1	PSO2
CO1	L3	M	M	H	L	M	-	-	-	-	M	-	L	M	M
CO2	L3	M	L	H	L	M	-	-	-	-	L	-	L	M	M
CO3	L3	M	M	H	L	M	-	-	-	-	M	-	L	M	M
CO4	L4	M	M	H	L	M	-	-	-	-	M	-	L	M	M

H- High, M- Moderate, L- Low, '-' for No correlation

BTCSSODECA 806: Social Outreach, Discipline & Extra Curricular Activities

Course Objectives:

- To allowing students to explore strengths and talents outside of academics.
- To helping students develop stronger time-management and organizational skills.
- To giving students the opportunity to build friendships and participate in group activities outside of the tight circle of the regular classroom.
- To helping to build confidence and self-esteem.

Course Outcomes:

At the end of the course, the student will be able to:

CO1: Develop their self-confidence, leadership qualities, and their responsibilities towards the community.

CO2: Have an impact on academic development, personal development, and civic responsibility

CO3: Understand the value of Social Work.

CO4: Understand the Significance of Discipline in student's Life

CO5: Contribute towards in social up-gradation by social organization like, Art of Living, Yoga etc., Blood donation, Awareness programs, personality development programs.

Table : Mapping of Course Outcomes with Program Outcomes

Course Outcome	Bloom Level	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	P0 11	PO 12	PS O1	PS O2
CO1	L2	-	-	-	-	-	M	L	M	M	-	-	-	-	-
CO2	L4	-	-	-	-	-	M	M	M	L	-	-	-	-	-
CO3	L1	-	-	-	-	-	M	L	M	L	-	-	-	-	-
CO4	L2	-	-	-	-	-	M	M	M	M	-	-	-	-	-
CO5	L2	-	-	-	-	-	M	M	L	M	-	-	-	-	-

H- High, M- Moderate, L- Low, '-' for No correlation

6. TEACHING-LEARNING PROCESS/ METHODOLOGY (TLM):

The teaching-learning process should be aimed at systematic exposition of basic concepts so as to acquire knowledge of technical program in a canonical manner. In this context, applications of technical program and linkage with the theory constitute a vital aspect of the teaching-learning process. The course offers many modes of learning and assessment methods. Students have great freedom of choice of course which they can study. The various components of teaching learning process are summarized in the following heads.

1. **Class room Lectures:** The most common method of imparting knowledge is through lectures.There are diverse modes of delivering lectures such as through blackboard, power point presentation and other technology aided means. A judicious mix of these means is a key aspect of teaching-learning process.

2. **Tutorials:** To reinforce learning, to monitor progress, and to provide a regular pattern ofstudy, tutorials are essential requirements. During these tutorials, difficulties faced by the students in understanding the lectures, are dealt with. Tutorials are also aimed at solving problems associated with the concepts discussed during the lectures.

3. **Practical:** To provide scientific visualization and obtaining results of Technical program inpractical sessions. These sessions provide vital insights into scientific concepts and drawlearner's attention towards limitations of scientific computations. During practical, scientific models arising in real life problems can also be simulated.

4. **Choice based learning/Open elective:** LOCF in this undergraduate program providesgreat flexibility both in terms of variety of courses and range of references in each course.

5. **Field based learning:** Students may enhance their knowledge through field based learningwhile understanding the practical importance.

6. **Textbooks learning:** A large number of books are included in the list of references of eachcourse for enrichment and enhancement of knowledge.

7. **E-learning:** Learner may also access electronic resources and educational websites for betterunderstanding and updating the concepts.

8. **Self-study materials:** Self-study material provided by the teachers is an integral part oflearning. It helps in bridging the gaps in the classroom teaching. It also provides scope for teachers to give additional information beyond classroom learning.

9. **Assignment/Problem solving:** Assignments at regular intervals involving applications oftheory are necessary to assimilate basic concepts of courses. Hence, it is incumbent on the part of a learner to complete open-ended projects assigned by the teacher.

10. **Internships:** The teaching-learning process needs to be further supported by other activitiesdevoted to subject-specific and interdisciplinary skills, summer and winter internships. During these internships it is expected that a learner will interact with experts and write a report on a topic provided to the learner.

11. **Institute visits:** Institute visit by a learner is also a part of learning process. During suchvisits a learner has access to knowledge by attending academic activities such as seminars, colloquia, library consultation and discussion with faculty members. These activities provide guidance and direction for further study.

12. **Industrial visits:** Industrial visits offer an opportunity to observe applications of scientificconcepts. These visits also give an opportunity to realize the power of mathematical ideas and their translation in problem solving.

13. **Training programs:** Training programs organized by various agencies/institutesprovide an opportunity to learn various dimensions of courses.