JAGANNATH UNIVERSITY

# Faculty of Engineering & Technology

## Syllabus

**For**

## Bachelor of Technology (B. Tech.)

**in**

## Computer Science & Engineering

**(2017-18)**

# B.Tech. (CSE) Course Structure (2017-18)

**Semester - I**

| THEORY PAPERS | | No. of Teaching Hours | | | Marks Allocation | | | |
|---|---|---|---|---|---|---|---|---|
| **Code** | **Subject/Paper** | **L** | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| BT 101 | Engineering mathematics-I | 3 | 1 | - | 30 | 70 | 100 | 4 |
| BT 102 | Communication Skills | 3 | 1 | - | 30 | 70 | 100 | 4 |
| BT 103 | Engineering Physics | 3 | 1 | - | 30 | 70 | 100 | 4 |
| BT 104 | Computer Programming-I | 3 | 1 | - | 30 | 70 | 100 | 4 |
| BT 105 | Environmental Engineering and Disaster Management | 3 | 1 | - | 30 | 70 | 100 | 4 |
| | | | | | | | | |
| *PRACTICALS/VIVA VOCE* | | **No. of Teaching Hours** | | | **Sessional** | **Practical** | **Total** | **Credits** |
| BT 107 | Communication Skills Lab | - | - | 2 | 30 | 20 | 50 | 1 |
| BT 108 | Engineering Physics Lab | - | - | 2 | 30 | 20 | 50 | 1 |
| BT 109 | Computer Programming Lab | - | - | 2 | 30 | 20 | 50 | 1 |
| BT 110 | Computer Aided Engineering Graphics | - | - | 2 | 30 | 20 | 50 | 1 |
| BT 111 | Mechanical Workshop Practice | - | - | 2 | 30 | 20 | 50 | 1 |
| | TOTAL | 15 | 5 | 10 | 300 | 450 | 750 | 25 |

## Semester - II

| THEORY PAPERS | | No. of Teaching Hours | | | Marks Allocation | | | |
|---|---|---|---|---|---|---|---|---|
| **Code** | **Subject/Paper** | **L** | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| BT 201 | Engineering Mathematics-II | 3 | 1 | - | 30 | 70 | 100 | 4 |
| BT 202 | Human Values | 3 | - | - | 30 | 70 | 100 | 3 |
| BT 203 | Engineering Chemistry | 3 | 1 | - | 30 | 70 | 100 | 4 |
| BT 204 | Computer Programming-II | 3 | - | - | 30 | 70 | 100 | 3 |
| | **Elective (any two)*** | | | | | | | |
| BT 205A | Basic Electrical and Electronic Engineering | 3 | - | - | 30 | 70 | 100 | 3 |
| BT 205B | Basic Civil Engineering | 3 | - | - | 30 | 70 | 100 | 3 |
| BT 205C | Basic Mechanical Engineering | 3 | - | - | 30 | 70 | 100 | 3 |
| BT 205D | Engineering Mechanics | 3 | - | - | 30 | 70 | 100 | 3 |
| | | | | | | | | |
| *PRACTICALS/VIVA VOCE* | | **No. of Teaching Hours** | | | **Sessional** | **Practical** | **Total** | **Credits** |
| BT 206 | Human Values: Activities | - | - | 2 | 30 | 20 | 50 | 1 |
| BT 207 | Engineering Chemistry Lab | - | - | 2 | 30 | 20 | 50 | 1 |
| BT 208 | Computer Programming-II Lab | - | - | 2 | 30 | 20 | 50 | 1 |
| BT 209 | Computer Aided Machine Drawing | - | - | 2 | 30 | 20 | 50 | 1 |
| | TOTAL | **18** | **2** | **10** | **330** | **520** | **800** | **24** |

## Semester -III

| THEORY PAPERS | | No. of Teaching Hours | | | Marks Allocation | | | |
|---|---|---|---|---|---|---|---|---|
| **Code** | **Subject/Paper** | L | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| BTCS 301 | Advanced Engineering Mathematics | 3 | 1 | 0 | 30 | 70 | 100 | 4 |
| BTCS302 | Managerial Economics and Financial Accounting | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS 303 | Digital Electronics | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS 304 | Data Structures and Algorithms | 3 | 1 | 0 | 30 | 70 | 100 | 4 |
| BTCS 305 | Object Oriented Programming | 3 | 1 | 0 | 30 | 70 | 100 | 4 |
| BTCS 306 | Software Engineering | 3 | 1 | 0 | 30 | 70 | 100 | 4 |
| BTCS 307 | Data Structures and Algorithms Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS 308 | Object Oriented Programming Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS309 | Software Engineering Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS 310 | Digital Electronics Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS 311 | Mini Project | | | | | | 50 | 1 |
| | **TOTAL** | 18 | 4 | 8 | 300 | 500 | 800 | 27 |

# Semester -IV

| THEORY PAPERS | | No. of Teaching Hours | | | Marks Allocation | | | |
|---|---|---|---|---|---|---|---|---|
| **Code** | **Subject/Paper** | L | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| BTCS401 | Discrete Mathematics Structure | 3 | 1 | 0 | 30 | 70 | 100 | 4 |
| BTCS402 | Technical Communication | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS403 | Microprocessor & Interfaces | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS404 | Database Management System | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS 405 | Theory of Computation | 3 | 1 | 0 | 30 | 70 | 100 | 4 |
| BTCS406 | Data Communication and Computer Networks | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS 407 | Microprocessor & Interfaces Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS 408 | Database Management System Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS 409 | Network Programming Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS 410 | Linux Shell Programming Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS 411 | Java Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS 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** |
| BTCS 501 | Information Theory & Coding | 3 | - | - | 30 | 70 | 100 | 3 |
| BTCS 502 | Compiler Design | 3 | - | - | 30 | 70 | 100 | 3 |
| BTCS 503 | Operating System | 3 | - | - | 30 | 70 | 100 | 3 |
| BTCS 504 | Computer Graphics & Multimedia | 3 | - | - | 30 | 70 | 100 | 3 |
| BTCS 505 | Analysis of Algorithms | 3 | - | - | 30 | 70 | 100 | 3 |
| BTCS 506A | Wireless Communication | 3 | - | - | 30 | 70 | 100 | 3 |
| BTCS 506B | Human-Computer Interaction | 3 | - | - | 30 | 70 | 100 | 3 |
| BTCS 506C | Bioinformatics | 3 | - | - | 30 | 70 | 100 | 3 |
| **LABS** | | | | | | | | |
| BTCS 507 | Computer Graphics & Multimedia Lab | - | - | 2 | 30 | 20 | 50 | 1 |
| BTCS 508 | Compiler Design Lab | - | - | 2 | 30 | 20 | 50 | 1 |
| BTCS 509 | Analysis of Algorithms Lab | - | - | 2 | 30 | 20 | 50 | 1 |
| BTCS 510 | Advance Java Lab | - | - | 2 | 30 | 20 | 50 | 1 |
| BTCS 511 | Industrial Training | - | - | 2 | 30 | 20 | 50 | 1 |
| BTCS 512 | Social Outreach, Discipline & Extra Curricular Activities | | | | | | 50 | 1 |
| | **TOTAL** | **18** | **-** | **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** |
| BTCS 601 | Digital Image Processing | 3 | - | - | 30 | 70 | 100 | 3 |
| BTCS 602 | Machine Learning | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS 603 | Information Security System | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS 604 | Computer Architecture and Organization | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS 605 | Artificial Intelligence | 3 | - | 0 | 30 | 70 | 100 | 3 |
| BTCS 606 | Cloud Computing | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| **ELECTIVE SUBJECT** | | | | | | | | |
| BTCS 607A | Distributed System | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS 607B | Software Defined Network | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS 607C | Ecommerce & ERP | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| **LABS** | | | | | | | | |
| BTCS 608 | Digital Image Processing Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS 609 | Machine Learning Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS 610 | Python Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS 611 | Mobile Application Development Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS 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** |
| BTCS701 | Internet of Things | 3 | - | - | 30 | 70 | 100 | 3 |
| **ELECTIVE SUBJECT** | | | | | | | | |
| BTCS 702A | Principle of Electronic Communication | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS 702B | Micro and Smart System Technology | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS 702C | Optimization Techniques | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| **LABS** | | | | | | | | |
| BTCS 703 | Internet of Things Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS704 | Cyber Security Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS705 | Industrial Training | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS706 | Seminar | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS707 | Social Outreach, Discipline &Extra Curricular Activities | | | | | | 50 | 1 |
| | **TOTAL** | **6** | **0** | **8** | **180** | **220** | **450** | **11** |

## Semester –VIII

| THEORY PAPERS | | No. of Teaching Hours | | | Marks Allocation | | | |
|---|---|---|---|---|---|---|---|---|
| **Code** | **Subject/Paper** | L | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| BTCS801 | Big Data Analytics | 3 | - | - | 30 | 70 | 100 | 3 |
| **ELECTIVE SUBJECT** | | | | | | | | |
| BTCS802A | Soft Computing | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS802B | Robotics and Control | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS802C | Simulation Modeling and Analysis | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| **LABS** | | | | | | | | |
| BTCS803 | Big Data Analytics Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS804 | Software Testing and Validation Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS805 | Project | 0 | 0 | 0 | 120 | 80 | 200 | 4 |
| BTCS806 | Social Outreach, Discipline &Extra Curricular Activities | | | | | | 50 | 1 |
| | **TOTAL** | **7** | **2** | **4** | **270** | **330** | **650** | **15** |

## Semester - I

| THEORY PAPERS | | No. of Teaching Hours | | | Marks Allocation | | | |
|---|---|---|---|---|---|---|---|---|
| **Code** | **Subject/Paper** | **L** | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| BT 101 | Engineering mathematics-I | 3 | 1 | - | 30 | 70 | 100 | 4 |
| BT 102 | Communication Skills | 3 | 1 | - | 30 | 70 | 100 | 4 |
| BT 103 | Engineering Physics | 3 | 1 | - | 30 | 70 | 100 | 4 |
| BT 104 | Computer Programming-I | 3 | 1 | - | 30 | 70 | 100 | 4 |
| BT 105 | Environmental Engineering and Disaster Management | 3 | 1 | - | 30 | 70 | 100 | 4 |
| | | | | | | | | |
| *PRACTICALS/VIVA VOCE* | | **No. of Teaching Hours** | | | **Sessional** | **Practical** | **Total** | **Credits** |
| BT 107 | Communication Skills Lab | - | - | 2 | 30 | 20 | 50 | 1 |
| BT 108 | Engineering Physics Lab | - | - | 2 | 30 | 20 | 50 | 1 |
| BT 109 | Computer Programming Lab | - | - | 2 | 30 | 20 | 50 | 1 |
| BT 110 | Computer Aided Engineering Graphics | - | - | 2 | 30 | 20 | 50 | 1 |
| BT 111 | Mechanical Workshop Practice | - | - | 2 | 30 | 20 | 50 | 1 |
| | TOTAL | 15 | 5 | 10 | 300 | 450 | 750 | 25 |

# BT-101 ENGINEERING MATHEMATICS-I

**Unit-I**

Differential Calculus:

Asymptotes (Cartesian coordinates only), concavity, convexity and point of inflection, Curve tracing (Cartesian and standard Polar curves- Cardioids, Lemniscates of Bernoulli, Limacon, Equiangular Spiral only).

**Unit-II**

Limit, continuity and differentiability of functions of two variables, Partial differentiation, Euler's theorem on homogeneous functions, change of variables, chain rule.

**Unit-III**

Taylor's theorem (two variables), approximate calculations, Jacobian, maxima & minima of two and more independent variables, Lagrange's method of multipliers.

**Unit-IV**

Integral Calculus:

Double integral, change of order of integration, Double integral by changing into Polar form, Applications of Double integrals for evaluating areas & volumes, triple integral; Beta function and Gamma function (simple properties).

**Unit-V**

Vector Calculus:

Scalar and vector field, differentiation & integration of vector functions: Gradient, Directional derivative, Tangent planes and Normals.

Divergence, Curl and Differential Operator; Line, Surface and Volume integrals; Green's theorem in a plane, Gauss's and Stoke's theorem (without proof) and their applications.

Suggested Readings:


1. Thomas' Calculus, George B. Thomas, Jr., Maurice D. Weir, Joel R. Hass, Pearson Educations.
2. Calculus with Early Transcendental Functions, James Stewart, Cengage Lerning Publication.
3. Engineering Mathematics, C.B. Gupta, S.R. Singh and Mukesh Kumar, McGraw Hill Education.
4. Engineering Mathematics, S. Pal and S.C. Bhunia, Oxford University Press.
5. Higher Engineering Mathematics, B.V. Ramana, McGraw Hill Education.
6. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley.

# BT-102 COMMUNICATION SKILLS

**Unit-I**

Communication: Meaning, Importance and Cycle of Communication, Media and Types of Communication, Formal and Informal Channels of Communication, Barriers to Communication, Division of Human Communication and Methods to Improve Interpersonal Communication, Qualities of Good Communication.

**Unit-II**

Grammar: Passive Voice, Indirect Speech, Conditional Sentences, Modal Verbs, Linking Words.

**Unit-III**

Composition: Curriculum Vitae Writing, Business Letter Writing, Job Application Writing, Paragraph Writing, Report Writing.

**Unit-IV**

Short Stories: 'The Luncheon' by Somerset Maugham, 'How much Land does a Man Need?' by Leo Tolstoy, 'The Night Train at Deoli' by Ruskin Bond.

**Unit-V**

Poems: 'No Men are Foreign' by James Kirkup, 'If' by Rudyard Kipling, 'Where the Mind is without Fear' by Rabindranath Tagore.

Suggested Readings:


1. Communication Skills, Pushplata & Sanjay Kumar, Oxford University Press, India.
2. The Written Word, Vandana Singh, Oxford University Press, India.
3. Current English Grammar and Usage with Composition, R. P. Sinha, Oxford University Press, India.
4. Rodriques M. V., 'Effective Business Communication', Concept Publishing Company, New Delhi, 1992 reprint (2000).
5. Bansal, R K and Harrison J B, 'Spoken English' Orient Longman, Hyderabad.
6. Binod Mishra & Sangeeta Sharma, 'Communication Skills for Engineers and Scientists, PHI Learning Private Ltd, New Delhi, 2011.
7. Gartside L. 'Modern Business Correspondence, Pitman Publishing, London.

# BT-103 ENGINEERING PHYSICS

**Unit-I**

Interference of light: Michelson's Interferometer: Production of circular & straight line fringes; Determination of wavelength of light; Determination of wavelength separation of two nearby wavelengths. Optical technology: Elementary idea of anti-reflection coating and interference filters.

**Unit-II**

Diffraction and Polarization of light: Fraunhofer Diffraction at Single Slit. Diffraction grating: Construction, theory and spectrum; Determination of wavelength of light. Resolving power: Raleigh criterion; Resolving power of diffraction grating and telescope. Plane, circularly and elliptically polarized light on the basis of electric (light) vector: Malus law; Double Refraction; Phase retardation plates and their use in production and detection of circularly and elliptically polarized light; Optical activity and laws of optical rotation; specific rotation and its measurement using half-shade device.

**Unit-III**

Elements of Material Science: Bonding in solids; covalent bonding and Metallic bonding; Classification of solids as Insulators, Semiconductors and Conductors; X-Ray diffraction and Bragg's Law. Hall Effect: Theory, Hall Coefficient and applications.

**Unit-IV**

Quantum Mechanics: Compton effect & quantum nature of light; Derivation of time dependent and time independent Schrodinger's Wave Equation; Physical interpretation of wave function and its properties; boundary conditions; Particle in one dimensional box.

**Unit-V**

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.

Laser and Holography: Theory of laser action; Einstein's coefficients; Components of laser; Threshold conditions for laser action; Theory, Design and applications of He-Ne and semiconductor lasers; Holography versus photography, Basic theory of holography; basic requirement of a Holographic laboratory; Applications of Holography in microscopy and interferometry.

Suggested Readings:


1. Engineering Physics: Malik and Singh (Tata McGraw Hill)
2. Engineering Physics: Naidu (Pearson)
3. Optics : Ajay Ghatak (Tata McGraw Hill)
4. Concept of Modern Phyiscs: A. Baiser (Tata McGraw Hill)
5. Fundamental of Optics : Jetkins and White (Tata McGraw Hill)
6. Material Science: Smith (McGraw Hill)

## BT-104 COMPUTER PROGRAMMING-I

**Unit-I**
**Computer Fundamentals:** Flow chart, pseudocode. binary, octal and hexadecimal number system. ASCII, EBCDIC and UNICODE. boolean operations,

**Unit-II**
primary and secondary memory. Difference among low-level & high-level languages.

**Unit-III**
**C Programming:** Structure of a 'C' program, Datatypes, enumerated, assignment statements, input output statements,

**Unit-IV**
If statement, for loops, while loops, do-while loops, switch statement, break statement, continue statement. Datatype conversion.

**Unit-V**
Functions & program structure (function call and return), scope of variables, parameter passing methods, recursion v/s iteration.

**Suggested Readings:**
1. Fundamental of Computers By R. Thareja**,** Oxford University Press.
2. Programming in ANSI C by E Balagurusamy, Tata McGraw-Hill Education.
3. The C Programming Language by Brian W. Kernighan and Dennis M. Ritchie, PHI.
4. C:The Complete Reference by Herbert Schildt, McGraw-Hill Education.
5. Let us C by Yashavant P. Kanetkar, bpb publications.

## BT-105 ENVIRONMENTAL ENGINEERING AND DISASTER MANAGEMENT

**Unit-I**
Basics of Environment: Environmental Pollution, Environmental Acts and Regulations, Ecosystem, Hydrological and
chemical cycles, Energy flow in ecosystems. Biodiversity, population dynamics.

**Unit-II**
Water Pollution: Water pollutants, effects of oxygen demand, water quality in lakes, reservoirs and groundwater, contaminant transport, self cleaning capacity of streams and water bodies,

water quality standards, Waste water management, Treatment &
disposal of wastewater.
Rain water harvesting: Reuse and saving in use of water, methods of rain water harvesting.

**Unit-III**
Solid Waste Management: Classification of solid waste, Collection, transportation, treatment, and disposal of solid waste. Economic recovery of solid waste. Sanitary landfill, on site sanitation. Energy interaction from solid waste.

**Unit-IV**
Air and Noise Pollution: Primary and Secondary air pollutants, Air Pollution, Harmful effects of Air Pollution, Control of Air Pollution. Noise Pollution, Harmful effects of noise pollution, control of noise pollution, Global warming, Acid rain, Ozone depletion, Green House effect

**Unit-V**
Natural Disasters: Hydro-meteorological Based Disasters like Flood, Flash Flood, Cloud Burst, Drought, Cyclone, Forest Fires; Geological Based Disasters like Earthquake, Tsunami, Landslides, Volcanic Eruptions. Man made Disasters: Chemical Industrial Hazards, Major Power Break Downs, Traffic Accidents, Fire Hazards, Nuclear Accidents.
Disaster profile of Indian continent. Study of recent major disasters. Disaster Management Cycle and its components.

Disaster Management: Understanding Disasters and Hazards and related issues social and environmental. Risk and Vulnerability. Types of Disasters, their occurrence/ causes, technical terminology involved, impact and preventive measures.

Suggested Readings:
1. Towards Basics of Natural Disaster Reduction by Prof. D.K. Sinha. Researchco Book Center,Delhi.
2. Understanding Earthquake Disasters by Amita Sinvhal. Tata McGraw Hill, New Delhi.
3. Selected Resources available on www.nidmindia.nic.in
4. Basic Environmental Engineering by Prof. R.C. Gaur, New Age International Publication.

## BT-107 COMMUNICATION SKILLS LAB

1. Phonetic Symbols and Transcriptions
2. Extempore
3. Group Discussion
4. Dialogue Writing
5. Listening Comprehension
6. Word Formation
7. Synonyms and Antonyms
8. Affixes

(Note: Wherever appropriate, Language Lab Software is to be used to improve

listening comprehension and speaking skills.)

Suggested Readings:


1. Technical Communication: principles and Practice, Meenakshi Raman & Sangeeta Sharma, Oxford University Press, India.
2. Effective Technical Communication, Barun K. Mitra, Oxford University Press, India.
3. Binod Mishra & Sangeeta Sharma, 'Communication Skills for Engineers and Scientists, PHI Learning Private Ltd, New Delhi, 2011.
4. Communication Skills, Pushplata & Sanjay Kumar, Oxford University Press, India.
5. Bhattacharya, Indrajit, An Approach to Communication Skills, Dhanpat Rai & Co. (Pvt) Ltd., New Delhi.
6. Wright, Crissy, Handbook of Practical Communication Skills, Jaico Publishing House, Mumbai.
7. Gimson, A C, 'An Introduction to the Pronunciation of English', ELBS.


## BT-108 ENGINEERING PHYSICS LAB

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 specific rotation of glucose (sugar) solution using polarimeter.
4. To determine the wave length of prominent lines of mercury by plane diffraction grating with the help of spectrometer.
5. To study the variation of a semiconductor resistance with temperature and hence determine the band gap of the semi conductor in the form of reverse baised P-N junction diode.
6. To determine the height of water tank with the help of sextant.
7. To determine the dispersive power of material of a prim for violet and yellow colour's of mercury light with the help of spectrometer.
8. To study the charge and discharge of a condenser and hence determine the same constant (both current and voltage graphs are to be plotted.
9. To verify the expression for the resolving power of a Telescope.
10. To determine the coherence length and coherence time of laser using He – Ne laser.
11. To determine the specific resistance of the material of a wire by Carey Froster's bridge.

## BT-109 COMPUTER PROGRAMMING LAB

The programs shall be developed in C language related with the following concepts:

1. Eight programs using input output statements, if statement, for loops, while loops, do-while loops, switch statement, break statement, continue statement, datatype conversion etc.
2. Check a number- palindrome, prime, etc.
3. Eight programs using functions.
4. Two programs using recursion and Iteration.

## BT-110 COMPUTER AIDED ENGINEERING GRAPHICS

**1.Projections of Point & Lines**: Positions of Point, Notation system, systematic Approach for projections of points, Front view & Top view of point, Positions of straight 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)

**2.Projections 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 RPs, True shape of the plane, Distance of a point from plane, Angle between two planes (no drawing sheet required, only assignment in sketch book)

**3.Projection of solids**: Basic solids, Frustums and truncated solids, Positions of the solids, solid with Axis perpendicular to an RP, solid with axis inclined to one RP and parallel to the other solid with axis Inclined to Both the RPs Solid with Axis parallel to Both the RPs (One drawing sheet, one assignment in sketch book)

**4.Section of solids**: Theory of sectioning, section of prisms and cubes, sections of pyramids and Tetrahedron section of Cylinders, Section of cones, Section of spheres (One drawing sheet, one assignment in sketch book)

**5.Development of surfaces**: Methods of development, parallel line developments, Radial line Development, Anti- Development (One drawing sheet, one assignment in sketch book)

**6.Isometric Projection**: Principle of Isometric Projection Isometric scale, Isometric projections and Isometric Views, Isometric Views of standard shapes, Isometric views of standard solids (One drawing sheet, one assignment in sketch book)

**7.Computer Aided Drafting**: Introduction to CAD, Advantages of CAD software's, Auto CAD, Auto CAD Commands and tool bars, Creating the Drawing, Charging properties, Dimensioning other object, Text editing, Isometric drawing (Four assignments on the computer)

Suggested Readings:


1. Engineering Drawing Geometrical Drawing P.S.Gill , S.K.Katara & Sons
2. Engineering Drawing,Dhanarajay A Jolhe ,Tata McGraw Hill.
3. Engineering Drawing, Basant Agarwal & CM Agarwal ,Tata McGraw Hill

4. Engineering Drawing, N.D.Bhatt, Charotar Publishing House Pvt. Ltd.
5. Engineering Drawing with an introduction to AutoCAD, Dhananjay A Jolhe
6. Engineering Drawing with AutoCAD, B.V.R. Gupta and M. Rajaroy
7. AutoCAD 2017 for Engineers & Designers (Basic and Intermediate), Sham Tickoo,

## BT-111 MECHANICAL WORKSHOP PRACTICE

**1.Carpentry Shop:**
1. T – Lap joint
2. Bridle joint

**2. Foundry Shop:**
1. Mould of any pattern
2. Casting of any simple pattern

**3.Welding Shop:**
1. Lap joint by gas welding
2. Butt joint by arc welding
3. Lap joint by arc welding
4. Demonstration of brazing, soldering & gas cutting

**4.Machine Shop Practice:**
1. Demonstration of various machine tools such as Lathe, Shaper, Milling, Grinding and Drilling

**5.Fitting Shop**
1. Finishing of two sides of a square piece by filing
2. Making mechanical joint and soldering of joint on sheet metal
3. To cut a square notch using hacksaw and to drill a hole and tapping

**6.Sheet Metal Shop**
Making of Funnel using sheet metal

Suggested Readings:

1. Elements of Workshop Technology Hajra & Choudhary, Media Promoters & Publisher.
2. Workshop Practice HS Bawa, Tata McGraw Hill 2nd ed. India.
3. Mechanical Workshop Practice, K.C. John, PHI Learning New Delhi.
4. Workshop Technology, W.A.J.Chapman, CBS Publisher & Distributor New Delhi.

## Semester - II

| THEORY PAPERS | | No. of Teaching Hours | | | Marks Allocation | | | |
|---|---|---|---|---|---|---|---|---|
| **Code** | **Subject/Paper** | **L** | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| BT 201 | Engineering Mathematics-II | 3 | 1 | - | 30 | 70 | 100 | 4 |
| BT 202 | Human Values | 3 | - | - | 30 | 70 | 100 | 3 |
| BT 203 | Engineering Chemistry | 3 | 1 | - | 30 | 70 | 100 | 4 |
| BT 204 | Computer Programming-II | 3 | - | - | 30 | 70 | 100 | 3 |
| | **Elective (any two)*** | | | | | | | |
| BT 205A | Basic Electrical and Electronic Engineering | 3 | - | - | 30 | 70 | 100 | 3 |
| BT 205B | Basic Civil Engineering | 3 | - | - | 30 | 70 | 100 | 3 |
| BT 205C | Basic Mechanical Engineering | 3 | - | - | 30 | 70 | 100 | 3 |
| BT 205D | Engineering Mechanics | 3 | - | - | 30 | 70 | 100 | 3 |
| | | | | | | | | |
| *PRACTICALS/VIVA VOCE* | | **No. of Teaching Hours** | | | **Sessional** | **Practical** | **Total** | **Credits** |
| BT 206 | Human Values: Activities | - | - | 2 | 30 | 20 | 50 | 1 |
| BT 207 | Engineering Chemistry Lab | - | - | 2 | 30 | 20 | 50 | 1 |
| BT 208 | Computer Programming-II Lab | - | - | 2 | 30 | 20 | 50 | 1 |
| BT 209 | Computer Aided Machine Drawing | - | - | 2 | 30 | 20 | 50 | 1 |
| | TOTAL | **18** | **2** | **10** | **330** | **520** | **800** | **24** |

# BT:201 ENGINEERING MATHEMATICS-II

**Unit-I**

Linear Algebra:
Rank of a matrix, Normal forms, consistency of systems of linear simultaneous equations and its solutions, Linear dependence and independence of vectors, Eigen values and Eigen vectors, Cayley-Hamilton theorem (without proof), orthogonal matrices, diagonalization ofmatrix.

**Unit-II**

Fourier Series:
Orthogonal functions, periodic functions, Fourier series of periodic functions, Euler formula, change of intervals, Even and Odd functions, half range Fourier sine and cosine series; Harmonic analysis.

**Unit-III**

Differential Equations:
Linear differential equations of first order, Reducible to linear form, Exact differential equations, reducible to exact form; Linear Differential Equations of Higher order with constant coefficients, Simultaneous linear differential equations.

**Unit-IV**

Second order linear ODE with variables coefficients, Homogenous and exact forms, Change of dependent and independent variables; Variation of parameters, Method of Undetermined coefficients, Euler-Cauchy equations.

**Unit-V**

Partial Differential Equations: Order and Degree, Formation; Linear partial differential equations of first order: Lagrange's form, Standard forms, Charpit's method.
Solutions of PDE of Second order using separation of variable method.

Suggested Readings:


1. Advanced Engineering Mathematics, Peter O Neil, Cengage Learning Publication.
2. Advanced Engineering Mathematics, 4th Edition, Dennis G. Zill, Warren S. Wright, Jones & Bartlett Publications.
3. Engineering Mathematics, S. Pal and S.C. Bhunia, Oxford University Press.
4. Engineering Mathematics, C.B. Gupta, S.R. Singh and Mukesh Kumar, McGrawHill Education.
5. Advanced Engineering Mathematics, Jain and Iyengar, Narosa Publications.
6. Higher Engineering Mathematics, B.V. Ramana, McGraw Hill Education.
7. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley.

# BT-202 HUMAN VALUES

**Unit-I**

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

Understanding the need, basic guidelines, content and process for Value Education

Self Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration

Continuous Happiness and Prosperity- A look at basic Human Aspirations

Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority

Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario

Method to fulfill the above human aspirations: understanding and living 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' and the material 'Body'

Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha

Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)

Understanding the characteristics and activities of 'I' and harmony in 'I' Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail

Programs to ensure Sanyam and Swasthya

**Unit-III**

Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

Understanding harmony in the Family- the basic unit of human interaction

Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti;

Trust (Vishwas) and Respect (Samman) as the foundational values of relationship

Understanding the meaning of Vishwas; Difference between intention and competence

Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship

Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals

Visualizing a universal harmonious order in society- Undivided Society (AkhandSamaj), Universal Order (Sarvabhaum Vyawastha )- from family to world family!

**Unit-IV**

Understanding Harmony in the Nature and Existence - Whole existence as Co-existence Understanding the harmony in the Nature Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation innature

Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all- pervasive space Holistic perception of harmony at all levels of existence 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

**Unit-V**

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
Case studies of typical holistic technologies, management models and production systems Strategy for transition from the present state to Universal Human Order:
a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers

Suggested Readings:


1. R R Gaur, R Sangal, G P Bagaria, A Foundation Course in Human Values and Professional Ethics, Excel Books, 2009. ISBN: 978-9-350-62091-5
2. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins, USA
3. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
4. R. Subramanian, Professional Ethics includes Human Values, Oxford Univ. Press.
5. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
6. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
7. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
8. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
9. A N Tripathy, 2003, Human Values, New Age International Publishers.

SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik)


## BT-203 ENGINEERING CHEMISTRY

**Unit-I**

Water:
Common natural impurities, hardness, determination of hardness by complexometric (EDTA method), degree of hardness. Municipal water supply, requisite of drinking water, purification of water, sedimentation, filtration, sterilization, breakpoint chlorination. Water for steam making and boiler troubles, formation of solids (Scale and Sludge formation), carryover (Foaming and Priming), boiler corrosion and caustic embrittlement, Methods of boiler water treatment(water softening) preliminary treatments, preheating, Lime-Soda process, Zeolite (Permutit) process, Deionization (Demineralization) process.
Numerical problems based on hardness, Lime-Soda and zeolite process.

**Unit-II**

Organic Fuels:
Origin and classification of fuels. Solid fuels-, coal, classification of coal, significance of

constituents, proximate and ultimate analyses of coal, gross and net calorific value, determination of calorific value of coal by Bomb Calorimeter. Metallurgical coke, carbonization processes- Beehive coke oven and Hoffmann Oven (by-products oven) method. Liquid fuels- Advantages of liquid fuels, petroleum and refining of petroleum, reforming, cracking, synthetic petrol, knocking, octane number, anti-knocking agents. Gaseous fuels-advantages, manufacture, composition and uses of coal gas and oil gas, determination of calorific value of gaseous fuels by Junker's calorimeter, flue gas analysis by Orsat's apparatus.
Numerical problems based on determination of calorific value (bomb calorimeter/Junkers calorimeter/Dulongs formula, proximate analysis & ultimate and combustion of fuel.

**Unit-III**

Polymers:
Classification, constituents, general properties of polymers and their uses. Preparation properties and uses of polyethylene, polyethylene terephthalate (PET), nylon 6, nylon 66, nylon 6, 10, Kevlar, Bakelite. Elastomers – natural rubber and vulcanization, synthetic rubbers viz. Buna-S, Buna –N, Butyl and Neoprene Rubbers. Conducting polymers-.

**Unit-IV**

Lubricants:
Classification, types of lubrication, properties and uses. Viscosity and viscosity index, flash and fire point, cloud and pour point. Emulsification and steam emulsion number.

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

**Unit-V**

Inorganic Engineering Materials:
Cement: Manufacture of Portland cement. Rotary kiln technology. Chemistry of hardening and setting of cement. Role of gypsum. Refractories: Definition properties and classification. Silica and fire clay refractories. Glass: Definition, type and properties of glasses. Manufacture of glass, annealing of glass. Optical fibre grade glass.

Suggested Readings:


1. Engineering Chemistry by Monica Jain and P C Jain, Dhanpat Rai Publishing Company (P) Ltd, New Delhi.
2. Engineering Chemistry Wiley, India.
3. The Chemistry and Technology of Coal, by J G Speigh, CRC Press.
4. The Chemistry and Technology of Petroleum, by J G Speigh, CRC Press.
5. Polymer Chemistry: An Introduction, Malcolm P. Stevens, Oxford University Press.
6. Lubricants and Lubrications, Theo Mang, Wilfeied, Wiley-VCH.
7. Chemistry of water treatment, Samuel Faust & Osman M Aly, CRC Press.
8. Boilers water treatment. Principles and Practice, Colin Frayne, CRC Press.
9. Corrosion Understanding the Basic, by Joseph R Davis, ASM International.
10. Engineering Chemistry, by O.G. Palanna, McGraw Hill Education, India.


## BT-204 COMPUTER PROGRAMMING-II

**Unit-I**
**Computer System Fundamentals:** System software, firmware, freeware/open-source, loader, compiler, peripherals.

**Unit-II**
**Computer Programming:** one-dimensional arrays, multi-dimensional arrays, character arrays and strings,

**Unit-III**
Pointers ,Pointers arithmetic, Dynamic memory allocation: functions like malloc, calloc, free.

**Unit-IV**
Preprocessor, command line arguments, difference between macro and inline function. Structure & Union, typedef.

**Unit-V**
File operations and multi-file handling, sscanf()/sprintf(). Graphics using C.

**Suggested Readings:**
1. Programming in ANSI C by E Baluguamsamy, TaTa McGraw-Hill Education
2. Programming in C by Thareja, Oxford University Press.
3. The C Programming Language by Brian W. Kernighan and Dennis M. Ritchie, PHI.
4. C: The Complete Reference by Herbert Schildt, McGraw-Hill Education.
5. Graphics Under C by Yashavant P. Kanetkar, bpb publications.

## BT 205.A BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

**Unit-I**
Basic Concepts of Electrical Engineering: Electric Current, Electromotive force, Electric Power, Ohm's Law, Basic Circuit Components, Faraday's Law of Electromagnetic Induction, Lenz's Law, Kirchhoff's laws, Network Sources, Resistive Networks, Series-Parallel Circuits, Node Voltage Method, Mesh Current Method, Superposition, Thevenin's, Norton's and Maximum Power Transfer Theorems.

**Unit-II**
Transformers: Construction, EMF equation, ratings, phasor diagram on no load and full load, equivalent circuit, regulation and efficiency calculations, open and short circuit tests, auto-transformers

**Unit-III**
Alternating Quantities: Introduction, Generation of AC Voltages, Root Mean Square and Average Value of Alternating Currents and Voltages, Form Factor and Peak Factor, Phasor Representation of Alternating Quantities, Single Phase RLC Circuits, Introduction to 3- Phase AC System.

**Unit-IV**
Rotating Electrical Machines; DC Machines: Principle of Operation of DC Machine as Motor and Generator, EMF Equation, Applications of DC Machines. AC Machines: Principle of Operation of 3-Phase Induction Motor, 3-Phase Synchronous Motor and 3-Phase Synchronous Generator (Alternator), Applications of AC Machines.

**Unit-V**
Basic Electronics: Conduction in Semiconductors, Conduction Properties of Semiconductor Diodes, Behaviour of the PN Junction, PN Junction Diode, Zener Diode, Photovoltaic Cell, Rectifiers, Bipolar Junction Transistor, Field Effect Transistor, Transistor as an Amplifier. Digital Electronics: Boolean algebra, Binary System, Logic Gates and Their Truth Tables. Electrical Measuring Instruments: DC PMMC instruments, shunt and multipliers, multimeters, Moving iron ammeters and voltmeters, dynamometer, wattmeter, AC watthour meter, extension of instrument ranges.

Suggested Readings:


1. Basic Electrical and Electronics Engineering by Sukhija and Nagsarkar, Oxford Publication
2. Basic Electrical & Electronics Engineering by Kothari, Nagrath, TMH
3. Basic Electrical & Electronics Engineering by V. Jagathesan, K. Vinod Kumar & R. Saravan Kumar, WileyIndia.
4. Basic Electrical & Electronics Engineering by Van Valkenburge, Cengage learning Indian Edition
5. Basic Electrical and Electronics Engineering by Muthusubrmaniam, TMH
6. Fundamentals of Electrical and Electronics Engineering by Ghosh, Smarajit, PHI India
7. Basic Electrical & Electronics Engineering by Ravish Singh, TMH
8. Basic Electronics Engineering by Vijay Baru et al, Dream Tech, New Delhi


## BT-205.B BASIC CIVIL ENGINEERING

**Unit-I**
Introduction: Specialization of Civil Engineering, scope of Civil Engineering, Role of civil Engineer in Society, Impact of infrastructural development on economy of country.

Surveying: Object & principles of Surveying, plans and maps, Scales, Unit of measurement.

**Unit-II**

Linear measurements: Direct measurements- Tape & Chain, Ranging out survey lines, taking measurements of sloping ground.
Tape correction, conventional symbols. Introduction to Compass Surveying & Leveling. Introduction to totalstation.

**Unit-III**
Building & Building materials:
Construction materials: Stone, Brick, Cement, Mortar, Concrete, Steel – their properties & uses.
**Unit-IV**
Selection of site for Buildings, 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, Traffic and Road Safety: Types and characteristics of various modes of transportation, various road traffic signs, causes of accidents and road safety measures.

Suggested Readings:

1. Palancharmy, Basic Civil Engineering, McGraw Hill publishers.
2. Satheesh Gopi, Basic Civil Engineering, Pearson Publishers.
3. Ketki Ranwala Dalal, Essentials of Civil Engineering, Charotar Publishing House.

## BT-205.C BASIC MECHANICAL ENGINEERING

**Unit-I**
Fundamentals: Introduction to mechanical engineering, concepts of thermal engineering, mechanical machine design, industrial engineering and manufacturing technology. Steam Boilers, Steam Turbines and Power Plants: Introduction, classification and types of steam boilers and steam turbines. Discuss working of steam boilers and steam turbines.
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 IC Engines, Working of IC Engines and its components.

**Unit-III**
Refrigeration and Air Conditioning: Introduction, classification and types of refrigeration systems and air-conditioning. Applications of refrigeration an Air-conditioning.

Transmission of Power: Introduction and types of Belt and Rope Drives. Introduction to Gears and Gear Trains.

**Unit-IV**

Primary Manufacturing Processes:
Metal Casting Process: Introduction to Casting Process, Patterns, Molding, Furnaces.
Metal Forming Processes: Introduction to Forging, Rolling, Extrusion, Drawing.
Metal Joining Processes: Introduction to various types of Welding, Gas Cutting, Brazing, and Soldering.
Metal Removal or Machining Processes: Introduction to machining process and various machine tools.

**Unit-V**

Engineering Materials and Heat Treatment of Steel:Introduction to various engineering materials and their properties. Introduction to Heat Treatment and types of Heat Treatment Processes.
Introduction to CAD, CAM, FMS, MEMS and CIM:Introduction to modern manufacturing systems and their applications.

Suggested Readings:


1. G. Shanmugam and S Ravindran, Basic Mechanical Engieering, Mc Graw hill, fourth edition.
2. K Venu Gopal and Prabhu Raja V, Basic Mechanical Engineering, Anuradha agencies pub, Chennai.


## BT-205.D ENGINEERING MECHANICS

**Unit-I**

Statics of particles and rigid bodies: Fundamental laws of mechanics, Principle of transmissibility, System of forces, Resultant force, Resolution of force, Moment and Couples, Resolution of a force into a force and a couple, Free body diagram, Equilibrium, Conditions for equilibrium, Lami's theorem.

Centroid & Moment of inertia (M.I): Location of centroid, Moment of inertia (mass and area), Parallel axis and perpendicular axis theorems, M.I of composite section, M.I. of solid bodies, Polar moment of inertia.

**Unit-II**

Virtual work: Principle of Virtual Work, Active forces and active force diagram, Stability of equilibrium.

Friction: Types of Friction, Laws of friction, Angle of friction, Angle of repose, Ladder, Wedge, Belt Friction.

**Unit-III**

Kinematics of particles and rigid bodies: Velocity, Acceleration, Types of Motion,

Equations of Motion, Rectangular components of velocity and acceleration, Angular velocity and Angular acceleration, Radial and transverse velocities and accelerations, Projectiles motion on plane and Inclined Plane, Relative Motion.

Kinetics of particles and rigid bodies: Newton's second law, Equation of motion in rectangular coordinate, Equation of motion in radial and transverse components, Equation of motion in plane for a rigid body, D'Alembert principle.

**Unit-IV**

Work, Energy and Power: Work of a force, weight, spring force and couple, Power, Efficiency, Energy, Kinetic energy of rigid body, Principle of work and energy, Conservative and Non-conservative Force, Conservation of energy.

**Unit-V**

Impulse and Momentum: Linear and angular momentum, Linear and angular impulse, Principle of momentum for a particle and rigid body, Principle of linear impulse and momentum for a particle and rigid body, Principle of angular momentum and Impulse, Conservation of angular momentum, Angular momentum of rigid body, Principle of impulse and momentum for a rigid body, Central impact, System of variable mass.

Suggested Readings:


1. Engineering Mechanics, Sharma, Pearson Education.
2. Engineering Mechanics, Beer and Johnston, Tata McGraw-Hill.
3. Engineering Mechanics, Basudeb Bhattacharya, Oxford University Press
4. Engineering Mechanics, Hibbeler, Pearson Education.
5. Engineering Mechanics, Meriam and Kraige, John Wiley & Sons.
6. Engineering Mechanics, Timoshenko and Young, Tata McGraw-Hill.
7. Engineering Mechanics, Shames, Pearson Education.


## BT- 206 HUMAN VALUES: ACTIVITIES

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 diffierentiate 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, environemental pollution, global warming, ozone depletion, deforestation, soil degradation, etc. - all these seem to be manmade problems, threatening the survival of life Earth - What is the root cause of these maladies & what is the way out in opininon?

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 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) or 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.

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

tearms of nurturing, protection and right utilisation 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 (NaturalAcceptance)

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 youself 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 balues 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

3. What practical steps are you able to visualize for the transition of the society from its present state.
4.
5.
6. Project:
7.
8. 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

## BT-207 ENGINEERING CHEMISTRY LAB

1. To determine the hardness of water by HCL method.
2. To determine the hardness of water by EDTA method

3. Measurement of conductivity of a given sample by conductivity meter.
4. Study of Bomb Calorimeter.
5. To determine the strength of Ferrous Ammonium sulphate solution with the help of $K_2Cr_2O_7$ solution.
6. To determine the strength of $CuSO_4$ solution with the help of hypo solution.
7. To determine the strength of NaOH and $Na_2CO_3$ in a given alkali mixture.
8. To determine the flash and fire point of a given lubricating oil.
9. To determine the viscosity of a given lubricating oil by Redwood viscometer.
10. To determine cloud and pour point of lubricating oil.

## BT 208 COMPUTER PROGRAMMING-II LAB

The programs shall be developed in C language related with the following concepts:

1. Input roll numbers of your friends in an array & print in reverse order.
2. Input names of your friends in an array & print in reverse order.
3. Input two matrices and output third matrix after performing add/subtract the corresponding elements.
4. Four programs using malloc, calloc, free & sscanf()/sprintf() functions.
5. Two programs using macro and online functions.
6. Two programs using structure & union.
7. Two programs using pointers.
8. Three programs belonging to file operations and multi-file handling.
9. Three programs belonging to graphics using C.

## BT 209: COMPUTERS AIDED MACHINE DRAWING

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

**2.Conversion of pictorial views into orthographic views**: (1 drawing sheet) Introduction to orthographic projection, concept of first angle and third angle projection, drawing of simple machine elements in first angle projection, missing view problems.

**3.Sectional view** : ( 1 drawing sheet) Introduction, cutting plane line, type of sectional views-full section, half section, partial or broken section, revolved section, removed section, offset section, sectioning conventions-spokes, web, rib, shaft, pipes, different types of holes, conventions of section lines for different metals and materials.

**4.Fasteners**: (1 drawing sheet) Temporary and 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 knuckle joints. Riveted joints, rivets and riveting, types of rivets, types of riveted joints etc.

**5.Assembly drawing**: (1 drawing sheet) Introduction to assembly drawing, assembly drawing of simple machine elements; like rigid or flexible coupling, muff coupling, plummer block, footstep bearing, bracket etc.

**6.Free hand sketching**: Need for free hand sketching, Free hand sketching of conventional representation of materials, screw fasteners, foundation bolts, studs.

**7.Bearing**: Ball, roller, needle, foot step bearing.

**8.Coupling**: Protected type, flange, and pin type flexible coupling.

**9.Other components**: Welded joints, belts and pulleys, pipes and pipe joints, valves etc.

**10.Computer aided drafting**: Concepts of computer aided 2D drafting using any drafting software like AutoCAD/ Solid works/Creo/Catia etc., basic drawing and modify commands, making 2D drawings of simple machine parts.

Suggested Readings:


1. Laxminarayan and M.L. Mathur, Machine Drawing, Jain Brothers
2. Gill P S, Machine Drawing, Kataria & Sons 2009
3. Basudeb Bhattacharya, Machine Drawing, Oxford University Press 2011
4. Dhawan, R.K., A Text Book of Machine Drawing, S. Chand & Company, 1996
5. Ostrowsky, O., Engineering Drawing with CAD Applications, ELBS, 1995
6. Siddeshswar N., P Kannaiah, VVS Shastry, Machine Drawing,Tata McGraw Hill

## Semester -III

| THEORY PAPERS | | No. of Teaching Hours | | | Marks Allocation | | | |
|---|---|---|---|---|---|---|---|---|
| **Code** | **Subject/Paper** | L | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| BTCS 301 | Advanced Engineering Mathematics | 3 | 1 | 0 | 30 | 70 | 100 | 4 |
| BTCS302 | Managerial Economics and Financial Accounting | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS 303 | Digital Electronics | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS 304 | Data Structures and Algorithms | 3 | 1 | 0 | 30 | 70 | 100 | 4 |
| BTCS 305 | Object Oriented Programming | 3 | 1 | 0 | 30 | 70 | 100 | 4 |
| BTCS 306 | Software Engineering | 3 | 1 | 0 | 30 | 70 | 100 | 4 |
| BTCS 307 | Data Structures and Algorithms Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS 308 | Object Oriented Programming Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS309 | Software Engineering Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS 310 | Digital Electronics Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS 311 | Mini Project | | | | | | 50 | 1 |
| | **TOTAL** | 18 | 4 | 8 | 300 | 500 | 800 | 27 |

# BTCS 301
# Advanced Engineering Mathematics

**Unit-1 (7 Hours)**
**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 (5 Hours)**

**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 (8 Hours)**

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

**Unit-4 (6 Hours)**

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

**Unit-5 (14 Hours)**

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

***Textbooks/References:***

# BTCS 302

## Managerial Economics and Financial Accounting

**UNIT 1: Basic economic concepts-**Meaning, nature and scope of economics, deductive vs inductive methods, static and dynamics, Economic problems: scarcity and choice, circular flow of economic activity, national income-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.

## BTCS303

## Digital Electronics

**Detailed contents:**

**Unit-1 (8 Hours)**
**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 Boolean algebra. Theorems of Boolean algebra.

**Unit-2 (8 Hours)**

**Minimization Techniques and Logic Gates:** Principle of Duality - Boolean expression - Minimization of Boolean expressions — Minterm – Maxterm - Sum of Products (SOP) –

Product of Sums (POS) – Karnaugh map Minimization – Don't care conditions – Quine - McCluskey method of minimization.

**Unit-3 (8 Hours)**

**Digital Logic Gate Characteristics:**

TTL logic gate characteristics. Theory & operation of TTL NAND gate circuitry. Open collector TTL. Three state output logic. TTL subfamilies. MOS& CMOS logic families. Realization of logic gates in RTL, DTL, ECL, C-MOS & MOSFET.

**Unit-4 (8 Hours)**
**Combinational Circuits:**

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

**Unit-5 (5 Hours)**
**Sequential Circuits:**

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

***Textbooks/References:***

## BTCS 304

## Data Structures and Algorithms

**Detailed contents:**

**Unit-1 (8 Hours)**

**Stacks:** Basic Stack Operations, Representation of a Stack using Static Array and Dynamic Array, Multiple stack implementation using single array, Stack Applications: Reversing list, Factorial Calculation, Infix to postfix Transformation, Evaluating Arithmetic Expressions and Towers of Hanoi.

**Unit-2 (10 Hours)**

**Queues**: Basic Queue Operations, Representation of a Queue using array, Implementation of Queue Operations using Stack, Applications of Queues- Round Robin Algorithm. Circular Queues, DeQueue Priority Queues.

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

**Unit-3 (7 Hours)**

**Searching** Techniques: Sequential and binary search. Sorting Techniques: Basic concepts, Sorting by: bubble sort, Insertion sort, selection sort, quick sort, heap sort, merge sort, radix sort and counting sorting algorithms.

**Unit-4 (7 Hours)**

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

**Unit-5 (8 Hours)**

**Graphs**: Basic concepts, Different representations of Graphs, Graph Traversals (BFS & DFS), Minimum Spanning Tree(Prims &Kruskal), Dijkstra's shortest path algorithms. Hashing: Hash function, Address calculation techniques, Common hashing functions, Collision resolution: Linear and Quadratic probing, Double hashing.

***Textbooks/References:***

## BTCS305

## Object Oriented Programming

**Detailed contents:**

**Unit-1 (8 Hours)**
Introduction to different programming paradigm, characteristics of OOP, Class, Object, data member, member function, structures in C++, different access specifiers, defining member function inside and outside class, array of objects.

**Unit-2 (8 Hours)**
Concept of reference, dynamic memory allocation using new and delete operators, inline functions, function overloading, function with default arguments, constructors and destructors, friend function and classes, using this pointer.

**Unit-3( 9 Hours)**
Inheritance, types of inheritance, multiple inheritance, virtual base class, function overriding, abstract class and pure virtual function

**Unit-4 (9 Hours)**
Constant data member and member function, static data member and member function, polymorphism, operator overloading, dynamic binding and virtual function

**Unit-5 (6 Hours)**
Exception handling, Template, Stream class, File handling.

## BTCS306

## Software Engineering

**Detailed contents:**

**Unit-1 (8 Hours)**
Introduction, software life-cycle models, software requirements specification, formal requirements specification, verification and validation.

**Unit-2 (8 Hours)**
Software Project Management: Objectives, Resources and their estimation, LOC and FP estimation, effort estimation, COCOMO estimation model, risk analysis, software project scheduling.

**Unit-3 (8 Hours)**
Requirement Analysis: Requirement analysis tasks, Analysis principles. Software prototyping and specification data dictionary, Finite State Machine (FSM) models. Structured Analysis: Data and control flow diagrams, control and process specification behavioral modeling

**Unit-4 (8 Hours)**
Software Design: Design fundamentals, Effective modular design: Data architectural and procedural design, design documentation.

**Unit-5 (8 Hours)**
Object Oriented Analysis: Object oriented Analysis Modeling, Data modeling. Object Oriented Design: OOD concepts, Class and object relationships, object modularization, Introduction to Unified Modeling Language

## BTCS 307
## Data Structures and Algorithms Lab

1. Write a simple C program on a 32 bit compiler to understand the concept of array storage, size of a word. The program shall be written illustrating the concept of row major and column major storage. Find the address of element and verify it with the theoretical value. Program may be written for arrays up to 4-dimensions.
2. Simulate a stack, queue, circular queue and dequeue using a one dimensional array as storage element. The program should implement the basic addition, deletion and traversal operations.
3. Represent a 2-variable polynomial using array. Use this representation to implement addition of polynomials
4. Represent a sparse matrix using array. Implement addition and transposition operations using the representation.
5. Implement singly, doubly and circularly connected linked lists illustrating operations like addition at different locations, deletion from specified locations and traversal.
6. Repeat exercises 2, 3 & 4 with linked structure.
7. Implementation of binary tree with operations like addition, deletion, traversal.
8. Depth first and breadth first traversal of graphs represented using adjacency matrix and list.
9. Implementation of binary search in arrays and on linked Binary Search Tree.
10. Implementation of different sorting algorithm like insertion, quick, heap, bubble and many more sorting algorithms.

## BTCS 308
## Object Oriented Programming Lab

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.

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

7Write programs to understand the usage of constant data member and member function, 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.

## BTCS309

## Software Engineering Lab

**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.

# BTCS 310

## Digital Electronics Lab

1. To verify the truth tables of basic logic gates: AND, OR, NOR, NAND, NOR. Also to 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 & NOR gatesand 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. Realize the multiplexer using basic gates only. Also to construct and 8-to-1 multiplexer and 1-to-8 demultiplexer using blocks of 4-to-1 multiplexer and 1-to-4 demultiplexer.
7. Design & Realize a combinational circuit that will accept a 2421 BCD code and drive a TIL -312 seven-segment display.
8. Using basic logic gates, realize the R-S, J-K and D-flip flops with and without clock signal and verify their truth table.
9. Construct a divide by 2,4& 8 asynchronous counter. Construct a 4-bit binary counter 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/Serial out registers using clock. Also exercise loading only one of multiple values into the register using multiplexer. Note: As far as possible, the experiments shall be performed on bread board. However, experiment Nos. 1-4 are to be performed on bread board only.

# Semester -IV

| THEORY PAPERS | | No. of Teaching Hours | | | Marks Allocation | | | |
|---|---|---|---|---|---|---|---|---|
| **Code** | **Subject/Paper** | L | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| BTCS401 | Discrete Mathematics Structure | 3 | 1 | 0 | 30 | 70 | 100 | 4 |
| BTCS402 | Technical Communication | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS403 | Microprocessor & Interfaces | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS404 | Database Management System | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS 405 | Theory of Computation | 3 | 1 | 0 | 30 | 70 | 100 | 4 |
| BTCS406 | Data Communication and Computer Networks | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS 407 | Microprocessor & Interfaces Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS 408 | Database Management System Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS 409 | Network Programming Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS 410 | Linux Shell Programming Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS 411 | Java Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS 412 | Social Outreach, Discipline & Extra Curricular Activities | | | | | | 50 | 1 |
| | **TOTAL** | **18** | **2** | **10** | **330** | **520** | **900** | **26** |

# BTCS 401

# Discrete Mathematics Structure

**Unit I**: **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 II**: **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 III**:
**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 IV**:
**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 V**:
**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.


# BTCS 402
# Technical Communication

**Unit I**: **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 II**: **Comprehension of Technical Materials/Texts and Information Design & development** - Reading of technical texts, Reading and comprehending instructions and technical manuals, Interpreting and summarizing technical texts, Note -making. Introduction of different kinds of technical documents, Information collection, factors affecting information and document design, Strategies for organization, Information design and writing for print and online media.

**Unit III**: **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.

**Unit IV**:
**Advanced Technical Writing -**Technical Reports, types of technical reports, Characteristics and formats and structure of technical reports. Technical Project Proposals, types of technical proposals, Characteristics and formats and structure of technical proposals. Technical Articles, types of technical articles, Writing strategies, structure and formats of technical articles

**References:**


1. English for competitive examinations, Prof. R. P. Bhatnagar, Macmillan Publications.

2. "Current English Grammar and usage with composition" by R. P. Sinha, Oxford University Press (New Delhi).

3. Effective Technical Communication by M. Ashraf Rizvi Tata Mcgraw-Hill Companies, New Delhi.

4. Communication skills by Sanjay Kumar & Pushp Lata. Oxford University Press (New Delhi)


## BTCS 403
## Microprocessor & Interfaces

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

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

**Unit V :** 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.

## BTCS 404
## Database Management System

**UNIT I: 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 II: 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 III: 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 IV: Transaction Processing:** Introduction-Transaction State, Transaction properties, Concurrent Executions. Need of Serializability, Conflict vs. View Serializability, Testing for Serializability, Recoverable Schedules, Cascadeless Schedules.

**UNIT V: 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.


## BTCS 405
## Theory of Computation

**UNIT I: 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 II:** 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 III:** 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 IV**: 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 V:** 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.


## BTCS 406

## Data Communication and Computer Networks

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

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

**UNIT V:** 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.


## BTCS 407
## Microprocessor & Interfaces Lab

**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

## BTCS 408
## Database Management System Lab

**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.

# BTCS 409
# Network Programming Lab

**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

# BTCS 410
# Linux Shell Programming Lab

**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.

## BTCS 411
## Java Lab

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.

**Indicative List of exercises:**

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.

# Semester –V

| **THEORY PAPERS** | | **No. of Teaching Hours** | | | **Marks Allocation** | | | |
|---|---|---|---|---|---|---|---|---|
| **Code** | **Subject/Paper** | L | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| BTCS 501 | Information Theory & Coding | 3 | - | - | 30 | 70 | 100 | 3 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| BTCS 502 | Compiler Design | 3 | - | - | 30 | 70 | 100 | 3 |
| BTCS 503 | Operating System | 3 | - | - | 30 | 70 | 100 | 3 |
| BTCS 504 | Computer Graphics & Multimedia | 3 | - | - | 30 | 70 | 100 | 3 |
| BTCS 505 | Analysis of Algorithms | 3 | - | - | 30 | 70 | 100 | 3 |
| BTCS 506A | Wireless Communication | 3 | - | - | 30 | 70 | 100 | 3 |
| BTCS 506B | Human-Computer Interaction | 3 | - | - | 30 | 70 | 100 | 3 |
| BTCS 506C | Bioinformatics | 3 | - | - | 30 | 70 | 100 | 3 |
| **LABS** | | | | | | | | |
| BTCS 507 | Computer Graphics & Multimedia Lab | - | - | 2 | 30 | 20 | 50 | 1 |
| BTCS 508 | Compiler Design Lab | - | - | 2 | 30 | 20 | 50 | 1 |
| BTCS 509 | Analysis of Algorithms Lab | - | - | 2 | 30 | 20 | 50 | 1 |
| BTCS 510 | Advance Java Lab | - | - | 2 | 30 | 20 | 50 | 1 |
| BTCS 511 | Industrial Training | - | - | 2 | 30 | 20 | 50 | 1 |
| BTCS 512 | Social Outreach, Discipline & Extra Curricular Activities | | | | | | 50 | 1 |
| | **TOTAL** | **18** | **-** | **10** | **330** | **520** | **900** | **24** |

## BTCS 501
## Information Theory & Coding

**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.

## BTCS 502
## Compiler Design

**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.

## BTCS 503
## Operating System

**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

## BTCS 504
## Computer Graphics & Multimedia

**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.

## BTCS 505
## Analysis of Algorithms

**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.

## BTCS 506 A
## Wireless Communication

**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.

## BTCS 506B
## Human Computer Interaction

**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 modeling 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.

## BTCS 506 C
## Bioinformatics

**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

## BTCS 507
## Computer Graphics & Multimedia Lab

**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

## BTCS 508
## Compiler Design Lab

**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.

## BTCS 509
## Analysis of Algorithms Lab

**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.

## BTCS 510

## Advance Java Lab

**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

# Semester –VI

| THEORY PAPERS | | No. of Teaching Hours | | | Marks Allocation | | | |
|---|---|---|---|---|---|---|---|---|
| **Code** | **Subject/Paper** | L | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| BTCS 601 | Digital Image Processing | 3 | - | - | 30 | 70 | 100 | 3 |
| BTCS 602 | Machine Learning | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS 603 | Information Security System | 3 | 0 | 0 | 30 | 70 | 100 | 3 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| BTCS 604 | Computer Architecture and Organization | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS 605 | Artificial Intelligence | 3 | - | 0 | 30 | 70 | 100 | 3 |
| BTCS 606 | Cloud Computing | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| **ELECTIVE SUBJECT** | | | | | | | | |
| BTCS 607A | Distributed System | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS 607B | Software Defined Network | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS 607C | Ecommerce & ERP | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| **LABS** | | | | | | | | |
| BTCS 608 | Digital Image Processing Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS 609 | Machine Learning Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS 610 | Python Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS 611 | Mobile Application Development Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS 612 | Social Outreach, Discipline & Extra Curricular Activities | | | | | | 50 | 1 |
| | **TOTAL** | **21** | **2** | **8** | **330** | **570** | **950** | **26** |

# BTCS 601

## Digital Image Processing

**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.

# BTCS 602

# Machine Learning

**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.

# BTCS 603

# Information Security System

**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 Encryptionstandard (DES) with example, strength ofDES, Design principles ofblock cipher, AES with structure, its transformation functions, keyexpansion, example and implementation.Multiple encryption and triple DES, Electronic Code Book, CipherBlock Chaining Mode, Cipher Feedback mode, Output Feedbackmode, 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

# BTCS 604

# Computer Architecture and Organization

**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.

# BTCS 605

# Artificial Intelligence

**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.

## BTCS 606

## Cloud Computing

**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 ofServer, 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

# BTCS 607A

# Distributed System

**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 oftime 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, GraphModels for Process Representation, Client/Server Model, Time Services,Language Mechanisms for Synchronization, Object Model ResourceServers, Characteristics of Concurrent Programming Languages (Languagenot included).Inter-process Communication and Coordination: MessagePassing, Request/Reply and Transaction Communication, Name andDirectory 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

## BTCS 607B

## Software Defined Network

**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.

## BTCS 607C

## Ecommerce & ERP

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**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.

# BTCS 608

# Digital Image Processing Lab

## 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.

# BTCS 609

# Machine Learning Lab

## 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.

# BTCS610

# Python Lab

## 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.

# BTCS611

# Mobile Application Development Lab

## 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.

**Semester –VII**

| THEORY PAPERS | | No. of Teaching Hours | | | Marks Allocation | | | |
|---|---|---|---|---|---|---|---|---|
| **Code** | **Subject/Paper** | L | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| BTCS701 | Internet of Things | 3 | - | - | 30 | 70 | 100 | 3 |
| **ELECTIVE SUBJECT** | | | | | | | | |
| BTCS 702A | Principle of Electronic Communication | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS 702B | Micro and Smart System Technology | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS 702C | Optimization Techniques | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| **LABS** | | | | | | | | |
| BTCS 703 | Internet of Things Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS704 | Cyber Security Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS705 | Industrial Training | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS706 | Seminar | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS707 | Social Outreach, Discipline &Extra Curricular Activities | | | | | | 50 | 1 |
| | **TOTAL** | **6** | **0** | **8** | **180** | **220** | **450** | **11** |

# BTCS701

## Internet of Things

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.

# BTCS702A

## Principle of Electronic Communication

**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

## BTCS702B

## Micro and Smart System Technology

**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.

## BTCS702C

## Optimization Techniques

**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.

# BTCS703

# Internet of Things Lab

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.

## BTCS704

## Cyber Security Lab

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.

## Semester –VIII

| THEORY PAPERS | | No. of Teaching Hours | | | Marks Allocation | | | |
|---|---|---|---|---|---|---|---|---|
| **Code** | **Subject/Paper** | L | **T** | **P** | **IA** | **EA** | **Total** | **Credits** |
| BTCS801 | Big Data Analytics | 3 | - | - | 30 | 70 | 100 | 3 |
| **ELECTIVE SUBJECT** | | | | | | | | |
| BTCS802A | Soft Computing | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS802B | Robotics and Control | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| BTCS802C | Simulation Modeling and Analysis | 3 | 0 | 0 | 30 | 70 | 100 | 3 |
| **LABS** | | | | | | | | |
| BTCS803 | Big Data Analytics Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS804 | Software Testing and Validation Lab | 0 | 0 | 2 | 30 | 20 | 50 | 1 |
| BTCS805 | Project | 0 | 0 | 0 | 120 | 80 | 200 | 4 |
| BTCS806 | Social Outreach, Discipline &Extra Curricular Activities | | | | | | 50 | 1 |
| | **TOTAL** | **7** | **2** | **4** | **270** | **330** | **650** | **15** |

# BTCS801

# Big Data Analytics

## 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 Map Reduce Programs: A Weather Dataset. Understanding Hadoop API for Map Reduce Framework (Old and New). Basic programs of Hadoop Map Reduce: 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


# BTCS802A

# Soft Computing

**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-Fuzzy Modeling–Fuzzy DecisionMaking-Pattern Analysis and Classification-Fuzzy Control Systems-Fuzzy Information Processing-Fuzzy Robotics.

## Unit-3

**ARTIFICIAL NEURAL NETWORKS:** Artificial Neural Networks-Models of Neuron-Architecture of FeedForward Neural Networks, Recurrent Neural Networks-Learning methods-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.

## BTCS802B

## Robotics and control

**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, CapacitiveSensors, 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, perspectivetransformations.Higher-Level Vision: Segmentation, Edge Linking and Boundarydetection,

**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

# BTCS802C

## Simulation Modeling and Analysis

**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 output data,
MeasuresofPerformanceandtheirestimation,Outputanalysisofterminatingsimulation,
Output analysis of steady state
simulations.4SelectionofSimulationSoftware,Simulationpackages,TrendinSimulation. Do modeling using ARENA software which is freely available. Some more suggested simulation packages are Promodel, Quest, Witness, Extend, Simio etc. Students can learn

**TEXTBOOK**

1SimulationModelingandAnalysis,LawA.M.,McGrawHill

**REFERENCEBOOKS**

1.Event System Simulation, Banks and Carsan, Prentice Hall of India

2SimulationModelingandAnalysiswithARENA,Altiokand Melamed, Academic Press

3SimulationwithARENA,Keltan, Sadowskiand Turrock, McGrawHil

4. Simulation Modeling and ARENA, Rossetti and Taha,John Wiley and Sons

5SystemsSimulationwithDigitalComputer,Narsingh Deo, PHI Publication ( EEE)

# BTCS803

## Big Data Analytics Lab

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.

# BTCS804

## Software Testing and Validation Lab

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 |

**BTCS805**

**Project**

**BTCS806**

**Social Outreach, Discipline &Extra Curricular Activities**