COURSE HAND-OUT

IKGPTU B.TECH – 1 YEAR
SEM 1 TO 8

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BHAI GURDAS INSTITUTE OF ENGINEERING AND TECHNOLOGY (BGIET)

VISION

To impart values based multidisciplinary quality education to the students which can enable them to contribute their knowledge in industrial development, technology revolution and economic growth of the nation with global perspective.

MISSION

Mission No.	Mission Statements
M1	To develop technical manpower of quality standards with capabilities of accepting new challenges.
M1	To provide teaching and research environment.
M3	To promote collaborative coexistence amongst academic institute and industries for resources sharing.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (CSE), BGIET

VISION

To be a center of excellence in technical education, research and support services to produce comprehensively trained, innovative Computer Science Engineers of highest quality to contribute to the Nation's development.

MISSION

Mission No.	Mission Statements
M1	Create an environment of skill learning through faculty training, online learning, sound academic practices and research endeavors
M2	Provide opportunities to promote organizational and leadership skills in students through various extra- curricular and co-curricular events.
M3	To uplift innovative research in Computer Science and Engineering to serve the needs of industry, Government and society.
M4	Providing social awareness and responsibility in students to serve the Nation and to protect environment.

B.TECH PROGRAMME

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO No.	Program Educational Objectives Statement
PEO1	The Graduate will be able to implement domain Knowledge of core courses for developing effective computing solutions by incorporating creativity and logical reasoning
PEO2	The Graduate will be able to deliver professional services in the field of computer science to respond swiftly to the challenges of 21st century.
PEO3	The Graduate will be able to develop leadership and interpersonal skills with effective communication and amp; time management in the profession.
PEO4	The Graduates will be able to competent globally with moral values and ethics for personal and professional development.

PROGRAMME OUTCOMES (POs)

PO1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering Problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions**: Design solutions for complex engineering problems and design System components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to Provide valid conclusions.
PO5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering And IT tools including prediction and modeling to complex engineering activities with an understandingof the limitations.
PO6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal,health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional Engineering practice.
PO7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in Societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the Engineering practice.
PO9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and Design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance**:Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (CSE)

PSO1	To design and implement sustainable solutions by new ideas and innovations in the field of Computer Science**.**
PSO2	To use Problem Solving Skills to develop efficient solutions to simplify real world problems and ability to understand and apply engineering solutions in a global and social context.

INDEX
B.TECH 1st SEMESTER
(COMPUTER SCIENCE AND ENGINEERING)

IK Gujral Punjab Technical University Bachelor of Technology Scheme for B.Tech Syllabus 2018

Slot	Course No.	Subject	L-T-P	Hours	Credits
A	BTPH104-18	Physics	3-1-0	4	4
B	BTPH114-18	Physics (Lab)	0-0-3	3	1.5
C	BTAM104-18	Maths-I	3-1-0	4	4
D	BTEE101-18	Basic Electrical Engineering	3-1-0	4	4
E	BTEE102-18	Basic Electrical Engineering (L,ab)	0-0-2	2	1
F	BTME101-21	Engineering Graphics & Design	1-0-5	6	3
G	BMPD101-18	Mentoring and Professional Development	0-0-2	2	Noncredit

Total Credits = 17.5 Hours: 25

SEMICONDUCTOR PHYSICS
COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	**DEGREE: BTECH**
COURSE: SEMICONDUCTOR PHYSICS	**SEMESTER: 1 CREDITS: 4**
COURSE CODE: BTPH-104-18 **REGULATION: 2018**	**COURSE TYPE: CORE**
COURSE AREA/DOMAIN: SEMICONDUCTOR PHYSICS	**CONTACT HOURS: 3(L) + 1 (T) hours/Week.**
CORRESPONDING LAB COURSE CODE : BTPH-114-18	**LAB COURSE NAME: Semiconductor Physics**

SYLLABUS:

UNIT	DETAILS	HOURS
I	**Electronic materials**: Free electron theory of metals, Density of states in 1D, 2D, and 3D, Bloch's theorem for particles in a periodic potential, Energy band diagrams, Kronig- Penny model (to introduce origin of band gap), Energy bands in solids, E-k diagram, Direct and indirect band gaps, Types of electronic materials: metals, semiconductors, and insulators, Occupation probability, Fermi level, Effective mass	10
II	**Semiconductors:** Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction, Metal-semiconductor junction (Ohmic and Schottky), Semiconductor materials of interest for optoelectronic devices	10
III	**Light-semiconductor interaction:** Optical transitions in bulk semiconductors: absorption, spontaneous emission, and stimulated emission; Einstein coefficients, Population inversion, application in semiconductor Lasers; Joint density of states, Density of states for phonons, Transition rates (Fermi's golden rule), Optical loss and gain; Photovoltaic effect, Exciton, Drude model	10
IV	**Measurement Techniques:** Measurement for divergence and wavelength using a semiconductor laser, Measurements for carrier density, resistivity, hall mobility using Four-point probe and van der Pauw method, Hot-point probe measurement, capacitance-voltage measurements, parameter extraction from diode I-V characteristics	10

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS
T	B. E. A. Saleh and M. C. Teich: Fundamentals of Photonics, John Wiley & Sons, Inc., (2007).
T	Ben G. Streetman: Solid State Electronics Devices, Pearson Prentice Hall
T	Optoelectronic Materials and Devices" by Monica Katiyar and Deepak
T	P. Bhattacharya: Semiconductor Optoelectronic Devices, Prentice Hall of India (1997).
T	J. Singh: Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc. (1995).
T	B. E. A. Saleh and M. C. Teich: Fundamentals of Photonics, John Wiley & Sons, Inc., (2007)
T	D.A. Neamen, "Semiconductor Physics and Devices", Times Mirror High Education Group, Chicago, 1997
R	J. Singh: Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc. (1995).

	BOOK TITLE SUGGESTED BY FACULTY
1	P. Bhattacharya: Semiconductor Optoelectronic Devices, Prentice Hall of India (1997).
2	Physics of Semiconductor Devices by Pearson

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Small Group Instruction.
Making real world connections
Presentations

E- content used:
https://youtu.be/F5IpIHzBvLQ

Additional topics:

COURSE OBJECTIVES:

The aim and objective of the course on Semiconductor Physics is to introduce the students of B. Tech. class to the formal structure of semiconductor physics so that they can use these in Engineering as per their requirement

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
BTPH-104-18	**Higher secondary Education**	**Introduction to Quantum Mechanics desirable**	**1 & 2**

COURSE OUTCOMES

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	State the fundamentals of Solid State, Classical, Quantum and semiconductor Physics.	B.L -1 B.L -4
2	Differentiate between classical and quantum concept and Apply fundamentals of quantum mechanics to problems on bound states.	B.L -1 B.L -3
3	Understand and describe the interaction of light with semiconductors in terms of Fermi golden rule.	B.L-3 B.L-4
4	Gain knowledge of electron theory of metals and understand electrical properties, characteristics of metals and their application in electrical appliance.	B.L -1 B.L- 5
5	Understand the design, fabrication, and characterization techniques of Engineered semiconductor materials.	B.L -1 B.L -3
6	Develop the basic tools with which they can study and test the newly developed devices and other semiconductor applications..	B.L -1 B.L -6

CO mapping with PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	2	2	2	2	1	2		1	2	2	2	1
CO2	1	2	1	1		2	2	2		1	1	2	2	2
CO3	1	2	2	1	1	1	1	2		2	2	-	2	1
CO4	1		2	1	1	2	1	1		1	2	2	2	1
CO5	1			1	1		1	2		1	2	2	2	1
CO6	1				1			2			2	2	2	

SEMICONDUCTOR PHYSICS LAB

PROGRAMME: ENGINEERING	**DEGREE: BTECH**
COURSE: SEMICONDUCTOR PHYSICS	**SEMESTER: 1 CREDITS: 1.5**
COURSE AREA/DOMAIN: SEMICONDUCTOR PHYSICS	**CONTACT HOURS: 0(L) + 0 (T) + 3(P) hours/Week.**
CORRESPONDING LAB COURSE CODE : BTPH-114-18	**LAB COURSE NAME: Semiconductor Physics Lab**

SYLLABUS:

SECTION-A

- To study the characteristic of different PN junction diode- Ge and Si.
- To analyze the suitability of a given Zener diode as a power regulator.
- To find out the intensity response of a solar cell/Photo diode.
- To find out the intensity response of a LED.
- To determine the band gap of a semiconductor.
- To determine the resistivity of a semiconductor by four probe method.
- To confirm the de Broglie equation for electrons.
- To study voltage regulation and ripple factor for a half-wave and a full-wave rectifier without and with different filters.
- To study the magnetic field of a circular coil carrying current.
- To find out polarizability of a dielectric substance.
- To study B-H curve of a ferro-magnetic material using CRO.
- To find out the frequency of AC mains using electric-vibrator.
- To study laser interference using Michelson's Interferometer
- Study of diffraction using laser beam and thus to determine the grating element.

SECTION-B

- To draw the static current-voltage (I-V) characteristics of a junction diode.
- To plot the characteristics of thermistor and hence find the temperature coefficient of resistance.
- To determine the resistivity of semiconductors by Four Probe Method.
- To study Zener diode voltage as regulator and measure its line and load regulation.
- To study the B-H Curve for a ferromagnetic material.
- To study the Hall Effect experiment to determine the charge carrier density.
- To determine the magnetic susceptibilities of paramagnetic liquids by Quincke's Method.
- To study the phenomena of magnetic hysteresis and calculate the retentivity, coercivity and saturation magnetization of a
- Verification and design of combinational logic using AND, OR, NOT, NAND and XOR
- To determine the resistivity of semiconductors by Four Probe Method.
- To find the velocity of ultrasound in liquid.
- To study the Hall Effect for the determination of charge current densities.
- Distinguish between Diamagnetic material, Paramagnetic and ferromagnetic material.
- Measurement of susceptibility of a liquid or a solution by Quincke's method.
- To study the sample with the nano-scale objects and measure surface topography with different scales, width and height of nano objects, and force-distance curves using AFM
- To study the temperature coefficient of Resistance of copper.
- To determine the ratio k/e using a transistor.
- To compare various capacitance and verify the law of addition of capacitance.
- To determine dipole moment of an organic molecule acetone.
- To measure the temperature dependence of a ceramic capacitor.
- Verification of the curie Weiss law for the electrical susceptibility of a ferromagnetic material.
- To study the laser beam characteristics like; wave length using diffraction grating aperture

TEXT/REFERENCE BOOKS:

	BOOK TITLE SUGGESTED BY FACULTY
1	A Text Book of Practical Physics, I. Prakash & Ramakrishna, 11 th Edn, 2011, Kitab Mahal
2	Practical Physics, C L Arora, S. Chand & Company Ltd

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T	Engineering Practical Physics, S. Panigrahi & B. Mallick, 2015, Cengage Learning India Pvt. Ltd
T	Experiments in Modern Physics, A.C. Melissinos, Academic Press, N.Y., 1966.

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Small Group Instructions.
Making real world connections
Viva voce

Additional topics:

COURSE OBJECTIVES:

The aim and objective of the Lab course on Semiconductor Physics is to introduce the students of B.Tech. Class to the formal structure of semiconductor physics so that they can use these in Engineering as per their requirement.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
BTPH-104-18	**Higher secondary Education**	**Introduction to Semiconductor lab**	**1 & 2**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Understand, explain and use instrumental techniques for intensity pattern analysis	B.L -1 B.L -4
2	Understand resistivity measurements with the help of various methods.	B.L -1 B.L -3
3	Examine the methods used for estimating and dealing with experimental uncertainties and systematic errors.	B.L-3 B.L-4
4	Apply and demonstrate the theoretical concepts of Engineering Physics.	B.L -1 B.L- 3
5	Apply the theoretical concepts of laser, numerical aperture and photo detectors.	B.L -1 B.L -3
6	Construct a presentation on the application of modern physics to modern technology.	B.L -1 B.L -6

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	2	2	2	2	1		2	1	2	2	2
CO2	2			1	2	2	2	2		3		2	2	2
CO3		1	1	1	2	2	1	1		2	1	2	2	2
CO4	1			1	2	1	1	1		2		2	2	2
CO5	1	1		1	2	1	1	1		2		2	2	2
CO6	1			1	2	2	2			3		2	2	2

MATHEMATICS PAPER-1

COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	DEGREE: B.TECH
COURSE- MATHEMATICS PAPER-I	SEMESTER-1 CREDITS-4
COURSE CODE- BTAM104-18 Year of introduction – 2018	COURSE TYPE – CORE
COURSE AREA/DOMAIN- MATHEMATICS	CONTACT HOURS: 4-1-0
CORRESPONDING LAB COURSE CODE (IF ANY): NIL	LAB COURSE NAME: NA

SYLLABUS:

MODULE	DETAILS	HOURS
I	Rolle's theorem, Mean value theorems, Statements of Taylor's and Maclaurin theorems with Remainders; Indeterminate forms and L' Hôpital's rule; Maxima and minima. Evaluation of definite and improper integrals; Applications of definite integrals to evaluate Surface areas and volumes of revolutions; Beta and Gamma functions and their properties.	13
II	Matrices, vectors addition and scalar multiplication, matrix multiplication; Linear systems of equations, linear Independence, rank of a matrix, determinants, Cramer's Rule, inverse of a matrix, Gauss elimination and Gauss-Jordan elimination.	12
III	Vector Space, linear dependence of vectors, basis, dimension; Linear transformations (maps), range and kernel of a linear map, rank and nullity, statement of rank-nullity theorem, Matrix Associated with a linear map.	13
IV	Eigen values, eigenvectors, symmetric, skew-symmetric, and orthogonal Matrices, Eigen bases; Similar matrices, diagonalization	12

Total hours – 50

TEXT/REFERENCE BOOKS:

	BOOK TITLE SUGGESTED BY FACULTY
1	LINEAR ALGEBRA. SCHAUM SERIES - Seymour Lipschutz
2	CALCULUS. MATHEMATICAL ANALYSIS - S C Malik and Savita Arora

	BOOK TITLE/AUTHORS/PUBLICATION
1	Thomas, G.B, Finney, R.L. Calculus and Analytic Gemetry, Ninth Edition, Peason Education..
2	Kreyszig, E., Advanced Engineering Mathematics, Eighth edition, John wiley.
3	Peter. V. O" Nil, Advanced Engineering Mathematics, Wordsworth Publishing Company
4	Jain, R.K and Lyengar, S.R.K., Advanced Engineering Mathematics, Narosa Publishing Company.
5	Grewal, B.S., Higher Engineering Mathematics, Khanna Publishers, New Delhi.

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Small Group Instruction.
Making real world connections
Inquiry-based Learning

E- CONTENT USED:
https://youtu.be/1XlT3Y2oyAU
https://youtu.be/1wjXVdwzgX8

ADDITIONAL TOPICS:
Projections
Complex numbers
Linear dependence and independence
Singular value decomposition

Course: MATHEMATICS PAPER-I		
Course Code: BTAM104-18		
	Course Outcomes	**BT Level**
1.	Understand the basics of calculus and linear algebra to enhance mathematical skills	2
2.	Apply the idea of differential and integral calculus to notions of improper integrals and Solve problems using beta and gamma Function.	3
3.	Construct the detailed matrices which are applied for solving system of linear equations and useful in various field of technology.	3
4.	Simplify the concept of linear dependence of vectors by using appropriate mapping and Construct the essential tools of matrices and linear algebra	4
5.	Determine the concept of eigen value, eigen vector and determine a linear transformation is diagonalizable or not.	5
6.	Explain the various types of matrices and compare its properties.	5

COURSE OBJECTIVES

The objective of this course is to familiarize the prospective engineers with techniques in basic calculus and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their field.

CO MAPPING WITH PO

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**
CO 1	3	3	2	2	1	2	1		1		1	2	2	2
CO 2	3	2	2	2	2	2	1		1		2	2	1	2
CO 3	3	3	2	2	1	1	1				1	2	2	1
CO 4	3	3	2	2	1	1	2		1		1	1	1	2
CO 5	2	2	2	1	1	1	1				1	2	2	2
CO 6	1	2	2	3		2						1	1	

COURSE INFORMATION SHEET

PROGRAMME: B.Tech	
COURSE: Basic Electrical Engineering	SEMESTER: 2nd CREDITS: 05
COURSE CODE: BTEE-101-18	COURSE TYPE: Regular
COURSE AREA/ DOMAIN: Basic Electrical	CONTACT HOURS: L T P 3 1 2
CORRESPONDING LAB CODE: BTEE102-18	LAB COURSE NAME: Basic Electrical Engineering Laboratory

UNIT	DETAILS	HOURS
1	**Module 1: DC Circuits** Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff's current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin's and Norton's Theorems. Time-domain analysis of first-order RL and RC circuits.	9
2	**Module 2: AC Circuits** Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations series resonance. Parallel resonance. Three-phase balanced circuits, voltage and current relations in star and delta connections.	13
3	**Module 3: Electrical Machines** Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections. Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.	12
4	**Module 4: Electrical Installations** Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.	5
	TOTAL HOURS	39

TEXT/ REFERENCE BOOKS

T/R	BOOK TITLE/ AUTHORS/ PUBLICATION
T1	D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010
T2	D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
R1	L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011
R2	E. Hughes, "Electrical and Electronics Technology", Pearson, 2010
R3	V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989

Web Source References:

Recommended NPTEL/ MOOCS/Swayam Courses/ Videos
https://www.coursera.org/learn/electric-power-systems (Electric Power System)
https://www.youtube.com/watch?v=U3CubKnkO4c (Transformer 3D Animation)
https://www.youtube.com/watch?v=DsVbaKZZOFQ (three phase induction motor working)
https://www.youtube.com/watch?v=tiKH48EMgKE&list=PLZY3yNTglIyWtOLxTl9ZlAK9zIgPK3H9d (working of alternator)
https://www.youtube.com/watch?v=gW45N2WpD64 (working of DC generator)
https://www.youtube.com/watch?v=QkbnOga09Vg (flip flops)

1	https://nptel.ac.in/courses/108108076/ (1-39) (Covering Transformer, Machines, power factor etc.)

Course Objectives:

- Impart a basic knowledge of electrical quantities such as current, voltage, power, energy and frequency to understand the impact of technology in a global and societal context.
- Provide working knowledge for the analysis of basic DC and AC circuits used in electrical and electronic devices.
- To explain the working principle, construction, applications of DC machines, AC machines & the importance of transformers in transmission and distribution of electric power.
- To Gain knowledge about the fundamentals of LT components of switchgear, wiring and earthing.

CO MAPPING WITH PO

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	3	2	3	1	1	1	2		2		1	1	2	1
CO2	2	1	2	1	1	1	1		2		2	2	2	2
CO3		1		2	1	1	1		3		1	1	1	1
CO4	1	3	1	1	2	1	1		1		1	1	1	1
CO5	2	2	1	1	1		1		2		1	1	2	1
CO6		3	1			2			2					

COURSE INFORMATION SHEET
BASIC ELECTRICAL ENGINEERING LAB

List of experiments/demonstrations:

- Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
- Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storage oscilloscope). Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits.
- Transformers: Observation of the no-load current waveform on an oscilloscope (non-sinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics). Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
- Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents). Phase-shifts between the primary and secondary side. Cumulative three-phase power in balanced three-phase circuits.
- Demonstrate of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine.
- Torque Speed Characteristic of separately excited dc motor.
- Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections. Torque-Slip Characteristic of an induction motor. Generator operation of an induction machine driven at super-synchronous speed.
- Synchronous Machine operating as a generator: stand-alone operation with a load. Control of voltage through field excitation.

Course outcome

- Apply KCL, KVL and ohms law to Simple circuits.
- Determine the inductance of the coil & BH curve loops
- Performing the operation & tests of transformer and rotating machines ac & dc machines
- Analyze the differences in operation of different DC machine configurations.
- Experimentally verify the basic circuit theorems
- Measure power and power factor in ac circuits or in ac machines

CO MAPPING WITH PO

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO 1	2	2	2	2	1	2	2	2		1	1	1	3	2
CO 2	2	1	2	2	1	2	2	2		2		1	3	2
CO 3	2	2	2	2	1	2	2	2		1	2	1	3	1
CO 4	1	2	2	2	2	2	1	1		1	1	1	3	2
CO 5	1	2	2	2	1	2	2	1		1	1	1	3	2
CO 6	1	2	2	2		2	2	1			1	1	3	2

ENGINEERING GRAPHICS AND DESIGN
COURSE INFORMATION SHEET

PROGRAMME: COMPUTER SCIENCE & ENGINEERING	**DEGREE: BTECH**
COURSE: ENGINEERING GRAPHICS AND DESIGN (THEORY & LAB)	**SEMESTER: 1 CREDITS: 3**
COURSECODE: BTME101-18 **REGULATION: 2018**	**COURSE TYPE: CORE**
COURSE AREA/DOMAIN: ENGINEERING DRAWING	**CONTACT HOURS: 1(L) + 5(P) hours/Week.**

SYLLABUS:

UNIT	DETAILS	HOURS
I	**INTRODUCTION TO ENGINEERING DRAWING:** Principles of engineering drawing / engineering graphics / technical drawing and their significance –Drawing Instruments: their Standard and uses – symbols and conventions in drawing practice – lettering & numbering – BIS conventions. Types of lines and their uses, Drawing Sheets: sizes and layout, methods of folding drawing sheet, Grades of pencils used, Dimensioning: definition, types and methods of dimensioning, geometrical construction, concept of scales in drawing, types of scales, construction of plane and diagonal scales	**18**
II	**ORTHOGRAPHIC PROJECTIONS:** Relevance of projection, Types of projections, Principles of orthographic projections in reference to quadrants – conventions – first and third angle projections, illustration through simple problems of projection; Projections of points in quadrants. Projections and trace of a line with different possible orientations in a quadrant. Methods to find true length and inclination of a line with principal planes.	**12**
III	**PROJECTIONS OF PLANES AND SOLIDS:** Concept of plane and lamina, Projections of a lamina when; parallel to any reference plane, perpendicular to any reference plane, inclined to reference plane. Traces of planes. Definition of solid, types of solids – conventions-different possible orientations of solid in a quadrant. Projections of solid when; axis parallel to reference plane, perpendicular to reference plane, inclined to one and parallel to other reference plane, parallel to both horizontal and vertical planes.	**18**
IV	**ISOMETRIC PROJECTIONS:** Principles of Isometric Projections-Isometric Scale- Isometric Views or drawing- Conventions. Isometric drawing / projections of solids such as cube, prisms, pyramids, cylinder, and cone.	**12**
V	**Practice using Computer Aided Drafting (CAD) tools**: Hands on training on any CAD software to strengthen the understanding of the engineering drawing wherein the students will be introduced to a number of assignments as mentioned in the syllabus**.**	**12**

TEXT/REFERENCE BOOKS:

S.NO	BOOK TITLE/AUTHORS/PUBLICATION
1	Engineering Drawing- Basant Agarwal, TMH
2	D. M. Kulkarni, A. P. Rastogi, and A. K. Sarkar (2009), Engineering Graphics with AutoCAD, PHI Learning Private Limited, New Delhi.
3	P.S Gill, "Engineering Drawing", S K Kataria and sons, 18th edition, 2017 reprint
4	Jolhe, Dhananjay (2006), Engineering Drawing: With an Introduction to CAD, Tata Mc Graw Hill, India.
5	N. D. Bhat (2006), Engineering Drawing, Charotar Publications, New Delhi
6	Venugopal (2010), Engineering Drawing and Graphics, 2nd edition, New Age Publications, New Delhi
7	Trymbaka Murthy (2007), Computer Aided Engineering Drawing, I.K. International Publishers, New Delhi.
8	R.B. Choudary (2005), Engineering graphics with Auto CAD, Anuradha Publishers, New Delhi

T/R	BOOK TITLE SUGGESTED BY FACULTY
1	Harwinder Singh, Engineering Drawing and Computer Graphics , Dhanpat Rai Publishing Co.
2	R.K Dhawan, Text Book of Engineering Drawing, S Chand Publication.

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:

Chalk & Talk
Small Group Instruction.
Making real world connections
Presentations

E- content used:
https://archive.nptel.ac.in/courses/112/102/112102304/

Additional topics:

1. Intersection of Surfaces/Solids
Purpose of intersection of surfaces, Intersection between the two cylinder, two prisms, prism and pyramid, pyramid and pyramid, cylinder and prism, cone and cylinder, sphere and cylinder etc., use of cutting plane and line method.
2. Development of Surface
Purpose of development, Parallel line, radial line and triangulation method. Development of prism,cylinder, cone and pyramid surface for both right angled and oblique solids, and development of surface of sphere.

COURSE OBJECTIVES:

1. To understand the basic principles of engineering drawing
2. To have the knowledge of generating the pictorial views
3. To understand the development of surfaces
4. Use CAD tools for making drawings of machine components and assemblies.
5. To have the knowledge of interpretation of dimensions of different quadrant projections.

.**COURSE PRE-REQUISITES:**

C.CODE	COURSE NAME	DESCRIPTION	SEM

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
CO1	Prepare and **understand** drawings	B.L -1
CO2	**Use** the principles of orthographic projections.	B.L -3
CO3	By studying about projections of solids, students will be **able to visualize** three dimensional objects and that will **enable** them to design new products.	B.L-2 B.L -3
CO4	**Design and fabricate** surfaces of different shapes.	B.L- 6
CO5	**Apply** Computer-aided design (CAD) software to modeling of parts and assemblies, dimensions, and annotations to drawing.	B.L -3
CO6	**Represent** and **create** the objects in three dimensional appearances.	B.L -1 B.L -6

PROGRAME SPECIFIC OUTCOMES:

S.NO	DESCRIPTION
PSO1	To design and implement sustainable solutions by new ideas and innovations in the field of computer science
PSO2	To use problem solving skills to develop efficient solutions to simplify real world problems

CO –PO-PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	2	2	1	1	-	-	1	2	-	3	2
CO2	3	3	1	1	2	-	1	-	-	-	1	-	2	3
CO3	1	3	1	1	1	1	2	-	-	-	1	3	2	-
CO4	2	2	2	1	1	-	1	-	-	2	1	-	-	-
CO5	2	2	1	1	-	1	1	-	-	3	1	3	1	2
CO6	2	-	-	-	3	-	-	-	-	-	-	3	1	1

INDEX
B.TECH 2ND SEMESTER
(COMPUTER SCIENCE & ENGINEERING)

I K Gujral Punjab Technical University Bachelor of Technology Scheme for B.Tech Syllabus 2018

Slot	Course No.	Subject	L-T-P	Hours	Credits
A.	BTCH101-18	Chemistry-I	3-1-0	4	4
B.	BTCH102-18	Chemistry-I (Lab)	0-0-3	3	1.5
C.	BTAM204-18	Maths-II	3-1-0	4	4
D.	BTPS101-18	Programming for Problem Solving	3-0-0	3	3
E.	BTPS102-18	Programming for Problem Solving (Lab)	0-0-4	4	2
F.	BTMP101-18	Workshop / Manufacturing Practices	1-0-4	5	3
G.	BTHU101-18	English	2-0-0	2	2
H.	BTHU102-18	English (Lab)	0-0-2	2	1
I.	BMPD201-18	Mentoring and Professional Development	0-0-2	2	Noncredit

Total Credits = 20.5 Hours: 29

BTECH101-18 Chemistry-I
COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	DEGREE: B.TECH
COURSE- CHEMISTRY-I	SEMESTER-2 CREDITS-4
COURSE CODE- BTCH101-18 Year of introduction – 2018	COURSE TYPE – CORE
COURSE AREA/DOMAIN- CHEMISTRY	CONTACT HOURS: 3-1-0
CORRESPONDING LAB COURSE CODE (IF ANY): BTCH102-18	LAB COURSE NAME: CHEMISTRY-I LAB

SYLLABUS:

MODULE	DETAILS	HOURS
I	**Atomic and molecular structure** Schrodinger equation. Particle in a box solutions and their applications for conjugated molecules and nano particles. Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations. Molecular orbitals of diatomic molecules and plots of the multicenter orbitals. Equations for atomic and molecular orbital's. Energy level diagrams of diatomic. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.	12
II	**Spectroscopic techniques and applications** Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterisation techniques. Diffraction and scattering.	8
III	**Intermolecular forces and potential energy surfaces** Ionic, dipolar and van Der Waals interactions. Equations of state of real gases and critical phenomena. Potential energy surfaces of H_3, H_2F and HCN and trajectories on these surfaces.	4
IV	**Use of free energy in chemical equilibria** Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Water chemistry. Corrosion.Use of free energy considerations in metallurgy through Ellingham diagrams.	6
V	**Periodic properties** Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries	4
VI	**Stereochemistry** Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds	4
VII	**Organic reactions and synthesis of a drug molecule** Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule.	4

Total hours – 42

TEXT/REFERENCE BOOKS:

S. No.	BOOK TITLE/AUTHORS/PUBLICATION
1.	University chemistry, by B. H. Mahan.
2.	Chemistry: Principles and Applications, by M. J. Sienko and R.A. Plane.
3.	Fundamentals of Molecular Spectroscopy, by C. N. Banwell.
4.	Physical Chemistry, by P. W. Atkins.
5.	Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5thEdition http://bcs.whfreeman.com/vollhardtschore5e/default.asp.

	BOOK TITLE SUGGESTED BY FACULTY
1	Conceptual Engineering Chemistry by Dr. S.K. Bhasin Ajay Publications

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:

Chalk & Talk
PPTs
Group Discussions

E- content used:

https://youtu.be/5RlvRCjLT4Y

Additional topics:

Woodward rules for conjugated dienes and α, β- unsaturated carbonyl groups.
Application of Schrodinger wave equation to Harmonic oscillator and rigid rotor.

Course Objectives

The aim and objective of the course on Chemistry-I is to introduce the students of B. Tech. class to the formal structure of Chemistry-I so that they can use these in Engineering as per their requirement.

Course: CHEMISTRY-I		
	Subject Code- BTECH101-18	
	Course Outcomes	**BT Level**
1.	Illustrate the structures of diatomic and polyatomic in terms of molecular orbitals and relate intermolecular forces.	2
2.	Interpret the molecular interactions by choosing suitable spectroscopic methods and interpreting corresponding data.	2
3.	Make use of free energy in chemical equilibria and relate intermolecular forces.	3
4.	Analyze periodic properties such as ionization potential, electro negativity, oxidation states and electro negativity	4
5.	Determine the stereochemistry of organic compounds and major chemical reactions that are used in the synthesis of molecules.	5
6.	Formulate the reactivity/stability of compound and identification of drug molecule.	6

CO mapping with PO, PSO

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO 1				1				1			2	1	2	2
CO 2	2	2	1					2			1	1	2	2
CO 3								1			1	1	2	3
CO 4	2	2	1					2			1	1	2	1
CO 5				1							1	1	2	3
CO 6												1	2	1

BTCH102-18 CHEMISTRY-I LAB
COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	DEGREE: B.TECH
COURSE- CHEMISTRY-I LAB	SEMESTER-2 CREDITS-1.5
COURSE CODE- BTCH102-18 Year of introduction – 2018	COURSE TYPE – CORE
COURSE AREA/DOMAIN- CHEMISTRY	CONTACT HOURS: 0-0-3
CORRESPONDING LAB COURSE CODE (IF ANY): NIL	LAB COURSE NAME: NIL

SYLLABUS:
Choice of 10-12 Experiments from the following:

- Determination of surface tension and viscosity
- Thin Layer Chromatography
- Ion exchange column for removal of hardness of water
- Colligative properties using freezing point depression
- Determination of the rate constant of a reaction
- Determination of cell constant and conductance of solutions
- Potentiometry-determination of redox potentials and emf
- Synthesis of a polymer/drug
- Saponification/acid value of an oil
- Chemical analysis of a salt
- Lattice structures and packing of spheres
- Models of potential energy surfaces
- Chemical oscillations- Iodine clock reaction
- Determination of the partition coefficient of a substance between two immiscible liquids
- Adsorption of acetic acid by charcoal
- Use of the capillary viscometers to the demonstrate of the isoelectric point as the pH ofminimum viscosity for gelatin sols and/or coagulation of the white part of egg.

TEXT/REFERENCE BOOKS:

S. No	BOOK TITLE/AUTHORS/PUBLICATION
1.	Vogel A-I, Quantitative Inorganic Analysis, Oxford ELBS

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:

Chalk & Talk
PPTs
Group Discussions
Lab Performance

E- content used:

https://youtu.be/ukjRtZVBkx8

Additional topics:

Synthesis of tris(ethylenediamine)nickel(II) dichloride, [Ni(en)3]Cl2, and estimation of Ni(II).
To prepare Adipic acid from cyclohexanone.

COURSE OBJECTIVE:

The aim and objective of the Lab course on Chemistry-I Lab is to introduce the students of B.Tech. Class to the formal structure of Chemistry-I so that they can use these in Engineering as per their requirement.

Course: CHEMISTRY-I LAB		
Subject Code- BTCH102-18		
	Course Outcomes	**BT Level**
1.	Classify different physical properties such as surface tension and viscosity of unknown liquids.	2
2.	Build skills in method of creating different chromatographic techniques.	3
3.	Make use of the rate constants, cell constant, redox potentials and conductance for different chemical solutions.	3
4.	Survey basic techniques and procedures in laboratory for synthesis and purification of any organic compounds	4
5.	Inspect acid value of oil and analysis of salt.	4
6.	Measure the partition coefficient of substance and adsorption of acetic acid by different methods.	5

CO mapping with PO, PSO

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**
CO 1				1				2	3	2	2	1	2	3
CO 2	2	1	1					1	3	2	2	1	2	1
CO 3	2	1	1					1	3	2	2	1	1	1
CO 4				1				1	3	2	3	1	1	2
CO 5								2	3	2	2	1		1
CO 6								1	3	2	1	1		1

BTAM204-18 MATHEMATICS PAPER-II
COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	DEGREE: B.TECH
COURSE- MATHEMATICS PAPER-II	SEMESTER-2 CREDITS-4
COURSE CODE- BTAM204-18 Year of introduction – 2018	COURSE TYPE – CORE
COURSE AREA/DOMAIN- MATHEMATICS	CONTACT HOURS: 4-1-0
CORRESPONDING LAB COURSE CODE (IF ANY): NIL	LAB COURSE NAME: NA

SYLLABUS:

MODULE	DETAILS	HOURS
I	Measures of Central tendency: Moments, skewness and kurtosis, Variance, Correlation coefficient, Probability, conditional probability, independence; Discrete random variables, Independent random variables, expectation of Discrete random variables.	10
II	Probability distributions: Binomial, Poisson and Normal, Poisson approximation to the binomial distribution, evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation.	15
III	Continuous random variables and their properties, distribution functions and densities, normal and exponential densities. Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas.	10
IV	Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations. Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.	15

Total hours – 50

	BOOK TITLE/AUTHORS/PUBLICATION
1.	Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2.	P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
3.	S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
4.	W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968
5.	N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010

	BOOK TITLE SUGGESTED BY FACULTY
1	Statistical methods by S.P. GUPTA.
2	Fundamentals of mathematical statistics by S.C. GUPTA & V.K. KAPOOR

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Small Group Instruction.
Making real world connections

E- CONTENT USED:
https://youtu.be/QfVx7AH8rck
https://youtu.be/LSIgQH06j74

ADDITIONAL TOPICS:

- Correlation and regression for bivariate.
- Exponential curve fitting.
- Analysis of variance for one way and two way classification.

COURSE OBJECTIVES

The objective of this course is to familiarize the students with statistical techniques. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.

Course: MATHEMATICS PAPER-II		
Course Code: BTAM204-18		
	Course Outcomes	**BT Level**
1.	Illustrate basics of Probability and Statistics	2
2.	Demonstrate Concept of basic probability, two types of random variables and their probability functions	3
3.	Apply the principles of various discrete and continuous probability distributions.	3
4.	Choose the concepts of central tendency, correlation and correlation coefficient and also regression.	4
5.	Analyze the significance of the given large and small sample Data by using t- test, F- test and Chi-square test.	5
6.	Estimate appropriately least square method to fit the various curves	5

CO mapping with PO, PSO

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**
CO 1	3	2	2		1	3	2		2		2	2	3	2
CO 2	3	2	1	1	2	2	1		2		2	2	1	
CO 3	3	2	2	3	2	1	1				1	1	1	1
CO 4	3	2	2	2	1	1	1				1	1	3	
CO 5	3	2	1	1	3	2	1				1	2	3	
CO 6	3	2		1							1	2	1	

BTPS101-18 COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	DEGREE: B.TECH
COURSE:PPS	SEMESTER-2 CREDITS-3
COURSE CODE- BTPS101-18 Year of Introduction - 2018	COURSE TYPE – CORE
COURSE AREA/DOMAIN- PPS	CONTACT HOURS:3-0-0
CORRESPONDING LAB COURSE CODE (IF ANY): BTPS102-18	LAB COURSE NAME: ENGLISH- LAB

SYLLABUS

MODULE	DETAILS	HOURS
1.	Introduction to Programming, Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) Idea of Algorithm: steps to solve logical and numerical problems. Representation of algorithm Flowchart/ Pseudo code with examples. Syntax and logical errors in compilation	8
2.	Introduction about constants, variables, data types, operators, precedence and expressions. Evaluation of conditional Branching and loops	14
3.	1-D and 2-D Arrays, Character Array and strings.	6
4.	Searching, Sorting algorithms (Bubble, insertion and selection) quick sort and merge sort.	6
5.	Functions, Parameter passing in functions, call by value and call by reference, passing array to functions.	6
6.	Recursion Recursion, as a different pointers, Use of Pointers in self-referential structures, notion of linked list	5
7.	Defining structures and Array of structures	4
8.	Idea of pointers, Use of pointers in structure.	2
9.	Introduction, File reading/writing in different modes	3

Total hours –52

TEXT/REFERENCE BOOKS:

S. No	BOOK TITLE/AUTHORS/PUBLICATION
1.	"The Programming Language", Braian W. Kernighan and Desnnis M. Ritchie.
2.	"Let Us C", By Yashwant Kanetkar, Saurav Kulkarni.
3.	"C Programming Language", A step by step beginner's guide to learn C programming by Darel L Graham.
4.	"Programming in C", by Reema Thareja
5.	"C in Depth", by Deepali Srivastava and S K Srivastava.
6.	Computer Programming using C language – Vipan Arora, Eagle's Publications.

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Small Group Instruction.
Making real world connections
Presentations

E- CONTENT USED:
https://www.youtube.com/watch?v=8PopR3x-VMY
https://www.youtube.com/watch?v=3lqgdqoY83o
https://www.youtube.com/watch?v=08LWytp6PNI

ADDITIONAL TOPICS:
Object Oriented Programming Concepts
Use of Class in OOPS
Use of Inhertance
Introduction about N/w Security
Introduction about Web Technology

COURSE OBJECTIVES

The aim and objective of the course on English is to introduce the students of B. Tech. class to the formal structure of English so that they can use these in Engineering as per their requirement**.**

Course: PPS		
Subject Code- BTPS101-18		
	Course Outcomes	**BT Level**
1.	Explore the working of program development, characteristics of C, compilation process, Flowchart and it's working.	1
2.	Explain the use of different data types, operators, expressions, Input / Output statements, Library Functions.	2
3.	Run programs based on control statements like if-else, if-else-if, for loop, while loop, do-while loop, Switch statement and break statement.	3
4.	Identify the use of functions (Call by value, call by reference), parameter passing in functions, Passing array to functions, Categorize sorting algorithms (Bubble, Insertion and Selection)	4
5.	Order of complexity through Programs, Use of array (1-d Array & 2-d Array), Relate the use of structures, Array of structures, Use of pointer in C	4
6.	Describe Strings, reading & writing strings, standard library string functions, Study of reading from a file, writing to a file, structure of file program, Error handling in file and command line arguments in file.	6

CO MAPPING WITH PO

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	2	1	2	1		2						2	3
CO2	2	1	1	2			1					1	3	2
CO3	3	1	2	1	1		2						2	3
CO4	1	2	1	1			1						2	1
CO5	1	2	2	1			1					1	1	1
CO6	1		1	1			1						2	2

S. No	DETAILS	HOURS
1.	Familiarization with programming environment	3
2.	Simple computational problems using arithmetic expressions	4
3.	Problems involving if-then-else structures.	2
4.	Iterative Problems	1
5.	1D Array manipulation	2
6.	Matrix problems, String operations	2
7.	Simple functions	1
8.	Pointers and structures	2
9.	File handling	3

TEXT/REFERENCE BOOKS:

S. No	BOOK TITLE/AUTHORS/PUBLICATION
1.	"The Programming Language", Braian W. Kernighan and Desnnis M. Ritchie.
2.	"Let Us C", By Yashwant Kanetkar, Saurav Kulkarni.
3.	"C Programming Language", A step by step beginner's guide to learn C programming by Darel L Graham.
4.	"Programming in C", by Reema Thareja
5.	"C in Depth", by Deepali Srivastava and S K Srivastava.
6.	Computer Programming using C language – Vipan Arora, Eagle's Publications.

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Small Group Instruction.
Making real world connections
Presentations

E- CONTENT
https://youtu.be/GIqcZXtqh_U
https://youtu.be/dQa4A2Z0_Ro

ADDITIONAL TOPIC
Basic programs of OOPS
Program of class in C++
Practical work related to network security

Course Objectives

The aim and objective of the course on English is to introduce the students of B. Tech. class to the formal structure of English so that they can use these in Engineering as per their requirement.

Course: PPS lab		
Subject Code- BTPS102-18		
	Course Outcomes	**BT Level**
1.	Familiarization with programming environment	1
2.	Simple computational problems using arithmetic expressions	2
3.	Problems involving if-then-else structures, 1D Array manipulation	3
4.	Matrix problems, String operations	4
5.	Simple functions	4
6.	Pointers and structures, File handling	6

CO MAPPING WITH PO AND PSO

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	1	2	1			1		3	1		2		1	
CO2	2							2		1	2	1		2
C03	1			2	2	1	2	3	2	2	2		2	1
C04	3	1	3	2			3	2		1	3		1	2
CO5	1	2		2	2			1		1	2		1	2
CO6			3				1	1		1	1	1		2

WORKSHOP/MANUFACTURING PRACTICES
COURSE INFORMATION SHEET

PROGRAMME: COMPUTER SCIENCE & ENGINEERING	**DEGREE: BTECH**
COURSE: WORKSHOP/MANUFACTURING PRACTICES	**SEMESTER: 1 CREDITS: 3**
COURSECODE:BTMP101-18 **REGULATION:2018**	**COURSE TYPE: CORE**
COURSE AREA/DOMAIN:	**CONTACT HOURS: 1(L) + 4(P) hours/Week.**

SYLLABUS

UNIT	DETAILS	HOURS
	THEORY	
I	Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods	**3**
II	CNC machining, Additive manufacturing	**1**
III	Fitting operations & power tools	**1**
IV	Electrical &Electronics	**1**
V	Carpentry	**1**
VI	Plastic moulding, glass cutting	**1**
VII	Metal casting	**1**
VIII	Welding (arc welding & gas welding), brazing	**1**
	WORKSHOP PRACTICE	
I	Machine shop	**10**
II	Fitting shop	**8**
III	Carpentry	**6**
IV	Electrical & Electronics	**8**
V	Welding shop (Arc welding 4 hrs + gas welding 4 hrs)	**8**
VI	Casting	**8**
VII	Smithy	**6**
VII	Plastic moulding & Glass Cutting	**6**

TEXT/REFERENCE BOOKS:

S.NO	BOOK TITLE/AUTHORS/PUBLICATION
1	Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited,
2	Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.
3	Gowri P. Hariharan and A. Suresh Babu," Manufacturing Technology – I" Pearson Education, 2008.
4	Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.
5	Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGrawHill House, 2017.

T/R	BOOK TITLE SUGGESTED BY FACULTY
1	B.S Raghuwanshi, A course in Workshop Technology, Dhanpat Rai & Co.
2	R S Khurmi,J K Gupta, Textbook of Workshop Technology, S Chand
3	O P Khanna, Production Technology Manufacturing Processes, Dhanpat Rai Publications.

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:

Chalk & Talk
Small Group Instruction.
Making real world connections
Presentations

E-CONTENT USED
NPTEL Notes and videos

Additional topics:

Sheet Metal: Shop development of surfaces of various objects; sheet metal forming and joining operations, joints, soldering and brazing; exercises involving use of sheet metal forming operations for small joints.

Foundry Shop: Introduction to molding materials; moulds; use of cores; melting furnaces; tools and equipment used in foundry shops; firing of a cupola furnace; exercises involving preparation of small sand moulds and castings

COURSE OBJECTIVES:

1. Upon completion of this course, students will be able to fabricate components with their own hands.
2. They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
3 .By assembling different components, they will be able to produce small devices of their interest.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
CO1	**Define** different manufacturing process commonly employed in the industry to fabricate components using different materials.	1
CO2	**Explain** the mechanisms of metal cutting and chip formation in machining and distinguish between various process of casting and welding technology.	2
CO3	**Understand** CNC Machining and different additive manufacturing techniques.	2
CO4	**Demonstrate** practical knowledge of dimensional accuracies and dimensional tolerances possible with different manufacturing processes.	3
CO5	**Apply** the skills of basic electrical engineering for house wiring practice and illustrate the working of electronic components and its utilization	3
CO6	By assembling different components, they will be **able** to produce small devices of their interest and **fabricate** components with their own hands.	6

PROGRAME SPECIFIC OUTCOMES:

S.NO	DESCRIPTION
PSO1	To design and implement sustainable solutions by new ideas and innovations in the field of computer science
PSO2	To use problem solving skills to develop efficient solutions to simplify real world problems

CO –PO-PSO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2		2	2	2	-	-	-	1	1	-	2	
CO2	2	-	2	-	1	2	-	-	-	3	1	-	2	1
CO3	-	-	3	1	1	2	2	-	-	2	2	-	1	
CO4	2	3	-	2	1	1	2	-	-	2	2	-	3	1
CO5	3	2	-	1	1	2	2	-	-	2	-	1	3	
CO6	1	2	3	-	-	3	3	-	-	2	-	-	1	1

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BTHU101-18 ENGLISH
COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	DEGREE: B.TECH
COURSE:ENGLISH	SEMESTER-2 CREDITS-4
COURSE CODE- BTHU101-18 Year of introduction – 2018	COURSE TYPE – CORE
COURSE AREA/DOMAIN- ENGLISH	CONTACT HOURS: 3-1-0
CORRESPONDING LAB COURSE CODE (IF ANY): BTHU102-18	LAB COURSE NAME: ENGLISH- LAB

SYLLABUS:

MODULE	DETAILS	HOURS
I	**Vocabulary Building & Basic Writing Skills** The concept of Word Formation • Root words from foreign languages and their use in English • Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives. Synonyms, antonyms, and standard abbreviations. • Sentence Structures • Use of phrases and clauses in sentences • Importance of proper punctuation • Creating coherence • Organizing principles of paragraphs in documents • Techniques for writing precisely	4
II	**Identifying Common Errors in Writing** Subject-verb agreement • Noun-pronoun agreement • Misplaced modifiers • Articles • Prepositions • Redundancies • Clichés	6
III	**Mechanics of Writing** Writing introduction and conclusion • Describing • Defining • Classifying • Providing examples or evidence	4
IV	**Writing Practices** Comprehension • Précis Writing • Essay Writing • Business Writing-Business letters, Business Emails, Report Writing, Resume/CV	4

Total hours – 42

TEXT/REFERENCE BOOKS:

S. No	BOOK TITLE/AUTHORS/PUBLICATION
1.	Practical English Usage. Michael Swan. OUP. 1995.
2.	Remedial English Grammar. F.T. Wood. Macmillan.2007
3.	On Writing Well. William Zinsser. Harper Resource Book. 2001
4.	Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006
5.	Communication Skills. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
6.	Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

	BOOK TITLE SUGGESTED BY FACULTY
1	Oxford modern English grammar by B. Aarts
2	English Grammar by Michael swan

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Group Discussion.
Projector
Presentations

E- content used:
https://www.youtube.com/watch?v=zfbUzWqsH74

Course Objectives

The aim and objective of the course on English is to introduce the students of B. Tech. class to the formal structure of English so that they can use these in Engineering as per their requirement.

Course: ENGLISH		
Subject Code- BTHU-101-18		
	Course Outcomes	**BT Level**
CO1	Choose basic proficiency in listening and speaking skills.	1
CO2	Interpret the independent user of English language.	2
CO3	Make use of communication training.	3
CO4	Discover different strategy of effective communication and select the most appropriate mode of communication for a given situation.	4
CO5	Distinguish effectively and assertively.	4
CO6	Combine effectively through different mode of written communication.	6

CO MAPPING WITH PO AND PSO

CO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1.								2		3		2	2	
2.						1				2		3	3	3
3.						2		2		3		2	3	1
4.						2				2		1	2	2
5.						1		1		1		2	1	3
6.								1		1		2	1	3

BTHU102-18 English Lab

COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	DEGREE: B.TECH
COURSE:ENGLISH	SEMESTER-2 CREDITS-4
COURSE CODE- BTHU102-18 Year of introduction – 2021	COURSE TYPE – CORE
COURSE AREA/DOMAIN- ENGLISH	CONTACT HOURS: 0(L)-0(T)-2(P)
CORRESPONDING LAB COURSE CODE (IF ANY): BTHU102-18	LAB COURSE NAME: ENGLISH- LAB

SYLLABUS:

MODULE	DETAILS
I	Listening Comprehension
II	Self-Introduction, Group Discussion and Role Play
III	Common Everyday Situations: Conversations and Dialogues
IV	Communication at Workplace
V	Interviews
VI	Formal Presentations

Total hours – 42

TEXT/REFERENCE BOOKS:

S.No	BOOK TITLE/AUTHORS/PUBLICATION
1.	(i) Practical English Usage. Michael Swan. OUP. 1995.
2.	(ii) Communication Skills. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
3.	(iii) Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

T/R	BOOK TITLE SUGGESTED BY FACULTY
1	Oxford modern English grammar by B. Aarts
2	English Grammar by Michael swan

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Group Discussion.
Projector
Presentations

E- content used:
https://www.youtube.com/watch?v=JuBAXrPGiXg&list=RDQMjCpImeiKYJo&start_radio=1

Course Objectives

The aim and objective of the course on English Lab is to introduce the students of B. Tech. class to the formal structure of English Lab so that they can use these in Engineering as per their requirement.

Course: ENGLISH		
Subject Code- BTHU-102-18		
	Course Outcomes	**BT Level**
CO1	Recall the content of audio inputs for effective listening skills.	1
CO2	Demonstrate the physiological characteristics of proper voice and diction for better speaking skills.	2
CO3	Practice the worksheets related to stress and intonation on words for better fluency in language.	3
CO4	Analyze everyday situations through role play activities for better presentation in corporate sector and daily life.	4
CO5	Illustrate interview skills through mock interview practices.	4
CO6	Implement Listening, Speaking, Reading and Writing skills through formal presentation	6

CO MAPPING WITH PO AND PSO

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
1.									3		2	3	3	2
2.									3		2	2	1	3
3.									2		2	2	2	2
4.									3		1	3		2
5.									1		3			1
6.											2	2		2

INDEX

B.TECH 3rd SEMESTER

(COMPUTER SCIENCE AND ENGINEERING)

IK Gujral Punjab Technical University Bachelor of Technology Scheme for B.Tech Syllabus 2018

Sem 3	Course Code	Subject	L-T-P	Hours	Credits
3rd	BTCS301-18	Data Structure & Algorithms	3-0-0	3	3
3rd	BTCS303-18	Data Structure & Algorithms Lab	0-0-4	4	2
3rd	BTCS302-18	Object Oriented Programming	3-0-0	3	3
3rd	BTCS304-18	Object Oriented Programming Lab	0-0-4	4	2
3rd	BTAM304-18	Mathematics-III	3-0-0	3	3
3rd	BTES301-18	Digital Electronics	3-0-0	3	3
3rd	BTES302-18	Digital Electronics Lab	0-0-2	2	1
3rd	HSHC101/102	Foundation Course in Humanities (Development of Societies/Philosophy)	2-1-0	2	3
3rd	BTCS305-18	IT Workshop	0-0-2	2	1

Total Credits = 20 Hours: 24

DATA STRUCTURE & ALGORITHMS

COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	**DEGREE: BTECH**
COURSE TYPE : PROFESSIONAL CORE COURSE	**SEMESTER: 3** **CREDITS: 3**
COURSE CODE: BTCS301-18 **REGULATION: 2018**	**COURSE TYPE: CORE**
COURSE AREA/DOMAIN: Data Structure & Algorithms	**CONTACT HOURS: 3(L) + 1 (T) hours/Week.**
CORRESPONDING LAB COURSE CODE :BTCS303-18	**LAB COURSE NAME:** Data Structure & Algorithms Lab

SYLLABUS:

UNIT	DETAILS	HOURS
I	**Introduction** Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. Searching: Linear Search and Binary Search Techniques and their complexity analysis.	**6**
II	**Stacks and Queues** ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.	**10**
III	**Linked Lists** Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: All operations their algorithms and the complexity analysis. **Trees**: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.	**10**
IV	**Sorting and Hashing** Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing.	**10**
V	**Graph** Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis. [6 hrs] (CO2, CO4)	**6**

TEXT/REFERENCE BOOKS:

S.NO	BOOK TITLE/AUTHORS/PUBLICATION
1	Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company.
2	"How to Solve it by Computer", 2nd Impression by R. G. Dromey, Pearson Education

T/R	BOOK TITLE SUGGESTED BY FACULTY
1	"Classic Data Structures", Samanta and Debasis, 2nd edition, PHI publishers.
2	"Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, SartajSahni, Computer Science Press
3	"Data Structures with C (Schaum's Outline Series)", Seymour Lipschutz, 1st edition,McGraw Hill Education

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Small Group Instruction.
Making real world connections
Presentatons

E- content used:
https://youtu.be/RBSGKlAvoiM

Additional topics:

Asymptotic analysis (Big-O notation) Basic math operations (addition, subtraction, multiplication, division, exponentiation) Sqrt(n) primality testing.

COURSE OBJECTIVES:

The aim and objectives of data structure are to provide the knowledge of basic data structures and their implementations. To understand importance of data structures in context of writing efficient programs.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTCS301-18	**Higher Secondary Education**	**Data, Files, Data base, Basics of C language**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Understand the basic concepts of data structures like arrays, stacks.	B.L-2
2	Understand the concept and various operations of linked lists and queues.	B.L-2
3	Implementation of various operations on Trees.	B.L-3
4	Implement various searching and sorting techniques.	B.L-3
5	Analyze the space and time complexity of algorithms.	B.L-4
6	Apply graph theory and hashing techniques.	B.L-3

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1	1	1	1	1	0	1	0	0	2	2	1
CO2	3	2	2	1	2	0	0	0	1	0	0	0	2	1
CO3	3	1	1	1	1	2	1	0	1	0	0	1	2	2
CO4	2	1	1	1	1	1	1	0	0	0	0	0	2	2
CO5	2	1	1	1	1	1	1	0	2	0	0	2	2	2
CO6	2	2	1	1	1	1	2	0	1	0	0	1	2	2

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Data Structure & Algorithm Lab

SYLLABUS:

Task 1: Write a program to insert a new element at end as well as at a given position in an array.
Task 2: Write a program to delete an element from a given whose value is given or whose position is given
Task 3: Write a program to find the location of a given element using Linear Search
Task 4: Write a program to find the location of a given element using Binary Search.
Task 5: Write a program to implement push and pop operations on a stack using linear array.
Task 6: Write a program to convert an infix expression to a postfix expression using stacks.
Task 7: Write a program to evaluate a postfix expression using stacks
Task 8: Write a recursive function for Tower of Hanoi problem.
Task 9: Write a program to implement insertion and deletion operations in a queue using linear array.
Task 10: Write a menu driven program to perform following insertion operations in a single linked list:
Task 11: Write a menu driven program to perform following deletion operations in a single linked list: Deletion at beginning ii. Deletion at end iii. Deletion after a given node
Task 12: Write a program to implement push and pop operations on a stack using linked list.
Task 13: Write a program to implement push and pop operations on a queue using linked list.
Task 14: Program to sort an array of integers in ascending order using bubble sort.
Task 15: Program to sort an array of integers in ascending order using selection sort.
Task 16: Program to sort an array of integers in ascending order using insertion sort.
Task 17: Program to sort an array of integers in ascending order using quick sort.
Task 18: Program to traverse a Binary search tree in Pre-order, In-order and Post-order.
Task 19: Program to traverse graphs using BFS.
Task 20: Program to traverse graphs using DFS.

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T	"Classic Data Structures", Samanta and Debasis, 2nd edition, PHI publishers.
T	"Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, SartajSahni, Computer Science Press

COURSE OBJECTIVES:

The aim and objective of this course is designed to develop skills to design and analyze simple linear and non linear data structures. It strengthen the ability to the students to identify and apply the suitable data structure for the given real world problem.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTCS303-18	**Higher Secondary Education**	**Basics of C Language**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Implementation of various searching and sorting algorithms.	B.L-3
2	Apply the various operations on Array, Stacks and Queues.	B.L-3
3	Familiarize with various linear data structures Linked list in C++.	B.L-1
4	Analyze the complexity of various data structures.	B.L-4
5.	Implementation the operations on Tree	B.L-3
6	Implementation various traversing operation on Graph	B.L-3

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1	2	1	0	1	1	2	3	3	1	1	1
CO2	2	2	0	1	2	0	0	1	1	2	2	0	2	0
CO3	2	1	1	1	1	0	1	1	2	2	2	2	1	0
CO4	2	1	2	1	0	0	0	0	2	1	2	1	2	1
CO5	2	1	1	1	0	0	2	1	2	2	1	1	2	2
CO6	2	1	2	1	2	0	2	2	2	2	2	1	1	2

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OBJECT ORIENTED PROGRAMMING

PROGRAMME: ENGINEERING	**DEGREE: BTECH**
COURSE: PROFESSIONAL CORE COURSE	**SEMESTER 3 CREDITS: 3**
COURSE CODE: BTCS302-18 **REGULATION: 2018**	**COURSE TYPE: CORE**
COURSE AREA/DOMAIN: OBJECT ORIENTED PROGRAMMING	**CONTACT HOURS: 3(L) + 1 (T)+P(4) hours/Week.**
CORRESPONDING LAB COURSE CODE :BTCS304-18	**LAB COURSE NAME:** OBJECT ORIENTED PROGRAMMING LAB

SYLLABUS:

UNIT	DETAILS	HOURS
I	Overview of C++, Sample C++ program, Different data types, operators, expressions, and statements, arrays and strings, pointers & function components, recursive functions, user - defined types, function overloading, inline functions, Classes & Objects – I: classes, Scope resolution operator, passing objects as arguments, returning objects, and object assignment.	**8**
II	Constructors, Destructors, friend functions, Parameterized constructors, Static data members, Functions, Arrays of objects, Pointers to objects, this pointer, and reference parameter, Dynamic allocation of objects, Copy constructors, Operator overloading using friend functions, overloading	**8**
III	Base Class, Inheritance and protected members, Protected base class inheritance, Inheriting multiple base classes, Constructors, Destructors and Inheritance, Passing parameters to base class constructors, Granting access, Virtual base classes.	**8**
IV	Virtual function, calling a Virtual function through a base class reference, Virtual attribute is inherited, Virtual functions are hierarchical, pure virtual functions, Abstract classes, Using virtual functions, Early and late binding	**8**
V	Basics of exception handling, exception handling mechanism, throwing mechanism, catching mechanism, I/O System Basics, File I/0: Exception handling fundamentals, Exception handling options. C++ stream classes, Formatted I/O, fstream and the File classes, Opening and closing a file, Reading and writing text files.	**10**

TEXT/REFERENCE BOOKS:

S.NO	BOOK TITLE/AUTHORS/PUBLICATION
1	Stanley B.Lippmann, JoseeLajoie: C++ Primer, 4th Edition, Addison Wesley, 2012.
2	Herbert Schildt: The Complete Reference C++, 4th Edition, Tata McGraw Hill, 2011

T/R	BOOK TITLE SUGGESTED BY FACULTY
1	E. Balagurusamy, Object Oriented Programming with C++, Tata McGraw Hill

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Small Group Instruction.
Making real world connections
Presentatons

E- content used:
https://youtu.be/pTB0EiLXUC8

Additional topics:

Fundamentals and Instantiation

COURSE OBJECTIVES:

The aim and objective of the course on Semiconductor Physics is to introduce the students of B. Tech. class to the formal structure of semiconductor physics so that they can use these in Engineering as per their requirement.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTCS302-18	**Higher Secondary Education**	**Basics of C and C++**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Identify classes, objects, members of a class and the relationships among them needed to solve a specific problem	1
2	Implementing the concept of constructors and destructors. And create new definitions for some of the operators	3
3	Create function templates, overload function templates	6
4	Illustrating the concept of data encapsulation, inheritance, polymorphism with virtual functions	4
5	Apply the concept of file operations, streams in C++ and various I/O manipulators	5
6	Develop C++ programs with reusability concept	6

CO MAPPING WITH PO

	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO9	PO10	PO1 1	PO1 2	PSO 1	PSO 2
CO1	**3**	**2**	**2**	**0**	**1**	**1**	**1**	**1**	**0**	**0**	**2**	**2**	**2**	**1**
CO2	**3**	**2**	**2**	**2**	**1**	**2**	**2**	**1**	**0**	**0**	**2**	**2**	**2**	**1**
CO3	**2**	**2**	**3**	**2**	**0**	**2**	**2**	**2**	**0**	**0**	**2**	**2**	**2**	**2**
CO4	**3**	**2**	**3**	**2**	**2**	**2**	**1**	**2**	**0**	**0**	**2**	**2**	**1**	**2**
CO5	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**0**	**0**	**1**	**2**	**2**	**1**
CO6	**3**	**2**	**2**	**1**	**2**	**1**	**2**	**0**	**0**	**0**	**1**	**2**	**1**	**1**

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OBJECT ORIENTED PROGRAMMING Lab

SYLLABUS:

Task 1: Write a program that uses a class where the member functions are defined inside a class.
Task 2: Write a program that uses a class where the member functions are defined outside a class.
Task 3: Write a program to demonstrate the use of static data members.
Task 4: Write a program to demonstrate the use of const data members.
Task 5: Write a program to demonstrate the use of zero argument and parameterized constructors.
Task 6: Write a program to demonstrate the use of dynamic constructor.
Task 7: Write a program to demonstrate the use of explicit constructor.
Task 8: Write a program to demonstrate the use of initializer list.
Task 9: Write a program to demonstrate the overloading of increment and decrement operators.
Task 10: Write a program to demonstrate the overloading of memory management operators.
Task 11: Write a program to demonstrate the typecasting of basic type to class type.
Task 12: Write a program to demonstrate the typecasting of class type to basic type.
Task 13: Write a program to demonstrate the typecasting of class type to class type.
Task 14: Write a program to demonstrate the multiple inheritances.
Task 15: Write a program to demonstrate the runtime polymorphism.
Task 16: Write a program to demonstrate the exception handling.
Task 17: Write a program to demonstrate the use of class template.
Task 18: Write a program to demonstrate the reading and writing of mixed type of data.

COURSE OBJECTIVES:

The aim and objective of the Lab course is to creating a basic programming and OOP concepts, tokens, expressions and control structures in C++, arranging same data systematically with arrays.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTCS304-18	Higher Secondary Education	Simple programs of C and C++

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Develop classes incorporating object-oriented techniques	6
2	Design and implement object-oriented concepts of inheritance and polymorphism	6
3	illustrate and implement STL class of containers and need for exceptions to handle errors for object oriented programs	4
4	Design and implement any real world based problem involving GUI interface using object-oriented concepts	6
5	Write C++ programs to handle exceptions in programming	6
6	Evaluate different type of problems using object-oriented programming Techniques	5

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	0	2	2	1	2	1	2	2	1	2
CO2	2	2	1	2	0	2	2	1	2	1	2	1	1	2
CO3	2	2	1	1	0	2	2	2	2	1	1	1	2	1
CO4	2	3	2	2	0	2	2	2	1	3	1	2	1	2
CO5	3	2	2	2	0	2	2	0	2	2	2	2	2	2
CO6	3	2	1	2	0	2	2	2	1	2	1	1	2	2

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MATHEMATICS – III

COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	**DEGREE: BTECH**
COURSE: Calculus and Ordinary Differential Equations	**SEMESTER: 3 CREDITS: 3**
COURSE CODE: BTAM-304-18 REGULATION: 2021	**COURSE TYPE: CORE**
COURSE AREA/DOMAIN: Calculus and Ordinary Differential Equations	**CONTACT HOURS: 3-0-0**

SYLLABUS:

UNIT	DETAILS	HOURS
I	Limit, continuity for functions with severable variables, partial derivatives, total derivative, Maxima, minima and saddle points; Method of Lagrange multipliers, Multiple Integration: double and triple integrals (Cartesian and polar), Change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications of double and triple integrals to find surface area and volumes.	**12**
II	Sequence and series, Bolzano Weirstrass Theorem, Cauchy convergence criterion for sequence, uniform convergence, convergence of positive term series: comparison test, limit comparison test, D'Alembert's ratio test, Raabe's test, Cauchy root test, p-test, Cauchy integral test, logarithmic test, Alternating series, Leibnitz test, Power series, Taylor's series, Series for exponential, trigonometric and logarithmic functions**.**	**13**
III	Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.	**12**
IV	Second and higher order linear differential equations with constant coefficients, method of variation of parameters, Equations reducible to linear equations with constant coefficients: Cauchy and Legendre's equations.	**12**

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
1.	G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9 th Edition, Pearson, Reprint, 2002.
2.	T. Veerarajan, Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
3.	N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
4.	Erwin Kreyszig, Advanced Engineering Mathematics, 9 th Edition, John Wiley & Sons, 2006.
5.	W.E. Boyce and R.C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edition, Wiley India, 2009.
6.	E.A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.

T/R	BOOK TITLE SUGGESTED BY FACULTY
1	Calculus and Ordinary Differential Equations by D Pearson
2	M.V.Makarates ; V.Yu.Reshetnyak :Ordinary Differential Equations And Calculus Of Variations

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Small Group Instruction.
Making real world connections
Presentations

E- content used:
https://youtu.be/_sPJl9woJtw
https://youtu.be/A6Ad7VnSlZE
https://youtu.be/jyD3uKKxI0g

Additional topics:

- Linear Equations with Variable Coefficients
- Boundary value problem
- Polynomial interpolation

COURSE OBJECTIVES:

The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

COURSE OUTCOMES:

Course: MATHEMATICS-III		
Course Code: BTAM304-18		
	Course Outcomes	**BT Level**
BTAM304-18.1	Remember the concepts of existence and uniqueness of solutions.	1
BTAM304-18.2	Apply multiple integrals to deal with areas and volume of various structures which are quite significant.	2
BTAM304-18.3	Indentify the functions of several variables that are essential in engineering.	3
BTAM304-18.4	Analyze the knowledge required to solve higher order differential equations.	4
BTAM304-18.5	Formulate and solve engineering problems related to convergence, infinite series and Taylor series.	5
BTAM304-18.6	Construct the techniques of first degree differential equations to model real world problems.	6

CO Mapping With PO

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO2**
CO1	3	2	0	1	0	1	1	2	0	2	0	0	2	0
CO2	3	0	3	0	2	0	1	2	0	2	0	0	2	0
CO3	3	0	2	0	0	0	1	2	0	2	0	0	2	0
CO4	3	0	0	0	2	0	1	2	0	2	0	0	2	1
CO5	0	0	1	3	0	0	1	0	0	2	0	0	2	0
CO6	0	3	0	0	3	0	1	0	0	2	0	0	2	1

DIGITAL ELECTRONICS

COURSE: ENGINEERING SCIENCE CODE	**SEMESTER :3RD CREDITS: 3**
COURSE CODE:BTES301-18 REGULATION: 2018	**COURSE TYPE: CORE**
COURSE AREA/DOMAIN: DIGITAL ELECTRONICS	**CONTACT HOURS: 3(L) + 1 (T) hours/Week.**
CORRESPONDING LAB COURSE CODE :BTES318-18	**LAB COURSE NAME: DIGITAL ELECTRONICS LAB**

SYLLABUS:

1	NUMBER SYSTEMS: Binary, Octal, Decimal, Hexadecimal. Number base conversions, 1's, 2's complements, signed Binary numbers. Binary Arithmetic, Binary codes: Weighted BCD, Gray code, Excess 3 code, ASCII. LOGIC GATES: AND, OR, NOT, NAND, NOR, Exclusive-OR and Exclusive-NOR. Implementations of Logic Functions using gates, NAND-NOR implementations.	**5**
2	BOOLEAN ALGEBRA: Boolean postulates and laws – De-Morgan's Theorem, Principle of Duality, Boolean expression – Boolean function, Minimization of Boolean expressions – Sum of Products (SOP), Product of Sums (POS), Minterm, Maxterm, Canonical forms, Conversion between canonical forms, Karnaugh map Minimization, Don't care conditions, Quine-McCluskey method	**6**
3	COMBINATIONAL CIRCUITS: Design procedure – Adders, Subtractors, BCD adder, Magnitude Comparator, Multiplexer/Demultiplexer, encoder/decoder, parity checker, code converters. Implementation of combinational logic using MUX, BCD to 7 segment decoder EQUENTIAL CIRCUITS: Flip flops SR, JK, T, D and Master slave, Excitation table, Edge triggering, Level Triggering, Realization of one flip flop using other flip flops. Asynchronous/Ripple counters, Synchronous counters, Modulo-n counter, Ring Counters. Design of Synchronous counters: state diagram, Circuit implementation. Shift registers	**12**
4	MEMORY DEVICES: Classification of memories, RAM organization, Write operation, Read operation, Memory cycle. ROM organization, PROM, EPROM, EEPROM, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA A/D & D/A CONVERTORS: Analog & Digital signals, sample and hold circuit, A/D and D/A conversion techniques (Weighted type, R-2R Ladder type, Counter Type, Dual Slope type, Successive Approximation type).	**12**

TEXT/REFERENCE BOOKS:

S.NO	BOOK TITLE/AUTHORS/PUBLICATION
1	Morris Mano, **Digital Design**, Prentice Hall of India Pvt. Ltd.
2	Donald P.Leach and Albert Paul Malvino, **Digital Principles and Applications**, 5 ed., Tata McGraw HillPublishing CompanyLimited, New Delhi, 2003.
3	R.P.Jain, **Modern Digital Electronics**, 3 ed., Tata McGraw–Hill publishing company limited, New Delhi, 2003
4	Thomas L. Floyd, **Digital Fundamentals**, Pearson Education, Inc, New Delhi, 2003

T/R	BOOK TITLE SUGGESTED BY FACULTY
1	Ronald J. Tocci, Neal S. Widmer, Gregory L. Moss, **Digital System - Principles and Applications**, Pearson Education.
2	Ghosal , **Digital Electronics**, Cengage Learning

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Small Group Instruction.
Making real world connections
Presentatons

E- content used:
https://youtu.be/KDZ-SI7OHNY

Additional topics:

Gate Level Minimization, Programs

COURSE OBJECTIVES:

To familiarize with the different number systems, logic gates, and combinational and sequential circuits utilized in the different digital circuits and systems. The course will help in design and analysis of the digital circuit and system.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTES301-18	**Higher secondary Education**	**Machine and High Level Language, Binary Number System**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Explain the concept of Boolean algebra and logic gates.	**2**
2	Illustrate the realisation of Boolean expressions using logic gates.	**2**
3	Apply the design procedure to construct basic combinational circuits.	**3**
4	Analysis of synchronous and asynchronous sequential circuits using flip flops.	**4**
5	Interpretation of various types of memories with their operations.	**5**
6	Discuss the various programmable logic devices.	**6**

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1	2	2	2	2	2	1	0	1	1	2	2
CO2	2	2	2	1	1	2	1	2	1	0	0	2	1	2
CO3	2	1	1	2	1	2	1	1	1	0	1	1	1	2
CO4	2	2	2	1	1	2	2	2	2	0	1	2	1	1
CO5	2	2	2	2	1	2	2	2	1	0	2	1	2	2
CO6	2	2	2	2	1	2	1	1	2	0	1	1	2	1

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DIGITAL ELECTRONICS LAB

SYLLABUS:

1. To verify the Truth-tables of all logic gates.
2. To realize and verify the Half & full adder circuits using logic gates.
3. To realize Half & full subtractor circuits using logic gates.
4. To realize Encoder and Decoder circuits
5. To realize Multiplexer circuits
6. To realize 4-bit binary-gray & gray-binary converters.
7. To realize comparator circuit for two binary numbers of 2-bit each.
8. To realize Full adder & full subtractor circuits using encoder.
9. To design Full adder & full subtractor circuits using multiplexer.
10. To design and verify the Truth tables of all flip-flops.
11. To design Mod-6/Mod-9 synchronous up-down counter

COURSE OBJECTIVES:

Students will learn and understand the Basics of digital electronics and able to design basic logic circuits, combinational and sequential circuits. Course Delivery: The course will be delivered through tutorials of two hours and four hours of hands on practice per week.

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Define the digital trainer Kit and associated equipment.	**1**
2	Study and design of TTL Gates.	**2**
3	Analysis the working of Half adders and full Adders.	**4**
4	Examine the procedures for the analysis and design of Multiplexers and de-multiplexers.	**2**
5	Implement the designing of BCD to seven segment displays.	**6**
6	Designing of various types of sequential circuits like flip flops, registers.	**6**

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	0	2	2	1	0	1	1	2	1	0	0	2	2
CO2	2	2	2	2	2	0	1	1	2	2	1	0	1	1
CO3	2	2	3	3	1	0	2	2	1	2	2	0	2	2
CO4	3	2	2	2	2	0	2	2	1	2	2	0	2	2
CO5	3	2	1	3	2	0	1	2	2	1	2	0	1	2
CO6	2	2	2	2	2	0	1	1	2	1	1	0	2	1

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DEVELOPMENT OF SOCIETIES

COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	**DEGREE: BTECH**
COURSE: HUMINITIES & SOCIAL SCIENCES	**SEMESTER : 3CREDITS: 3**
COURSE CODE: HSHC101/102 **REGULATION:2018**	**COURSE TYPE: CORE**
COURSE AREA/DOMAIN: DEVELOPMENT OF SOCIETIES	**CONTACT HOURS: 3(L) hours/Week.**
CORRESPONDING LAB COURSE CODE : N/A	**LAB COURSE NAME: N/A**

SYLLABUS:

UNIT	DETAILS	HOURS
I	Social Development 1. Concepts behind the origin of Family, Clan and Society 2. Different Social Systems 3. Relation between Human being and Society 4.Comparative studies on different models of Social Structures and their evolution	5
II	Political Development 1. Ideas of Political Systems as learnt from History 2. Different models of Governing system and their comparative study	3
III	Economic Development 1. Birth of Capitalism, Socialism, Marxism 2. Concept of development in pre-British, British and post British period- Barter, Jajmani 3. Idea of development in current context.	18
IV	E. F.Schumacher's idea of development, Buddhist economics. Gandhian idea of development. Swaraj and Decentralization.	2

TEXT/REFERENCE BOOKS:

S.NO	BOOK TITLE/AUTHORS/PUBLICATION
1	Copleston, Frederick, History of Philosophy, Vol. 1.Great Britain: Continuum.
2	Hiriyanna, M. Outlines of Indian Philosophy, Motilal Banarsidass Publishers; Fifth Reprint edition (2009)

T/R	BOOK TITLE SUGGESTED BY FACULTY
1	Sathaye, Avinash, Translation of Nasadiya Sukta

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:

Chalk & Talk
Small Group Instruction.
Making real world connections
Presentations

COURSE OBJECTIVES:

The aim and objective of this course is to learn and maintain relation between society and others, different social systems, government system, idea of development in current context.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
HSHC101/102	Higher Secondary Education	Maintain relation between family and society, Introduction about government systems in different departments

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	To learn the concept of comprehensive social development and to develop its relation with the professional life.	**2**
2	To analyze the diverse models of the social structure for various parameters.	**4**
3	To understand the basics of the political system, its growth and its governance in a hierarchical manner thro' comparative models.	**2**
4	To understand the role of economy from ancient to modern era w.r.t its growth and its impact on society.	**2**
5	To acquire the knowledge of development in diverse context for the societal growth and its importance.	**2**
6	To understand the concept of development related to the economic front from its historical point of view to the modern trends.	**2**

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	0	0	2	2	2	3	2	0	2	0	2	3	1	2
CO2	0	0	2	2	1	3	2	0	2	0	1	3	2	2
CO3	0	0	2	2	2	2	2	0	2	0	1	2	3	2
CO4	0	0	1	3	2	2	2	0	2	0	2	2	2	2
CO5	0	0	2	2	2	2	2	0	2	0	1	1	2	2
CO6	0	0	2	1	1	1	2	0	2	0	2	2	2	2

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IT WORKSHOP

COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	**DEGREE: BTECH**
COURSE: Professional Core Course	**SEMESTER : 3 CREDITS: 1**
COURSE CODE: BTCS305-18 **REGULATION:2018**	**COURSE TYPE: CORE**
COURSE AREA/DOMAIN: IT Workshop	**CONTACT HOURS: 2(P) hours/Week.**
CORRESPONDING LAB COURSE CODE : N/A	**LAB COURSE NAME: N/A**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Identify various components of a system	**1**
2	Understand the Usage of internet, web browser and email	**2**
3	Practice of assembling the Computer	**3**
4	Solve the Trouble Shooting problems	**3**
5	Apply the looks for preparation of PPT, Documentation and budget Sheet etc	**3**
6	Implements the Basics in real life Problems	**3**

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	0	0	0	1	1	0	1	0	1	0	2	1
CO2	2	1	1	2	1	1	1	0	1	0	1	0	1	2
CO3	1	1	1	2	0	1	1	0	1	0	2	0	2	1
CO4	2	2	2	1	2	1	1	0	2	0	2	0	1	1
CO5	2	1	2	1	2	1	1	0	1	0	2	0	1	1
CO6	2	2	2	0	1	1	1	0	0	0	1	0	1	2

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INDEX

B.TECH 4th Semesters

(Computer Science & Engineering)

IK Gujral Punjab Technical University Bachelor of Technology Scheme for B.Tech Syllabus 2018

Sem 4	Course Code	Subject	L-T-P	Hours	Credits
4th	BTCS401-18	Discrete Mathematics	3-1-0	3	4
4th	BTES401-18	Computer Organization & Architecture	3-0-0	3	3
4th	BTES402-18	Computer Organization & Architecture Lab	0-0-2	2	1
4th	BTCS402-18	Operating System	3-0-0	3	3
4th	BTCS404-18	Operating System Lab	0-0-4	4	2
4th	BTCS403-18	Design & Analysis of Algorithms	3-0-0	3	3
4th	BTCS405-18	Design & Analysis of Algorithms Lab	0-0-4	4	2
4th	HSMC122-18	Universal Human Values 2	2-1-0	2	3

Total Credits= 21 Hours: 24

BTCS401-18 DISCRETE MATHEMATICS

COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	DEGREE: B.TECH
COURSE- DISCRETE MATHEMATICS	SEMESTER-4th CREDITS-4
COURSE CODE- BTCS401-18 Year of introduction – 2021	COURSE TYPE - CORE
COURSE AREA/DOMAIN- MATHEMATICS	CONTACT HOURS: 3(L)-1(T)-0(P)
CORRESPONDING LAB COURSE CODE (IF ANY): NIL	LAB COURSE NAME: NA

SYLLABUS:

MODULE	DETAILS	HOURS
I	**Sets, Relation and Function**: Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem.Principles of Mathematical Induction: The Well-Ordering Principle, Recursive definition **The Division algorithm**: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic	10
II	Basic counting techniques-inclusion and exclusion, pigeon-hole principle, permutation and Combination.	6
III	**Propositional Logic**: Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers. Proof Techniques: Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency.	10
IV	**Algebraic Structures and Morphism**: Algebraic Structures with one Binary Operation, semigroups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Boolean Algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function,Disjunctive and Conjunctive Normal Form	12
V	**Graphs and Trees:** Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Colouring, Colouring maps and Planar Graphs, Colouring Vertices, Colouring Edges, List Colouring, Perfect Graph, definition properties and Example, rooted trees, trees and sorting, weighted trees and prefix codes, Biconnected component and Articulation Points, Shortest distances.	12

TEXT/REFERENCE BOOKS:

	BOOK TITLE/AUTHORS/PUBLICATION
1	Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw – Hill
2	Susanna S. Epp, Discrete Mathematics with Applications, 4th edition, Wadsworth Publishing Co. Inc.
3	C L Liu and D P Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, 3rd Edition by, Tata McGraw – Hill.

	BOOK TITLE SUGGESTED BY FACULTY
1	Discrete Mathematics and Application by Kenneth Rosen
2	Discrete Mathematics (Schaum's Outlines)" by Seymour Lipschutz and Marc Laras Lipson

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:

- Chalk & Talk
- Small Group Instruction.
- Making real world connections
- Inquiry-based Learning

E- CONTENT USED:

- https://youtu.be/V7WNE8b5vJg
- https://youtu.be/RLIlANJlLjo

ADDITIONAL TOPICS:

- Five coloring theorem
- Mathematical Induction and Recurrence Relations
- block designs

Course Objectives

- Introduce concepts of mathematical logic for analyzing propositions and proving theorems.
- Use sets for solving applied problems, and use the properties of set operations algebraically.
- Work with relations and investigate their properties.
- Investigate functions as relations and their properties.
- Introduce basic concepts of graphs, digraphs and trees.

Course: DISCRETE MATHEMATICS		
Course Code: BTCS401-18		
	Course Outcomes	**BT Level**
1.	Understand the concept of relations, equivalence relations and partitions.	2
2.	Summarize Boolean functions and simplify expressions using the properties of Boolean algebra.	2
3.	Construct the given problems as graph networks and solve the techniques of graph theory.	3
4.	Identify the solutions for a given problem using various logic and prove the solutions based on logical inference.	3
5.	Develop basic counting principles and recurrence relations.	4
6.	Construct a range of mathematical techniques to solve a variety of quantitative problems.	6

CO MAPPING WITH PO

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	2	2	2	2	0	2	2	1	2	2	1	1	1
CO2	2	2	1	2	1	0	0	2	0	1	1	1	0	2
CO3	2	2	1	2	2	0	2	1	2	2	1	1	2	2
CO4	2	2	1	2	2	0	1	2	2	3	2	1	2	2
CO5	2	0	2	2	1	0	2	2	2	2	2	1	2	2
CO6	2	0	1	2	2	0	2	0	2	1	2	1	2	1

COMPUTER ARCHITECTURE & ORGANIZATION

COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	**DEGREE: BTECH**
COURSE: ENIGINEERING SCIENCE COURSE	**SEMESTER : 4TH CREDITS: 3**
COURSE CODE: BTES401-18 **REGULATION: 2018**	**COURSE TYPE: CORE**
COURSE AREA/DOMAIN: Computer Architecture & Organization	**CONTACT HOURS: 3(L)+2(P) hours/Week.**
CORRESPONDING LAB COURSE CODE : BTES402-18	**LAB COURSE NAME: Computer Architecture & Organization Lab**

SYLLABUS:

UNIT	DETAILS	HOURS
I	**Functional blocks of a computer** CPU, memory, input-output subsystems, control unit. Instruction set architecture of a CPU – registers, instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set. Case study – instruction set of 8085 processor. **Data representation**: signed number representation, fixed and floating point representations, character representation. Computer arithmetic – integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. multiplication – shift-andadd, Booth multiplier, carry save multiplier, etc. Division restoring and non-restoring techniques, floating point arithmetic.	**10**
II	**CPU control unit design**: Hardwired and micro-programmed design approaches, Case study – design of a simple hypothetical CPU. **Memory system design**: semiconductor memory technologies, memory organization. **Peripheral devices and their characteristics**: Input-output subsystems, I/O device interface, I/O transfers – program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes –role of interrupts in process state transitions, I/O device interfaces – SCII, USB.	**12**
III	Basic concepts of pipelining, throughput and speedup, pipeline hazards. **Parallel Processors**: Introduction to parallel processors, Concurrent access to memory and cache coherency	**10**
IV	Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. block size, mapping functions, replacement algorithms, write policies.	**9**

TEXT/REFERENCE BOOKS:

S.NO	BOOK TITLE/AUTHORS/PUBLICATION
1	"Computer Architecture and Organization", 3rd Edition by John P. Hayes, WCB/McGraw-Hill
2	"Computer Organization and Architecture: Designing for Performance", 10th Edition by William Stallings, Pearson Education.
3	"Computer System Design and Architecture", 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education

T/R	BOOK TITLE SUGGESTED BY FACULTY
1.	"ComputerOrganization and Architecture", Moris Mano,
2.	"ComputerOrganization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.
3.	"Computer Organization and Embedded Systems", 6th Edition by CarlHamacher, McGraw Hill Higher Education.

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Small Group Instruction.
Making real world connections
Presentations

E- content used:
https://youtu.be/e-fz5xmt4uc

Additional topics:

Introduction to memory and memory units. Memory Hierarchy Design and its Characteristics. Difference between Byte Addressable Memory and Word Addressable Memory. Difference between Simultaneous and Hierarchical Access Memory Organizations

COURSE OBJECTIVES:

To understand the structure, function and characteristics of computer systems. To understand the design of the various functional units and components of computers. To identify the elements of modern instructions sets and their impact on processor design.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTES402-18	Higher Secondary Education	Memory Organization, Hardware and Software components of computer

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1.	Understand functional block diagram of microprocessor;	2
2.	Apply instruction set for writing assembly language programs.	3
3.	Design a memory module and analyze its operation by interfacing with the CPU.	6
4.	Classify hardwired and micro programmed control units	4
5.	Understand the concept of pipelining and its performance metrics.	2
6.	Demonstrate the basic knowledge of I/O devices and interfacing of I/O devices with computer.	2

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	2	2	2	2	2	1	2	2	2	1
CO2	3	3	2	2	2	2	0	1	2	1	1	1	1	2
CO3	3	2	1	1	2	2	1	1	2	2	1	1	2	2
CO4	3	2	1	2	2	2	2	2	1	1	1	2	2	2
CO5	3	1	2	2	2	2	2	2	2	1	1	2	1	2
CO6	3	1	2	1	2	2	2	1	2	0	1	1	1	1

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COMPUTER ARCHITECTURE & ORGANIZATION LAB

SYLLABUS:

Task 1: Computer Anatomy- Memory, Ports, Motherboard and add-on cards.
Task 2: Dismantling and assembling PC
Task 3: Introduction to 8085 kit.
Task 4: Addition of two 8 bit numbers, sum 8 bit.
Task 5: Subtraction of two 8 bit numbers
Task 6: Find 1's complement of 8-bit number
Task 7: Find 2's complement of 8-bit number
Task 8: Shift an 8-bit no. by one bit.
Task 9: Find Largest of two 8 bit numbers.
Task 10: Find Largest among an array of ten numbers (8 bit).
Task 11: Sum of series of 8 bit numbers.
Task 12: Introduction to 8086 kit.
Task 13: Addition and subtraction of two 16 bit numbers, sum 16 bit
Task 14: Implement of Booth's algorithm for arithmetic operations
Task 15: Find 1's and 2's complement of 16-bit number.
Task 16: Implement simple programs using I/O based interface.

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T	Fundamentals of Microprocessors and Microcontrollers by B. Ram, Dhanpat Rai Publications

COURSE OBJECTIVES:

Computer Organization and Architecture Tutorial provides in-depth knowledge of internal working, structuring, and implementation of a computer system.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTES402-18	**Higher Secondary Education**	Memory Organization, Hardware and Software components of computer

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Build a program on a microprocessor using instruction set of 8085.	3
2	Analyze the behaviour of digital circuits	4
3	Design digital circuits for basic components of computer system and applications	6
4	Describe the internal architecture and different modes of operations of a typical micro controller	2
5	Understand different addressing modes and instructions of 8085	2
6	Design and Develop assembly language programs using software interrupts, subroutines and macros	6

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	1	2	2	2	1	1	1	2	1	2	2	1
CO2	2	1	2	2	2	2	1	1	0	2	1	2	2	2
CO3	2	1	0	1	2	1	1	1	1	1	1	2	0	2
CO4	2	2	1	2	2	2	1	1	1	1	1	2	1	2
CO5	1	2	2	2	2	1	2	1	1	2	1	2	1	2
CO6	1	1	2	2	1	1	2	1	2	1	1	2	2	1

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OPERATING SYSTEM

COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	**DEGREE: BTECH**
COURSE: PROFESSIONAL CORE COURSE	**SEMESTER : 4TH CREDITS: 4**
COURSE CODE: BTCS402-18 **REGULATION: 2018**	**COURSE TYPE: CORE**
COURSE AREA/DOMAIN: OPERATING SYSTEM	**CONTACT HOURS: 3(L) + 2(P) hours/Week.**
CORRESPONDING LAB COURSE CODE : BTCS404-18	**LAB COURSE NAME: OPERATING SYSTEM LAB**

SYLLABUS:

UNIT	DETAILS	HOURS
I	Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System.	**6**
II	**Processes:** Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching **Thread:** Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads, **Process Scheduling**: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non-pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Real Time scheduling: RM and EDF.	**10**
III	**Inter-process Communication:** Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, The Producer \Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc	**8**
IV	**Deadlocks:** Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.	**8**
V	**Memory Management:** Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation -Fixed and variable partition-Internal and External fragmentation and Compaction; Paging: Principle of operation-Page allocation-Hardware support for paging, Protection and sharing, Disadvantages of paging. **Virtual Memory**: Basics of Virtual Memory-Hardware and control structures-Locality of reference, Page fault, Working Set, Dirty page/Dirty bit-Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).	**10**
VI	**I/O Hardware:** I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms. **File Management**: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free Space Management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance. Disk Management: **Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks**	**8**

TEXT/REFERENCE BOOKS:

S.NO	BOOK TITLE/AUTHORS/PUBLICATION
1	Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing
2	Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley
3	Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India

T/R	BOOK TITLE SUGGESTED BY FACULTY
1.	Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
2.	Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.
3.	Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Small Group Instruction.
Making real world connections
Presentations

E- content used:
https://youtu.be/WJ-UaAaumNA

Additional topics:
OS Process Management, OS Memory Management, OS Input Output Systems, OS CPU Scheduling, Deadlock.

COURSE OBJECTIVES:

The main objectives of the course are to introduce concepts of mathematical logic for analyzing propositions and proving theorems. Use sets for solving applied problems, and use the properties of set operations algebraically. Work with relations and investigate their properties.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTCS402-18	**Higher Secondary Education**	**Introduction about different Operating Systems**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1.	Explain basic operating system concepts such as overall architecture, system calls, user mode and kernel mode	**2**
2.	Distinguish concepts related to processes, threads, process scheduling, race conditions and critical sections	**2**
3.	Analyze and apply CPU scheduling algorithms, deadlock detection and prevention algorithms	**2**
4.	Examine and categorize various memory management techniques like caching, paging, segmentation, virtual memory, and thrashing	**2**
5.	Design and implement file management system	**4**
6	Appraise high-level operating systems concepts such as file systems, disk-scheduling algorithms and various file systems	**2**

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	2	2	2	1	2	2	1	1	1	2	0
CO2	2	2	2	1	2	2	2	0	1	1	2	0	2	1
CO3	2	1	2	2	2	2	2	2	2	1	1	0	1	1
CO4	2	1	2	1	2	2	1	2	2	1	2	1	1	1
CO5	2	2	1	2	2	2	2	1	2	1	2	2	1	2
CO6	2	1	1	1	2	2	1	0	0	1	1	2	2	1

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Operating System Lab

SYLLABUS:

Task 1: Installation Process of various operating systems.
Task 2: Implementation of CPU scheduling algorithms to find turnaround time and waiting time. a) FCFS b) SJF c) Round Robin (pre-emptive) d) Priority
Task 3: Virtualization, Installation of Virtual Machine Software and installation of Operating System on Virtual Machine.
Task 4: Commands for files & directories: cd, ls, cp, md, rm, mkdir, rmdir. Creating and viewing files using cat. File comparisons. Disk related commands: checking disk free spaces. Processes in linux, connecting processes with pipes, background processing, managing multiple processes. Background process: changing process priority, scheduling of processes at command, batch commands, kill, ps, who, sleep. Printing commands, grep, fgrep, find, sort, cal, banner, touch, file. File related commands ws, sat, cut, grep.
Task 5: Shell Programming: Basic of shell programming, various types of shell, Shell Programming in bash, conditional & looping statement, case statements, parameter passing and arguments, shell variables, shell keywords, creating shell programs for automate system tasks, report printing.
Task 6: Implementation of Bankers algorithm for the purpose of deadlock avoidance

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T	Operating Systems: Design and Implementation, Albert S. Woodhull and Andrew S. Tanenbaum, Pearson Education

COURSE OBJECTIVES:

To provide an understanding of the design aspects of operating system concepts through simulation. Introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTCS404-18	**Higher Secondary Education**	**Introduction about Operating System**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Understand and implement basic services and functionalities of the operating system	**2**
2	Analyze and simulate CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority	**4**
3	Apply commands for files and directories in Linux	**3**
4	Understand and implement the concepts of shell programming	**2**
5.	Describe file allocation and organization techniques	**1**
6	Understand the concepts of deadlock in operating systems and implement them in multiprogramming system.	**2**

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1	1	2	2	1	2	2	2	2	2	2	1
CO2	2	3	2	2	1	1	1	1		3	2	2	0	1
CO3	2	2	2	2	1	1	1	2	2	2	2	2	1	2
CO4	2	3	1	1	1	2	1	2	1	1	1	1	1	1
CO5	2	1	1	1	1	2	2	3	1	2	1	1	1	1
CO6	2	2	2	2	1	1	1	2	2	2	1	1	1	1

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DESIGN & ANALYSIS OF ALGORITHM

COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	**DEGREE: BTECH**
COURSE: PROFESSIONAL CORE COURSE	**SEMESTER : 4TH CREDITS: 4**
COURSE CODE: BTCS403-18 **REGULATION: 2018**	**COURSE TYPE: CORE**
COURSE AREA/DOMAIN: Design & Analysis of Algorithm	**CONTACT HOURS: 3(L) hours/Week.**
CORRESPONDING LAB COURSE CODE : BTCS405-18	**LAB COURSE NAME: Design & Analysis of Algorithm Lab**

SYLLABUS:

UNIT	DETAILS	HOURS
I	**Module 1: Introduction** Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.	**8**
II	**Module 2: Fundamental Algorithmic Strategies** Brute-Force, Greedy,Dynamic Programming, Branch- and-Bound and Backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving: Bin Packing, Knap Sack, TSP.	**10**
III	**Graph and Tree Algorithms** **[**Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm	**10**
IV	**Tractable and Intractable Problems** Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook's theorem, Standard NP-complete problems and Reduction techniques.	**8**
V	**Advanced Topics** **Approximation algorithms, Randomized algorithms, Heuristics and their characteristics.**	**8**

TEXT/REFERENCE BOOKS:

S.NO	BOOK TITLE/AUTHORS/PUBLICATION
1	Algorithm Design, 1st Edition, Jon Kleinberg and ÉvaTardos, Pearson
2	Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael T Goodrich and Roberto Tamassia, Wiley.
3	Algorithms -- A Creative Approach, 3RD Edition, UdiManber, Addison-Wesley, Reading,

T/R	BOOK TITLE SUGGESTED BY FACULTY
1.	Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.
2.	Data Structures and Algorithms in C++, Weiss, 4th edition, Pearson.
3.	Fundamentals of Computer Algorithms – E. Horowitz, Sartaj Saini, Galgota Publications

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Small Group Instruction.
Making real world connections
Presentations

E- content used:
https://youtu.be/ZnBF2GeAKbo

Additional topics:
Huffman Coding, Efficient Huffman Coding for Sorted Input. Prim's Minimum Spanning Tree Algorithm. Prim's MST for Adjacency List Representation.

COURSE OBJECTIVES:

The main objectives of this course is to write rigorous correctness proofs for algorithms. Demonstrate a familiarity with major algorithms and data structures. Apply important algorithmic design paradigms and methods of analysis. Synthesize efficient algorithms in common engineering design situation.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTCS403-18	**Higher Secondary Education**	**Introduction about C language**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1.	Understand Concept & complexity of algorithms.	2
2.	Study & Analyze various fundamental algorithmic strategies.	2
3.	Apply the graph traversing algorithms and shortest path, minimum spanning tree.	3
4.	Study & identify algorithm that can be used to solve with P, NP, and NP Hard & NP Complete Problems.	3
5.	Solve the real world complex problems.	3
6	Understand the various advance algorithms like Randomized algorithm, Heuristics and characteristics.	2

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1	2	1	1	1	1	2	1	1	1	2	1
CO2	2	2	1	2	1	1	2	0	2	1	2	0	2	2
CO3	2	1	1	1	2	1	1	1	2	2	1	1	2	1
CO4	2	1	2	1	1	1	0	2	2	2	2	1	2	1
CO5	2	2	2	1	1	0	1	1	2	2	2	1	2	0
CO6	2	2	2	1	1	2	1	1	2	1	1	2	2	1

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DESIGN & ANALYSIS OF ALGORITHM LAB

SYLLABUS:

Task 1: Code and analyze solutions to following problem with given strategies: i. Knap Sack using greedy approach ii. Knap Sack using dynamic approach
Task 2: Code and analyze to find an optimal solution to matrix chain multiplication using dynamic programming.
Task 3: Code and analyze to find an optimal solution to TSP using dynamic programming.
Task 4: Implementing an application of DFS such as: i. to find the topological sort of a directed acyclic graph ii. to find a path from source to goal in a maze.
Task 5: Implement an application of BFS such as: i. to find connected components of an undirected graph ii. to check whether a given graph is bipartite.
Task 6: Code and analyze to find shortest paths in a graph with positive edge weights using Dijkstra's algorithm.
Task 7: Code and analyze to find shortest paths in a graph with arbitrary edge weights using Bellman-Ford algorithm.
Task 8: Code and analyze to find shortest paths in a graph with arbitrary edge weights using Flyods' algorithm.
Task 9: Code and analyze to find the minimum spanning tree in a weighted, undirected graph using Prims' algorithm
Task 10: Code and analyze to find the minimum spanning tree in a weighted, undirected graph using Kruskals' algorithm.
Task 11: Coding any real world problem or TSP algorithm using any heuristic technique.

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
1	Data Structures and Algorithms in C++, Weiss, 4th edition, Pearson
2	Data Structures and Algorithms using Python and C++, David M. Reed and John Zelle, 2009 edition (available as e book), Franklin Beedle& Associates.

COURSE OBJECTIVES:

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTCS405-18	Higher Secondary Education	Introduction about C Language

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Understand problems by applying appropriate algorithms.	2
2	Analyze the efficiency of various algorithms.	4
3	Apply techniques of stacks and queues to solve problems.	3
4	Develop a program that can be solved in many ways using different techniques.	3
5	Apply Dynamic programming to solve the different problems.	3
6	Apply Backtracking to solve the different type of problems.	3

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1	2	1	1	1	1	2	2	2	1	1	2
CO2	2	2	2	1	1	2	2	2	2	2	2	1	2	2
CO3	3	1	1	1	1	1	1	2	1	2	2	1	2	2
CO4	3	1	1	1	2	1	0	2	1	2	2	1	2	2
CO5	2	2	1	1	2	0	0	1	2	2	2	0	2	2
CO6	2	2	2	2	2	1	2	1	1	2	2	2	1	2

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COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	**DEGREE: BTECH**
COURSE: HUMANITIES & SOCIAL SCIENCES INCLUDING MANAGEMENT COURSES	**SEMESTER : 4TH CREDITS: 3**
COURSE CODE: HSMC122-18 **REGULATION: 2018**	**COURSE TYPE: Humanities & Social Sciences including Management Courses**
COURSE AREA/DOMAIN: Universal Human Values-2	**CONTACT HOURS: 28(L)+1(P) hours/Week.**
CORRESPONDING LAB COURSE CODE : N/A	**LAB COURSE NAME: N/A**

SYLLABUS:

UNIT	DETAILS	HOURS
I	**Course Introduction - Need, Basic Guidelines, Content and Process for Value Education** • Purpose and motivation for the course, recapitulation from Universal Human Values-I • Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration. • Continuous Happiness and Prosperity- A look at basic Human Aspirations • Right understanding, Relationship and Physical Facility- 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. • Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co- existence) rather than as arbitrariness in choice based on liking-disliking.	**9**
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' - happiness and physical facility • 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 Health; correct appraisal of Physical needs, meaning of Prosperity in detail • Programs to ensure Sanyam and Health. • Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.	**9**
III	**Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship** • Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of relationship. • Understanding the meaning of Trust; Difference between intention and competence • Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship. • Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals. • Visualizing a universal harmonious order in society- Undivided Society,	**9**
IV	**Understanding Harmony in the Nature and Existence - Whole existence as Coexistence** • Understanding the harmony in the Nature • Interconnectedness and mutual fulfillment among the four orders of nature -recyclability	**9**

	and self-regulation in nature • Understanding Existence as Co-existence of mutually interacting units in all- pervasive space • Holistic perception of harmony at all levels of existence. • Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.	
V	**Implications of the above Holistic Understanding of Harmony on Professional Ethics** • Natural acceptance of human values • Definitiveness of Ethical Human Conduct • Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order • Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco -friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. • 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 b. At the level of society: as mutually enriching institutions and organizations. • Sum up. **Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. to discuss the conduct as an engineer or scientist etc.**	**6**

TEXT/REFERENCE BOOKS:

S.NO	BOOK TITLE/AUTHORS/PUBLICATION
1	Jeevan Vidya: EkParichaya, A. Nagaraj, Jeevan VidyaPrakashan, Amarkantak, 1999.
2	Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3	The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
4	Small is Beautiful - E. F Schumacher.

T/R	BOOK TITLE SUGGESTED BY FACULTY
1.	Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010.

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Small Group Instruction.
Making real world connections
Presentations

COURSE OBJECTIVES:

The main course objective and aim of Development of societies is how a person can maintain human values, relationship with others, understand harmony of nature & its existence in life

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
HSMC122-18	**Higher Secondary Education**	**Need of self, Value of relationships in life**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1.	To learn the concept of human values and its vitality in the life.	**2**
2.	To understand the critical ability to distinguish between essence and form.	**2**
3.	To apply the critical ability to differentiate the values and its comprehensiveness in the real life.	**3**
4.	To analyze the human value parameters such as sensitiveness, awareness, leading to commitment and courage to act their own belief.	**4**
5.	To evaluate the focus on the life orientation in a professional manner.	**5**
6	To develop skills and train other human resources in a structured manner.	**6**

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	0	0	0	0	0	3	3	2	2	2	2	2	1	1
CO2	0	0	0	0	0	2	1	2	1	2	2	2	1	2
CO3	0	0	0	0	0	3	2	1	2	2	3	2	2	2
CO4	0	0	0	0	0	2	2	0	2	2	2	1	2	2
CO5	0	0	0	0	0	1	2	1	2	1	1	3	1	2
CO6	0	0	0	0	0	3	3	1	1	1	2	2	2	2

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INDEX

B.TECH 5th Semesters

(Computer Science & Engineering)

IK Gujral Punjab Technical University Bachelor of Technology Scheme for B.Tech Syllabus 2018

Sem 5	Course Code	Subject	L-T-P	Hours	Credits
5th	BTES501-18	Enterprise Resource Planning	3-0-0	3	3
5th	BTCS501-18	Database Management System	3-0-0	3	3
5th	BTCS505-18	Database Management System lab	0-0-4	4	2
5th	BTCS502-18	Formal Languages & Automata Theory	3-0-0	3	3
5th	BTCS503-18	Software Engineering	3-0-0	3	3
5th	BTCS506-18	Software Engineering Lab	0-0-2	2	1
5th	BTCS504-18	Computer Networks	3-0-0	3	3
5th	BTCS507-18	Computer Networks Lab	0-0-2	2	1
5th	BTCS515 -18	Computer Graphics	3-0-0	3	3
5th	BTCS 518-18	Computer Graphics Lab	0-0-2	2	1

Total Credits= 23 Hours: 28

ENTERPRISE RESOURCE PLANNING

COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	**DEGREE: BTECH**
COURSE: ENGINEERING SCIENCE	**SEMESTER : 5TH CREDITS: 3**
COURSE CODE: BTES501-18 **REGULATION: 2018**	**COURSE TYPE: CORE**
COURSE AREA/DOMAIN: ENTERPRISE RESOURCE PLANNING	**CONTACT HOURS: 3(L) hours/Week.**
CORRESPONDING LAB COURSE CODE : N/A	**LAB COURSE NAME: N/A**

SYLLABUS:

UNIT	DETAILS	HOURS
I	ERP: An Overview, Enterprise – An Overview, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering (BPR), Data Warehousing, Data Mining, OLAP, SCM	**9**
II	ERP Implementation Lifecycle, Implementation Methodology, Hidden Costs, Organizing the Implementation, Vendors, Consultants and Users, Contracts with Vendors, Consultants and Employees, Project Management and Monitoring	**9**
III	Business modules in an ERP Package, Finance, Manufacturing, Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution	**9**
IV	ERP Market Place, SAP AG, Peoplesoft, Baan, JD Edwards, Oracle, QAD, SSA	**9**
V	Turbo Charge the ERP System, EIA, ERP and e-Commerce, ERP and Internet, Future Directions	**6**

TEXT/REFERENCE BOOKS:

S.NO	BOOK TITLE/AUTHORS/PUBLICATION
1	Joseph A Brady, Ellen F Monk, Bret Wagner, "Concepts in Enterprise Resource Planning", Thompson Course Technology, USA, 2001.
2	Vinod Kumar Garg and Venkitakrishnan N K, "Enterprise Resource Planning – Concepts and Practice", PHI, New Delhi, 2003

T/R	BOOK TITLE SUGGESTED BY FACULTY
1	Alexis Leon, "ERP Demystified", Tata McGraw Hill, New Delhi, 2000

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Small Group Instruction.
Making real world connections
Presentations

COURSE OBJECTIVES:

The aim and objective of the course Enterprise RP Business Transformation Strategy is to modernize and integrate business processes and systems.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTES501-18	**Higher Secondary Education**	**Accounting, Project Managment**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Make basic use of enterprise software and its role in integrating business functions and also create reengineered business processes for successful ERP implementation.	3
2	Analyze the strategic options for ERP identification and adoption and classify different processes of the organization.	4
3	Design the ERP implementation strategies and to be able to map business processes using process mapping techniques	6
4	To understand management concern for ERP Success and its useful guidelines for proper implementations.	2
5	To demonstrate knowledge of SAP and Oracle Apps.	6
6	To develop new apps for better ERP Ecosystem.	6

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	1	1	2	2	1	2	1	0	2	2
CO2	2	2	1	2	1	1	1	1	2	2	1	2	2	2
CO3	2	1	1	1	2	2	1	0	2	2	1	0	2	2
CO4	2	1	2	1	2	1	1	0	2	2	0	0	2	2
CO5	1	1	2	1	1	1	2	2	2	2	2	1	2	2
CO6	1	1	2	2	1	2	0	2	2	2	1	1	2	2

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DATABASE MANAGEMENT SYSTEM

COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	**DEGREE: BTECH**
COURSE: PROFESSIONAL CORE COURSE	**SEMESTER : 5TH CREDITS: 3**
COURSE CODE: BTCS501-18 **REGULATION: 2018**	**COURSE TYPE: CORE**
COURSE AREA/DOMAIN: Database Management System	**CONTACT HOURS: 3(L)+2(P) hours/Week.**
CORRESPONDING LAB COURSE CODE :BTCS505-18	**LAB COURSE NAME: Database Management System Lab**

SYLLABUS:

UNIT	DETAILS	HOURS
I	Database system architecture Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML). Data models: Entity-relationship model, network model, relational and object oriented Data models, integrity constraints, data manipulation operations	**7**
II	Relational query languages Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server. Relational database design: Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design. Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.	**10**
III	Storage strategies, Indices, B-trees, hashing	**3**
IV	Transaction processing Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.	**6**
V	Database Security Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection.	**8**
VI	Advanced Topics Object oriented and object relational databases, Logical databases, Web databases, Distributed databases.	**8**

TEXT/REFERENCE BOOKS:

S.NO	BOOK TITLE/AUTHORS/PUBLICATION
1	Joseph A Brady, Ellen F Monk, Bret Wagner, "Concepts in Enterprise Resource Planning", Thompson Course Technology, USA, 2001.
2	Vinod Kumar Garg and Venkitakrishnan N K, "Enterprise Resource Planning – Concepts and Practice", PHI, New Delhi, 2003

S. No	BOOK TITLE SUGGESTED BY FACULTY
1	Alexis Leon, "ERP Demystified", Tata McGraw Hill, New Delhi, 2000

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Small Group Instruction.
Making real world connections
Presentations

E- content used:
https://www.techtarget.com/searchdatamanagement/definition/database-management-system

Additional topics:
Oracle

COURSE OBJECTIVES:

The aim and objective of a database management system is to facilitate the creation of data structures and relieve the programmer of the problems of setting up complicated files. Data base management systems have developed from a concept of the data base as something distinct from the programs accessing it.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTCS501-18	**Higher Secandary Education**	**Spreadsheet, Ms-Excel, Sql Server**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Write relational algebra expressions for a query and optimize the Developed expressions	**5**
2	Design the databases using ER method and normalization	**5**
3	Construct the SQL queries for Open source and Commercial DBMS-MYSQL, ORACLE, and DB2	**5**
4	Understand the transaction atomicity, consistency, isolation, and durability	**2**
5.	Explain the isolation property, including locking, time stamping based on concurrency control	**2**
6	Explain Serializability of scheduling.	**2**

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	1	2	2	0	0	2	2	3	0	1	2	2
CO2	3	3	1	3	2	2	0	2	1	3	1	1	2	2
CO3	2	1	2	1	2	2	0	1	2	3	1	0	2	2
CO4	2	2	2	1	1	2	0	1	2	3	1	1	2	2
CO5	2	1	0	1	2	2	0	1	2	3	1	2	2	2
CO6	2	2	2	2	1	1	0	0	2	2	2	1	2	2

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Data Base Management System Lab

SYLLABUS:

Task 1: Introduction to SQL and installation of SQL Server / Oracle.
Task 2: Data Types, Creating Tables, Retrieval of Rows using Select Statement, Conditional Retrieval of Rows, Alter and Drop Statements.
Task 3: Working with Null Values, Matching a Pattern from a Table, Ordering the Result of a Query, Aggregate Functions, Grouping the Result of a Query, Update and Delete Statements.
Task 4: Set Operators, Nested Queries, Joins, Sequences.
Task 5: Views, Indexes, Database Security and Privileges: Grant and Revoke Commands, Commit and Rollback Commands.
Task 6: PL/SQL Architecture, Assignments and Expressions, Writing PL/SQL Code, Referencing Non-SQL parameters.
Task 7: Stored Procedures and Exception Handling.
Task 8: Triggers and Cursor Management in PL/

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T	Joseph A Brady, Ellen F Monk, Bret Wagner, "Concepts in Enterprise Resource Planning", Thompson Course Technology, USA, 2001.
T	Vinod Kumar Garg and Venkitakrishnan N K, "Enterprise Resource Planning – Concepts and Practice", PHI, New Delhi, 2003

COURSE OBJECTIVES:

The objective of this lab course is to understand the practical applicability of database management system concepts. Working on existing database systems, designing of database, creating relational database, analysis of table design.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTCS505-18	**Higher Secondary Education**	Introduction about SQL

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Apply the basic concepts of Database Systems and Applications.	**3**
2	Use the basics of SQL and construct queries using SQL in database creation and interaction	**3**
3	Understand various advanced queries execution such as relational constraints, joins, set operations, aggregate functions, trigger, views and embedded SQL.	**2**
4	Design a commercial relational database system (Oracle, MySQL) by writing SQL using the system.	**5**
5	Analyze and Select storage and recovery techniques of database system.	**4**
6	Design and execute the various data manipulation queries	**5**

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	1	2	2	1	2	2	0	1	2	1
CO2	1	2	1	1	1	1	1	2	1	1	0	1	1	2
CO3	2	1	2	1	2	1	2	1	2	1	0	1	1	1
CO4	3	2	1	2	1	2	1	1	1	2	0	2	2	2
CO5	2	2	1	2	2	1	2	0	1	0	0	0	1	2
CO6	2	3	1	1	1	2	2	1	1	0	0	1	2	2

FORMAL LANGUAGE & AUTOMATA THEORY

COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	**DEGREE: BTECH**
COURSE: CSE	**SEMESTER : 5TH CREDITS: 3**
COURSE CODE: BTCS502-18 **REGULATION: 2018**	**COURSE TYPE: CORE**
COURSE AREA/DOMAIN: FORMAL LANGUAGE & AUTOMATA THEORY	**CONTACT HOURS: 3(L) hours/Week.**
CORRESPONDING LAB COURSE CODE :	**LAB COURSE NAME: N/A**

SYLLABUS:

UNIT	DETAILS	HOURS
I	Introduction Alphabet, languages and grammars, productions and derivation, Chomsky hierarchy of languages.	**3**
II	Regular languages and finite automata: Regular expressions and languages, deterministic finite automata (DFA) and equivalence with regular expressions, nondeterministic finite automata (NFA) and equivalence with DFA, regular grammars and equivalence with finite automata, properties of regular languages, pumping lemma for regular languages, minimization of finite automata	**8**
III	Context-free languages and pushdown automata Context-free grammars (CFG) and languages (CFL), Chomsky and Greibach normal forms, nondeterministic pushdown automata (PDA) and equivalence with CFG, parse trees, ambiguity in CFG, pumping lemma for context-free languages, deterministic pushdown automata, closure properties of CFLs.	**8**
IV	Context-sensitive languages Context-sensitive grammars (CSG) and languages, linear bounded automata and equivalence with CSG.	**5**
V	Turing machines The basic model for Turing machines (TM), Turing recognizable (recursively enumerable) and Turing-decidable (recursive) languages and their closure properties, variants of Turing machines, nondeterministic TMs and equivalence with deterministic TMs, unrestricted grammars and equivalence with Turing machines, TMs as enumerators.	**8**
VI	**Undecidability & Intractability**: Church-Turing thesis, universal Turing machine, the universal and diagonalization languages, reduction between languages and Rice s theorem, undecidable problems about languages. Intractablity: Notion of tractability/feasibility. The classes NP and co-NP, their importance. Polynomial time many-one reduction. Completeness under this reduction. Cook-Levin theorem: NP-completeness of propositional satisfiability, other variants of satisfiability. NP-complete problems from other domains: graphs (clique, vertex cover, independent sets, Hamiltonian cycle), number problem (partition), set cover	**12**

TEXT/REFERENCE BOOKS:

S.NO	BOOK TITLE/AUTHORS/PUBLICATION
1.	Harry R. Lewis and Christos H. Papadimitriou, Elements of the Theory of Computation, Pearson Education Asia.
2.	Dexter C. Kozen, Automata and Computability, Undergraduate Texts in Computer Science, Springer
3.	Michael Sipser, Introduction to the Theory of Computation, PWS Publishing
4.	John Martin, Introduction to Languages and The Theory of Computation, Tata McGraw Hill.

T/R	BOOK TITLE SUGGESTED BY FACULTY
1	John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, Pearson Education Asia.

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Small Group Instruction.
Making real world connections
Presentations

E-Content Used :
https://youtu.be/V19S3Mqfrzo

Additional topics:

Machine Level Language, High Level Language.

COURSE OBJECTIVES:

The objective of this course is to explore the theoretical foundations of computer science from the perspective of formal languages and classify machines by their power to recognize languages.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTCS502-18	**Higher Secondary Education**	**String Symbols, Machine Level Language, High Level Language**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Create a formal notation for strings, languages and machines.	6
2	Design finite automata to accept a set of strings of a language.	6
3	Construct context free grammars to generate strings of context free language.	3
4	Determine equivalence of languages accepted by Push Down Automata and languages generated by context free grammars	5
5	Distinguish between computability and non-computability and Decidability and undecidability	4
6	Apply Automata Theory concepts in engineering applications like designing of compilers.	3

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	2	1	2	1	1	2	1	0	1	1	2
CO2	1	2	2	1	1	2	2	1	2	1	0	1	2	2
CO3	2	2	1	2	1	2	2	1	1	1	0	1	2	1
CO4	3	2	1	1	1	1	2	1	1	1	0	1	2	1
CO5	2	2	1	1	2	1	1	1	1	1	0	0	1	2
CO6	2	2	2	2	2	1	2	1	1	1	0	2	1	2

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SOFTWARE ENGINEERING

COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	**DEGREE: BTECH**
COURSE: CSE	**SEMESTER : 5TH CREDITS: 3**
COURSE CODE: BTCS503-18 **REGULATION: 2018**	**COURSE TYPE: CORE**
COURSE AREA/DOMAIN: SOFTWARE ENGINEERING	**CONTACT HOURS: 3(L) +1(P) hours/Week.**
CORRESPONDING LAB COURSE CODE : BTCS506-18	**LAB COURSE NAME: SOFTWARE ENGINEERING LAB**

SYLLABUS:

UNIT	DETAILS	HOURS
I	Evolution and impact of Software engineering, software life cycle models: Waterfall, prototyping, Evolutionary, and Spiral models. Feasibility study, Functional and Non-functional requirements, Requirements gathering, Requirements analysis and specification.	**3**
II	Basic issues in software design, modularity, cohesion, coupling and layering, function-oriented software design: DFD and Structure chart, object modeling using UML, Object-oriented software development, user interface design. Coding standards and Code review techniques.	**8**
III	Fundamentals of testing, White-box, and black-box testing, Test coverage analysis and test case design techniques, mutation testing, Static and dynamic analysis, Software reliability metrics, reliability growth modeling Software project management, Project planning and control, cost estimation, project scheduling using PERT and GANTT charts, cost-time relations: Rayleigh- Norden results, quality management	**8**
IV	ISO and SEI CMMI, PSP and Six Sigma. Computer aided software engineering, software maintenance, software reuse, Component-based software development.	**5**

TEXT/REFERENCE BOOKS:

S.NO	BOOK TITLE/AUTHORS/PUBLICATION
1.	Sommerville, "Software Engineering, 7th edition", Adison Wesley, 1996.
2.	Watts Humphrey, "Managing software process", Pearson education, 2003
3.	James F. Peters and Witold Pedrycz, " Software Engineering – An Engineering Approach", Wiley
4.	Mouratidis and Giorgini. "Integrating Security and Software Engineering–Advances and Future", IGP. ISBN – 1-59904-148-0.
5.	Pankaj Jalote, "An integrated approach to Software Engineering", Springer/Narosa
6.	Fundamentals of Software Engineering by Rajib Mall, – PHI-3rd Edition, 2009.

T/R	BOOK TITLE SUGGESTED BY FACULTY
1	1. Roger Pressman, "Software Engineering: A Practitioners Approach,(6th Edition), McGraw Hill, 1997

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Small Group Instruction.
Making real world connections
Presentations

E- content used:
https://techohealth.com/future-of-software-engineering/

Additional topics:

1. User Interface Design
2. Coupling and Cohesion.
3. Information System Life Cycle.
4. Database application system life cycle.

COURSE OBJECTIVES:

The aim and objective of software engineering is to develop methods and procedures for software development that can scale up for large systems and that can be used consistently to produce high-quality software at low cost and with a small cycle of time.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTCS503-18	**Higher Secondary Education**	**Study of Project Planning, Software Development**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Students should be able to identify the need for engineering approach to software development and various processes of requirements analysis for software engineering problems.	1
2	Analyse various software engineering models and apply methods for design and development of software projects.	4
3	Examine various techniques, metrics and strategies for Testing software projects.	3
4	Apply the principles, processes and main knowledge areas for Software Project Management.	3
5	Proficiently apply standards, CASE tools and techniques for engineering software projects.	3
6	Facilititate project schedule, estimate project cost and effort required.	6

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	2	2	1	2	2	2	1	2	1	2	2
CO2	3	3	2	2	2	2	2	2	2	1	2	1	2	2
CO3	2	2	1	2	2	2	2	2	2	2	2	2	2	2
CO4	3	1	1	2	0	2	2	1	2	2	1	1	2	1
CO5	3	2	2	2	3	2	2	1	2	2	1	2	2	2
CO6	2	1	2	0	2	2	1	2	2	1	2	1	2	1

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SOFTWARE ENGINEERING LAB

SYLLABUS:

Task 1: Study and usage of OpenProj or similar software to draft a project plan
Task 2: Study and usage of OpenProj or similar software to track the progress of a project
Task 3: Preparation of Software Requirement Specification Document, Design Documents and Testing Phase
Task 4: related documents for some problems
Task 5: Preparation of Software Configuration Management and Risk Management related documents
Task 6: Study and usage of any Design phase CASE tool
Task 7: To perform unit testing and integration testing
Task 8: To perform various white box and black box testing techniques
Task 9: Testing of a web site

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T	Joseph A Brady, Ellen F Monk, Bret Wagner, "Concepts in Enterprise Resource Planning", Thompson Course Technology, USA, 2001.
T	Vinod Kumar Garg and Venkitakrishnan N K, "Enterprise Resource Planning – Concepts and Practice", PHI, New Delhi, 2003

COURSE OBJECTIVES:

Students will be capable to acquire the generic software development skill through various stages of software life cycle. He will also be able to ensure the quality of software through software development with various protocol based environment.

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Analyze Plan a software engineering process life cycle.	4
2	Able to analyze and specify software requirements.	4
3	Apply specification into a design.	3
4	Built an SRS documents :Realize design practically, using an appropriate software engineering.	6
5	Develop prototype model for a given case study using modern engineering tools.	6
6	To gain knowledge about open source tools used for implementing software engineering methods.	1

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2	2	2	2	2	2	1	1	2	1
CO2	2	2	2	2	2	2	2	2	2	2	0	2	2	1
CO3	2	3	2	1	1	2	2	1	2	2	0	2	1	2
CO4	3	2	2	2	2	2	1	2	2	2	2	2	2	1
CO5	3	1	2	1	2	1	2	2	2	2	2	1	1	2
CO6	2	2	2	2	2	2	2	2	2	2	2	1	2	2

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COMPUTER NETWORKS

COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	**DEGREE: BTECH**
COURSE: CSE	**SEMESTER : 5TH CREDITS: 3**
COURSE CODE: BTCS504-18 **REGULATION: 2018**	**COURSE TYPE: CORE**
COURSE AREA/DOMAIN: Computer Networks	**CONTACT HOURS: 3(L)+1(P) hours/Week.**
CORRESPONDING LAB COURSE CODE :BTCS507-18	**LAB COURSE NAME: Computer Networks Lab**

SYLLABUS:

UNIT	DETAILS	HOURS
I	Data Communication Components Representation of data and its flow Networks, Various Connection Topology, Protocols and Standards, OSI model, Transmission Media, LAN: Wired LAN, Wireless LANs, Connecting LAN and Virtual LAN, Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.	**8**
II	Data Link Layer and Medium Access Sub Layer Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA, CSMA/CDCDMA/CA.	**10**
III	Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.	**8**
IV	Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm	**8**
V	Application Layer Domain Name Space (DNS), DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls, Basic concepts of Cryptography	**8**

TEXT/REFERENCE BOOKS:

S.NO	BOOK TITLE/AUTHORS/PUBLICATION
1	Computer Networks, 8th Edition, Andrew S. Tanenbaum, Pearson New International Edition.
2	Internetworking with TCP/IP, Volume 1, 6th Edition Douglas Comer, Prentice Hall of India.
3	TCP/IP Illustrated, Volume 1, W. Richard Stevens, Addison-Wesley, United States of America

S.No	BOOK TITLE SUGGESTED BY FACULTY
1	Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGraw- Hill.
2.	Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice Hall India.

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Small Group Instruction.
Making real world connections
Presentations

E-Content used:
https://www.javatpoint.com/networking-interview-questions

Additional topics:

Smart Message Sharing in Vehicular ad hoc network simulator System.

COURSE OBJECTIVES:

The aim and objectives of computer Networks is Sharing devices such as printers saves money.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTCS504-18	**Higher Secondary Education**	**Characteristics of Computer Networks, Operating System, Parts of Computer(CPU)**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Outline the basic concept of networking, types, networking topologies and layered architecture	2
2	Explain data link layer and MAC sub-layer.	5
3	Demonstrate the network Layer functioning.	2
4	Identify the different types of network devices and their functions within a network.	3
5	Explain the transport layer and application layer operation.	5
6	Design and maintenance of individual networks	6

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	2	2	1	2	2	0	1	1	1	2	2	1
CO2	2	2	1	2	2	1	1	0	1	1	2	2	1	1
CO3	2	1	1	1	2	2	2	0	2	1	0	2	2	2
CO4	2	1	2	1	1	1	1	0	0	2	1	1	1	1
CO5	2	2	1	1	1	1	2	0	1	1	1	1	2	2
CO6	2	1	1	1	1	1	1	0	1	0	1	1	1	1

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Computer Networks Lab

SYLLABUS:

Task 1: To study the different types of Network cables and network topologies.
Task 2: Practically implement and test the cross-wired cable and straight through cable using clamping tool and network lab cable tester.
Task 3: Study and familiarization with various network devices.
Task 4: Familiarization with Packet Tracer Simulation tool/any other related tool
Task 5: Study and Implementation of IP Addressing Schemes
Task 6: Creation of Simple Networking topologies using hubs and switches
Task 7: Simulation of web traffic in Packet Tracer
Task 8: Study and implementation of various router configuration commands
Task 9: Creation of Networks using routers.
Task 10: Configuring networks using the concept of subnetting
Task 11: Practical implementation of basic network command and Network configuration commands like ping, ipconfig, netstat, tracert etc. for troubleshooting network related problems.
Task 12: Configuration of networks using static and default routes.

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T	Joseph A Brady, Ellen F Monk, Bret Wagner, "Concepts in Enterprise Resource Planning", Thompson Course Technology, USA, 2001.
T	Vinod Kumar Garg and Venkitakrishnan N K, "Enterprise Resource Planning – Concepts and Practice", PHI, New Delhi, 2003

COURSE OBJECTIVES:

The aim and objective of this lab course is to get practical knowledge of working principles of various communication protocols. Analyse structure and formats of TCP/IP layer protocols using network tools such as Wireshark and network simulators.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTCS507-18	**Higher Secondary Education**	**Parts of Computer, Operating System , Working of Computer**

COURSE OUTCOMES:

S No.	Description	Bloom's Level (B.L)
1	Understand the different types of Network cables and network topologies.	2
2	Implement and test the cross-wired cable and straight through cable using clamping tool and network lab cable tester.	3
3	Implementation of IP Addressing Schemes.	3
4	Implementation of various router configuration commands	3
5	Configuring networks using the concept of subnetting	4
6	Creation of Simple Networking topologies using hubs and switches	6

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	1	2	1	0	1	1	2	2	2	1
CO2	3	1	1	1	2	1	1	0	1	1	1	1	1	1
CO3	1	2	1	2	1	1	1	0	1	1	0	2	2	2
CO4	2	1	1	1	2	1	2	0	1	1	1	2	1	1
CO5	2	1	2	1	1	2	2	0	1	1	1	1	1	1
CO6	2	1	1	1	1	1	2	0	1	1	1	1	2	2

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COMPUTER GRAPHICS

COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	**DEGREE: BTECH**
COURSE: PROFESSIONAL ELECTIVE	**SEMESTER : 5TH CREDITS: 3**
COURSE CODE: BTCS515-18 **REGULATION: 2018**	**COURSE TYPE: CORE**
COURSE AREA/DOMAIN: Computer Graphics	**CONTACT HOURS: 3(L)+1(P) hours/Week.**
CORRESPONDING LAB COURSE CODE :BTCS518-18	**LAB COURSE NAME: Computer Graphics Lab**

SYLLABUS:

UNIT	DETAILS	HOURS
I	Overview of Computer Graphics: Basics of Computer Graphics, Applications, Video Display devices, Raster–Scan displays, Random–Scan displays, Color CRT Monitors, Flat–Panel Displays; Video Controller, Display Processor, Common Graphic Input and Output devices, Graphic File Formats, Graphics Software's.	**8**
II	Output Primitives: Line Drawing, DDA, Bresenham Line Algorithm; Mid-Point Line Algorithm, Bresenham Circle Algorithm, Midpoint Circle drawing algorithms; Midpoint Ellipse Algorithm; Flood and Boundary Filling.	**10**
III	Two-Dimensional Geometric Transformation: Translation, Rotation, Scaling, Reflection, Shearing, Matrix representations; Composite transformations.	**8**
IV	Two-Dimensional Viewing: Viewing coordinate reference frame; Window to Viewport coordinate transformation. Point Clipping, Line Clipping, text Clipping; Cohen–Sutherland and Liang–Barskey Algorithms for line clipping; Sutherland–Hodgeman algorithm for polygon clipping.	**8**
V	Three Dimensional Transformations & Viewing: Translation, Rotation, Scaling, Reflection and composite transformations. Parallel and Perspective Projections, Viewing Transformation: View Plan, View Volumes and Clipping	**8**
VI	3 D Graphics and Visibility: Plane projections and its types, Vanishing points, Specification of a 3D view. Image and object precision, Hidden edge/surface removal or visible edge/surface determination techniques; z buffer algorithms, Depth sort algorithm, Scan line algorithm and Floating horizon technique	**6**
VII	Color Models: Properties of Light, Intuitive Color Concepts, concepts of chromaticity, RGB Color Model, CMY Color Model, HLS and HSV Color Models, Conversion between RGB and CMY color Models, Conversion between HSV and RGB color models, Color Selection and Applications.	**6**
VIII	Animation: Graphics Design of Animation sequences, General Computer Animation Functions Introduction to Rendering, Ray tracing, Antialiasing, Fractals, Gourard and Phong shading	**3**

TEXT/REFERENCE BOOKS:

S.NO	BOOK TITLE/AUTHORS/PUBLICATION
1	1. D. Hearn and M.P. Baker, Computer Graphics: C version, 2nd Edition, PHI, 2004.
2	D.F. Rogers, Mathematical Elements for Graphics, 2nd Edition., McGraw Hill, 2004
3	J.D. Foley et al, Computer Graphics, Principles and Practices, 2nd Edition, Addison Wasley, 2004.

S.No	BOOK TITLE SUGGESTED BY FACULTY
1	Roy A. Plastock, Gordon Kalley, Computer Graphics, Schaum's Outline Series, 1986.

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:

Chalk & Talk
Small Group Instruction.
Making real world connections
Presentations

E- content used:
https://www.javatpoint.com/computer-graphics-tutorial

Additional topics:

Some topics in computer graphics include user interface design, sprite graphics, rendering, ray tracing, geometry processing, computer animation, vector graphics, 3D modeling, shaders, GPU design, implicit surfaces, visualization, scientific computing, image processing, computational photography.

COURSE OBJECTIVES:

The course introduces the basic concepts of computer graphics. It provides the necessary theoretical background and demonstrates the application of computer science to graphics. The course further allows students to develop programming skills in computer graphics through programming assignments.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTCS515-18	**Higher Secondary Education**	**C Language**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Summarize various graphics devices along with output primitives	2
2	Analyze and implement algorithms for line drawing, circle drawing and polygon filling	4
3	Apply geometrical transformation on 2D and 3D objects and viewing	3
4	Analyze and implement algorithms for clipping	4
5	Apply various projection techniques on 3D objects	5
6	Summarize algorithms to detect hidden surfaces and rendering	2

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**	**2**	**2**	**1**	**1**	**1**	**2**	**1**	**2**	**2**	**0**	**1**	**1**	**2**
CO2	**2**	**2**	**1**	**2**	**1**	**2**	**2**	**0**	**1**	**2**	**0**	**1**	**2**	**2**
CO3	**3**	**1**	**1**	**2**	**0**	**2**	**1**	**2**	**2**	**2**	**0**	**2**	**0**	**1**
CO4	**2**	**2**	**1**	**2**	**2**	**0**	**1**	**1**	**0**	**1**	**0**	**0**	**0**	**1**
CO5	**3**	**1**	**0**	**1**	**1**	**2**	**1**	**1**	**1**	**1**	**0**	**2**	**2**	**2**
CO6	**3**	**2**	**1**	**2**	**1**	**2**	**1**	**1**	**2**	**1**	**0**	**2**	**2**	**2**

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Computer Graphics Lab

SYLLABUS:

Task 1: WAP to draw different geometric structures using different functions.
Task 2: Implement DDA line generating algorithm.
Task 3: Implement Bresenham's line generating algorithm.
Task 4: Implement Mid-point circle line generating algorithm.
Task 5: Implementation of Bresenham's circle drawing algorithm.
Task 6: Implementation of mid-point circle generating Algorithm.
Task 7: Implementation of ellipse generating Algorithm.
Task 8: WAP of color filling the polygon using Boundary fill and Flood fill algorithm.
Task 9: To translate an object with translation parameters in X and Y directions.
Task 10: To scale an object with scaling factors along X and Y directions.
Task 11: Program of line clipping using Cohen-Sutherland algorithm.
Task 12: To perform composite transformations of an object.
Task 13: To perform the reflection of an object about major

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T	J.D. Foley et al, Computer Graphics, Principles and Practices, 2nd Edition, Addison Wasley, 2004

COURSE OBJECTIVES:

Typically, the term computer graphics lab refers to several different things: The representation and manipulation of image data by a computer. The various technologies used to create and manipulate images.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTCS518-18	**Higher Secondary Education**	**C Language**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Apply the knowledge about the algorithms to draw 2D and 3D objects	1
2	Acquire the knowledge about transformations and projections for 2D and 3D objects	2
3	Reframe graphical object using clipping algorithms and viewing technique	5
4	Simulating image editing tool for image manipulation and enhancement	6
5	Evaluate the authoring tool to develop a 3D scene and to perform 2D animation	5
6	Create interactive graphics applications using modern engineering tools.	6

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**2**	**1**	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**2**	**1**
CO2	**2**	**2**	**1**	**2**	**2**	**2**	**2**	**1**	**0**	**2**	**2**	**1**	**1**	**2**
CO3	**2**	**2**	**1**	**2**	**2**	**2**	**1**	**2**	**1**	**1**	**0**	**1**	**2**	**2**
CO4	**1**	**2**	**2**	**1**	**2**	**1**	**1**	**0**	**2**	**1**	**1**	**1**	**1**	**1**
CO5	**3**	**1**	**2**	**1**	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**2**
CO6	**2**	**2**	**2**	**1**	**1**	**1**	**0**	**1**	**1**	**0**	**1**	**1**	**2**	**2**

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INDEX

B.TECH 6 Semesters

(Computer Science & Engineering)

IK Gujral Punjab Technical University Bachelor of Technology Scheme for B.Tech Syllabus 2018

Sem 6	Course Code	Subject	L-T-P	Hours	Credits
6th	BTCS601-18	Compiler Design	3-0-0	3	3
6th	BTCS604-18	Compiler Design Lab	0-0-2	2	1
6th	BTCS602-18	Artificial Intelligence	3-0-0	3	3
6th	BTCS605-18	Artificial Intelligence Lab	0-0-2	2	1
6th	BTCS512-18	Cloud Computing	3-0-0	3	3
6th	BTCS513-18	Cloud Computing Lab	0-0-2	2	1
6th	BTCS620-18	Mobile Application Development	3-0-0	3	3
6th	BTCS621-18	Mobile Application Development Lab	0-0-2	2	1
6th	BTEC 401-18	Analog Circuits	3-0-0	3	3
6th	BTCS603-18	Project-1	0-0-6	6	3

Total Credits=22 Hours: 29

COMPILER DESIGN

COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	**DEGREE: BTECH**
COURSE TYPE	**SEMESTER : 6TH CREDITS: 3**
COURSECODE:BTCS601-18 **REGULATION: 2018**	**COURSE TYPE: CORE**
COURSE AREA/DOMAIN: Compiler Design	**CONTACT HOURS: 3(L) ;2(P) hours/Week.**
CORRESPONDING LAB COURSE CODE :BTCS604-18	**LAB COURSE NAME: Compiler Design Lab**

SYLLABUS:

UNIT	DETAILS	HOURS
I	Introduction to Compilers: Structure of a compiler – Lexical Analysis – Role of Lexical Analyzer – Input Buffering – Specification of Tokens – Recognition of Tokens – Lex – Finite Automata – Regular Expressions to Automata – Minimizing DFA.	**8**
II	Syntax Analysis: Role of Parser – Grammars – Error Handling – Context-free grammars – Writing a grammar, Top-Down Parsing – General Strategies Recursive Descent Parser – Predictive Parser-LL(1) Parser-Shift Reduce Parser-LR Parser-LR (0) Item Construction of SLR Parsing Table -Introduction to LALR Parser – Error Handling and Recovery in Syntax Analyzer-YACC.	**8**
III	Intermediate Code Generation: Syntax Directed Definitions, Evaluation Orders for Syntax Directed Definitions, Intermediate Languages: Syntax Tree, Three Address Code, Types and Declarations, Translation of Expressions, Type Checking.	**8**
IV	Run-Time Environment and Code Generation: Storage Organization, Stack Allocation Space, Access to Non-local Data on the Stack, Heap Management – Issues in Code Generation – Design of a simple Code Generator.	**6**
V	Code Optimization: Principal Sources of Optimization – Peep-hole optimization – DAG-Optimization of Basic Blocks-Global Data Flow Analysis – Efficient Data Flow Algorithm.	**6**

TEXT/REFERENCE BOOKS:

S.NO	BOOK TITLE/AUTHORS/PUBLICATION
1	A.V. Aho, Monica, R.Sethi, J.D.Ullman, "Compilers, Principles, Techniques and Tools", Second Edition, Pearson Education/Addison Wesley, 2009.
2	Andrew W. Appel, "Modern Compiler Implementation in Java", Second Edition, 2009.

T/R	BOOK TITLE SUGGESTED BY FACULTY
1	J.P. Tremblay and P.G. Sorrenson, "The Theory and Practice of Compiler Writing", McGraw Hill, 1985.

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:

Chalk & Talk
Small Group Instruction.
Making real world connections
Presentations

E-Content :
https://youtu.be/XUsw5igq4DM

Additional topics:

Compiler design covers basic translation mechanism and error detection & recovery. It includes lexical, syntax and semantic analysis as front end, and code generation and optimization as back-end

COURSE OBJECTIVES:

The aim and Objectives of this course is to explore the principles, algorithms, and data structures involved in the design and construction of compilers. Topics include context-free grammars, lexical analysis, parsing techniques, symbol tables, error recovery, code generation, and code optimization

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTCS601-18	Higher Secondary Education	Introduction about Memory Storage

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Build concepts on lexical analysis	6
2	Understand strategies of syntax analysis	2
3	Learn techniques of Intermediate code generation	1
4	Evaluate code design issues and design code generator	5
5	Design and develop optimized codes	6
6	Design a Lexical analyzer	6

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	0	2	0	1	2	1	1	2	2	1
CO2	2	3	2	2	2	2	0	1	2	1	1	1	2	2
CO3	3	2	2	2	2	2	0	2	2	1	1	2	1	2
CO4	2	2	2	2	2	2	0	2	2	1	1	1	2	2
CO5	2	0	2	2	2	2	0	2	2	1	1	1	1	1
CO6	2	3	2	2	1	2	0	0	1	1	1	2	2	2

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Compiler Design Lab

SYLLABUS:

Task 1: Design a lexical analyser for given language and the lexical analyser should ignore redundant spaces, tabs and new lines. It should also ignore comments. Although the syntax specification states that identifiers can be arbitrarily long, you may restrict the length to some reasonable value. Simulate the same in C language.
Task 2: Write a C program to identify whether a given line is a comment or not.
Task 3: Write a C program to recognize strings under 'a', 'a*b+', 'abb'.
Task 4: Write a C program to test whether a given identifier is valid or not.
Task 5: Write a C program to simulate lexical analyzer for validating operators.
Task 6: Implement the lexical analyzer using JLex, flex or other lexical analyzer generating tools.
Task 7: Write a C program for implementing the functionalities of predictive parser for the mini language specified in Note 1.
Task 8: a) Write a C program for constructing of LL (1) parsing. b) Write a C program for constructing recursive descent parsing.
Task 9: Write a C program to implement LALR parsing.
Task 10:a) Write a C program to implement operator precedence parsing. b) Write a C program to implement Program semantic rules to calculate the expression that takes an expression with digits, + and * and computes the value.
Task 11: Convert the BNF rules into YACC form and write code to generate abstract syntax tree for the mini language specified in Note 1.
Task 12: Write a C program to generate machine code from abstract syntax tree generated by the parser. The instruction set specified in Note 2 may be considered as the target code.

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T	Andrew W. Appel, “Modern Compiler Implementation in Java”, Second Edition, 2009

COURSE OBJECTIVES:

To implement front end of the compiler by means of generating Intermediate codes. To implement code optimization techniques.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTCS604-18	**Higher Secondary Education**	**Introduction about C Language**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Implement the techniques of Lexical Analysis and Syntax Analysis	6
2	Apply the knowledge of Lex & Yacc tools to develop programs	1
3	Construct the intermediate representation	6
4	Implement Optimization Techniques and generate machine level code	3
5	Apply different compiler writing tools to implement the different Phases	5
6	Design the back end of a compiler for any assembler	6

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	**3**	**1**	**2**	**2**	**0**	**1**	**2**	**2**	**2**	**2**	**2**	**2**	**1**	**2**
CO2	**3**	**1**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**1**	**1**	**2**
CO3	**3**	**2**	**2**	**1**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**1**
CO4	**2**	**2**	**2**	**2**	**2**	**1**	**2**	**2**	**2**	**2**	**1**	**1**	**2**	**2**
CO5	**3**	**1**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**1**	**2**	**1**	**1**
CO6	**3**	**0**	**2**	**1**	**2**	**2**	**2**	**2**	**2**	**2**	**1**	**2**	**2**	**2**

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Artificial Intelligence

COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	**DEGREE: BTECH**
COURSE TYPE : Professional Core Course	**SEMESTER : 6TH CREDITS: 3**
COURSECODE: BTCS602-18 **REGULATION: 2018**	**COURSE TYPE: CORE**
COURSE AREA/DOMAIN: Artificial Intelligence	**CONTACT HOURS: 3(L)+2(P) hours/Week.**
CORRESPONDING LAB COURSE CODE :BTCS605-18	**LAB COURSE NAME: Artificial Intelligence Lab**

SYLLABUS:

UNIT	DETAILS	HOURS
I	Introduction (3 Hours) Concept of AI, history, current status, scope, agents, environments, Problem Formulations, Review of tree and graph structures, State space representation, Search graph and Search tree.	**8**
II	Search Algorithms Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search, Best first search, A* algorithm, Game Search.	**9**
III	Probabilistic Reasoning Probability, conditional probability, Bayes Rule, Bayesian Networks-representation, construction and inference, temporal model, hidden Markov model.	**6**
IV	Markov Decision process MDP formulation, utility theory, utility functions, value iteration, policy iteration and partially observable MDPs.	**6**
V	Reinforcement Learning Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference learning, active reinforcement learning- Q learning.	**6**

TEXT/REFERENCE BOOKS:

S.NO	BOOK TITLE/AUTHORS/PUBLICATION
1	Stuart Russell and Peter Norvig, "Artificial Intelligence: A Modern Approach" , 3rd Edition, Prentice Hall
2	Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill
3	Trivedi, M.C., "A Classical Approach to Artifical Intelligence", Khanna Publishing House, Delhi.
4	David Poole and Alan Mackworth, "Artificial Intelligence: Foundations for Computational Agents", Cambridge University Press 2010

S. No	BOOK TITLE SUGGESTED BY FACULTY
1	SarojKaushik, "Artificial Intelligence", Cengage Learning India,

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Small Group Instruction.
Making real world connections
Presentations

E- content used:
https://youtu.be/oV74Najm6Nc

Additional Topics:
Reinforcement learning
Fuzzy Logics
Agile

COURSE OBJECTIVES:

The aim and objective of Artificial Intelligence is to acquire knowledge on intelligent systems and agents, formalization of knowledge, reasoning with and without uncertainty, machine learning and applications at a basic level.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTCS602-18	Higher Secondary Education	Introduction about machine language

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Build intelligent agents for search and games	3
2	Solve AI problems by learning various algorithms and strategies	3
3	Understand probability as a tool to handle uncertainity	2
4	Understand to learn optimization and inference algorithms for model learning	2
5.	Design and develop programs for an reinforcement agent to learn and act in a structured environment	6
6.	Demonstrate proficiency in applying scientific method to models of machine learning.	2

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	2	2	2	2	1	1	1	1	2	2
CO2	3	2	2	1	2	1	1	1	2	2	0	2	1	1
CO3	2	1	1	1	1	1	1	1	1	1	2	1	1	2
CO4	3	2	2	2	2	1	1	2	1	0	1	0	2	1
CO5	2	1	1	1	1	0	0	1	1	1	1	1	1	2
CO6	2	2	1	1	0	1	1	2	0	1	1	1	2	1

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Artificial Intelligence Lab

SYLLABUS:

Task 1: Write a programme to conduct uninformed and informed search.
Task 2: Write a programme to conduct game search.
Task 3: Write a programme to construct a Bayesian network from given data.
Task 4: Write a programme to infer from the Bayesian network.
Task 5: Write a programme to run value and policy iteration in a grid world.
Task 6: Write a programme to do reinforcement learning in a grid world

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T	Trivedi, M.C., "A Classical Approach to Artifical Intelligence", Khanna Publishing House, Delhi

COURSE OBJECTIVES:

To study and discuss various techniques and algorithms of AI used in general problem solving, optimization problems, constraint satisfaction problems, and game programming. To familiarize students with various sub-areas of AI, such as expert systems, natural language processing and machine learning.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTCS605-18	**Higher Secondary Education**	**Introduction about computer , Programming Languages**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Build intelligent agents for search and games	3
2	Solve AI problems by learning various algorithms and strategies	3
3	Understand probability as a tool to handle uncertainity	2
4	Understand to learn optimization and inference algorithms for model learning	2
5	Design and develop programs for an reinforcement agent to learn and act in a structured environment	6
6	Demonstrate proficiency in applying scientific method to models of machine learning.	2

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	2	1	2	2	2	2	1	1	1	2
CO2	2	2	2	1	2	2	1	1	1	1	2	2	2	1
CO3	2	0	1	2	2	0	2	1	2	0	1	1	1	2
CO4	2	2	0	2	1	2	1	1	1	1	1	1	2	2
CO5	2	1	1	1	1	1	0	1	1	2	0	1	1	2
CO6	2	2	1	2	1	0	0	0	2	0	1	0	2	1

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Cloud Computing

COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	**DEGREE: BTECH**
COURSE TYPE: Professional Elective II	**SEMESTER : 6TH CREDITS: 3**
COURSECODE: BTCS612-18 **REGULATION: 2018**	**COURSE TYPE: Elective-II**
COURSE AREA/DOMAIN: Cloud Computing	**CONTACT HOURS: 3(L)+2(P) hours/Week.**
CORRESPONDING LAB COURSE CODE :BTCS 613-18	**LAB COURSE NAME: Cloud Computing Lab**

SYLLABUS:

UNIT	DETAILS	HOURS
I	**Introduction :** Definition of cloud, characteristics of cloud, historical developments & challenges ahead, the vision of cloud computing, Driving factors towards cloud, Comparing grid with utility computing, cloud computing and other computing systems, types of workload patterns for the cloud, IT as a service, Applications of cloud computing.	**8**
II	**Cloud computing concepts:** Introduction to virtualization techniques, Characteristics of virtualization, Pros and Cons of virtualization Technology, Hypervisors, Types of hypervisors, Multitenancy, Application programming interfaces (API), Elasticity and scalability.	**9**
III	**Cloud service models:** Cloud service models, Infrastructure as a service (IaaS) architecture- details and example, Platform as a service (PaaS) architecture- details and example, Software as a service (SaaS) architecture-- details and example, Comparison of cloud service delivery models.	**6**
IV	**Cloud deployment models:** Introduction to cloud deployment models, Public clouds, Private clouds, Hybrid clouds, Community clouds, Migration paths for cloud, Selection criteria for cloud deployment.	**6**
V	**Security in cloud computing:** Understanding security risks, Principal security dangers to cloud computing, Internal security breaches, User account and service hijacking, measures to reduce cloud security breaches **Case Studies:** Comparison of existing Cloud platforms /Web Services.	**6**

TEXT/REFERENCE BOOKS:

S.NO	BOOK TITLE/AUTHORS/PUBLICATION
1.	Raj Kumar Buyya, James Broberg, AndrezeiM.Goscinski, "Cloud Computing: Principles and Paradigms", Wiley 2011
2.	Anthony T. Velte, Toby J. Velte and Robert Elsenpeter, "Cloud Computing: A practical Approach", McGraw Hill, 2010.
3.	Barrie Sosinsky, "Cloud Computing Bible", Wiley, 2011.
4.	Judith Hurwitz, Robin Bllor, Marcia Kaufman, Fern Halper, "Cloud Computing for dummies", 2009.

T/R	BOOK TITLE SUGGESTED BY FACULTY
1	RajkumarBuyya, Christian Vecchiola, S.ThamaraiSelvi, "Mastering Cloud Computing" TMH 2013.
2	George Reese "Cloud Application Architectures", First Edition, O"Reilly Media 2009.
3	Dr. Kumar Saurabh "Cloud Computing" 2nd Edition, Wiley India 2012.

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Small Group Instruction.
Making real world connections
Presentations

E-Content Used:
https://youtu.be/Dv0sjAYnVCY

Additional topics:
Big data refers to the large amounts of data produced by various programs in a very short duration of time. DevOps, Cloud Cryptography, Cloud Load Balancing, Mobile Cloud Computing, Green Cloud Computing, Edge Computing, Containerization.

COURSE OBJECTIVES:

The key objectives of this course are for participants to be able to: Understand the concepts, characteristics, delivery models and benefits of cloud computing. Understand the key security and compliance challenges of cloud computing. Understand the key technical and organizational challenges.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTCS612-18	Higher Secondary Education	Introduction about Networking

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Understanding importance of virtualization along with their technologies	2
2	Interpret various data, scalability and cloud services to acquire efficient database for cloud storage.	3
3	Classify the cloud service models.	2
4	Understand the ways in which cloud can be programmed and deployed.	2
5	Understand different cloud service providers	2
6	Classify the utilization of cloud in real world	2

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	2	1	1	2	2	0	1	1	1	2	2	2
CO2	3	2	1	2	2	1	1	0	2	2	2	1	2	2
CO3	2	1	0	0	1	2	1	0	1	1	2	2	1	1
CO4	3	2	2	1	0	1	1	0	1	1	1	1	2	1
CO5	3	1	0	2	2	1	0	0	1	2	1	2	1	1
CO6	3	1	1	2	2	2	1	0	0	2	1	1	1	1

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Cloud Computing Lab

SYLLABUS:

Task 1: Install Virtual Box/VMware Workstation on different OS.
Task 2: Install different operating systems in VMware.
Task 3: Simulate a cloud scenario using simulator.
Task 4: Implement scheduling algorithms.
Task 5: To study cloud security management
Task 6: To study and implementation of identity management
Task 7: Case Study - Amazon Web Services/Microsoft Azure/Google cloud services.

COURSE OBJECTIVES:

The objective of cloud computing lab is **to learn the cloud architecture and its efficiency, and tools to provide virtualization on cloud**. The lab enables the study and implementation of infrastructure as a service, storage as a service, and user management on cloud.

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COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTCS613-18	Higher Secondary Education	Basics of Networking

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Install Virtual Box/VMware Workstation on different OS.	3
2	Install different operating systems in VMware	3
3	Implement scheduling algorithms.	3
4	Understand the cloud security management.	2
5	Simulate a cloud scenario using simulator.	6
6	Implementation of various security strategies for different cloud platform	3

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	1	2	1	1	2	1	2	1	1	2	2	1
CO2	3	1	2	1	2	2	1	2	1	2	2	2	1	2
CO3	2	1	1	2	1	2	2	1	0	1	1	2	2	2
CO4	2	1	2	1	1	1	1	2	1	0	1	1	2	2
CO5	2	1	2	1	0	1	2	2	0	1	0	1	2	2
CO6	3	2	1	1	1	1	1	2	2	1	1	1	1	1

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MOBILE APPLICATION DEVELOPMENT

COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	**DEGREE: BTECH**
COURSE: Professional Elective Course	**SEMESTER : 6TH CREDITS: 3**
COURSECODE: BTCS620-18 **REGULATION: 2018**	**COURSE TYPE: Elective III**
COURSE AREA/DOMAIN: Mobile Application Development	**CONTACT HOURS: 3(L) + 2(P) hours/Week.**
CORRESPONDING LAB COURSE CODE :BTCS621-18	**LAB COURSE NAME: Mobile Application Development Lab**

SYLLABUS:

UNIT	DETAILS	HOURS
I	Introduction to Android: The Android Developing environment, Android SDK, Introduction to Open Handset Alliance, Development Framework, Application Fundamentals; Device Compatibility, System permissions, Understanding Anatomy of Android Application, Android Development Tools	**6**
II	Getting started with Mobility: Mobility Landscape, Mobile Platforms, Mobile apps development, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Setting up the mobile apps development environment with emulator	**6**
III	Building block of Mobile apps: App user Interface Designing, Layout, User Interface elements, VUIs and Mobile Apps, Text to Speech Techniques, Designing the Right UI, Activity states and lifecycle, Interaction among activities	**6**
IV	Sprucing up Mobile apps: App functionality beyond user interface- Threads, sync task, Services-states and life cycle, Notifications, Broadcast receivers, Telephony and SMS APIs Native data handling: on device file I/O, shared preferences, mobile databases such as SQLite, Working with a content provider	**8**
V	Factors in Developing Mobile Applications: Mobile Software Engineering, Frameworks and Tools, Generic UI Development, Android User Graphics and Multimedia: Performance and Multithreading, Graphics and UI Performance, Android Graphics, Mobile Agents and Peer-to-Peer Architecture, Android Multimedia	**8**
VI	Platforms and Additional Issues: Development Process, Architecture, Design, Technology Selection, Testing, Security and Hacking, Active Transactions, More on Security	**8**

TEXT/REFERENCE BOOKS:

S.NO	BOOK TITLE/AUTHORS/PUBLICATION
1.	Rick Rogers, John Lombardo, Meike Blake, "Android application development", Ist Edition, O'Reilly, 2010
2.	Lauren Darcey and Shane Conder,"Android Wireless Application Development", 2nd ed. Pearson Education, 2011
3.	Wei-Meng Lee , Beginning Android 4 development ,2012 by John Wiley & Sons
4.	Jeff Mewherter, Scott Gowell,WroxPublisher,"Professional Mobile Application Development", Ist Edition, 2012

T/R	BOOK TITLE SUGGESTED BY FACULTY
1	Reto Meier, "Professional Android 4 Application Development", Wrox, 2012

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Small Group Instruction.
Making real world connections
Presentations

E- content used:
https://youtu.be/fis26HvvDII

Additional topics:
Other additional topics in Mobile Application Development are 5G Technology, Block chain, Cloud, Artificial Intelligence, Mobile Wallets, Chatbots.

COURSE OBJECTIVES:

There are three main objectives for a mobile app: User Growth, Engagement, and Brand Awareness.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTCS620-18	**Higher Secondary Education**	**Software application files**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Build an application using Android development environment.	3
2	Experiment with the method of storing, sharing and retrieving the data in Android Applications.	**3**
3	Examine responsive user interface across wide range of devices	**4**
4	Create a mobile Application by using various components like activity, views, services, content providers and receivers.	**6**
5	Develop mobile applications for the Android operating system that use basic and advanced phone features	**3**
6	Apply applications to the Android marketplace for distribution	**3**

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	2	2	1	2	1	2	2	1	1	1	2	2
CO2	2	2	1	1	2	2	1	2	1	1	1	1	1	1
CO3	2	1	1	1	2	1	1	1	1	1	1	1	1	1
CO4	2	2	2	2	1	2	1	2	2	1	1	1	1	2
CO5	2	2	2	2	1	2	0	2	2	0	0	0	1	2
CO6	2	1	1	1	1	1	2	1	1	2	2	2	2	1

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MOBILE APPLICATION DEVELOPMENT LAB

SYLLABUS:

Task 1: Introduction to Android platform. Introduction to the tools used in the lab. Create a simple application
Task 2: Understand the app idea and design user interface/wireframes of mobile app
Task 3: Set up mobile app development environment
Task 4: Write a program using activity class to show different events.
Task 5: Write a program to convert text to speech
Task 6: Develop and debug mobile app components – User interface, services, notifications, broadcast receivers, data components
Task 7: Using emulator to deploy and run mobile apps
Task 8: Testing mobile app- unit testing, black box testing and test automation

TEXT/REFERENCE BOOKS:

T/R	BOOK TITLE/AUTHORS/PUBLICATION
T	Lauren Darcey and Shane Conder,"Android Wireless Application Development", 2nd ed. Pearson Education, 2011

COURSE OBJECTIVES:

The aim and objective of Mobile Application Development is it helps validate the appearance, performance, and functionality of apps across multiple devices. Optimizing apps for mobile-OS combinations popular among the target audience helps the app provide a seamless user experience, irrespective of device or OS

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTCS621-18	**Higher Secondary Education**	**Introduction about Software Applications**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Build a native application using GUI components and Mobile application development	3
2	Develop an application using basic graphical primitives and databases	**3**
3	Construct an application using multi threading and RSS feed	**3**
4	Make use of location identification using GPS in an application	**3**
5	Construct an application using multimedia .	**3**
6	Discover the android studio IDE.	**4**

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	2	1	1	2	2	2	2	2	1	1	2	1
CO2	2	2	2	2	2	2	2	1	1	2	2	2	2	2
CO3	2	2	1	1	2	1	1	1	2	1	2	1	2	2
CO4	1	1	2	1	1	2	2	2	1	2	2	1	2	1
CO5	2	1	2	2	1	2	2	2	1	2	2	2	2	2
CO6	2	1	1	1	1	1	1	1	1	1	2	1	1	2

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ANALOG CIRCUITS

COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	**DEGREE: BTECH**
COURSE TYPE: Engineering Science Course	**SEMESTER : 6TH CREDITS: 4**
COURSECODE: BTEC401-18 **REGULATION: 2018**	**COURSE TYPE: Open Elective**
COURSE AREA/DOMAIN: Analog Circuits	**CONTACT HOURS: 3(L) + 1(T) hours/Week.**
CORRESPONDING LAB COURSE CODE :	**LAB COURSE NAME:NA**

SYLLABUS:

UNIT	DETAILS	HOURS
I	**Diode and Transistor Amplifier Circuits** Diode Circuits, Amplifiers types: Voltage amplifier, current amplifier, trans-conductance amplifier and trans-resistance amplifier; biasing schemes for BJT and FET amplifiers; bias stability; transistor configurations: CE/CS, CB/CG, CC/CD and their features; small-signal analysis; low-frequency transistor models; amplifier analysis: current gain, voltage gain, input resistance and output resistance; amplifier design procedure; low frequency analysis of multistage amplifiers. High frequency transistor models.	**8**
II	**Feedback Amplifiers** Feedback topologies: Voltage series, current series, voltage shunt and current shunt feedback; effect of feedback on gain, bandwidth, input & output impedances; concept of stability, gain margin and phase margin.	**8**
III	**Oscillators** Introduction, Types of Oscillators, Barkhausen criterion, RC-phase shift, Wien bridge, Hartley, Colpitts, Clapp oscillators and Non-sinusoidal oscillators.	**6**
IV	**Power Amplifiers** Class A, B, AB and C power amplifiers, their efficiency and distortions; frequency response: single stage, multistage amplifiers and cascade amplifier.	**6**

TEXT/REFERENCE BOOKS:

S.NO	BOOK TITLE/AUTHORS/PUBLICATION
1	J Millman & A Grabel, Microelectronics, McGraw Hill
2	J Millman& C Halkias, Integrated Electronics, Tata McGraw Hill
3	A Ramakant, Gayakwad, Op-Amps And Linear Integrated Circuits, PHI
4	P Horowitz & W Hill, The Art of Electronics, Cambridge University Press
5	AS Sedra & KC Smith, Microelectronic Circuits, Saunder's College Publishing

S.No	BOOK TITLE SUGGESTED BY FACULTY
1	J Millman & A Grabel, Microelectronics, McGraw Hill

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:

Chalk & Talk
Small Group Instruction.
Making real world connections
Presentations

E-Content used:
https://youtu.be/XDy-rD5AJl0

Additional topics:

Microprocessor performs three basic things while executing the instruction: It performs some basic operations like addition, subtraction, multiplication, division, and some logical operations using its Arithmetic and Logical Unit (ALU). New Microprocessors also perform operations on floating-point numbers

COURSE OBJECTIVES:

This course deals design & analytical concepts of various Analog circuits like BJT/FET circuits, feedback amplifiers, oscillators, power amplifiers.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTEC402-18	**Higher Secondary Education**	**Machine Level Language, High Level Language**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Understand the biasing of transistors and analyze BJT/FET amplifiers	3
2	Analyze various rectifier and amplifier circuits	**3**
3	Describe Barkhausen criterion and clapp oscillator	**3**
4	Analyze sinusoidal and non-sinusoidal oscillator	**3**
5	Explain input and output impedence	**3**
6	Understand various types of Power Amplifiers	**4**

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	2	1	2	0	2	2	1	2	1	2	2
CO2	2	2	2	1	1	1	0	2	1	1	1	1	1	2
CO3	2	2	2	1	0	2	0	1	1	0	1	0	2	2
CO4	1	1	1	2	2	1	0	1	2	2	2	2	1	2
CO5	2	1	2	2	1	2	0	2	2	1	2	1	2	2
CO6	2	1	1	1	1	1	0	2	1	1	1	1	1	1

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PROJECT I

COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	**DEGREE: BTECH**
COURSE TYPE: Project	**SEMESTER : 6TH CREDITS: 3**
COURSECODE: BTCS 603-18 **REGULATION: 2018**	**COURSE TYPE: Open Elective**
COURSE AREA/DOMAIN: Project I	**CONTACT HOURS: 6(P) hours/Week.**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Understand programming language concepts, particularly Java and object-oriented concepts or go through research activities.	2
2	Undertake problem identification, formulation and solution.	2
3	Communicate with engineers and the community at large in written and oral forms	3
4	Demonstrate the knowledge, skills and attitudes of a professional engineer.	3
5	Design engineering solutions to complex problems utilising a systems approach.	6
6	Develop an engineering project.	6

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	1	1	1	2	1	1	0	1	2	1	1
CO2	2	2	2	1	2	1	0	2	1	2	2	1	2	2
CO3	2	2	2	1	1	2	2	0	2	2	1	1	2	1
CO4	2	1	2	2	1	0	2	0	1	2	1	2	1	2
CO5	2	2	1	2	1	1	2	2	1	1	2	1	1	1
CO6	2	1	1	1	0	1	1	1	2	1	2	1	1	1

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B.TECH 7 Semesters

(Computer Science & Engineering)

IK Gujral Punjab Technical University Bachelor of Technology Scheme for B.Tech Syllabus 2018

Sem 7	Course Code	Subject	L-T-P	Hours	Credits
7th	BTCS 801-18	Semester Training	0-0-0		16

Total Credits= 16 Hours:

COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	**DEGREE: BTECH**
COURSE TYPE : TRAINING COURSE	**SEMESTER: 8** **CREDITS: 16**
COURSE CODE: BTCS801-18 **REGULATION: 2018**	**COURSE TYPE: CORE**
COURSE AREA/DOMAIN: Semester Training	**CONTACT HOURS:**
CORRESPONDING LAB COURSE CODE :	**LAB COURSE NAME**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Learn project management skills.	1
2	Identify areas for future learning and skill development.	1
3	Understand career options in IT industry.	2
4	Learn professional and corporate behavior and ethics.	2
5	Enhance soft skills required for the industry.	2
6	Apply knowledge and skills learned in the classroom to solve real life problems.	3

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	1	1	1	1	1	1	2	1	1	1	1	1
CO2	2	2	2	2	2	0	0	2	2	2	2	2	2	2
CO3	3	2	2	2	1	2	1	1	1	1	0	1	1	1
CO4	2	2	2	1	1	1	1	2	1	1	2	2	1	1
CO5	2	1	2	1	2	1	1	1	1	2	2	1	2	2
CO6	2	1	1	1	1	1	2	2	3	2	2	1	2	2

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B.TECH 8th Semesters

(Computer Science & Engineering)

IK Gujral Punjab Technical University Bachelor of Technology Scheme for B.Tech Syllabus 2018

Sem 8	Course Code	Subject	L-T-P	Hours	Credits
8th	BTCS701-18	Network Security & Cryptography	3-0-0	3	3
8th	BTCS702-18	Data Mining & Data Warehouse	3-0-0	3	3
8th	BTCS706-18	Distributed Data Base	3-0-0	3	3
8th	BTCS707-18	Distributed Data Base Lab	0-0-2	2	1
8th	BTCS716-18	Adhoc Wireless Sensor Networks	3-0-0	3	3
8th	BTCS717-18	Adhoc Wireless Sensor Networks Lab	0-0-2	2	1
8th	BTEC906B-18	Satellite Communication	3-0-0	3	3
8th	BTCS703-18	Project-II	0-0-12	12	6

Total Credits=23 Hours: 31

NETWORK SECURITY AND CRYPTOGRAPHY

COURSE INFORMATION SHEET

PROGRAMME: PROFESSIONAL CORE COURSES	**DEGREE: BTECH**
COURSE: CSE	**SEMESTER : 8TH CREDITS: 3**
COURSE CODE: BTCS 701-18 **REGULATION: 2018**	**COURSE TYPE: CORE**
COURSE AREA/DOMAIN: NETWORK SECURITY AND CRYPTOGRAPHY	**CONTACT HOURS: 3(L) hours/Week.**
CORRESPONDING LAB COURSE CODE :	**LAB COURSE NAME: N/A**

SYLLABUS:

UNIT	DETAILS	HOURS
I	Introduction : Introduction to Cryptography, Security Threats, Vulnerability, Active and Passive attacks, Security services and mechanism, Conventional Encryption Model, CIA model	**5**
II	Math Background : Modular Arithmetic, Euclidean and Extended Euclidean algorithm, Prime numbers, Fermat and Euler's Theorem	**5**
III	Cryptography : Dimensions of Cryptography, Classical Cryptographic Techniques Block Ciphers (DES, AES) : Feistal Cipher Structure, Simplifies DES, DES, Double and Triple DES, Block Cipher design Principles, AES, Modes of Operations Public-Key Cryptography : Principles Of Public-Key Cryptography, RSA Algorithm, Key Management, Diffie-Hellman Key Exchange, Elgamal Algorithm, Elliptic Curve Cryptography	**12**
IV	Hash and MAC Algorithms : Authentication Requirement, Functions, Message Authentication Code, Hash Functions, Security Of Hash Functions And Macs, MD5 Message Digest Algorithm, Secure Hash Algorithm, Digital Signatures, Key Management : Key Distribution Techniques, Kerberos	**6**
V	Security in Networks : Threats in networks, Network Security Controls – Architecture, Encryption, Content Integrity, Strong Authentication, Access Controls, Wireless Security, Honeypots, Traffic flow security, Firewalls – Design and Types of Firewalls, Personal Firewalls, IDS, Email Security – PGP, S/MIME	**7**

TEXT/REFERENCE BOOKS:

S.NO	BOOK TITLE/AUTHORS/PUBLICATION
1	Cryptography And Network Security Principles And Practice Fourth Edition, William Stallings, Pearson Education
2	Modern Cryptography: Theory and Practice, by Wenbo Mao, Prentice Hall PTR
3	Network Security Essentials: Applications and Standards, by William Stallings. Prentice Hall
4	Cryptography: Theory and Practice by Douglas R. Stinson, CRC press.

T/R	BOOK TITLE SUGGESTED BY FACULTY
1	Cryptography And Network Security Principles And Practice Fourth Edition, William Stallings, Pearson Education

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Small Group Instruction.
Making real world connections
Presentations

E- content used:
https://youtu.be/C7vmouDOJYM

Additional topics:

There are different additional topics in Network Security and cryptography are Data Loss Prevention (DLP), Intrusion Prevention Systems (IPS),Sandboxing, Hyper scale Network Security

COURSE OBJECTIVES:

The goal and objective of network security are Confidentiality, Integrity, and Availability. These three pillars of Network Security are often represented as CIA triangle. Confidentiality − The function of confidentiality is to protect precious business data from unauthorized persons.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
BTCS 701-18	Higher Secondary Education	Introduction about virus, antivirus, basics of cryptography	**1 & 2**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Understand the fundamental principles of access control models and techniques, authentication and secure system design.	2
2	Have a strong understanding of different cryptographic protocols and techniques and be able to use them.	2
3	Apply methods for authentication, access control, intrusion detection and prevention.	3
4	Identify and mitigate software security vulnerabilities in existing systems.	1
5	Illustrate various Public key cryptographic techniques.	4
6	Summarizing Basic concepts of system level security.	2

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	1	2	2	1	1	2	2	2	1	2	2
CO2	2	1	2	1	1	2	1	2	3	2	2	1	2	1
CO3	3	2	1	1	1	1	1	2	2	2	2	2	2	2
CO4	3	2	0	2	1	1	1	1	1	2	2	2	1	2
CO5	2	3	2	1	2	2	2	2	1	2	2	2	2	2
CO6	2	1	2	1	2	1	2	2	2	2	2	2	1	1

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DATA WAREHOUSING AND DATA MINING

COURSE INFORMATION SHEET

PROGRAMME: PROFESSIONAL CORE COURSES	**DEGREE: BTECH**
COURSE: CSE	**SEMESTER : 8TH CREDITS: 3**
COURSE CODE: BTCS -702-18 **REGULATION: 2018**	**COURSE TYPE: CORE**
COURSE AREA/DOMAIN: DATA WAREHOUSING AND DATA MINING	**CONTACT HOURS: 3(L) hours/Week.**
CORRESPONDING LAB COURSE CODE :	**LAB COURSE NAME: N/A**

SYLLABUS:

UNIT	DETAILS	HOURS
I	**Data Warehousing Introduction:** design guidelines for data warehouse implementation, Multidimensional Models; OLAP- introduction, Characteristics, Architecture, Multidimensional view Efficient processing of OLAP Queries, OLAP server Architecture ROLAP versus MOLAP Versus HOLAP and data cube, Data cube operations, data cube computation. **Data mining:** What is data mining, Challenges, Data Mining Tasks, Data: Types of Data, Data Quality, Data Pre-processing, Measures of Similarity and Dissimilarity	**10**
II	**Data mining:** Introduction, association rules mining, Naive algorithm, Apriori algorithm, direct hashing and pruning (DHP), Dynamic Item set counting (DIC), Mining frequent pattern without candidate generation (FP, growth), performance evaluation of algorithms **Classification:** Introduction, decision tree, tree induction algorithms – split algorithm based on information theory, split algorithm based on Gini index; naïve Bayes method; estimating predictive accuracy of classification method	**10**
III	**Cluster analysis:** Introduction, partition methods, hierarchical methods, density based methods, dealing with large databases, cluster software . **Search engines:** Characteristics of Search engines, Search Engine Functionality, Search Engine Architecture, Ranking of web pages, The search engine history, Enterprise Search, Enterprise Search Engine Software.	**10**
IV	**Web data mining:** Web Terminology and Characteristics, Locality and Hierarchy in the web, Web Content Mining, Web Usage Mining, Web Structure Mining, Web mining Software.	**8**

TEXT/REFERENCE BOOKS:

S.NO	BOOK TITLE/AUTHORS/PUBLICATION
1	Carlo Vercellis, Business Intelligence: Data mining and Optimization for Decision Making, WILEY.
2	Han J., Kamber M. and Pei J. , b Data mining concepts and techniques, Morgan Kaufmann Publishers (2011) 3rd ed.
3	Pudi V., Krishana P.R., Data Mining, Oxford University press, (2009) 1st ed.
4	Adriaans P., Zantinge D., Data mining, Pearsoneducation press (1996), 1st ed.
5	Pooniah P. , Data Warehousing Fundamentals, Willey interscience Publication, (2001), 1st ed.

S.No	BOOK TITLE SUGGESTED BY FACULTY
1	Carlo Vercellis, Business Intelligence: Data mining and Optimization for Decision Making, WILEY.

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Small Group Instruction.
Making real world connections
Presentations

E- content used:
https://youtu.be/jmwGNhUXn_o

Additional topics:
Detecting Phishing website

COURSE OBJECTIVES:

The goal of data warehousing is to create a trove of historical data that can be retrieved and analyzed to provide useful insight into the organization's operations. Data warehousing is a vital component of business intelligence.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
BTCS702-18	Higher Secondary Education	Database, Sql,Oracle, Ms-Excel	**1 & 2**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Understand the functionality of the various data mining and data warehousing component	2
2	Appreciate the strengths and limitations of various data mining and data warehousing models	5
3	Explain the analyzing techniques of various data	5
4	Describe different methodologies used in data mining and data ware housing.	4
5.	Compare different approaches of data ware housing and data mining with various technologies.	2
6	Develop skill in selecting the appropriate data mining algorithm for solving practical problems	6

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	3	1	1	2	2	1	1	2	1	2	1	2	2
CO2	2	1	1	2	1	2	1	1	1	1	2	2	2	1
CO3	3	1	1	2	1	1	2	1	2	2	2	1	1	2
CO4	3	3	2	2	2	2	1	1	2	2	1	1	2	1
CO5	1	3	1	1	1	2	1	1	1	0	2	1	2	2
CO6	2	1	2	3	2	2	2	1	1	0	2	2	2	1

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DISTRIBUTED DATABASES
COURSE INFORMATION SHEET

PROGRAMME: PROFESSIONAL ELECTIVE	**DEGREE: BTECH**
COURSE: CSE	**SEMESTER : 8TH CREDITS: 3**
COURSE CODE: BTCS706-18 **REGULATION: 2018**	**COURSE TYPE: CORE**
COURSE AREA/DOMAIN: DISTRIBUTED DATABASES	**CONTACT HOURS: 3(L) hours/Week.**
CORRESPONDING LAB COURSE CODE : BTCS707-18	**LAB COURSE NAME: DISTRIBUTED DATABASES LAB**

SYLLABUS:

UNIT	DETAILS	HOURS
I	**INTRODUCTION:** Distributed data processing; What is a DDBS; Advantages and disadvantages of DDBS; Problem areas; Overview of database and computer network concepts **DISTRIBUTED DATABASE MANAGEMENT SYSTEM ARCHITECTURE:** Transparencies in a distributed DBMS; Distributed DBMS architecture; Global directory issues.	**6**
II	**DISTRIBUTED DATABASE DESIGN:** Alternative design strategies; Distributed design issues; Fragmentation; Data allocation. **SEMANTICS DATA CONTROL:** View management; Data security; Semantic Integrity Control. **QUERY PROCESSING ISSUES:** Objectives of query processing; Characterization of query processors; Layers of query processing; Query decomposition; Localization of distributed data.	**10**
III	**DISTRIBUTED QUERY OPTIMIZATION:** Factors governing query optimization; Centralized query optimization; Ordering of fragment queries; Distributed query optimization algorithms. **TRANSACTION MANAGEMENT:** The transaction concept; Goals of transaction management; Characteristics of transactions; Taxonomy of transaction models. **CONCURRENCY CONTROL:** Concurrency control in centralized database systems; Concurrency control in DDBSs; Distributed concurrency control algorithms; Deadlock management.	**10**
IV	**RELIABILITY:Reliability issues in DDBSs;** Types of failures; Reliability techniques; Commit protocols; Recovery protocols. **PARALLEL DATABASE SYSTEMS**: Parallel architectures; parallel query processing and optimization; load balancing. **ADVANCED TOPICS:** Databases, Distributed Object Management, Multi-databases.	**10**
VI	**Undecidability & Intractablity**: Church-Turing thesis, universal Turing machine, the universal and diagonalization languages, reduction between languages and Rice s theorem, undecidable problems about languages. **Intractablity:** Notion of tractability/feasibility. The classes NP and co-NP, their importance. Polynomial time many-one reduction. Completeness under this reduction. Cook-Levin theorem: NP-completeness of propositional satisfiability, other variants of satisfiability. NP-complete problems from other domains: graphs (clique, vertex cover, independent sets, Hamiltonian cycle), number problem (partition), set cover	**12**

TEXT/REFERENCE BOOKS:

S.NO	BOOK TITLE/AUTHORS/PUBLICATION
1.	Principles of Distributed Database Systems, M.T. Ozsu and P. Valduriez, Prentice-Hall, 1991.
2.	Distributed Database Systems, D. Bell and J. Grimson, Addison-Wesley, 1992.

T/R	BOOK TITLE SUGGESTED BY FACULTY
1	Distributed Database Systems, D. Bell and J. Grimson, Addison-Wesley, 1992.

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Small Group Instruction.
Making real world connections
Presentations

E- content used:
https://youtu.be/8S4JdRH0TW8

Additional topics:

Other topics in distributed database are Distributed Database Architecture,Database Links, Distributed Database administration.

COURSE OBJECTIVES:

A distributed DBMS is a software system that manages a distributed database, which consists of data that are partitioned and replicated among interconnected server sites. The primary objective of a distributed DBMS is to hide data distribution so that it appears as one logical database system to the clients

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
BTCS706-18	Higher Secondary Education	Database Management System	**1 & 2**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Design trends in distributed systems.	6
2	Apply network virtualization in distributed environment.	3
3	Apply remote method invocation and objects.	3
4	Evaluate the different techniques of Distributed query processing.	5
5	Illustrate parallel database system architecture.	4
6	Apply various distributed algorithms related to clock synchronization, concurrency control, deadlock detection, load balancing, voting etc.	3

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	1	1	2	1	2	1	2	1	2	1
CO2	3	2	2	1	3	2	2	2	1	1	1	2	2	1
CO3	3	3	2	2	1	1	2	2	2	1	2	2	1	2
CO4	2	2	2	1	2	2	2	2	2	1	2	1	2	1
CO5	3	3	2	2	2	2	2	2	2	1	1	2	1	2
CO6	3	2	2	2	1	2	0	1	1	1	1	1	1	1

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DISTRIBUTED DATABASES LAB

SYLLABUS:

Task 1: Installation and configuration of database packages.
Task 2: Creating and managing database objects (Tables, views, indexes etc.)
Task 3: Creating and managing database security through user management.
Task 4: Creating and maintaining database links.
Task 5: Implement Partitioning on the database tables.
Task 6: Implement various Transaction concurrency control methods [i.e. locks] by executing multiple update and queries.
Task 7: Mini Project: Student has to do a project assigned from course contents in a group of two or three students. The team will have to demonstrate as well as have to give a presentation of the same.

COURSE OBJECTIVES:

The concept of distributed database was built with a *goal* to improve reliability in distributed database *s*ystem, if one system fails down.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTCS707-18	**Higher Secondary Education**	**Database Management System**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Understand the principal of distributed databases and types of data fragmentation with levels of distribution transparency	2
2	Summarize heterogeneous databases.	2
3	Implement of replication in distributed database system	6
4	Design distributed database and analyze the background processes involved in queries.	6
5	Implement materialized view.	6
6	Create and use new database, datatypes and inheritance.	6

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	2	2	1	1	2	2	2	2	1	1	2
CO2	3	2	1	1	1	2	2	1	2	1	2	1	1	1
CO3	3	2	2	2	2	2	2	1	2	2	2	2	2	2
CO4	2	1	1	2	2	2	2	1	2	1	2	2	1	2
CO5	3	2	2	1	2	2	2	2	2	2	1	2	2	2
CO6	2	1	1	2	1	1	2	1	1	1	1	1	1	1

ADHOC AND WIRELESS SENSOR NETWORKS

COURSE INFORMATION SHEET

PROGRAMME: PROFESSIONAL ELECTIVE COURSES	**DEGREE: BTECH**
COURSE: CSE	**SEMESTER : 8TH CREDITS: 3**
COURSE CODE: BTCS 716-18 **REGULATION: 2018**	**COURSE TYPE: CORE**
COURSE AREA/DOMAIN: ADHOC AND WIRELESS SENSOR NETWORKS	**CONTACT HOURS: 3(L) hours/Week.**
CORRESPONDING LAB COURSE CODE : BTCS 717-18	**LAB COURSE NAME: ADHOC AND WIRELESS SENSOR NETWORKS LAB**

SYLLABUS:

UNIT	DETAILS	HOURS
I	**ADHOC AND SENSORS NETWORKS – INTRODUCTION AND ROUTING PROTOCOLS**: **Wireless Sensor Networks (WSNs):** concepts and architectures - Applications of Ad Hoc and Sensor Networks - Design Challenges in Ad hoc and Sensor Networks. Wireless Networks, Issues in Ad hoc wireless networks, Routing Protocol for Ad Hoc Wireless Networks, Classifications of Routing Protocols, Table Driven Routing Protocols – Destination Sequenced Distance Vector (DSDV), On–Demand Routing protocols –Ad hoc On–Demand Distance Vector Routing (AODV).	**7**
II	**WSN NETWORKING CONCEPT AND MAC PROTOCOLS :** Issues in Designing a MAC Protocol for Ad Hoc Wireless Networks - Design Goals of a MAC Protocol for Ad Hoc Wireless Networks, MAC Protocols for wireless sensors Networks, Low duty cycle Protocols and Wakeup concepts, Classification of MAC Protocols , S-MAC, Contention based protocols -PAMAS schedule based protocols –LEACH, IEEE 802.15.4. MAC protocols , Energy efficient routing challenges and issues in transport layer	**9**
III	**ROUTING PROTOCOLS AND TRANSPORT LAYER IN AD HOC WIRELESS NETWORKS:** Routing Protocol: Issues in designing a routing protocol for Ad hoc networks - Classification- proactive routing - reactive routing (on-demand) - hybrid routing - Transport Layer protocol for Ad hoc networks - Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks -Classification of Transport Layer solutions-TCP over Ad hoc wireless ,	**6**
IV	**SENSOR NETWORKS INTRODUCTION AND ARCHITECTURES:** Challenges for Wireless Sensor Networks, Enabling Technologies for Wireless Sensor Networks, WSN application examples, Single-Node Architecture – Hardware Components, Energy Consumption of Sensor Nodes, Network Architecture – Sensor Network Scenarios, Transceiver Design Considerations.	**6**
V	**SENSOR NETWORK SECURITY- NETWORK SECURITY:** Security in Ad Hoc Wireless Networks - Network Security Requirements. Network Security requirements issues and Challenges in security provisioning Network, Security Attacks. Layer wise attack in wireless sensor networks, possible solutions for Jamming, tampering black hole attack, Flooding attack, Key distribution and Management, Secure Routing -SPINS reliability requirements in sensors Networks. Sensor Network Platforms and Tools	**7**

TEXT/REFERENCE BOOKS:

S.NO	BOOK TITLE/AUTHORS/PUBLICATION
1.	`C. Siva Ram Murthy, and B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols ", Pearson Education, 2008.
2.	Labiod. H, "Wireless Adhoc and Sensor Networks", Wiley, 2008.
3.	Li, X, "Wireless ad -hoc and sensor Networks: theory and applications", Cambridge University Press, 2008.
4.	Carlos De Morais Cordeiro, Dharma Prakash Agrawal "Ad Hoc & Sensor Networks: Theory and Applications", world Scientific Publishing Company, 2nd edition, 2011.
5.	Feng Zhao and Leonides Guibas, "Wireless Sensor Networks", Elsevier Publication
6.	Holger Karl and Andreas Willig "Protocols and Architectures for Wireless Sensor Networks", Wiley, 2005 .

T/R	BOOK TITLE SUGGESTED BY FACULTY
1	1. Roger Pressman, "Software Engineering: A Practitioners Approach,(6th Edition), McGraw Hill, 1997

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Small Group Instruction.
Making real world connections
Presentations

E- content used:
www.wirelessnetworksonline.com
www.securityinwireless.com

Additional topics:

Other topics in adhoc wireless sensor networks are access delay, exposed terminals, synchronization.

COURSE OBJECTIVES:

A wireless sensor network is an ad hoc network mainly comprising sensor nodes, which are normally used to monitor and observe a phenomenon or a scene. The sensor nodes are physically deployed within or close to the phenomenon or the scene.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
BTCS 716-18	Higher Secondary Education	ADHOC AND WIRELESS SENSOR NETWORKS	1 & 2

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Explain the Fundamental Concepts and applications of ad hoc and wireless sensor networks and apply this knowledge to identify the suitable routing algorithm based on the network.	2
2	Apply the knowledge to identify appropriate physical and MAC layer protocols	3
3	Understand the transport layer and Describe routing protocols for ad hoc wireless networks with respect to TCP design issues	2
4	Analyze the use of OS in Wireless Sensor Networks and build basic modules	4
5	Understand the Challenges in security provisioning ,Security Attacks and security issues possible in Adhoc and Sensors Networks	2
6	Apply the location identifier using GPS in an application.	3

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	1	1	1	2	1	1	2	1	1	2	2
CO2	2	2	0	2	2	1	1	2	2	1	2	2	1	2
CO3	2	1	2	1	1	1	2	0	1	1	1	1	2	3
CO4	2	2	1	0	1	2	0	1	2	0	1	1	1	1
CO5	2	1	0	1	1	0	0	1	2	1	2	1	1	2
CO6	2	2	1	1	1	1	1	1	2	1	2	2	2	2

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ADHOC AND WIRELESS SENSOR NETWORKS LAB

SYLLABUS:

Task 1: Introduction of Wireless sensor network applications and its simulation
Task 2: Network Simulator installation of wireless sensor network.
Task 3: Implementation of routing protocol in NS2 for DSR protocol
Task 4: Study other wireless sensor network simulators (Mannasim. Contiki
Task 5: Implementation of routing protocol in NS2 for AODV protocol for TORA protocol

COURSE OBJECTIVES:

The *objective* of this *course* is to study the fundamentals of *Adhoc* and appreciate the importance of *Adhoc* and *sensor networks for* applications like.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION
BTCS717-18	Higher Secondary Education	Lan, Wan, Man, Networking Basics

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Understand the Wireless sensor network applications and its simulation	2
2	Analyze the Network Simulator installation of wireless sensor network	4
3	Apply the routing protocol in NS2 for DSR protocol	3
4	Learn other wireless sensor network simulators	1
5.	Apply the routing protocol in NS2 for AODV protocol for TORA protocol	3
6.	Learn the use of different networks in the real life problems.	1

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	2	1	1	1	0	1	1	1	2	1
CO2	3	1	1	1	1	2	2	2	0	2	1	2	1	2
CO3	2	1	2	2	0	1	1	0	0	1	2	1	2	2
CO4	2	1	2	2	1	1	0	1	0	1	1	1	1	2
CO5	1	1	1	2	1	0	1	1	0	0	0	1	2	1
CO6	2	1	1	1	1	1	1	1	0	1	1	2	2	1

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SATELLITE COMMUNICATION
COURSE INFORMATION SHEET

PROGRAMME: OPEN ELECTIVE COURSES	**DEGREE: BTECH**
COURSE: CSE	**SEMESTER : 8TH CREDITS: 3**
COURSE CODE: BTEC906B-18 **REGULATION: 2018**	**COURSE TYPE: CORE**
COURSE AREA/DOMAIN: SATELLITE COMMUNICATION	**CONTACT HOURS: 3(L) hours/Week.**
CORRESPONDING LAB COURSE CODE :	**LAB COURSE NAME: N/A**

SYLLABUS:

UNIT	DETAILS	HOURS
I	**Introduction to Satellite Communication:** Principles and architecture of satellite Communication, Brief history of Satellite systems, advantages, disadvantages, applications and frequency bands used for satellite communication, Orbital Mechanics: Orbital equations, Kepler's laws, Apogee and Perigee for an elliptical orbit, evaluation of velocity, orbital period, angular velocity etc. of a satellite, concepts of Solar day and Sidereal day.	**6**
II	**Satellite sub-systems:** Study of Architecture and Roles of various sub-systems of a satellite system such as Telemetry, tracking, command and monitoring (TTC & M), Altitude and orbit control system (AOCS), Communication sub-system, power sub-systems etc.	**6**
III	**Typical Phenomena in Satellite Communication:** Solar Eclipse on satellite, its effects, remedies for Eclipse, Doppler frequency shift phenomena and expression for Doppler shift. Received signal power equations.	**5**
IV	**Satellite Link Design:** Introduction, General Link Design Equations, System Noise Temperature C/N and G/T Ratio, Atmospheric and Ionospheric Effects on Link design, Uplink design, Complete Link Design, Interference effects on Complete Link design, Earth Station Parameters.	**6**
V	**VSAT Satellite Systems:** Introduction, Network Architecture, VSAT Earth Station, VSAT Applications.	**3**

TEXT/REFERENCE BOOKS:

S.NO	BOOK TITLE/AUTHORS/PUBLICATION
1.	Trimothy Pratt, Charles W. Bostian, ―Satellite Communications‖, John Wiley & Sons, 1986.
2.	Dr. D.C. Aggarwal, ―Satellite Communications‖, Khanna Publishers, 2001.

T/R	BOOK TITLE SUGGESTED BY FACULTY
1	Dr. D.C. Aggarwal, ―Satellite Communications, Khanna Publishers, 2001.

DELIVERY/INSTRUCTIONAL METHODOLOGIES/ TEACHING PEDAGOGY:
Chalk & Talk
Small Group Instruction.
Making real world connections
Presentations

E- content used:
https://youtu.be/WARM4fwsoT4

COURSE OBJECTIVES:

The purpose of communications satellites is to relay the signal around the curve of the Earth allowing communication between widely separated geographical points. Communications satellites use a wide range of radio and microwave frequencies.

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
BTEC-906B-18	Higher Secondary Education	SATELLITE COMMUNICATION	1 & 2

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Visualize the architecture of satellite systems as a means of high speed, high range communication system.	2
2	State various aspects related to satellite systems such as orbital equations, sub-systems in a satellite, link budget, modulation and multiple access schemes.	2
3	Assess the Phenomena of satellite communication technologies and compare them to alternative systems.	2
4	Understand the general Link Design equation and the concepts related to it.	2
5	Analyze the multiple access schemes used in satellite communication.	2
6	Learn about VSAT system and its applications.	4

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2	2	1	1	1	1	2	0	2	2
CO2	2	2	1	1	1	2	1	1	2	1	1	1	2	1
CO3	2	2	2	1	1	2	1	1	1	0	2	1	2	1
CO4	2	2	2	2	0	1	2	2	2	1	2	2	2	1
CO5	2	1	1	2	2	2	2	2	2	1	2	1	2	2
CO6	2	1	2	2	1	1	2	2	2	2	1	1	2	2

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PROJECT II

COURSE INFORMATION SHEET

PROGRAMME: ENGINEERING	**DEGREE: BTECH**
COURSE TYPE: Project	**SEMESTER : 8TH CREDITS: 3**
COURSECODE: BTCS703-18 **REGULATION: 2018**	**COURSE TYPE: CORE**
COURSE AREA/DOMAIN: Project II	**CONTACT HOURS: 12(P) hours/Week.**

COURSE OUTCOMES:

S.NO	DESCRIPTION	Bloom's Level (B.L)
1	Identify and Finalize problem statement by surveying variety of domains.	1
2	Learn to work as a team and to focus on getting a working project done on time.	1
3	Perform requirement analysis and identify design methodologies	2
4	Apply advanced programming techniques	3
5	Prepare technical report by applying different visualization tools and Evaluation metrics..	3
6	Outline the software development cycle with emphasis on different processes - requirements, design, and implementation phases	4

CO MAPPING WITH PO

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	2	2	2	1	1	2	1	1	2	1	2	2
CO2	2	1	2	1	2	1	1	2	1	1	2	1	2	2
CO3	2	2	1	2	2	1	1	2	1	1	1	2	2	2
CO4	2	2	1	2	2	1	1	2	1	1	1	2	1	2
CO5	2	1	1	2	1	1	1	1	1	1	1	1	1	1
CO6	2	1	1	1	1	1	1	1	1	1	1	1	1	1

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