Integral University, Lucknow
Department of Computer Science &Engineering
B.TECH. COMPUTER SCIENCE
Subject Name: Physics, Subject Code: PY-101
w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
None	None	3	1	0	4

CO 1	To analyze the connection between daily life observations and science. To realize that apparently different ideas of Optics such as Interference and Diffraction have interrelationship between them. To realize the simplicity of ideas involved in explaining complex phenomenon.
CO 2	To grow in ideas of different aspect of light and develop connection between daily life applications and science To analyze the process of development of a new theory while dealing with Polarization. To correlate that the conceptualization of an idea is far ahead than its practical realization while dealing with LASER. To grow in realization of totally different manifestation of light. To find the most recent applications of light in terms of communication and storage of data. To realize that how the design of complex systems is based on the simple ideas.
CO 3	To grow in developing connection between philosophy and science. To find that seemingly different ideas such as Optics and Mechanics have interrelationship between them. To understand the process of development of a new theory and its application in life. To realize the requirement of power of imagination.
CO 4	To grow in developing the connection between philosophy and science To find that seemingly different ideas such as Compton Effect and Quantum Theory have interrelationship between them. To understand and analyze the process of development of a new theory and how the development of one idea leads to the development of a apparently different idea.
CO 5	To grow in developing connection between daily life utility and material science. To realize that apparently different materials with respect to Electric and Magnetic properties have inter relationship between them. To evaluate that how totally different manifestation of Modern Science leads to new technology.

COURSE OBJECTIVES: The purpose of this undergraduate course is to impart basic knowledge of fundamental concept of physics which is necessary for a strong engineering knowledge base.

UNIT I	**Electrostatics-**	**8**
	Boundary conditions and Boundary value problems in electrostatics, The Uniqueness theorem, Laplace and Poisson'sequations in electrostatics and their applications, method of electrical images and their simple applications, energy stored in discrete and continuous system of charges.	
UNIT II	**Wave Optics-**	**8**

	Methods of formation of coherent sources, Theory of Interference, Fresnel's Biprism, Displacement of Fringes, thinfilm interference, Newton's ring. Fraunhoffer diffraction at single slit and grating, Rayleigh's criterion of resolution,resolving power of grating.	
UNIT III	**Optical activity and Modern Optics-**	**8**
	Production of plane polarized light by reflection and Double refraction, Nicol prism. Optical activity, Fresnel'stheory, polarimeter (Laurentz and Biquartz). Principle of fiber optics, numerical aperture, attenuation, dispersion in optical fibers, material dispersion, waveguidedispersion, intermodal and intramodal dispersion, Pulse dispersion in step index fiber, Main components of laser,Einstein's coefficients, He-Ne laser, Nd-YAG laser and their applications.	
UNIT IV	**Properties of Matter and Relativistic Mechanics-**	**8**
	Viscosity, Poiseuille's equation, Frame of reference, Michelson-Morley experiment and its implications, Galileantransformation equations, Einstein's postulates, Lorentz transformation equations and their consequences, energy mass relation, relativistic kinetic energy.	
UNIT V	**Quantum Physics-**	**8**
	Compton effect, Basic postulates of quantum mechanics, Wave function and its physical admissibility, orthogonalityand normalization of wave functions, Heisenberg's uncertainty principle (no derivation) and its applications to (non-existence of electron in nucleus, Bohr's radius), Schrodinger's equation and its application to particle in 1-D box andfinite well.	

References:

1. Fundamentals of Optics by Jenkins and White.
2. Optical Fiber Communication by Gerd Keiser.
3. Concepts of Modern Physics by Arthur Beiser.
4. Introduction to Special Theory of Relativity by Robert Resnick.
5. Quantum Physics by Eisberg.
6. Introduction to Nanotechnology by Poole Owens, Wiley India.
7. Solid State Physics by S.O. Pillai, New Age Publications.

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	3	1	3	3	3	2	1	3			
CO2	2	2	2	2	2	3	2	2	2	2	2	2	1		3
CO3	3	3	1	3	3	1	3	3	3	1	3	3		2	
CO4	2	2	2	3	1	2	2	2	2	2	3	1	3		
CO5	2	1	1	1	2	2	2	2	1	1	1	2			1
1. Low Association 2: Average Association 3: Strong Association															

Integral University, Lucknow
Department of Computer Science &Engineering
B.TECH. COMPUTER SCIENCE
Subject Name: Professional Communication-I, Subject Code: LN-101
w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
None	None	2	1	0	3

CO 1	Basic Understanding of communication and Professional Communication
CO 2	Basic knowledge of structural and functional grammar. Learning Language through literature
CO 3	Basic tools of communication and improvement in communicative competence
CO 4	Understanding the basic grammar and basic structure of language
CO 5	Enhancement of writing skills in English i.e. writing application, report and various types of letters

COURSE OBJECTIVES:

- **Developing the art of communication and learning language though literature**
- **Knowledge of Professional, cultural and cross-cultural communication**
- **Basic concept of structural and functional grammar; meaning and process of communication, verbal and nonverbal communication**
- **Knowledge of reading and comprehension of general and technical articles, precise writing, summarizing, abstracting**
- **Basic concepts of group discussion, organizing seminars and conferences**
- **Development of Reading and Writing skills**

UNIT I	**Introduction to Communication**	**4**
	Definition, Types of Communication, Channels of Communication, Language.	
UNIT II	**Interpersonal Communication**	**6**
	Culture- Definition and Types, Communication and Culture including Cross Cultural Communication.	
UNIT III	**Written Communication**	**8**
	Letter Writing- Informal and Formal - Letters of Enquiry, Letters of complaint, Response to complaints and enquiries,Self Exploration through description.	
UNIT IV	**Grammar through Worksheets**	**12**
	Situational activities and modules- Parts of Speech, Tenses, Articles, Modals,Active and Passive, Subject-Verb Agreement, Direct and Indirect Speech, Degrees of comparison.	
UNIT V	**Grammar through Worksheets Continued**	**10**
	Sentences: Simple, Compound, Complex, Declarative, Assertive, Negative, Interrogative, Exclamatory, Imperative.	

References:

1. Wren PC and Martin H, “High School Grammar and Composition”, S. Chand and Co.
2. K. Floyd, “Interpersonal Communication: The Whole Story” (2009), McGraw Hill.
3. Greenbaum Sidney and Nelson Gerald, “An Introduction to English Grammar”, Pearson.
4. Swan Michael, “Practical English Usage” OUP, 2005.
5. Raymond Murphy, “Intermediate English Grammar”, (2007) Cambridge University Press.

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	3	3		1				3	3	2	2
CO2	3	2	3	2	1	1						2	1	2	1
CO3	3	2	1	1	1	2	3					2	1	3	2
CO4	3	2	3	2		3						1	2	2	2
CO5	3	2	2	1	1	2	1					2	3	3	2
1. Low Association 2: Average Association 3: Strong Association															

Integral University, Lucknow
Department of Computer Science &Engineering
B.TECH. COMPUTER SCIENCE
Subject Name: Engineering Mathematics-I, Subject Code: MT-101
w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
None	None	3	1	0	4

CO 1	Able to calculate rank of matrix, characteristic equation & characteristic roots & use the applicability of Cay lay Hamilton Theorem to find inverse of matrix which is very important in many engineering application.
CO 2	To develop ability to solve higher derivative, expansion of functions in ascending power of variable & partial derivatives.
CO 3	Develops ability to solve Jacobian, error and approximation and Extrema of the function.
CO 4	Learn the evaluation policy of some special function like gamma & Beta function. & their relation which is helpful to evaluate some definite integral arising in various branch of Engineering.
CO 5	Able to determine vector differentiation and integration.

COURSE OBJECTIVES: The course is aimed to develop the skills in mathematics which is necessary for grooming them into successful engineering graduate. The topics introduced will serve as basic tools for specialized studies in science field.

UNIT I	**Differential Equations**	**8**
	Linear differential equations of first order, Linear differential equations of higher order with constant coefficients,Complementary functions and particular integrals, Simultaneous linear differential equations, Solution ofsecond order differential equations by changing dependent and independent variables, Method of variation ofparameters, Applications to engineering problems (without derivation).	
UNIT II	**Laplace Transform**	**8**
	Laplace transform, Existence theorem, Laplace transform of derivatives and integrals, Unit stepfunction, Dirac-delta function, Laplace transform of periodic functions, Inverse Laplace transform, Convolutiontheorem, Applications to solve simple linear and simultaneous differential equations.	
UNIT III	**Fourier Series and Partial Differential Equations**	**9**
	Periodic functions, trigonometric series, Fourier series of period 2 π, Euler's formulae, functions havingarbitrary period, change of interval, Even and odd functions, Half range sine and cosine series. Introduction of partial differential equations, linear partial differential equations with constant coefficients ofsecond order and their classifications to parabolic,	

	elliptic and hyperbolic forms with illustrative examples.	
UNIT IV	**Applications of Partial Differential Equations**	**8**
	Method of separation of variables for solving partial differential equations, Wave equation up to two-dimensions,Laplace equation in two-dimensions, Heat conduction equations up to two dimensions, Equations of transmissionLines.	
UNIT V	**Basic Statistics and curve fitting**	**7**
	Mean, Median, Mode, Standard deviation and Variance, Method of least squares, Curvefitting of straight line and parabola.	

References:

1. E. Kreyszig Advanced Engineering Mathematics, Wiley Eastern Ltd.
2. Jaggi and Mathur Advanced Engineering Mathematics, Khanna Publication.
3. B. S. Grewal Higher Engineering Mathematics, Khanna Publication.
4. Dennis G. Zill Advanced Engineering Mathematics, CBS Publication.

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	3	3	3					1			
CO2	3	2	2	1	2	2	2		1	3			1	2	
CO3	3	2	3	1	3	2	3				1				3
CO4	3	2	3	1	3	3	2	2		1			2		
CO5	3	2	1	1	3	2	1						3		
1. Low Association 2: Average Association 3: Strong Association															

Integral University, Lucknow
Department of Computer Science &Engineering
B.TECH. COMPUTER SCIENCE
Subject Name: Basic Electrical Engineering, Subject Code: EE103/EEE103
w.e.f Session 2017-18

Pre-requisite	Co-requisite	L	T	P	C
None	None	3	1	0	4

CO 1	Know about the concept of D.C Circuit Analysis and Network Theorems Circuit.
CO 2	Steady State Analysis of Single Phase AC Circuits AC fundamentals.
CO 3	Know about concept of Three Phase AC Circuits Three phase system and measuring devices.
CO 4	Layout of Power System and transformer
CO 5	Know about Electromechanical energy conversion devices: AC/ DC Machines

COURSE OBJECTIVES:

- Knowledge and concept of D.C Circuit Analysis and Network Theorems Circuit.
- Use of Steady State Analysis of Single Phase AC Circuits AC fundamentals.
- Knowledge and concept of Three Phase AC Circuits Three phase system and measuring devices.
- Basic concepts of Power System and Transformer
- Study of Electromechanical energy conversion devices: AC/ DC Machines.

UNIT I	**D.C CIRCUIT ANALYSIS AND NETWORK THEOREMS**	**8**
	Circuit concepts: Concept of network, Active and passive elements, linear network, unilateral and bilateral elements, source transformation, Kirchhoff's Law: loop and nodal methods of analysis, star delta transformation. **Network theorems:** Superposition theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem.	
UNIT II	**STEADY STATE ANALYSIS OF SINGLE-PHASE AC CIRCUITS**	**8**
	AC fundamentals: Average and effective value of Sinusoidal waveform , form factor and peak factor, concept of phasor, phasor representation of sinusoidally varying voltage and current, analysis of series RLC circuits. Apparent, active and reactive powers, power factor, causes and problems of low power factor, power factor improvement, resonance, bandwidth and quality factor in series circuit.	
UNIT III	**THREE PHASE AC CIRCUITS&MEASURING INSTRUMENTS**	

	Three phase system: Its necessity and advantages, meaning of phase sequence, star and delta connections, balanced supply, line and phase voltage/current relationship. **Measuring Instruments:** Types of instruments: construction and working principle of PMMC, MI type instruments, induction type energy meter.	**8**
UNIT IV	**INTRODUCTION OF POWER SYSTEM, MAGNETIC CIRCUIT AND SINGLE PHASE TRANSFORMER**	
	Introduction of Power System: General layout of electrical power system, standard generation, transmission and distribution voltage levels, concept of grid. **Magnetic circuit:** Concepts, analogy between electric and magnetic circuit. **Single Phase Transformer:** Principle of operation, construction, emf equation, equivalent circuit, losses, efficiency, Introduction to auto transformer.	**8**
UNIT V	**PRINCIPLE OF ELECTROMECHANICAL ENERGY CONVERSION**	
	DC Machines: Types, emf equation of generator and torque equation of motor, applications. **Three Phase Induction Motor:** Types, principle of operation, applications. **Single Phase Induction Motor:** Principle of operation and introduction to methods of starting, applications. **Three Phase Synchronous Machines:** Principle of operation of alternator, synchronous motor, applications.	**8**

References:

1. V.Deltoro, "Principle of Electrical Engg." PHI, 2009.
2. M.A Mallick, Dr. I. Ashraf, "Fundamental of Electrical Engg," CBS Publishers, 2010.
3. A. Hussain, "Basic Electrical Engg" Dhanpat Rai & sons, 2007.
4. I J Nagrath, "Basic Electrical Engg", TMH, 2010.

CO-PO MAPPING

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	1	3						3	3	3	2
CO2	3	3	3	2	1	1						2	3	2	1
CO3	3	2	1	1	2	2	3					3	3	3	2
CO4	3	2	2	2	3	3						2	3	2	2
CO5	3	1	1	1	1	2	1					2	3	3	2
1. Low Association 2: Average Association 3: Strong Association															

Integral University, Lucknow
Department of Computer Science &Engineering
B.TECH. COMPUTER SCIENCE
Subject Name: Basic Electronics, Subject Code: EC-101
w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
None	None	3	1	0	4

CO 1	Understand the current voltage characteristics of semiconductor devices. Identify the unique vocabulary associated with electronics and explain the basic concepts of Semiconductor diodes such as pn junction diode, characteristics and ammeters, DC loadline, Zener diode. To apply the basics of diode to describe the working of rectifier circuits such as Full and half wave rectifiers.
CO 2	Analyze dc circuits and relate ac models of semiconductor devices with their physical Operation Draw and explain the structure of bipolar junction transistor. Explain the operation of each device in terms of junction bias voltage and charge carrier movement. Identify and explain the various current components in a transistor.
CO 3	Design and analyze of electronic circuits Describe the application of transistors for Current and voltage amplification. Also to describe the characteristics of different configurations of the transistor. Describe DC load line and bias point. List, explain, and design and analyze the different biasing circuits.
CO 4	Evaluate frequency response to understand behavior of Electronics circuits. Sketch, explain and design the amplifier circuit for given specification and analyze them discuss oscillator principles, oscillator types, and frequency stability as it relates to its operation. Analyze and Design the different types of Oscillators. Discuss ideal and practical operational amplifier (op amp) their electrical parameters, need for op amp. Explain and design different application circuits using op amp
CO 5	List and explain the different number system. Solve examples on converting one form of number system to another form. State Boolean laws and theorems. State and explain the different logic gates using truth table. Analyze and design different adder circuits.

COURSE OBJECTIVES:

UNIT I	**Semiconductor Diode**	**8**
	Mechanism of Conduction in Semiconductors: Mobility and Conductivity, Electrons and holes in anintrinsic semiconductors, Donor and acceptor impurities, Fermi level, Carrier densities insemiconductor, Hall effect, Diffusion, Recombination. Junction DiodePN junction characteristic and its equation, Effect of Temperature, Depletion Layer, Piecewise lineardiode model, Breakdown Mechanism, Zener and Avalanche Breakdown characteristics. Diode as circuit elementHalf wave and full wave rectifiers, capacitive filters, Zener diode as a regulator, clamper, clipper andvoltage double, special diode- LED, Schott key diodes.	
UNIT II	**BJT characteristics and circuits**	**8**
	Transistor Operation, CE, CB, CC configuration and their characteristics, transistor biasing circuits,stability factor, h- parameter model (low frequency), computation of Ai, Av, Ri, Ro of single transistorCE amplifier configuration.	
UNIT III	**Field Effect Transistors**	**8**
	JFET: Construction and principle of working,Drain / Transfer characteristics, basic amplifier circuits, Biasing of JFETMOSFET: Enhancement and depletion type N-channel, P-channel, Drain / TransferCharacteristics.	
UNIT IV	**Switching theory & Logic gates**	**8**
	Number system, Conversion, Compliments, Addition and Subtraction, BCD numbers,Boolean algebra, Canonical form, Logic gates, Minimization of logical function usingKarnaugh map.	
UNIT V	**Operational Amplifier**	**8**
	Concept of ideal operational amplifier (inverting and non-inverting) and its applications,Inverter, integrator, differentiator, voltage follower, summing and differential amplifierElectronic Instruments: Digital Multimeter (block diagram approach), CRO (block diagram and itsworking),Measurement of voltage, phase, frequency. Double beam CRO (block diagram & it'sworking).	

References:

1. Bolyested&Nashekey / Electronic Devices and Circuit Theory, PHI
2. Milliman &Halkias: Integrated Electronics, Mc Graw Hill
3. J. S. Katre: Electronics Engineering, Tech-Max Publication

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	3	3	3					1			
CO2	3	2	2	1	2	2	2		1	3			1	2	

CO3	**3**	**2**	**3**	**1**	**1**	**2**	**3**				**1**				**3**
CO4	**3**	**2**	**3**	**1**	**2**	**3**	**2**	**2**		**1**			**2**	**2**	**1**
CO5	**3**	**2**	**1**	**1**		**2**	**1**						**3**	**1**	
1. Low Association 2: Average Association 3: Strong Association															

PHYSICS LAB (PY104)

L T P
0 0 2

CO 1	To demonstrate how interference takes place by division of amplitude and by division

	of wavefront.
CO 2	To demonstrate the practical applications of polarization phenomenon in finding the specific rotation, refractive index and Brewster's angle.
CO 3	To demonstrate the practical application of Fraunhoffer diffraction in wavelength and focal length calculation.
CO 4	To demonstrate the magnetic and heating effect of current in finding the magnetic field and Stefan's constant.
CO 5	To demonstrate how to calculate the energy band gap of a semiconductor material and viscosity of a liquid

COURSE OBJECTIVES:
the purpose of this undergraduate course is to impart practical knowledge of the concepts through different experiments related to its theoretical course.

List of Experiments:

1. To determine the wave length of monochromatic light by Newton's ring.

2. To determine the wave length of monochromatic light with the help ofFresnel's Biprism.

3. To determine the focal length of two lenses by nodal slide and locate theposition of cardinal points.

4. To determine the specific rotation of cane sugar solution using Biquartzpolarimeter.

5. To determine the wavelength of spectral lines using plane transmissiongrating.

6. To determine the Brewster's angle and refractive index of material with thehelp of a laser source.

7. To determine the variation of magnetic field along the axis of a currentcarrying coil and then to estimate the radius of the coil.

8. To verify Stefan's law by electrical method.

9. To determine the energy band gap of a given semiconductor material.

10. To determine the viscosity of a liquid.

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	3	3		1				3	3	3	2
CO2	3	2	3	2	1	1						2	1	2	1
CO3	3	2	1	1	2	2	3		2			3	3	3	2
CO4	3	2	3	2		3						2	2	2	2

CO5	3	1	2	1	1	2	1					2	3	3	2
1. Low Association 2: Average Association 3: Strong Association															

Integral University, Lucknow
Department of Electrical Engineering
B.TECH. ELECTRICAL ENGINEERING
Subject Name: Electrical Engineering Lab, Subject Code: EE104/EEE104
w.e.f Session 2017-18

Pre-requisite	Co-requisite	L	T	P	C
None	None	0	0	2	1

CO 1	Know about the concept of D.C Circuit Analysis and Network Theorems Circuit.
CO 2	Steady State Analysis of Single Phase AC Circuits AC fundamentals.
CO 3	Know about concept of Three Phase AC Circuits Three phase system and measuring devices.
CO 4	Layout of Power System and transformer
CO 5	Know about Electromechanical energy conversion devices: AC/ DC Machines

COURSE OBJECTIVES:

- Knowledge and concept of D.C Circuit Analysis and Network Theorems Circuit.
- Use of Steady State Analysis of Single Phase AC Circuits AC fundamentals.
- Knowledge and concept of Three Phase AC Circuits Three phase system and measuring devices.
- Basic concepts of Power System and Transformer
- Study of Electromechanical energy conversion devices: AC/ DC Machines.

List of Experiments:

1. Verification of Thevenin's Theorem.
2. Verification of Superposition Theorem.
3. Verification of Maximum Power Transfer Theorem.
4. To study V-I characteristics of diode.
5. To study the input & output characteristics of BJT in CE configuration.
6. To study the full wave rectifier circuit with &without filter and determine the ripple factor.
7. To study the phenomenon of resonance in series RLC circuit.
8. Determination of losses in single phase transformer by OCT and SCT.
9. To calibrate a single-phase induction type energy meter.
10. To study the running and reversing of a three phase SCIM.
11. Study of OP Amp based inverting and non-inverting amplifier.

CO-PO MAPPING:

PO-	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

PSO / CO															
CO1	3	2	2	1	3	3		1				3	3	3	2
CO2	3	2	3	2	1	1						2	1	2	1
CO3	3	2	1	1	2	2	3		2			3	3	3	2
CO4	3	2	3	2		3						2	2	2	2
CO5	3	1	2	1	1	2	1					2	3	3	2
1. Low Association 2: Average Association 3: Strong Association															

ENGINEERING GRAPHICS (ME103)

L T P

0 0 2

1. Introduction

Engineering graphics as a tool to communicate ideas, Lettering and dimensioning.

Construction of geometrical figures like pentagon and hexagon.

2. Orthographic Projection

Principles of orthographic projections Principal and auxiliary planes, First and

Third angle projections.

Projection of points. Pictorial view.

Projection of lines parallel to both the planes. Parallel to one and inclined too other,Inclined to both the planes.Application to practical problems.

Projection of solid in simple position, Axis or slant edge inclined to one andparallel to other plane, solids lying on a face or generator on a plane.

Sectioning of solids lying in various positions, True shape of the section.

Development of lateral surfaces, sheet metal drawing.

3. Isometric Projection

Principles of isometric projection, Isometric projection using box and offset methods.

WORKSHOP PRACTICE (ME104)

L T P

0 1 2

1. Machine Shop

a. Study of tools and operations

b. Plane turning

c. Step turning

d. Taper turning

e. Threading

f. Single point cutting tool grinding.

2. Fitting Bench Working Shop

a. Study of tools and operations

b. Simple exercises involving filing work.

c. Making perfect male-female joint.

d. Simple exercises involving drilling/tapping/dieing.

3. Black Smithy Shop

a. Study of tools and operations

b. Simple exercises based on black smithy operations such asupsetting drawing down, punching, bending, fullering and swaging

4. Welding Shop

a. Study of tools and Operations

b. Simple butt joint

c. Lap Joint

d. Oxy acetylene welding

5. Sheet Metal Shop

a. Study of tools and Operations

b. Making funnel complete with soldering.

c. Fabrication of tool box, tray, electrical panel box etc.

6. Carpentry Shop

a. Study of tools and Operations and carpentry joints.
b. Simple exercise using jack plain.
c. To prepare half lap corner joint, mortise and tennon joints.
d. Simple exercise on woodworking lathe.

7. Foundry

a. Making a mould using single piece pattern.
b. Making a mould using two-piece pattern
c. Making a mould using a pattern with core print
d. Melting Pouring and Making an Aluminum Casting.

Integral University, Lucknow
Department of Computer Science & Engineering
B.TECH. COMPUTER SCIENCE
Subject Name: Chemistry, Subject Code: CH101
w.e.f Session 2019-20

Pre-requisite	Co-requisite	L	T	P	C
None	None	3	1	0	4

CO 1	Analyze and compare magnetic behavior and stability of heteronuclear diatomic molecules, Significance of hydrogen bonding ,band theory, radius ratio, density of unit cell, fullerenes and graphite
CO 2	Comprehension of types of polymers to make an appropriate choice of use of polymers (Natural, synthetic and biodegradable).
CO 3	Compare reaction intermediates and mechanism of chemical reactions and isomerism.
CO 4	Interpret phase rule, phase diagram, corrosion and its prevention, calculation of activation energy, rate constant, half-life period, emf of electrochemical cells, construction and operation of galvanic cell and concentration cells,
CO 5	Determination of calorific value , analyzing water softening methods, principles, instrumentations of UV, IR and NMR spectroscopy and their applications.

COURSE OBJECTIVES: The course is aimed to develop the skills in Chemistry which is necessary for grooming them into successful engineering graduate. The topics introduced will serve as basic tools for specialized studies in science field.

UNIT I	**Chemical bonding and state of matter:** Molecular theory of hetero diatomic molecules, Band theory of bonding in metals, Hydrogen bonding. Solid state chemistry: Radius ratio rule, Space lattice (only cubes), Types of Unit cells, Bragg's law, calculation of density of unit cell. One and Two Dimensional solids, Graphite as two dimensional solid and its conducting and lubricating properties. Fullerene and its applications	**8**
UNIT II	**Polymers:** Polymerization and its classification, Thermoplastic and thermosetting resins. Elastomers (Buna-S, Buna-N, thiokols, polyurethanes, silicons), Polyamides (Nylon-6, Nylon-6,6, Nylon-6,10, Nylon-11, Kevlar), Polyesters (Terelene), Polyacrylates (PMMA, PAN, PVC). Organic conducting and biodegradable polymers.	**8**
UNIT III	**Structural and mechanistic concepts in organics**: Stability of reaction intermediates, e.g. Carbanions, Carbocations and free radicals. Types of organic reactions, mechanism of nucleophilic substitutionreactions. Mechanism of the following name reactions. i. Aldolcondensation ii. Cannizzaro reaction	**8**

	iii. Beckmannrearrangement iv. Hofmann rearrangement and v. Diels-Alderreaction E-Z Nomenclature. R.S configuration, Optical isomerism of organic compounds containing one chiral center. Examples of optically active compounds without chirality. Conformations of n-butane.	
UNIT IV	**Reaction kinetics, Phase rule, Electrochemistry and Corrosion:** Order and molecularity of reactions. First and second order reactions. Energy ofactivation. Phase Rule, its application to one component system(water). Equilibrium potential, electrochemical cells (galvanic and concentrationcells) Electrochemical theory of corrosion and protection ofcorrosion.	**8**
UNIT V	**Analytical methods, Fuel and Water treatment:** Basic principles of spectroscopic methods. The use of UV, Visible, IR, 1HNMR, for the determination of structure of simple organic compounds. Classification of fuels, determination of gross and net calorific values using Bomb Calorimeter. Hardness of water, softening of water by Lime-Soda process, Zeolites and ion exchange resins process and Reverse Osmosis. Treatment of boiler feed water by Calgon process	**8**

References:

- Jain P. C. and Jain M. 1994. Engineering Chemistry. Danpat Rai publishing company Pvt. Ltd., Delhi.
- Bahl B.S, Arun Bahl and Tuli B.D. 2007. Essentials of Physical Chemistry. S. Chand and Co. Ltd., Delhi.
- Industrial Chemistry B.K.Sharma, Goel publishing house.

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1						1		2	3	2	2
CO2	3		2	1		2	1	2		1		3	3		2
CO3	3	2	2	2		2				1		2	3	2	
CO4	3	3	2	2	1	2	2			1		3	3	3	2
CO5	3	3	2	2	2	2	2	2		1		2	3	3	2
1. Low Association 2: Average Association 3: Strong Association															

Integral University, Lucknow
Department of Computer Science &Engineering
B.TECH. COMPUTER SCIENCE
Subject Name: Engineering Mathematics-II, Subject Code: MT-112
w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
None	None	3	1	0	4

CO 1	Solve first order linear equations and higher order differential equation of certain types and interpret the solutions.
CO 2	To use shift theorems to compute the Laplace transform, inverse Laplace transform and the solutions of second order, linear equations with constant coefficients.
CO 3	Able to determine given function in terms of sine and cosine terms in Fourier series.
CO 4	Apply problem-solving using concepts and techniques from PDE's and Fourier analysis applied to diverse situations in physics, engineering, financial mathematics and in other mathematical contexts.
CO 5	Apply method of least squares to find the curve of best fit for the given data

COURSE OBJECTIVES: The course is aimed to develop the skills in mathematics which is necessary for grooming them into successful engineering graduate. The topics introduced will serve as basic tools for specialized studies in science field

UNIT I	**Differential Equations**	**8**
	Linear differential equations of first order, Linear differential equations of higher order with constant coefficients,Complementary functions and particular integrals, Simultaneous linear differential equations, Solution ofsecond order differential equations by changing dependent and independent variables, Method of variation ofparameters, Applications to engineering problems (without derivation).	
UNIT II	**Laplace Transform**	**8**
	Laplace transform, Existence theorem, Laplace transform of derivatives and integrals, Unit stepfunction, Dirac-delta function, Laplace transform of periodic functions, Inverse Laplace transform, Convolutiontheorem, Applications to solve simple linear and simultaneous differential equations.	
UNIT III	**Fourier Series and Partial Differential Equations**	**9**
	Periodic functions, trigonometric series, Fourier series of period 2 π, Euler's formulae, functions havingarbitrary period, change of interval, Even and odd functions, Half range sine and cosine series. Introduction of partial differential equations, linear partial differential equations with constant coefficients ofsecond order and their classifications to parabolic, elliptic and hyperbolic forms with illustrative examples.	
UNIT IV	**Applications of Partial Differential Equations**	**8**

	Method of separation of variables for solving partial differential equations, Wave equation up to two-dimensions,Laplace equation in two-dimensions, Heat conduction equations up to two dimensions, Equations of transmissionLines.	
UNIT V	**Curve fitting and Solution of Equations**	**7**
	Method of least squares, curve fitting of straight line and parabola, Solution of cubic and biquadratic equations.	

References:

1. E. Kreyszig Advanced Engineering Mathematics,Wiley Eastern Ltd.
2. Jaggi and Mathur Advanced Engineering Mathematics, Khanna Pub.
3. B. S. Grewal Higher Engineering Mathematics, Khanna Pub.
4. Dennis G. Zill Advanced Engineering Mathematics, CBS Pub.

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	3	3	3					1			
CO2	3	2	2	1	2	2	2			3			1	2	
CO3	3	2	3	1	3	2	3								3
CO4	3	2	3	1	3	3	2			1			2		
CO5	3	2	1	1	3	2	1								
1. Low Association 2: Average Association 3: Strong Association															

Integral University, Lucknow
Department of Computer Science &Engineering
B.TECH. COMPUTER SCIENCE
Subject Name: Basic Mechanical Engineering, Subject Code: ME-101
w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
None	None	3	1	0	4

CO 1	Explain basic concepts of thermal sciences and temperature measurement on the basis of zeroth law of thermodynamics.
CO 2	Understand and apply first and second law of thermodynamics to various processes and real systems.
CO 3	Model the problem using free-body diagrams and reach to solution by using equilibrium equations.
CO 4	Draw Shear Force Diagram (SFD) and Bending Moment Diagrams (BMD) for statistically determinate beams.
CO 5	Design simple components on the basis of knowledge of stress, strain and strength of material.

UNIT I	**FUNDAMENTALS OF THERMODYNAMICS**	**8**
	Fundamental Concepts and Definitions: Definition of Thermodynamics, System, surrounding and universe, Phase, Concept of continuum,Macroscopic & microscopic point of view. Density, Specific volume, Pressure, temperature.Thermodynamic equilibrium, Property, State, Path, process, Cyclic process, Energy and its form,Work and heat, Enthalpy. Laws of thermodynamics: Zeroth law: Concepts of Temperature, Zeroth law.	
UNIT II	**FIRST LAW &SECOND LAW**	**8**
	First law: First law of thermodynamics. Concept of processes, Flow processes and control volume,Flow work, Steady flow energy equation, Mechanical work in a steady flow of process. Second law: Essence of second law, Thermal reservoir, Heat engines, COP of heat pump and refrigerator.Statements of second law, Carnot cycle, Clausius inequality.	
UNIT III	**MECHANICS AND STRENGTH OFMATERIALS**	**8**
	Force system and Analysis: Basic Concept: Laws of motion. Transfer of force to parallel position, Resultant of planer force system.Free Body diagrams, equilibrium and its equation.	

	Friction: Introduction, Laws of Coulomb friction, Equilibrium of bodies involving dry friction, beltfriction.	
UNIT IV	**STRUCTURE ANALYSIS**	**8**
	Beams: Introduction, Shear force and bending moment, Shear and bending moment diagram for staticallydeterminate beams.	
UNIT V	**STRESS AND STRAIN ANALYSIS**	**8**
	Simple Stress and strain: Introduction, Normal, shear stresses, Stress-strain diagrams for ductile andbrittle materials. Pure Bending of Beams: Introduction, Simple bending theory.	

References:

1. Van Wylen G.J. &Sonnlog R.E. Fundamentals of Classical Thermodynamics, John Wiley &Sons, Inc. NY.
2. WarkWenneth: Thermodynamics (2nd edition) Mc Graw Hill Book Co. NY.
3. Holman, J.P.: Thermodynamics, Mc Graw Hill Book Co.NY.
4. Shames I.H., Engineering Mechanics, P.H.I.
5. D.S. Kumar, Mechanical Engineering, S.K. Katarial& Sons.
6. BhaviKatti S.S., Engineering Mechanics, New Age Pub.
7. P.K. Bharti: Engineering Mechanics, Kataria and Sons.
8. R.K. Rajput, Mechanical Engineering, Laxmi Pub.

PO-PSO CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**	**2**	**2**	**1**		**2**						**3**	**3**	**2**	**2**
CO2	**3**	**3**	**3**	**2**		**3**						**3**	**3**	**3**	**2**
CO3	**3**	**3**	**3**	**2**		**3**						**3**	**3**	**2**	**1**
CO4	**3**	**2**	**2**	**2**		**3**						**3**	**3**	**2**	**1**
CO5	**3**	**3**	**2**	**1**		**3**						**3**	**3**	**2**	**2**
1. Low Association 2: Average Association 3: Strong Association															

Integral University, Lucknow
Department of Computer Science & Engineering
B.TECH. COMPUTER SCIENCE
Subject Name: Computer Programming, Subject Code: CS-101
w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
None	None	3	1	0	4

CO 1	Understand basic concepts of computer, networks and formulation of algorithmic solutions to problems.
CO 2	Understanding of programming concepts of C language and their implementation.
CO 3	Analyze and develop programs on pointers and functions.
CO 4	Develop programs on different operations on arrays, matrices & strings.
CO 5	Implement programs on structure, union & Dynamic memory allocation.

Objective:

- To give knowledge of computers, networks, algorithms & flowcharts.
- To provide fundamental concepts of programming language 'C'.
- To show the use of functions and pointers to different problems.
- To study the implementation of arrays, matrices and strings.
- To give concepts of user defined data types structure & union.

UNIT I	**Introduction to Computers:**	**9**
	Generation of computers, Characteristic and classifications of computers. Components of Computer: CPU, Various I/O Devices, Memory & its types, (Memory Hierarchy, Storage Media), Computer Software and their types, Operating System. Computer Networks & Communication: LAN, MAN, WAN, Network Topologies, Modes of Data Communication. Introduction to Internet and its Safeguard: Internet Addresses, Domain Name System, URL, Web Browsers Search Engines, Firewalls, Anti-Virus, Translators. Algorithm and flowchart: Algorithm and flow chart characteristics, Sketching Flowcharts of various problems.	
UNIT II	**Starting C:**	**8**
	Standard I/O in 'C', 'C' Fundamental, C Character set, Constants, Variables, Keywords and Identifiers, Data types, Declaration. Operators and Expressions, Conditional statements (If, If-else), Nesting of if- else statement, switch statement, The? operator, goto statement. Decision making and Looping (While, Do-While, for), Break and Continue statements, Case Control Structures (Switch), C programs based on above concepts.	
UNIT III	**Introduction to pointers:**	**9**

	Declaration and initialization of pointers, accessing the address of the variable, accessing the variable through the pointer, chain of pointers, pointers operators, pointer arithmetic Introduction to Functions: Need of "C" function, User Defined and Library Functions, Prototype of Function, Call by Value; Call by Reference; Nesting of Functions, Recursion. Pointers with function, C program based on above concept.	
UNIT IV	**Array:**	**10**
	Concept of One Dimensional and Multi-Dimensional arrays, Declaration, Operations: insert, delete, search, traverse, and merge, matrix operations, Sorting: Bubble sort, merge sort, insertion sort. Character array and strings: declaring and initializing strings variable, reading and writing a character, reading and writing strings from terminal, Arithmetic operations on characters, string handling functions. Application of pointers, and function on array, C program based on above concept.	
UNIT V	**Structures:**	**8**
	Defining Structure, Declaration of Structure Variable, Accessing Structure members, copying and comparing structure variable, operation on individual member, nesting of structures, Array of structures. Application of pointers and function on Structures. Union Defining Union Declaration of Union, difference between structure and Union, Introduction of Static and Dynamic memory allocation- The process of Dynamic memory allocation, C program based on above concept.	

References:

1. Foundation of Information Technology by 'D.S. Yadav'- New age International
2. Programming in 'C' by 'E Balagurusamy'. -TMH Publication.
3. Let us 'C' by 'YashwantKanitkar'-BPB Publication.
4. The C Programming Essentials by Dey- Pearson Publication.

CO-PO/PSO MAPPING

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**3**	**2**				**3**		**3**	**2**			**2**	**3**	**2**	
CO2	**3**	**3**	**1**			**1**		**2**				**2**	**1**	**3**	
CO3	**3**	**2**				**2**	**3**	**2**				**3**			**3**
CO4	**3**	**2**		**2**		**3**	**2**	**2**				**1**			**3**
CO5			**1**			**1**							**1**		**3**
1. Low Association 2: Average Association 3: Strong Association															

CHEMISTRY LAB (CH-102)

CO 1	Analyze the need, design and perform given set of experiments with precision and accuracy.
CO 2	Utilize the fundamental laboratory techniques for analyses such as titrations.
CO 3	Organize the records of all performed experiments in the manner which is required in laboratory.
CO 4	Comprehension of principle, instrumentation and use of UV-VIS spectrophotometer and pH meter.
CO 5	Able to analyze importance of personal safety, care of chemicals, equipments and gain experimental skill.

List of Experiments

1. To determine the Iron content in the given iron ore by using external indicator.

2. To determine the Alkalinity in the given water sample

3. To determine the Chloride content in the given water sample by Mohr's method. (Argentometric method)

4. To determine the Percentage of Available Chlorine in the given sample of Bleaching powder iodometrically.

5. To determine the temporary and permanent hardness in water sample by Complexometric titration using EDTA as standard solution.

6. To determine the Equivalent weight of Iron by Chemical Displacement method. (The Equivalent weight of copper is 63.5)

7. To determine the strength of given HCl solution by titrating it against NaOH solution using pH meter.

8. To determine the iron concentration in the given water sample by Spectrophotometer using potassium thiocyanate as color developing agent.

9. To detect the presence of functional groups in the given organic compound.

10.To detect the presence of Elements in the given organic compound.

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1					2			2			
CO2	3	3	3	3	1	2	1	2	2			2			
CO3	3	2	2	2		2			2	3		2			
CO4	3	1	2	2	1	2	2	1	2			2			
CO5	3	2	2	2	1	2	2	1	2			2			
1. Low Association 2: Average Association 3: Strong Association															

MECHANICAL ENGINEERING LAB (ME-102)

L T P

0 0 2

List of Experiments

1. To study and sketch the model of fire tube (Lancashire and Locomotive) boiler.

2. To study and sketch the model of water tube (Babcock & Wilcox) boiler.

3. To study and sketch the model of two stroke S.I. Engines.

4. To study and sketch the model of four stroke S.I. Engines.

5. To study and sketch the model of four stroke C.I. Engines.

6. To study and sketch the model of vapour compression refrigerator.

7. To study and sketch the model of simple steam engine.

8. To determine the Rockwell hardness no. of a given specimen using hardnesstester.

9. To perform the tensile test on specimen and determine the different mechanicalproperties with the help of UTM.

10. To determine the impact strength of mild steel by Izod method using impacttesting machine.

11. To perform the compression test on brick and determine the ultimate compressivestrength with the help of UTM.

COURSE: COMPUTER PROGRAMMING LAB

COURSE CODE: CS102

COURSE CREDIT: 1

COURSE OBJECTIVES:

- To learn the basic concepts and syntax of C programming.
- To be able to develop logics which help them to create programs and applications using C language.
- To learn the use of C libraries functions in C language.
- To learn the file handling and basic memory allocation concepts in C language.
- After learning the C programming they can easily switch over to any other language.

List of Experiments (s)

1	Write a Program to print any message
2	Write a Program to print sum and Multiply of two numbers.
3	Write a Program to enter the temperature in Celsius(c) then count it into Fahrenheit
4	Write a Program to swap the number taking the help of third variable.
5	Write a Program to calculate the volume of box.
6	Write a Program to swap the number without taking the help of third variable.
7	Write a Program to check a year is leap year not.
8	Write a Program to print number is even or odd.
9	Write a Program to Print month of name using switch case
10	Write a Program to print the no is positive or negative.
11	Write a Programto find the greater number enter by user.
12	Write a Program to find the greater number Input 3 No.
13	Write a Program to enter any no and check whether the given no is palindrome or not.
14	Write a Program to enter any no. and check whether the given no. is Armstrong or not.
15	Write a Program to Print Pattern * * * * * * * * * *
16	Write a Program to Print Pattern 1 2 3 4 1 2 3 1 2 1
17	Write a Program to Print Pattern 1 1 2 1 2 3

1 2 3 4

18 Write a program to find in C to design the report card of 5 subject
according to the following condition if the total percentage are.
>=35 and <45 IIIrdDiv
>=45 and <60 IIndDiv
>=60 IstDiv
If any students score <35 in any of the subject display fail

19 Write a Program to create 2-D array or order M*N and insert the element and display it.

20 Write a Program to find the addition of two matrix of order M*N.

21 Write a Program to find the Transpose of the matrix.

22 Write a Program to swap two numbers Call by Value.

23 Write a Program to swap two number using function pointers.

24 WAP for structure of player Name, batting average and then name.

COURSE OUTCOMES (CO):

After completion of the course, a student will be

CO 1	Able to understand the basic concepts of C programming language and their implementation.
CO 2	Able to design and develop various programming problems using C programming concepts.
CO 3	Able to analyze and develop programs on pointers and functions.
CO 4	Able to develop programs on different operations on arrays, matrices & strings.
CO 5	Able to implement programs on structure, union & Dynamic memory allocation.

CO-PO MAPPING:

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**1**	**1**	**2**		**3**		**3**						**2**	**1**	**1**
CO2	**1**	**1**	**1**	**2**	**1**		**3**						**2**	**1**	**1**
CO3	**1**	**2**	**2**	**2**			**3**						**2**	**1**	**1**
CO4	**1**	**2**	**2**	**2**			**3**						**2**	**1**	**1**
CO5	**1**	**2**	**1**				**3**						**2**	**1**	**1**
	1. Low Association **2: Average Association** **3: Strong Association**														

PROFESSIONAL COMMUNICATION LAB (LN-151)

Day 1. Introductions (Instructors, Students and Curriculum)

Day 2. Listening exercises

Day 3. Framing Questions

Day 4. Making Small talks

Day 5. Presentation Making- tips, do's and don'ts/ group presentations

Day 6. Group presentations

Day 7. Phonetic alphabet

Day 8. Phonetic transcription

Day 9. Intonation

Day 10. Stress

Day 11. . Working on Negotiations

Day 12- 14Situational conversational section- Social language, emergency situations/ seeking help, inquiries, communicating bad news

Day 15: Exercise on cross cultural communication

13/2/14

Integral University, Lucknow

Department of Computer Science and Engineering

Program: B. Tech. CSE (Cloud Technology and Information Security)

Subject Name: Introduction to Communication Skills**, Subject Code:** CS230

w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
None	None	2	1	0	3

CO 1	*State* **[L1: Knowledge]**the principles of communication
CO 2	*Classify* **[L2: Comprehension]** the different models of communication
CO 3	*Explain* **[L2: Comprehension]**how to plan a presentation
CO 4	*Compose***[L4: Analyze]** business letters and reports

Objective:

- To state the principles of Communication
- Classify the different models of communication
- Explain how to plan a presentation
- Compose business letters and reports

UNIT I	**Oral Communication**	**8**
	Principles of nonverbal communication - through clothes and body language, Types of managerial speeches – speech of introduction, speech of thanks, occasional speech, theme speech, Mastering the art of giving interviews in selection or placement interviews, discipline interviews, appraisal interviews, exit interviews, Building Persuasion & Negotiation abilities.	
UNIT II	**Communication in Business**	**8**
	Role of Communication in Business - Main forms of Communication in Business - Communication process – Coding and decoding - Roots of misunderstanding - Inferential model - Original message and reconstructed message Symbols mismatch implications -Non-verbal symbols - Verbal symbols - Seven communication roadblocks Communicating across cultures.	
UNIT III	**Better Public Speaking & Presentation Introduction:**	**8**
	Definition; Speaking to Audience; Preparing a Presentation; Achieving Clarity and Impact; UsingVisuals; Arranging the room; Presentation Planning Checklist; Presentation Delivery, appearance, Visual Aids; Understanding Presentations Aspects; Making Technical Talk interesting, Preparation, Research, Organizing Materials; Delivering presentation.	
UNIT IV	**Written Communication**	**8**
	7cs of written communication, Business letters - Stationery - Format and layout -E-mail - Managing the mailbox Presenting mail – Common sense and etiquette. Report Writing - Parts of a report - Qualities of a good report improving writing skills, internal communication through memos, minutes, notices & reports.	
UNIT V	**Sample Business Letters**	**8**

	Types of Business letters - routine letters, bad news and persuading letters, sales letters, Inquiries, Circulars,Quotations, Orders, Acknowledgments, Executions, Complaints, Claims & Adjustments, collection letters, job application letters, Curriculum Vitae / Resume -Invitation to interview - Offer of employment - Letter of acceptance Letter of resignation -Recommendation letter, Logical Traps.	

References:

1. Matthukutty M Monippally, Business Communication Strategies, Tata McGraw-Hill.
2. Chaturvedi P.D. et al, Business Communication; Concepts, Cases, & Applications, Pearson Education.
3. Shirley Taylor, Communication for Business, Pearson Education.
4. Lesiicar and Flatley, BasicBusiness Communication, Tata McGraw-Hill.
5. Courtan L. Bovees et al., Business Communication Today, Pearson Education.

CO-PO/PSO MAPPING

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		1				1			2	3			1	2	2
CO2		1				1	2			3		3	3	2	2
CO3		3	2		1				2	3		1	2	1	2
CO4						3	2		3			1	2	3	1
1: Low Association 2: Average Association 3: Strong Association															

Integral University, Lucknow

Department of Computer Science and Engineering

Program: B. Tech. CSE (Cloud Technology and Information Security)

Subject Name: Computer Architecture and Organization**, Subject Code:** CS231

w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
Computer fundamental	**None**	**2**	**1**	**0**	**3**

CO 1	Define **[L1: Knowledge]** registers, bus as well as memory and its hierarchy and input/output devices.
CO 2	Explain **[L2: Comprehension]** division-based algorithms for different representation of data and discuss I/O interfaces, ports and Data Transfer modes
CO 3	Apply **[L3: Application]** register and stack organization and construct different control units.
CO 4	Classify **[L4: Analysis]** types of memory and memory mapping of one type with other

Objective: To provide elementary and application-based knowledge of different components that can be used to design an efficient architecture of the system.

UNIT I	**Register Transfer and Micro-operation**	**8**
	Register Transfer Language, Register Transfer, Bus and Memory Transfer: Three state bus buffers, Memory Transfer. Arithmetic Micro-operations: Binary Adder, Binary Adder-Subtrator, Binary Incrementor, Logic Micro-operations: List of Logic micro operations, Shift Micro-operations (excluding H/W implementation), Arithmetic Logic Shift Unit.	
UNIT II	**Basic Computer Organization**	**8**
	Instruction Codes, Computer Registers: Common bus system, Computer Instructions: Instruction formats, Instruction Cycle: Fetch and Decode, Flowchart for Instruction cycle, Register reference instructions.	
UNIT III	Micro Programmed Control Unit	**8**
	Control Memory, Address Sequencing, Conditional branching, Mapping of instruction, Subroutines, Design ofControl Unit, Central Processing Unit: Introduction, General Register Organization, Stack Organization: Register stack, Memory stack; Instruction Formats, Addressing Modes.	
UNIT IV	**Computer Arithmetic**	**8**
	Introduction, Addition and Subtraction, Multiplication Algorithms (Booth algorithm), Division Algorithms, Input–Output Organization: Peripheral devices, Input – Output interface, Introduction of Multiprocessors: Characteristics of multi-processors.	

UNIT V	**Modes of Data Transfer and Memory Organization**	**8**
	Modes of Data Transfer: Priority Interrupt, Direct Memory Access, Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.	

References:

1. Computer System Architecture by Morris Mano, PHI
2. Computer Organization and Architecture by William Stallings, PHI
3. Digital Computer Electronics: An Introduction to Microcomputers by Malvino, TMH
4. PC Hardware in a Nutshell by Barbara Fritchman Thompson, Robert Bruce Thompson, O'Reilly, 2nd Edition , 2010
5. Fundamentals of Computer Organization and Architecture by Mostafa AB-EL-BARR and Hesham EL-REWNI, John Wiley and Sons
6. Fundamental Of computer Organization by Albert Zomaya, 2010

CO-PO/PSO MAPPING

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**3**	**3**	**2**	**1**								**3**	**1**	**2**	**2**
CO2	**3**	**3**	**3**	**2**	**1**	**1**						**3**	**3**	**2**	**2**
CO3	**3**	**3**	**2**	**1**	**2**	**1**						**3**	**2**	**1**	**2**
CO4	**3**	**2**	**3**	**2**	**2**	**1**						**2**	**2**	**3**	**1**
1: Low Association, 2: Average Association, 3: Strong Association															

Integral University, Lucknow

Department of Computer Science and Engineering

Program: B. Tech. CSE (Cloud Technology and Information Security)

Subject Name: Data Structures & Algorithms**, Subject Code:** CS232

w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
None	None	2	1	0	3

CO1	Students would be able to Define **[L1:Knowledge]** facts, terms and basic concepts of various data structures like Array, List, Stack, Queue, Tree and Graph using C as the programming language with static or dynamic implementations.
CO2	Students would be able to Demonstrate **[L2: Comprehension]** the basic understanding using programming techniques for illustrating solution of problems.
CO3	Students would be able to Perform **[L3: Application]** different operations on data structures by applying knowledge and facts gained.
CO4	Student would be able to Analyze **[L4: Analysis]** and test appropriate data structures and algorithms to solve problems and also to draw conclusions regarding the best data structure for the problem.

Objective:

To introduce the fundamental concepts of data structures and to emphasize the importance of data structures in development and implementation of efficient algorithms.

UNIT I	**Introduction to Data structures**	**8**
	Definition, Classification of data structures: primitive and non-primitive, Elementary data organization, Time andspace complexity of an algorithm (Examples), String processing. Dynamic memory allocation and pointers:Definition of dynamic memory allocation, Accessing the address of a variable, Declaring and initializing pointers,Accessing a variable through its pointer, Meaning of static and dynamic memory allocation, Memory allocationfunctions: Malloc(), Calloc(), free() and realloc(). Recursion: Definition, Recursion in C (advantages), WritingRecursive programs – Binomial coefficient, Fibonacci, GCD.	
UNIT II	**Searching and Sorting**	**8**

	Basic Search Techniques: Sequential search: Iterative and Recursive methods, Binary search: Iterative and Recursivemethods, Comparison between sequential and binary search. Sort: General background and definition, Bubble sort,Selection sort, Insertion sort, Merge sort, Quick sort.	
UNIT III	**Stack and Queue**	**7**
	Stack – Definition, Array representation of stack, Operations on stack: Infix, prefix and postfix notations, Conversionofan arithmetic expression from Infix to postfix, Applications of stacks. Queue: Definition, Array representation ofqueue, Types of queue: Simple queue, Circular queue, Double ended queue (deque), Priority queue, Operations on alltypes of Queues.	
UNIT IV	**Linked List**	**9**
	Definition, Components of linked list, Representation of linked list, Advantages and Disadvantages of linked list.Types of linked list: Singly linked list, doubly linked list, Circular linked list, Operations on singly linked list:creation, insertion, deletion, search and display.	
UNIT V	**Tree Graphs and their Applications**	**8**
	Definition : Tree, Binary tree, Complete binary tree, Binary search tree, Heap Tree terminology: Root, Node, Degreeof a node and tree, Terminal nodes, Non-terminal nodes, Siblings, Level, Edge, Path, depth, Parent node, ancestors ofa node. Binary tree: Array representation of tree, Creation of binary tree. Traversal of Binary Tree: Preorder, Inorderandpostorder. Graphs, Application of Graphs, Depth First search, Breadth First search.	

References:

1. Weiss, Data Structures and Algorithm Analysis in C, II Edition, Pearson Education, 2001
2. Lipschutz: Schaum's outline series Data structures Tata McGraw-Hill
3. Robert Kruse Data Structures and program designing using 'C'
4. Trembley and Sorenson Data Structures
5. E. Balaguruswamy Programming in ANSI C
6. Bandyopadhyay, Data Structures Using C Pearson Education, 1999
7. Tenenbaum, Data Structures Using C. Pearson Education, 200
8. Kamthane: Introduction to Data Structures in C. Pearson Education 2005.
9. Hanumanthappa M., Practical approach to Data Structures, Laxmi Publications, Fire Wall media 2006
10. Langsam, AusensteinMaoshe&M.Tanenbaum Aaron Data Structures using C and C++ Pearson Education

CO-PO/PSO MAPPING

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**3**	**3**										**3**			
CO2	**3**	**3**	**2**	**1**								**3**			
CO3	**3**	**3**	**2**									**3**			
CO4	**3**	**2**	**3**	**2**								**2**			
1: Low Association, 2: Average Association, 3: Strong Association															

Integral University, Lucknow

Department of Computer Science and Engineering

Program: B. Tech. CSE (Cloud Technology and Information Security)

Subject Name: Object Oriented Programming Using Java**, Subject Code:** CS234

w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
None	**None**	**2**	**1**	**0**	**3**

CO1	*Identify***[L1: Knowledge]**classes, objects, members of a class and relationships among them needed for a specific problem.
CO2	*Explain***[L2: Comprehension]**Java application programs using OOP principles and proper program structuring.
CO3	*Demonstrate***[L3: Application]**the concepts of polymorphism and inheritance.
CO4	WriteJava programs to *Analyze***[L4: Analyze]** error handling techniques usingexception handling

Objective:

- Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.
- Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc. and exception handling mechanisms.
- Understand the principles of inheritance, packages and interfaces.

UNIT I	**Introduction**	**8**
	History and Overview of Java, Object Oriented Programming, Control statements- if and for loop. Using Blocks ofcodes, Lexical issues - White space, identifiers, Literals, comments, separators, Java Key words, Data types - Integers,Floating point, characters, Boolean, A closer look at Literals, Variables, Type conversion and casting. Automatic typepromotion in Expressions Arrays. Operators - Arithmetic operators, Bit wise operators, Relational Operators, BooleanLogical operators, Assignment Operator, Operator Precedence. Control Statements – Selection Statements - if, Switch,Iteration Statements - While, Do-while, for Nested loops, Jump statements.	
UNIT II	**Classes**	**8**
	Class Fundamentals, Declaring objects, Assigning object reference variables. Methods - constructors, "this" keyword,finalize ( ) method A stack class, Over loading methods. Using objects as parameters, Argument passing, Returningobjects. Recursion, Access control, Introducing final, understanding static. Introducing Nested and Inner classes.Using command line arguments. Inheritance – Basics, Using super, method overriding, and Dynamic methodDispatch, Using abstract classes and final with Inheritance.	
UNIT III	**Packages**	**8**
	Definition. Access protection importing packages. Interfaces: Definition and implementation. Exception Handling –Fundamentals, types, Using try and catch and Multiple catch clauses, Nested try Statements, throw, throws, finally.Java's built-in exception, using Exceptions.	
UNIT IV	**Multithreaded Programming**	**8**
	Java thread model – main thread, creating single and multiple thread. Is alive ( ) and join ( ). Thread – Priorities,Synchronization, Inter thread communication, suspending, resuming and stopping threads, using multi-threading. I / Obasics – Reading control input, writing control output, Reading and Writing files. Applet Fundamentals – AWTpackage, AWT Event handling concepts, the transient and volatile modifiers. Using instance of using assert.	
UNIT V	**Database Connectivity (JDBC)**	**8**
	Database connectivity – JDBC architecture and Drivers. JDBC API - loading a driver, connecting to a database,creating and executing JDBC statements, handling SQL exceptions. Accessing result sets:types and methods. Anexample - JDBC application to query a database.	

Reference:

1. The complete reference Java –2: V Edition by Herbert Schildt Pub. TMH.
2. SAMS teach yourself Java – 2: 3rd Edition by Rogers Cedenhead and Leura Lemay Pub. Pearson Education.

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**3**	**3**	**2**	**1**								**3**			
CO2	**3**	**3**	**3**	**2**	**1**	**1**						**3**			
CO3	**3**	**3**	**2**	**1**	**2**	**1**						**3**			
CO4	**3**	**2**	**3**	**2**	**2**	**1**						**2**			
1: Low Association, 2: Average Association, 3: Strong Association															

Integral University, Lucknow

Department of Computer Science and Engineering

Program: B. Tech. CSE (Cloud Technology and Information Security)

Subject Name: Introduction to Information Security & Cryptography**, Subject Code:** CS254

w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
None	**None**	**3**	**1**	**0**	**4**

CO1	Describes **[L1: Knowledge]** Information System and classify **[L2: Comprehension]** various threats to Information System.
CO2	Illustrate **[L2: Comprehension**] various types of cyber-attacks and demonstrate **[L3: Application]** various security techniques.
CO3	Apply **[L3: Application]** different ways for developing **[L5: Synthesis]** secure Information System.
CO4	Define [L1: Knowledge] various encryption & decryption algorithms, Message authentication codes and Digital Signature and ability to relate [L1: Knowledge] Modular arithmetic Approaches and Network Security Approaches with Data Security.
CO5	Explain **[L2: Comprehension]** Key Management & Distribution Technique, Electronic mail security and ability to Discuss **[L2: Comprehension]** IP Security and System security to compute **[L2: Comprehension]** keys for encryption and decryption

Objective:

The course is designed to provide Basic knowledge of information security and cryptography. Students will be able to learn various algorithm used in securing information.

UNIT I	**Introduction to Information Security**	
	Overview of Information security, Threats, Type of Vulnerabilities and Risk, Business Requirements, Information Security Definitions – Security Policies – Tier 1 (origination Level), Tier 2 (Functional Level), Tier 3 (Application or Device Level), Procedures, Standards, Guidance. Role of Governance in Information Security, Develop a Risk Management Program, Risk Management Process, Best Practices for IT Governance.	
UNIT II	**Information Asset Classification**	
	Classification of Information, Information Assets – Owner, Custodian, User, Information Classification in terms of Secret, Confidential, Private and Public, Declassification. Retention and Disposal of Information Assets. Provide Authorization for Access – Owner, Custodian and User.	
UNIT III	**Logical Access Control**	
	User Identity and Access Management- Account Authorization, Access and Privilege Management, System and Network Access Control. Operating Systems Access Controls, Monitoring Systems Access Controls, Intrusion Detection System, Event logging, Cryptography. Physical Security: Identify Assets to be Protected, Perimeter Security, Firewalls, Prevention and Detection Systems, Safe Disposal of Physical Assets. Email Security: PGP, MIME, IP Security: IP security overview.	
UNIT IV	**Introduction to Cryptography**	
	Introduction to Advanced Cryptography and Cryptanalysis, Classical Encryption Techniques – Substitution Techniques, Transposition Techniques, Permutation Method. Advanced Encryption Techniques and Security Issues – RC4, One-time Pad, RSA, DES, Triple DES, AES and Diffie Hellman.	
UNIT V	**Conventional Encryption**	
	Confidentiality using conventional encryption – Placement of Encryption, Traffic Confidentiality, Key Distribution and Random Number Generation. Key management – Generating Keys, Nonlinear Keyspaces, Transferring Keys, Verifying Keys, Using Keys, Updating Keys, Storing keys, Backup keys, Compromised Keys, Lifetime of Keys, Destroying Keys and Public-Key Management	

Reference:

1. Mark Stamp's Information Security: Principles and Practice (WIND) Paperback – 2009 by Deven N. Shah, Wiley (2009)
2. Cryptography and Information Security by V. K. Pachghare, Prentice-Hall of India Pvt.Ltd; 2nd Revised edition edition (30 March 2015)
3. Information Security Risk Analysis - Thomas R. Peltier, Third Edition, Pub: Auerbach, 2012
4. Cryptography and Network Security Principles and Practices, by William Stallings, Pearson Education; Seventh edition (30 June 2017)

5. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole, Wiley, 1st ed; 2008
6. Information Security: The Complete Reference by Mark Rhodes-Ousley, McGraw Hill Education; Second edition (1 May 2013)
7. Principles of Information Security by Michael E. Whitman, Cengage Learning India Private Limited; 5 edition (2015)

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**3**	**3**	**2**									**3**			
CO2	**3**	**3**	**2**	**1**	**2**							**3**			
CO3	**3**	**3**	**2**	**2**	**2**							**3**			
CO4	**3**	**2**	**3**	**2**	**2**							**2**			
CO5	**3**	**2**	**3**	**2**	**3**							**2**			
1: Low Association, 2: Average Association, 3: Strong Association															

Pre-requisite	Co-requisite	L	T	P	C
None	None	3	1	0	4

CO1	*Define***[L1:Knowledge]** Object Oriented Programming paradigm and its use in web programming
CO2	*Explain***[L2: Comprehension]**basic principles of Python programming language and its integration with database
CO3	*Apply***[L3: Application]** python programming techniques to accessing Data in Structured Flat-File Form and sending Data in Unstructured File Form.
CO4	*Analyze***[L4: Analysis]** problem solving and programming capability of python programming
CO5	*Design***[L4: Design]**and Develop an application using python for Multithreading

Objective:

The course is designed to provide Basic knowledge of Python. Python programming is intended for software engineers, system analysts, program managers and user support personnel who wish to learn the Python programming language. Major Course learning objectives

1. To acquire programming skills in core Python.
2. To acquire Object Oriented Skills in Python
3. To develop the skill of designing Graphical user Interfaces in Python
4. To develop the ability to write database applications in Python

UNIT I	**Introduction to Python Environment** History and development of Python, Why Python? Grasping Python's core philosophy, discovering present and future development goals, working at the command line or in the IDE, Installing Anaconda on Windows, Linux and MAC, variables, data types. Output statements.	**9**
UNIT II	**Expressions and Control Statements** Working with Numbers and Logic, Performing variable assignments, Doing arithmetic, Comparing data using Boolean expressions, Creating and Using Strings, Interacting with Dates, Creating and Using Functions, Calling functions in a variety of ways, Using Conditional and Loop Statements, Making decisions using the if statement, Choosing between multiple options using nested decisions, Performing repetitive tasks using for, Using the while statement.	**9**
UNIT III	**Data Structures** Storing Data Using Sets, Lists, and Tuples: Performing operations on sets, working with lists, Creating and using Tuples, Defining Useful Iterators, indexing Data Using Dictionaries.	**8**
UNIT IV	**Data Management** Introduction to RDMS, Working with Real Data, Uploading small amounts of data into memory, Streaming large amounts of data into memory, Sampling data, Accessing Data in Structured Flat-File Form, Sending Data in Unstructured File Form, Managing Data from Relational Databases.	**8**
UNIT V	**CGI and GUI Programming in Python** Classes and Objects, Regular Expressions, CGI Programming, Networking, Sending Email, Multithreading, XML Processing, GUI Programming, Extending and	**8**

	Embedding Python	

Reference:

1. Python: Essential Reference, by David M. Beazley
2. Core Python Programming, by Wesley J. Chun, Prentice Hall
3. Python Programming: An Introduction to Computer Science, by John M. Zelle, Franklin – Beedle and Associates
4. Professional Ruby on Rails by Noel Rappin, Wiley India Pvt Ltd
5. Learn Ruby on Rails: Book one, by Daniel Kehoe

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**3**	**3**	**2**									**3**			
CO2	**3**	**3**	**2**	**1**	**2**							**3**			
CO3	**3**	**3**	**2**	**2**	**2**							**3**			
CO4	**3**	**2**	**3**	**2**	**2**							**2**			
CO5	**3**	**2**	**3**	**2**	**3**							**2**			
1: Low Association, 2: Average Association, 3: Strong Association															

Integral University, Lucknow

Department of Computer Science and Engineering

Program: B. Tech. CSE (Cloud Technology and Information Security)

Subject Name: Operating Systems Building Blocks**, Subject Code:** CS239

w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
None	None	2	1	0	3

CO1	Analyze**[L4: Analysis]** the structure of OS and basic architectural components involved in OS design.
CO2	Analyze**[L4: Analysis]** and design the applications to run in parallel either using process or thread models of different OS
CO3	Analyze**[L4: Analysis]** the various device and resource management techniques for timesharing and distributed systems
CO4	Understand**[L2: Comprehension]** the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system

Objective:

To study and apply concepts relating to operating systems, such as concurrency and control of asynchronous processes, deadlocks, memory management, processor and disk scheduling, parallel processing, and file system organization.

UNIT I	**Introduction to Operating System**	**6**
	Introduction, Objectives and Functions of OS, Evolution of OS, OS Structures, OS Components, OS Services, Systemcalls, System programs, Virtual Machines.	
UNIT II	**Process Management**	**14**
	Processes: Process concept, Process scheduling, Co-operating processes, Operations on processes, Inter processcommunication, Communication in client-server systems. Threads: Introduction to Threads, Single and Multi-threadedprocesses and its benefits, User and Kernel threads, Multithreading models, threading issues.CPU Scheduling: Basic concepts, Scheduling criteria, Scheduling Algorithms, Multiple Processor Scheduling, Realtime Scheduling, Algorithm Evaluation, Process Scheduling Models.Process Synchronization: Mutual Exclusion, Critical – section problem, Synchronization hardware, Semaphores,Classic problems of synchronization, Critical Regions, Monitors, OS Synchronization, Atomic TransactionsDeadlocks: System Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention,Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.	
UNIT III	**Storage Management**	**10**

	Memory Management: Logical and physical Address Space, Swapping, Contiguous Memory Allocation, Paging,Segmentation with Paging.Virtual Management: Demand paging, Process creation, Page Replacement Algorithms, Allocation of Frames,Thrashing, Operating System Examples, Page size and other considerations, Demand segmentationFile-System Interface: File concept, Access Methods, Directory structure, File- system Mounting, File sharing,Protection and consistency semanticsFile-System Implementation: File-System structure, File-System Implementations, Directory Implementation,Allocation Methods, Free-space Management, Efficiency and Performance, RecoveryDisk Management: Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, DiskAttachment, stable-storage Implementation.	
UNIT IV	**Protection and Security**	**5**
	Protection: Goals of Protection, Domain of Protection, Access Matrix, Implementation of Acess Matrix, Revocationof Access Rights, Capability- Based Systems, Language – Based ProtectionSecurity: Security Problem, User Authentication, One – Time Password, Program Threats, System Threats,Cryptography, Computer – Security Classifications.	

Reference:

1. Milan Milonkovic, Operating System Concepts and design, II Edition, McGraw Hill 1992.
2. Tanenbaum, Operation System Concepts, 2nd Edition, Pearson Education.
3. Silberschatz / Galvin / Gagne, Operating System,6th Edition,WSE (WILEY Publication)
4. William Stallings, Operating System, 4th Edition, Pearson Education.
5. H.M.Deitel, Operating systems, 2nd Edition ,Pearson Education
6. Abraham Silberschatz and peter Baer Galvin, Operating System Concepts, 8th Edition, Pearson Education 1989 (Chapter 1,3.1,3.2,3.3,3.4,3.6,4,5,6 (Except 6.8,6.9), 7, 8,9,10,11,13, (Except 13.6) 19 (Except19.6),20(Except 20.8, 20.9), 22,23)
7. Nutt: Operating Systems, 3/e Pearson Education 2004

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**3**	**3**	**2**	**1**								**3**			
CO2	**3**	**3**	**3**	**2**	**1**	**1**						**3**			
CO3	**3**	**3**	**2**	**1**	**2**	**1**						**3**			
CO4	**3**	**2**	**3**	**2**	**2**	**1**						**2**			
1: Low Association, 2: Average Association, 3: Strong Association															

Integral University, Lucknow

Department of Computer Science and Engineering

Program: B. Tech. CSE (Cloud Technology and Information Security)

Subject Name: Human Values & Professional Ethics**, Subject Code:** BM-226

w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
None	**None**	**3**	**0**	**0**	**0**

CO1	*Define***[L1: Knowledge]**the human values and related terms.
CO2	*Explain***[L2: Comprehension]** the difference between the moral, social and human values and others
CO3	*Build* **[L3: Application]**become a moral human being from inside.
CO4	*Analyze***[L4: Analysis]**the right or wrong before proceeding to a task.
CO5	*Create* **[L5: Synthesis]**awareness about management ethics and human values.
CO6	*Judge* **[L6: Evaluation]**the moral concerns regarding the profession.
CO6	*Appraise* **[L6: Evaluation]**the right of others.

Objective:

- To understand the **[L2: Comprehension]**moral values that ought to guide the Management profession, Resolve the moral issues in the profession,
- To justify the moral judgment**[L6: Evaluation]** concerning the profession.
- To create an awareness on **[L5: Synthesis]**Management Ethics and Human Values.
- To inspire Moral and Social Values and Loyalty.
- Intended to develop a set of beliefs, attitudes, and habits that engineers should display concerning morality.

➢ To appreciate**[L6: Evaluation]**the rights of others.

UNIT I	**Human Value Education**	**6**
	Understanding the need, basic guidelines, content and process for Value Education, SelfExploration - Its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for selfexploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations, Right understanding,Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being withtheir correct priority, Understanding Happiness and Prosperity correctly.	
UNIT II	**Introduction to Ethical Concept**	**6**
	Definition of industrial ethics and values, Ethical rules of industrial worker. Valuesand Value Judgments. Moral Rights and Moral rules, Moral character and responsibilities. Privacy, Confidentiality,Intellectual Property and the Law. Ethics as Law.	
UNIT III	**Professional Responsibility**	**6**
	The basis and scope of Professional Responsibility, Professions and Norms ofProfessional Conduct, Ethical Standards versus Profession, Culpable mistakes, the Autonomy of professions andcodes of ethics. Employee status and Professionalism. Central Professional Responsibilities of Engineers: Theemerging consensus on the Responsibility for safety among engineers, hazards and risks.	
UNIT IV	**Engineers Ethics**	**6**
	Senses of 'Engineering Ethics' - variety of moral issues - types of inquiry - moral dilemmas – moralautonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy – Models of Professional Roles theories about right action - Self-interest - customs and religion - uses of ethical theories. Valuing Time – Cooperation – Commitment.	
UNIT V	**Global Issues: A Glimpse of Life Stories**	**6**
	Life story of Prophet Mohammad, Mahatma Gandhi, SwamiVivekanand, Marie Curie and Steve Jobs. Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managersconsulting engineers-engineers as expert witnesses and advisors -moral leadership.	

Reference Readings:

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Value Education.
2. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw-Hill, New York 1996.
3. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

Relevant CDs, Movies, Documentaries & Other Literature:

1. Value Education website, *http://www.uptu.ac.in*
2. Story of Stuff, *http://www.storyofstuff.com*
3. Al Gore, *An Inconvenient Truth*, Paramount Classics, USA
4. Charlie Chaplin, *Modern Times*, United Artists, USA
5. IIT Delhi, *Modern Technology – the Untold Story*
6. The Hundred, Michael Hart

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1							3	3	3	3		3			
CO2			3			3	2	3	3	3		3			
CO3		3	2			3	3	3	2	3		3			
CO4		3	3			3	3	3	1	3		3			
CO5		3	2			3	3	3	3	3		3			
CO6		3	3			3	3	3	1	3		2			
CO6		3	3			3	3	3	3	3		3			
1: Low Association, 2: Average Association, 3: Strong Association															

Data Structures & Algorithms Labs

Subject Code: CS233

(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	None	0	0	2	1

List of Programs:

Part A

1. Use a recursive function to find GCD of two numbers.
2. Use a recursive function to find the Fibonacci series.
3. Use pointers to find the length of a string and to concatenate two strings.
4. Use pointers to copy a string and to extract a substring from a given a string.
5. Use a recursive function for the towers of Hanoi with three discs.
6. Insert an integer into a given position in an array.
7. Deleting an integer from an array.
8. Write a program to create a linked list and to display it.
9. Write a program to sort N numbers using insertion sort.
10. Write a program to sort N numbers using selection sort.

Part B

1. Inserting a node into a singly linked list.
2. Deleting a node from a singly linked list.
3. Pointer implementation of stacks.
4. Pointer implementation of queues.
5. Creating a binary search tree and traversing it using in order, preorder and post order.
6. Sort N numbers using merge sort

Object Oriented Programming Using Java Lab

Subject Code: CS235

(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	None	0	0	2	1

List of Lab programs

Part A

1. Write a program to check whether two strings are equal or not.
2. Write a program to display reverse string.
3. Write a program to find the sum of digits of a given number.
4. Write a program to display a multiplication table.
5. Write a program to display all prime numbers between 1 to 1t000.
6. Write a program to insert element in existing array.
7. Write a program to sort existing array.
8. Write a program to create object for Tree Set and Stack and use all methods.
9. Write a program to check all math class functions.
10. Write a program to execute any Windows 95 application (Like notepad, calculator etc.)
11. Write a program to find out total memory, free memory and free memory after executing garbage Collector (gc).

Part B

12. Write a program to copy a file to another file using Java to package classes. Get the file names at run time and ifthe target file is existed then ask confirmation to overwrite and take necessary actions.
13. Write a program to get file name at runtime and display number of lines and words in that file.
14. Write a program to list files in the current working directory depending upon a given pattern.
15. Create a text field that allows only numeric value and in specified length.
16. Create a Frame with 2 labels, at runtime display x and y command-ordinate of mouse pointer in the labels.

Information Security Fundamentals Lab

Subject Code: CS237

(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	None	0	0	2	1

List of Lab programs

1. System Security Configuration and Security Policy Management in Windows 10
2. Studying and configuring Windows and Linux based password authentication and user privilege management processes
3. Hashes and message digests calculation using has calculators
4. Generate Hash File and testing Kerberos Authentication
5. HMAC Construction using a "Dummy" Hash Function
6. Setting up simulator for SHA-1
7. Implement following Substitution & Transposition techniques
    a. Caesar cipher
    b. Play fair cipher
    c. Hill cipher
    d. Vigenere cipher
    e. Rail fence – row & Column Transformation
8. Implement following algorithms
    a. DES
    b. RSA
    c. MD5
    d. SHA-1
9. Diffiee – Hellman

Integral University, Lucknow

Department of Computer Science and Engineering

Program: B. Tech. CSE (Cloud Technology and Information Security)

Subject Name: Desktop Operating System**, Subject Code:** CS240

w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
None	None	2	1	0	3

CO1	Describeand explain[L2: Comprehension]the fundamental components of a windows operating system
CO2	Learn **[L1: Knowledge]** to do file processing, process management, storage backup, account management etc.
CO3	Demonstrate **[L3: Application]**the policies for scheduling, deadlocks, memory management, synchronization, system calls, and file systems
CO4	Analyze **[L4: Analysis]**the application of windows administrative features available to make system secure and easy to use.

Objective:

Student will be able to understand the basic components of a computer operating system, and the interactions among the various components. The course will cover an introduction on the policies for scheduling, deadlocks, memory management, synchronization, system calls, and file systems.

UNIT I	**Introduction to Operating System**	
	Introduction to Operating System, Evolution of operating system, Structure of Operating, OS Operations OS Organizations, Distributed Systems, Open source Operating systems, Process Management, Memory Management, Storage Management, Computing Environment.	
UNIT II	**Installing, upgrading and managing Windows**	
	Gathering hardware devices, preparing to install windows, upgrading and migrating, Clean and Image based installation, Configuring Application Compatibility, administrating windows features, Disk management, and installing and configuring device drivers.	
UNIT III	**File Access, Printers and Network connectivity with Windows**	
	Introduction to Authentication and Authorization, Managing file access , Shared Folders, File compression, file archiving, managing printers, connecting windows client with server, configuring ipv4 & ipv6 connectivity, Implementing APIPA, Introduction to Name resolution, troubleshooting network issues, Overview of wireless network, configuring wireless network.	
UNIT IV	**Securing, Optimizing and maintaining windows Client**	
	Overview of local security management, local security policy settings, EFS and Bitlocker, Application restrictions, UAC, Windows Firewall, Administrating IE8, Windows Defender.	

UNIT V	**Configuring Mobile Computing and Remote Access in windows**	
	Configure Mobile computer and device settings, Remote desktop, remote assistance, direct access, branch cache	

Reference:

1. Milan Milenkovic - Operating Systems – TATA McGraw hILL, 2009.
2. Operating Systems Fundamentals D. Irtegov, 2005Python: Essential Reference, by David M. Beazley
3. AShort Introduction to Operating Systems (M. Burgess), 2010
4. Operating Systems: Design and Implementation (Second Edition)., Andrew S. Tanenbaum, 2010

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**3**	**3**	**2**									**3**			
CO2	**3**	**3**	**2**	**1**	**2**							**3**			
CO3	**3**	**3**	**2**	**2**	**2**							**3**			
CO4	**3**	**2**	**3**	**2**	**2**							**2**			
1: Low Association, 2: Average Association, 3: Strong Association															

Integral University, Lucknow

Department of Computer Science and Engineering

Program: B. Tech. CSE (Cloud Technology and Information Security)

Subject Name: Relational Database Management Systems**, Subject Code:** CS242

w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
None	**None**	**2**	**1**	**0**	**3**

CO1	*Define***[L1:Knowledge]**the conceptual frameworks and definitions of specific terms that are integral to the Relational Database Management Systems
CO2	*Demonstrate***[L2: Comprehension]** an understanding of the elementary & advanced features of DBMS & RDBMS
CO3	*Evaluate***[L3: Application]**options to make informed decisions that meet data storage, processing, and retrieval needs
CO4	*Analyze***[L4: Analysis]**normalized database that meets business requirements using industry standards and best practices
CO5	*Design***[L4: Design]**and documents data structures incorporating integrity constraints to satisfy business rules by applying the relational model

Objective:

The objective of this course is to expose the students to the fundamentals & basic concepts in relational Data Base Management Systems. This course discusses architecture of Database Systems with concept of relational model & ER model. This course explains techniques for database design, Normalization and database recovery and protection.

UNIT I	**Introduction**	**5**
	Purpose of Database System -– Views of data – Data Models – Database Languages — Database System Architecture– Database users and Administrator – Entity– Relationship model (E-R model) – E-R Diagrams -- Introduction to relational databases.	
UNIT II	**Relational Model**	**13**
	The relational Model – The catalog- Types– Keys - Relational Algebra – Domain Relational Calculus – Tuple Relational Calculus - Fundamental operations – Additional Operations- SQL fundamentals Oracle data types, Data Constraints, Column level & table Level Constraints, working with Tables. Defining different	

	constraints on the table, Defining Integrity Constraints in the ALTER TABLE Command, Select Command, Logical Operator, Range Searching, Pattern Matching, Oracle Function, Grouping data from Tables in SQL, Manipulation Data in SQL. Joining Multiple Tables (Equi Joins), Joining a Table to itself (self Joins), Sub queries Union, intersect & Minus Clause, Creating view, Renaming the Column of a view, Granting Permissions, - Updating, Selection, Destroying view Creating Indexes, Creating and managing User Integrity – Triggers - Security – Advanced SQL features –Embedded SQL– Dynamic SQL- Missing Information– Views – Introduction to Distributed Databases and Client/Server Databases.	
UNIT III	**Database Design**	**7**
	Functional Dependencies – Non-loss Decomposition – Functional Dependencies – First, Second, Third Normal Forms, Dependency Preservation – Boyce Codd Normal Form-Multi-valued Dependencies and Fourth Normal Form –Join Dependencies and Fifth Normal Form.	
UNIT IV	**Transactions**	**11**
	Transaction Concepts - Transaction Recovery – ACID Properties – System Recovery – Media Recovery – Two Phase Commit - Save Points – SQL Facilities for recovery –Concurrency – Need for Concurrency – Locking Protocols –Two Phase Locking – Intent Locking – Deadlock- Serializability – Recovery Isolation Levels – SQL Facilities for Concurrency.	

Reference:

1. Milan Milenkovic - Operating Systems – TATA McGraw hILL, 2009.
2. Operating Systems Fundamentals D. Irtegov, 2005Python: Essential Reference, by David M. Beazley
3. AShort Introduction to Operating Systems (M. Burgess), 2010
4. Operating Systems: Design and Implementation (Second Edition)., Andrew S. Tanenbaum, 2010

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**3**	**3**										**3**			
CO2	**3**	**3**	**2**	**1**								**3**			
CO3	**3**	**3**	**2**	**2**	**2**							**3**			
CO4	**3**	**2**	**3**	**2**	**2**							**2**			
CO5	**3**	**2**	**3**									**2**			
1: Low Association, 2: Average Association, 3: Strong Association															

Integral University, Lucknow

Department of Computer Science and Engineering

Program: B. Tech. CSE (Cloud Technology and Information Security)

Subject Name: Network Security Basics**, Subject Code:** CS244

w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
None	**None**	**3**	**1**	**0**	**4**

CO1	Analyze**[L4: Analysis]**your exposure to security threats
CO2	Protect**[L6: Evaluation]**your organization's systems and data
CO3	Deploy**[L5: Synthesis]** firewalls and data encryption to minimize threats
CO4	Assess**[L6: Evaluation]** alternative user and host authentication mechanisms
CO5	Manage**[L5: Synthesis]** risks originating from inside the organization and the internet

Objective:

To Develop an understanding of information assurance as practiced in computer operating systems, distributed systems, networks and representative applications and Gain familiarity with prevalent network and distributed system attacks, defenses against them, and forensics to investigate the aftermath.

UNIT I	**Introduction to Network Security**	9

	Perimeter Security - Overview of Network Security, Access Control, Device Security, Security features on Switches,Firewall, Types of firewall, Attack vector and Mitigation techniques; Access Management - Securing ManagementAccess, Multifactor Authentication, Layer 2 Access Control, Wireless LAN (WLAN) Security and NetworkAdmission Control (NAC).	
UNIT II	**Threats, Vulnerabilities and Attacks**	**8**
	Threat; Vulnerabilities – vulnerability assessment and vulnerability scanning; Attacks – Application Attack, NetworkAttack and Mitigating & Deterring Attacks; Network Security – Security through network devices, Security throughNetwork Technologies and Security through Network Design Elements; Administering a Secure Network – NetworkAdministrative Principles and Securing Network Application.	
UNIT III	**Network Security Management**	**9**
	Secure Socket Layer (SSL) – Introduction to SSL, Open SSL basics, Problems with SSL, Cryptography, MessageDigits Algorithms, Digital Signature and Public Key Infrastructure (PKI); Data Privacy – IPsec VPN, DynamicMultipoint VPN (DMVPN), Group Encrypted Transport VPN (GET VPN), Secure Sockets Layer VPN (SSL VPN)and Multiprotocol Label Switching VPN (MPLS VPN).	
UNIT IV	**Network Security Controls**	**8**
	Network Intrusion Prevention – Overview of Intrusion Prevention System (IPS), Intrusion Detection System (IDS),Deploying IPS and IPS High Availability; Host Intrusion Prevention; Anomaly Detection and Mitigation.	
UNIT V	**Network Management**	**6**
	Security Monitoring and correlation; Security Management - Security and Policy Management and Security Framework and Regulatory Compliance; Best Practices Framework, Case Studies.	

Reference:

1. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole
2. Network Security Bible by Eric Cole

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**3**	**3**	**2**	**1**								**3**			
CO2	**3**	**3**	**3**	**2**	**1**	**1**						**3**			
CO3	**3**	**3**	**2**	**1**	**2**	**1**						**3**			
CO4	**3**	**2**	**3**	**2**	**2**	**1**						**2**			
CO5	**3**	**2**	**3**	**2**	**1**	**1**						**2**			
1: Low Association, 2: Average Association, 3: Strong Association															

Integral University, Lucknow

Department of Computer Science and Engineering

Program: B. Tech. CSE (Cloud Technology and Information Security)

Subject Name: Enterprise Network Engineering**, Subject Code:** CS246

w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
None	**None**	**3**	**1**	**0**	**4**

CO1	Analyze**[L4: Analysis]** state-of-the-art real-world enterprise-wide networks.
CO2	Design**[L5: Synthesis]** build, and implement advanced enterprise-wide computer networks;
CO3	Manage**[L5: Synthesis]** configure, troubleshoot, and maintain typical enterprise-wide computer networks
CO4	Introduce**[L1: Knowledge]** both theoretical, practical, and technical issues in enterprise-wide computer networks

Objective:

To provide an in-depth view of the advanced technologies used in enterprise-wide computer networks,provide the theoretical foundation and practical skills of advanced computer networks for many other relevant topics, such as distributed computing.

UNIT I	**Networking Fundamentals**	**7**
	The TCP/IP and OSI Networking Models, Fundamentals of Ethernet LANs, fundamentals of WANs, Fundamentals ofIPv4 Addressing and Routing, Fundamentals of TCP/IP Transport and Applications.	
UNIT II	**Ethernet LANs and Switches**	**6**
	Building Ethernet LANs with Switches, Cisco LAN Switches, Configuring Ethernet Switching.	
UNIT III	**IP Version 4 Addressing and Subnetting**	**9**
	Perspectives on IPv4 Subnetting, AnalyzingClassfull IPv4 Networks, Analysing Subnet Masks, Analysing ExistingSubnets, Implementing IP Version 4: Operating Cisco Routers, Configuring IPv4 Addresses and Routes,Implementing Ethernet Virtual LANs, Troubleshooting Ethernet LANs, Spanning Tree Protocol Concepts,Troubleshooting LAN Switching.	
UNIT IV	**LAN Routing**	**9**
	Configure IPv4 Routing, Configure and Verify Host Connectivity, Advanced IPv4 Addressing Concepts, Describe theboot process of Cisco IOS routers; Operation status of a serial interface; Manage Cisco IOS files; Routing and RoutingProtocols; OSPF (multi-area); EIGRP (single AS); Passive Interface.	
UNIT V	**IPv4 Services and IP Version 6**	**9**
	Basic IPv4 Access Control Lists, Advanced IPv4 ACLs and Device Security, Network Address Translation, Recognize high availability (FHRP); Describe SNMP v2 and v3, IPV6 addressing.	

Reference:

1. CCNA Cisco Certified Network Associate: Study Guide (With CD) 7th Edition (Paperback), Wiley India,2011
2. CCENT/CCNA ICND1 640-822 Official Cert Guide 3 Edition (Paperback), Pearson, 2013
3. Routing Protocols and Concepts CCNA Exploration Companion Guide (With CD) (Paperback), Pearson,2008
4. CCNA Exploration Course Booklet : Routing Protocols and Concepts, Version 4.0 (Paperback), Pearson,2010

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**3**	**3**	**2**	**1**								**3**			
CO2	**3**	**3**	**3**	**2**	**1**	**1**						**3**			
CO3	**3**	**3**	**2**	**1**	**2**	**1**						**3**			
CO4	**3**	**2**	**3**	**2**	**2**	**1**						**2**			
1: Low Association, 2: Average Association, 3: Strong Association															

Integral University, Lucknow

Department of Computer Science and Engineering

Program: B. Tech. CSE (Cloud Technology and Information Security)

Subject Name: Introduction To Linux**, Subject Code:** CS248

w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
None	None	3	1	0	4

CO1	Students will be able to understand**[L1: Knowledge]**the basics of the UNIX and Linux Operating Systems
CO2	Students will have the Illustrate [L3: Application]about the UNIX and Linux file system and comprehend the system calls
CO3	Students will be able to understand[L1: Knowledge] the UNIX process management
CO4	Student will be able to discuss [L2: Comprehension] the use and the functionality of the VI editor

Objective:

The course is designed to provide Basic knowledge of linux operating systems. Major Course learning objectives are

1. Teach Basics of Linux Operating System
2. Teach ownership and permissions of the files and directories.
3. Explain why these issues exist.
4. How to set permissions files/directories
5. How to manipulate files/directories

UNIT I	**Linux Introduction**	**9**
	Introduction to Multi user System, History of UNIX, Features & Benefits, Versions of UNIX, Features of UNIX FileSystem,, Commonly Used Commands like who, pwd, cd, mkdir, rm, rmdir, ls, mv, ln, chmod, cp, grep, sed, awk ,tr,yacc etc. getting Started (Login/Logout) . Creating and viewing files using cat, file comparisons, View files, diskrelated commands, checking disk free spaces. Exploring Linux Flavours: Introduction to various Linux flavours. Debian and rpm packages, Vendors providing DEBIAN & RPM distribution & Features. Ubuntu. History, Versions,Installation, Features, Ubuntu one. Fedora: History, Versions, Installation, Features.	
UNIT II	**The UNIX File System**	**8**
	I nodes - Structure of a regular file – Directories - Conversion of a path name to an I node Super block – Inode assignment to a new file - Allocation of disk blocks. System calls for the file System: Open –Read - Write - Lseek – Close - File creation - Creation of special files - Changing directory and root - changing ownerand mode – stat and fstat - pipes - Dup - Mounting and Un mounting file systems - Link and Un link.	

UNIT III	**UNIX Process Management** The Structure of Processes: Process States and Transitions - Layout of system memory - Context of a process. ProcessControl: Process Creation – Signals – Process Termination – Invoking other programs – PID & PPID – Shell on aShell.	**7**
UNIT IV	**VI editor** Vi Editor: Introduction to Text Processing, Command & edit Mode, Invoking vi, deleting & inserting Line, Deleting& Replacing Character, Searching for Strings, Yanking, Running Shell Command Macros, Set Window, Set AutoIndent, Set No. Communicating with Other Users: who, mail, wall, send, mesg, ftp.	**7**
UNIT V	**System Administration** Common administrative tasks, identifying administrative files configuration and log files, Role of systemadministrator, Managing user accounts-adding & deleting users, changing permissions and ownerships, Creating andmanaging groups, modifying group attributes, Temporary disabling of user's accounts, creating and mounting filesystem, checking and monitoring system performance - file security & Permissions, becoming super user using su.Getting system information with uname, host name, disk partitions & sizes, users, kernel, installing and removingpackages with rpm command.	**9**

Reference:

1. The Design of Unix Operating System, Maurice J. Bach, Pearson Education, 2010
2. Advance UNIX, a Programmer's Guide, S. Prata, BPB Publications, and New Delhi, 2011
3. Unix Concepts and Applications, Sumitabh Das, 2010
4. The UNIX Programming Environment, B.W. Kernighan & R. Pike, Prentice Hall of India. 2009
5. Guide to UNIX Using LINUX, Jack Dent Tony Gaddis, Vikas/ Thomson Pub. House Pvt. Ltd. 2010

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**3**	**3**	**2**									**3**			
CO2	**3**	**3**	**2**	**1**	**2**							**3**			
CO3	**3**	**3**	**2**	**2**	**2**							**3**			
CO4	**3**	**2**	**3**	**2**	**2**							**2**			
1: Low Association, 2: Average Association, 3: Strong Association															

Integral University, Lucknow

Department of Computer Science and Engineering

Program: B. Tech. CSE (Cloud Technology and Information Security)

Subject Name: Mathematical Analysis**, Subject Code:** MT-206

w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
None	**None**	**3**	**1**	**0**	**4**

CO1	*Define* **[L1: Knowledge]** normalization and state its consequences.
CO2	*Explain***[L2: Comprehension]** various methods of numerical analysis
CO3	*Demonstrate* **[L3: Application] integral** transformation of an equation using Fourier transformation.
CO4	*Analyze***[L4: Analysis]** correlation and regression of a coefficient.
CO5	*Compare***[L4: Synthesis]** Euler's Method and Modified Euler's Method

Objective:

• To understand the concepts of algebraic and transcendental equations

• Gain basic of numerical integration and solution of ordinary differential equation

• Understanding the concepts of binomial distribution, poison distribution and normal distribution.

UNIT I	**Errors**	**8**
	Error and their analysis, Computer Arithmetic, Floating-Point Number Operation, Normalization &theirconsequences.Statistics: Correlation and Regression analysis, Binomial Distribution, Poisson Distribution, Normal	

	Distribution.	
UNIT II	**Algebraic & Transcendental Equations**	**8**
	Bisection Method, Iteration Method, False Position Method, Secant method, Newton-Raphson Method, LinBairstow's Method. Rate of Convergence of Methods. Solution of system of linear equations by LU decompositionmethod and Gauss Seidel Method.	
UNIT III	**Interpolation**	**8**
	Finite differences, Newton's forward & backward Formula, Gauss, Stirling and Bessel's Formula forEqual Interval. Lagrange's Formula and Newton's Divided Difference Formula for Unequal Interval, NumericalDifferentiation.	
UNIT IV	**Numerical Integration & Solution of Ordinary Differential Equations**	**8**
	Numerical Integration by Trapezoidal Rule, Simpson's 1/3 Rule, Simpson's 3/8 Rule, Boole's & Weddle's Rule,Euler-Maclaurin's Formula.Taylor's Series Method, Euler's Method, Modified Euler's Method, Runge-Kutta Method.	
UNIT V	**Integral Transform & Complex Analysis**	**10**
	Introduction to Fourier Transform, Sine and Cosine transforms, Z-transform.Analytic functions, C-R equations and harmonic functions, Cauchy's integral theorem, Cauchy's integral formula forderivatives of analytic functions, Conformal mapping and bilinear transformations..	

Reference:

1. Sastry, Introductory method of Numerical Analysis, PHI
2. Balaguruswamy, Numerical method, TMH
3. Jain, Iyengar, Jain, Numerical Methods for Scientific & Engineering Computations, New Age International
4. P. Kandasamy, Numerical methods, S. Chand & Company
5. H.K. Dass, Advanced Engineering Mathematics, S. Chand & Company
6. B.S. Grewal, Higher Engineering Mathematics, Khanna Pub.

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**3**		**3**									**3**			
CO2	**3**	**2**	**1**						**2**						
CO3	**3**	**3**	**3**												
CO4	**3**	**3**	**2**									**3**			
CO5	**3**	**2**	**3**						**2**						
1: Low Association, 2: Average Association, 3: Strong Association															

Enterprise Network Engineering Lab

Subject Code: CS247

(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	None	0	0	2	1

List of Programs

1. Executing of Switch Configuration - Basic Commands
2. Recognize Switch Configuration - Switch Port Security
3. Schematize Router - Configuration
4. Demonstrate Configuration of IP Address for a Router
5. Classify Setting up of Passwords
6. Compare PPP Encapsulation, PPP PAP Authentication, PPP CHAP Authentication
7. Differentiate Configuration of Static and Dynamic Routing
8. Analyse Configuration of Default Route
9. Execute Implementation of EIGRP
10. Execute Implementation of OSPF
11. Interpret VLAN Configuration
12. Show Switch Troubleshooting
13. Justify Configuration of Access-lists - Standard & Extended ACLs
14. Analyse Cisco Discovery Protocol
15. Illustrate DHCP, DHCP Relay & DHCP Exclusions
16. Demonstrate Configuring Logging to a Remote Syslog Server

Relational Database Management Systems Lab

Subject Code: CS243

(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	None	0	0	2	1

List of programs

1. Create User in Oracle Database and grant and revoke the privileges and use of commitsavepointroleback command.
2. Create the following:
    - Synonym sequences and Index
    - Create alter and update views.
3. Create PL/SQL program using cursors, control structure, exception handling
4. Create following:
    - Simple Triggers
    - Package using procedures and functions.
5. Create the table for
    - COMPANY database
    - STUDENT database and Insert five records for each attribute.
6. Illustrate the use of SELECT statement
7. Conditional retrieval - WHERE clause
8. Query sorted - ORDER BY clause
9. Perform following:
    - UNION, INTERSECTION and MINUS operations on tables.
    - UPDATE, ALTER, DELETE, DROP operations on tables
10. Query multiple tables using JOIN operation.
11. Grouping the result of query - GROUP BY clause and HAVING clause
12. Query multiple tables using NATURAL and OUTER JOIN operation.

Introduction to Linux Lab

Subject Code: CS249

(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	None	0	0	2	1

List of Programs

1. Execute 25 basic commands of UNIX.
2. Basics of functionality and modes of VI Editor.
3. WAP that accepts user name and reports if user is logged in.
4. WAP which displays the following menu and executes the option selected by user:
1. ls 2. Pwd 3. ls –l 4. ps –fe
5. WAP to print 10 9 8 7 6 5 4 3 2 1 .
6. WAP that replaces all "*.txt" file names with "*.txt.old" in the current.
7. WAP that echoes itself to stdout, but backwards.
8. WAP that takes a filename as input and checks if it is executable, if not make it executable.
9. WAP to take string as command line argument and reverse it.
10. Create a data file called employee in the format given below:
    a. EmpCode Character
    b. EmpName Character
    c. Grade Character
    d. Years of experience Numeric
    e. Basic Pay Numeric

    $vi employee
    A001 ARJUN E1 01 12000.00
    A006 Anand E1 01 12450.00
    A010 Rajesh E2 03 14500.00
    A002 Mohan E2 02 13000.00
    A005 John E2 01 14500.00
    A009 Denial SmithE2 04 17500.00
    A004 Williams E1 01 12000.00
11. Perform the following functions on the file:
    a. Sort the file on EMPCode.
    b. Sort the file on
        i. Decreasing order of basic pay
        ii. Increasing order of years of experience.
    c. Display the number of employees whose details are included in the file.
    d. Display all records with 'smith' a part of employee name.
    e. Display all records with EmpName starting with 'B'.
    f. Display the records on Employees whose grade is E2 and have work experience of 2 to 5 years.

g. Store in ‘file 1’ the names of all employees whose basic pay is between 10000 and 15000.
h. Display records of all employees who are not in grade E2.

Network Security Basics Lab

Subject Code: CS245

(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	None	0	0	2	1

List of Programs

1. Firewall Configuration - I
2. Firewall Configuration - II
3. VPN Configuration - I
4. VPN Configuration - II
5. IDS Configuration - I
6. IDS Configuration - II
7. IDS Configuration - III
8. Router Security - I
9. Router Security - II
10. Router Security - III
11. Traffic Monitoring using WireShark - I
12. Traffic Monitoring using WireShark – II

Desktop Operating System Lab

Subject Code: CS241

(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	None	0	0	2	1

List of programs

1. Installing Windows 10

    - Upgrading Windows 7 to Windows 10
    - Migrating User Settings

2. Configuring Windows 10

    - Using the Settings App
    - Using Control Panel
    - Using Windows PowerShell
    - Using GPOs

3. Configuring Network Connectivity

    - Verifying and Testing IPv4 Settings
    - Configuring Automatic IPv4 Settings
    - Configuring and Testing Name Resolution

4. Managing Storage

    - Adding a Disk
    - Creating a Simple Volume
    - Compressing a Folder
    - Enabling Disk Quotas
    - Creating a Storage Space

5. Configuring and Managing Permissions and Shares

    - Creating, Managing, and Sharing a Folder
    - Using Conditions to Control Access and Effective Permissions

6. Installing and Managing a Printer

    - Managing and Using a Printer

7. Managing Data Security

- Using EFS
- Using BitLocker

8. **Managing Device Security**
    - Creating Security Policies
    - Testing Security Policies
    - Configuring UAC Prompts
    - Configuring and Testing AppLocker

Integral University, Lucknow

Department of Computer Science and Engineering

Program: B. Tech. CSE (Cloud Technology and Information Security)

Subject Name: Logical Reasoning and Thinking**, Subject Code:** CS361

w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
None	**None**	**2**	**1**	**0**	**3**

CO1	Identify [L1: Knowledge]the formula to apply as per the question, understand the trick of the question.
CO2	Recognize [L2: Comprehension]the question pattern and the topic from which question has been asked for.
CO3	Calculate [L3: Application]the question while applying the formula.
CO3	Solve [L3: Application] the question through the shortcut method to save their time.
CO4	Diagram[L4: Analysis] will be able to analyze the type of diagram in Data Interpretation section.
CO5	Create [L5: Synthesis] will be able to think about other method to solve the problem.
CO6	Evaluate [L6: Evaluation] will be able to judge by self that the question solved is right or not as per the methods taught.

Objective:

- The subject aims to provide students with an understanding **[L1: Knowledge]**of the structure of arguments and reasoning.
- The subject will also help students develop [**L3: Application]**logical skills in rationally constructing, analyzing, justifying and criticizing arguments.

UNIT I	**Verbal ability**	**3**
	Synonyms**,** Antonyms and One word substitutes	
UNIT II	**Basic quantitative aptitude**	**8**
	Speed, Time and Distance, Time and Work, Linear Equations, Progressions (Sequences & Series), Permutation and Combination, Probability, Functions, Set Theory, Number Systems, LCM and HCF, Percentages, Collection and Scrutiny of data: Primary data, questionnaire and schedule; secondary data, their major sources including some government publications.	
UNIT III	**Logical Reasoning - I**	**6**
	Number and Letter Series, Calendars, Clocks, Cubes, Venn Diagrams, Binary Logic, Seating Arrangement, Logical Sequence, Logical Matching, Logical Connectives, Syllogism. Blood Relations; concept of a statistical population and sample from a population; qualitative and quantitative data.	
UNIT IV	**Measures of Central Tendency**	**10**
	Objective of averaging, characteristics of good average, types of average, arithmetic mean of grouped and ungrouped data, correcting incorrect values, weighted arithmetic mean Median - median of grouped and ungrouped data merit andlimitation of median, computation of quartile, decile and percentile Mode - calculation of mode of grouped and ungrouped data, merits and limitation of mode, relationship between mean, median and mode. Geometric mean and Harmonic mean.	
UNIT V	**Presentation of Data**	**8**
	Construction of tables with one or more factors of classification; Diagrammatic and Graphical representation of non-frequency data; Frequency distribution, cumulative frequency distribution and their graphical representation - histogram, Column Graphs, Bar Graphs, Line Charts, Pie Chart, Data Interpretation – Introduction and approaches .	

References:

1. Richard I Levin, David S. Rubin: Statistics for Management, Pearson Prentice Hall Education Inc. Ltd, NewDelhi, 5th Ed. 2007

2. Bajpai, N. Business Statistics, Pearson, 2010

3. Sharma J.K., Business Statistics, Pearson Education India, 2010.

4. Anderson; David R, Dennis J. Sweeney and Thomas A. Williams, Quantitative Methods for Business, Prentice-Hall, WestPublishing Company, 1996.

5. CAT Complete course, UPKAR publications

CO-PO/PSO MAPPING

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3	3	1					3			3			
CO2		3	3	2					3			3			
CO3		3	2	1	2				1			3			
CO4		3	2	2	2				3			3			
CO5		2	2	1	1				1			2			
CO6		3	3	2					3			3			
1: Low Association 2: Average Association 3: Strong Association															

Integral University, Lucknow
Department of Computer Science and Engineering
Program: B. Tech. CSE (Cloud Technology and Information Security)
Subject Name: Storage Technologies **Subject Code:** CS353
w.e.f Session 2020-21

Pre-requisite	**Co-requisite**	**L**	**T**	**P**	**C**
Computer fundamental	**None**	**2**	**1**	**0**	**3**

CO1	*State* **[L1: Knowledge]** various key challenge in managing information
CO2	*Explain***[L2: Comprehension]** storage network technologies
CO3	*Compare* **[L3: Application]** various RAID levels
CO4	*Differentiate***[L4: Analysis]** between local and remote backup
CO5	*Specify***[L4: Synthesis]** the components of storage system environment.

Objective:

- Provides a comprehensive view of storage and networking infrastructures for highly virtualized cloud ready deployments.
- To Understand the process of backup and recovery, local replication and remote replication.
- To know various RAID levels and their use cases.
- To understand the evolution of storage technologies.

UNIT I	**Introduction to Information storage and Management**	**6**
	Information Storage: Data – Types of Data –Information - Storage , Evolution of Storage Technology and Architecture, Data Center Infrastructure - Core elementsKey Requirements for Data Center Elements - Managing Storage Infrastructure, Key Challenges in Managing Information, Information Lifecycle - Information Lifecycle Management - ILM Implementation -ILM Benefits.	

UNIT II	**Storage System Environment**	**8**
	Components of a Storage System Environment – Host –Connectivity – Storage, Disk Drive Components – Platter – Spindle - Read/Write Head - Actuator Arm Assembly - Controller - Physical Disk Structure - Zoned Bit Recording - Logical Block Addressing , Disk Drive Performance -1 Disk Service Time , Fundamental Laws Governing Disk Performance , Logical Components of the Host - Operating System - Device Driver - Volume Manager - File System – Application , Application Requirements and Disk Performance.	
UNIT III	**RAID and Storage Networking Technologies**	**8**
	Implementation of RAID - Software RAID - Hardware RAID -RAID Array Component -RAID Levels - Striping -Mirroring -Parity RAID 0 RAID 1 -Nested RAID -RAID 3-RAID 4-RAID 5-RAID 6 -RAID Comparison -RAID Impact on Disk-Performance - Application IOPS and RAID Configurations- Introduction to Direct Attached Storage – Types of DAS – Introduction to SAN – Components of SAN – FC connectivity – FC topologies – Introduction to NAS – NAS components – NAS Implementation – NAS File sharing	
UNIT IV	**Backup and Recovery**	**7**
	Introduction to Business Continuity - Backup Purpose -Disaster Recovery - Operational Backup –Archival, Backup Considerations, Backup Granularity, Recovery Considerations, Backup Methods , Backup Process, Backup and Restore Operations, Backup Topologies - Server less Backup , Backup Technologies - Backup to Tape - Physical Tape Library - Backup to Disk - Virtual Tape Library .	
UNIT V	**Replication – Local and Remote**	**6**
	Source and Target -Uses of Local Replicas, Data Consistency - Consistency of a Replicated File System - Consistency of a Replicated Database , Local Replication Technologies - Host-Based Local Replication - Storage Array-Based Replication , Res tore and Restart Considerations - Tracking Changes to Source and Target , Creating Multiple Replicas, Management Interface – Remote Replication Modes – Remote Replication Technologies – Network Infrastructure	

References:

1. EMC Education Services, “Information Storage and Management: Storing, Managing, and Protecting Digital Information”, Wiley Publishing Inc., 1st edition, 2009Bajpai, N. Business Statistics, Pearson, 2010.

2. Robert Spalding , “Storage Networks: The Complete Reference “, Tata McGraw Hill Publication, 2003

3. CO-PO/PSO MAPPING

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2			2			1			3			
CO2	3	3	2	3		2	1		2			3			
CO3	3	3	3	1					2			3			
CO4	3	3	3	2		1			3			2			
CO5	3	3	3		2				1			2			

1: Low Association 2: Average Association 3: Strong Association

Integral University, Lucknow

Department of Computer Science and Engineering

Program: B. Tech. CSE (Cloud Technology and Information Security)

Subject Name:Database SecuritySubject Code: CS363

w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
Computer fundamental	**None**	**3**	**1**	**0**	**4**

CO1	*Identify* **[L1: Knowledge]** the schemas for security and concepts of symmetric Encryption.
CO2	*Explain***[L2: Comprehension]**the different models in the Security Architecture
CO3	*Illustrate* **[L3: Application]** auditing in relational database and demonstrate the authentication stored procedure by signature.
CO4	*Analyze***[L4: Analysis]** the concept of least privilege in information security and difference between classical DBMS with the NoSQL.

Objective:

Master the security architecture

• Master virtual private databases

• Master multilevel secure relational model

• Master auditing in relational databases

• Understand NoSQL databases and its differences with RDBMS

• Understand administration of users

• Understand the databases security models

UNIT I	Concepts of Database Security Management System	6

	Database security concept, Importance of data, Levels of data security, Authorization in databases, Issues in database security, Concept of Least Privilege in User ID for databases. Perimeter security, firewalls, intrusion detection, and intrusion prevention.	
UNIT II	**Concepts of NoSQL**	**8**
	No SQL databases introduction, Differences from classical DBMS concepts with NoSQL, Advantages of NoSQL like Elastic Scaling, Big Data, Goodbye DBAs', Economics/Cost, Flexible Data models. Non/ partial applicability of ACID (Atomicity, Consistency, Isolation, Durability), BASE Properties, CAP theorem, comparison to traditional RDBMS databases. Horizontal scalability, Benefits of NoSQL Databases compared to traditional Databases. Concept of UnSQL or Unstructured Query Language, Concept of Key Value & Tuple Store Databases, Concept of Graph Databases, Concept of Multimodel Databases	
UNIT III	**Encryption and Permissions in SQL Server 2012**	**8**
	Facility and Supply Recovery strategies. User Recovery strategies. Technical Recovery strategies, Data Recovery strategies, Activation Phase- Major Disaster or Disruption, Intermediate Disaster or Disruption, Minor Disaster, Activating BC/DR Teams, Developing Triggers, Transition Trigger. Defining BC/DR Team and Key Personnel, Defining Tasks, Assigning Resources, Communication Plan.	
UNIT IV	**Security of SQL Server 2012**	**7**
	User authorization, authentication and security, protecting data using permissions, roles, schemas, SQL firewall, web application firewall, securing dynamic SQL from injections, protecting SQL server from DoS and injection attacks.	
UNIT V	**SQL Server Auditing**	**6**
	Auditing – Using the profiler to audit SQL server access, using DML trigger for auditing data modification, Using DDL triggers for auditing structure modification, configuring SQL server auditing, auditing and tracing user configurable events, policy based management, system centre advisor to analyze instances.	

References:

1. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole, Wiley, 1st ed; 2008
2. Database security by Silvana Castano, 2nd Edition, Pub: Addison-Wesley Professional, 2008
3. Microsoft SQL server 2012 Security Cookbook by Rudi Bruchez, Pub: PACKT publishing, 1st ed; 2012.

Reference Books:

1. Handbook of database security: Applications and Trends Michael Gertz, Sushil Jajodia, Pub: Springer, 1st ed; 2008
2. Implementing database security and auditing, Ron Ben-Natan, Pub: Digital Press, 1st ed; 2005

CO-PO/PSO MAPPING

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2			1						3			
CO2	3	3	2	3		1						3			
CO3	3	3	2	2								3			
CO4	3	2	3	2								2			
1: Low Association 2: Average Association 3: Strong Association															

Integral University, Lucknow

Department of Computer Science and Engineering

Program: B. Tech. CSE (Cloud Technology and Information Security)

Subject Name:Installation& Configuration of ServerSubject Code: CS357

w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
None	None	3	1	0	4

CO1	Be able to install**[L3: Application]**, configure, and monitor servers and local storage.
CO2	Know how to configure**[L3: Application]**, servers for remote management.
CO3	Create and configure**[L5: Synthesis]** virtual machine settings, storage, and networks.
CO4	Review**[L6: Evaluation]** how to install domain controllers and create and manage group policy by understanding its processing.

Objective:

To learn with paired demonstrations on how to configure, install, and monitor server 2012.

UNIT I	**Creating and Configuring Virtual Network in Windows**	**6**
	What is Virtual Networking, how to create New Virtual Switch, configuration of MAC Addresses, how to create Virtual Network Adapters, Synthetic Adaptors and Emulated Adapters, Configuration of Hardware Acceleration Setting and Advanced Network Adapter Features, Configure Virtual Network, Extending a Production Network into Virtual Space, creating an Isolated Network.	
UNIT II	**Configuring IPv4 and IPv6 Addressing in Windows**	**10**
	IPv4 Classful Addressing, Subnetting, Classless Inter-Domain Routing with Example, Public and Private IPv4 Addressing, Using Network Address Translation and Proxy Server, IPv4 Subnetting and Supernetting, Assigning IPv4 Addressing and Configuration, Dynamic Host Configuration Protocol, Automatic Private IP Addressing(APIPA), Introducing IPv6, IPv6 Address types, Global Unicast Addresses, Link-Local Unicast Addresses, Unique Local Unicast Addresses, Special, Multicast, Anycast Addresses, Assigning IPv6 Addresses, Manual IPv6 Address Allocation, Stateless IPv6 Address Auto configuration, Dynamic Host Configuration Protocol	
UNIT III	**Deploying and Configuring the DHCP, DNS Service**	**8**

	Understanding DHCP, DHCP Packets, DHCP message types option, pad option, option overload option, Vendor-Specific information Option, DHCP Communications and Lease Negotiation, DHCP Lease Renewal, Designing a DHCP Infrastructure, a Distributed DHCP and Centralised DHCP Infrastructures, a Hybrid DHCP Infrastructure and DHCP Network Traffic, How to create DNS Standard, how to create DNS Domain Hierarchy, Understanding DNS Communications, Comprehending DNS Server Caching, Understanding DNS Referrals and Queries, function of DNA Forwarders and Reverse Name Resolution, Designing DNS Deployment, Resolving Internet Names, Hosting internet Domains, Hosting Active Directory Domain, Integrating DHCP and DNS, Separating DNS Services	
UNIT IV	**Installing Domain Controllers**	**8**
	Understanding Active Directory and Active Directory Architecture Functions, function of Objects and Attributes, Understanding Domains, Zooming in: Organizational Units, Zooming in: Groups, Zooming out: Domain Trees, Zooming out: Forests, Introducing LDAP, function of Replication, Installing the Active Directory Domain Services Role, Creating a New Forest, Adding a Domain Controller to an Existing Domain, Creating a New Child Domain in a Forest, Installing AD DS on Server Core, install from media(IFM), Upgrading Active Directory Domain Services, Removing a Domain Controller, configuring the Global Catalog.	
UNIT V	**Creating and Managing Active Directory Groups and Organizational Units**	**8**
	Designing an Internal Domain Structure, how Inheritance works, how organizational Units and Group objects, Working with Organizational Units, creating OUs, using OUs to Delegate Active Directory, Management Tasks, Working with Groups, function of Group types and group scopes, Domain Local Groups, Global Groups and universal Groups, Nesting groups, Creating groups from the command line, Managing Group Memberships, Managing Group Membership using Group Policy, Managing group objects with Dsmod.exe, converting Groups, Deleting a Group	

References:

1. Windows Server 2012: A Handbook for Professionals by Aditya Raj (Author)
2. MCSA 70-410 Cert Guide R2: Installing and Configuring Windows Server 2012 (Certification Guide) Hardcover – Import, 12 Sep 2014 by Don Poulton (Author), David Camardella (Author)
3. Installing and Configuring Widows Server 2012 by Craig Zacker
4. Mastering Windows Server 2012 R2 by Mark Minasi, Kevin Greene, Christian Booth, Robert Butler

CO-PO/PSO MAPPING

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

CO1	3	3	2	1								3	1	**2**	**1**
CO2	3	3	3	2	1	1						3	2	**2**	**1**
CO3	3	3	2	1	2	1						3	1	**2**	
CO4	3	2	3	2	2	1						2	2		**1**
1: Low Association 2: Average Association 3: Strong Association															

Integral University, Lucknow

Department of Computer Science and Engineering

Program: B. Tech. CSE (Cloud Technology and Information Security)

Subject Name: Ethical Hacking Subject Code: CS355

w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
None	**None**	**3**	**1**	**0**	**4**

CO1	Outline**[L2: Comprehesion]** ethical considerations of hacking
CO2	Assess**[L6: Evaluation]** an environment using footprinting
CO3	.Collect**[L5: Synthesis]** information using network scanning
CO4	.Analyze**[L4: Analysis]** social engineering methods

Objective:

- To enable students to better understand the Ethical hacking concepts and various phases of hacking along with the objective of providing an in-depth knowledge on Web Application vulnerabilities and exploitation techniques.
- To familiarize them with the wide range of attacks in a Networking environment and to enable him/her to prepare a well-defined vulnerability reporting procedure along with the remediation techniques

UNIT I	**Introduction to Ethical Hacking**	**8**

	Hacking Methodology, Process of Malicious Hacking, and Foot printing and scanning: Foot printing, scanning. Enumeration: Enumeration. System Hacking and Trojans: System Hacking, Trojans and Black Box Vs. White Box Techniques	
UNIT II	**Hacking Methodology**	**8**
	Denial of Service, Sniffers, Session Hijacking and Hacking Web Servers: Session Hijacking, Hacking Web Servers. Web Application Vulnerabilities and Web Techniques Based Password Cracking: Web Application Vulnerabilities, Web Based Password Cracking Techniques.	
UNIT III	**Web and Network Hacking**	**8**
	SQL Injection, Hacking Wireless Networking, Viruses, Worms and Physical Security: Viruses and Worms, Physical Security. Linux Hacking: Linux Hacking. Evading IDS and Firewalls: Evading IDS and Firewalls.	
UNIT IV	**Report writing & Mitigation**	**8**
	Introduction to Report Writing & Mitigation, requirements for low level reporting &high level reporting of Penetration testing results, Demonstration of vulnerabilities and Mitigation of issues identified including tracking.	
UNIT V	**Ethical Hacking and Legal System**:	**8**
	Overview of India's Information Technology Amendment Act 2008 (IT Act 2008), hacker vs cracker, liabilities – civil and penal, cyber theft and IPC sec 378, IT Act 2008 – sections 43, 65 and 66, how to file a complaint of suspected hacking, Case Studies, understanding how hacking is legally dealt with among BRICS countries	

Reference:

1. Gray Hat Hacking The Ethical Hackers Handbook, 3rd Edition Paperback – 1 Jul 2017 by Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, McGraw Hill Education; 3 ed (1 July 2017)
2. CEH v9: Certified Ethical Hacker Version 9 Study Guide by Sean-Philip Oriyano, Sybex; Stg edition (17 June 2016)
3. Hacking for Beginners: Ultimate 7 Hour Hacking Course for Beginners. Learn Wireless Hacking, Basic Security, Penetration Testing by Anthony Reynolds, CreateSpace Independent Publishing Platform (10 April 2017)
4. An Ethical Guide To WI-FI Hacking and Security by Swaroop Yermalkar, BecomeShakespeare.com; First edition (15 August 2014)
5. Hands-On Ethical Hacking and Network Defense by Michael T. Simpson | Kent Backman | James Corley, Cengage India 1st edition (2016)
6. The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy by Patrick Engebretson, Syngress; 2 edition (12 September 2013)
7. Hacking With Python: The Complete Guide to Ethical Hacking, Basic Security, Botnet Attack, Python hacking and Penetration Testing Kindle Edition by John C. Smalls

CO-PO/PSO MAPPING

PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO															

CO1	3	3	2	1								3	**1**	**2**	**2**
CO2	3	3	3	2	1	1						3		**1**	
CO3	3	3	2	1	2	1						3	**1**		**1**
CO4	3	2	3	2	2	1						2	**2**	**2**	**2**

Integral University, Lucknow

Department of Computer Science and Engineering

Program: B. Tech. CSE (Cloud Technology and Information Security)

Subject Name: Cloud TechnologySubject Code: CS351

w.e.f Session 2020-21

Pre-requisite	**Co-requisite**	**L**	**T**	**P**	**C**
None	**None**	**3**	**1**	**0**	**4**

CO1	*State* **[L1: Knowledge]** various delivery models and service models of cloud computing
CO2	*Explain***[L2: Comprehension]** seven-step model for migrating into cloud
CO3	*Illustrate* **[L3: Application]** various considerations for selecting cloud solution
CO4	*Analyze***[L4: Analysis]** importance of governance in cloud
CO5	*Specify***[L4: Synthesis]** the do's and don'ts of cloud computing.

Objective:

To understand cloud services and solutions.

• To understand the process and purposes of migrating into cloud.

• To understand the relevance of Cloud, SOA and benchmarks

• To Know about governance in cloud and Do's and Don'ts in cloud

UNIT I	**Introduction**	**6**

	Introduction to Cloud Computing, History and Evolution of Cloud Computing, Types of clouds, Private Public and hybrid clouds, Cloud Computing architecture, Cloud computing infrastructure, Merits of Cloud computing, , Cloud computing delivery models and services (IaaS, PaaS, SaaS), obstacles for cloud technology, Cloud vulnerabilities, Cloud challenges, Practical applications of cloud computing.	
UNIT II	**Cloud Computing Companies and Migrating to Cloud**	**8**
	Web-based business services, Delivering Business Processes from the Cloud: Business process examples, Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud, Efficient Steps for migrating to cloud., Risks: Measuring and assessment of risks, Company concerns Risk Mitigation methodology for Cloud computing, Case Studies.	
UNIT III	**Cloud Cost Management and Selection of Cloud Provider**	**10**
	Assessing the Cloud: software Evaluation, System Testing, Seasonal or peak loading, Cost cutting and cost-benefit analysis, selecting the right scalable application. Considerations for selecting cloud solution. Understanding Best Practices used in selection of Cloud service and providers, Clouding the Standards and Best Practices Issue: Interoperability, Portability, Integration, Security, Standards Organizations 8and Groups associated with Cloud Computing, Commercial and Business Consideration .	
UNIT IV	**Governance in the Cloud**	**8**
	Industry Standards Organizations and Groups associated with Cloud Computing, Need for IT governance in cloud computing, Cloud Governance Solution: Access Controls, Financial Controls, Key Management and Encryption, Logging and Auditing, API integration. Legal Issues: Data Privacy and Security Issues, Cloud Contracting models, Jurisdictional Issues Raised by Virtualization and Data Location, Legal issues in Commercial and Business Considerations	
UNIT V	**Ten Cloud DO and DONTS**:	**8**
	Don't be reactive, do consider the cloud a financial issue, don't go alone, do think about your architecture, don't neglect governance, don't forget about business purpose, do make security the centerpiece of your strategy, don't apply the cloud to everything, don't forget about Service Management, do start with a pilot project.	

Reference:

1. Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, "Cloud Computing: Principles and Paradigms", John Wiley and Sons Publications, 2011
2. Christopher Barnett, "Brief Guide to Cloud Computing", Constable & Robinson Limited, 2010 BorivojeFurht, Armando Escalante, "Handbook on Cloud Computing" , Springer, 2010

CO-PO/PSO MAPPING

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2			2						3	**1**	**2**	
CO2	3	3	2	3		2						3		**3**	

CO3	3	3	2	2	2							3	**1**		**1**
CO4	3	2	3	2		1						2	**1**		**1**
CO5	3	2	3		2							2	**1**	**2**	**1**
1: Low Association 2: Average Association 3: Strong Association															

Storage Technologies Lab

Subject Code: CS354

(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	**None**	**0**	**0**	**2**	**1**

List of Programs:

1. Creating raw partitions and make a file system in server
2. Create volumes , extend and shrink the volumes
3. Configure RAID 1 (mirroring) that replicates the data in two different disks
4. Configure RAID 5 that shows the data striping with parity
5. Configure storage area network in server 2012
6. Configure iSCSI in server 2012
7. Configure and deploy NAS in server 2012
8. Create and use the virtual hard disk in Windows 7
9. Configuring the virtual disk to an existing virtual machine(VM)
10. Attaching different virtual disk formats in an existing VM with no downtime

Ethical Hacking Lab

Subject Code: CS356

(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	None	0	0	2	1

List of Programs:

1. Passive Reconnaissance using “Who is” and Online tools
2. Active Reconnaissance using “Sampad” and web site details
3. Full Scan, Half Open Scan and Stealth scan using “nmap”
4. UDP and Ping Scanning using “Advance Lan Scanner” and “Superscan”
5. Packet crafting using “Packet creator” tools
6. Exploiting NetBIOS vulnerability
7. Password Revelation from browsers and social networking application
8. Creating and Analyzing spoofed emails
9. Creating and Analyzing Trojans
10. OS password cracking

Installation & Configuration of Server Lab

Subject Code: CS358

(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	None	0	0	2	1

List of Programs:

1. Installation windows Server 2012.
2. Configuration for Windows Server.
3. Configuration Local Storage for Windows Server.
4. Configuration File and Share Access for Windows Server.
5. Configuration Print and Document Services for Windows Server.
6. Configuration windows server for Remote Management.
7. Creating Virtual Machine in Windows Server.
8. Configuration and Setting Virtual Machine.

Cloud Technology Lab

Subject Code: CS352

(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	None	0	0	2	1

List of Programs:

1. Study the basic cloud architecture and represent it using a case study
2. Enlist Major difference between SAAS PAAS & IAAS also submit a research done on various companies in cloud business and the corresponding services provided by them , tag them under SAAS PAAS & IAAS.
3. Study and present a report on Jolly cloud.
4. Present a report on obstacles and vulnerabilities in cloud computing on generic level
5. Present a report on Amazon cloud services.
6. Present a report on Microsoft cloud services.
7. Present a report on cost management on cloud
8. Enlist and explain legal issues involved in the cloud with the lelp of a case study
9. Explain the process of migrating to cloud with a case study.
10. Present a report on google cloud and cloud services.

Integral University, Lucknow

Department of Computer Science and Engineering

Program: B. Tech. CSE (Cloud Technology and Information Security)

Subject Name: Web Technology**, Subject Code:** CS371

w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
None	None	3	1	0	4

CO1	Define **[L1: Knowledge]** of Internet and the World Wide Web and to design **[L5: Synthesis]** and interactive web page(s) using HTML, CSS.
CO2	Describe **[L2: Comprehension]** and differentiate **[L2: Comprehension]** different Web Extensions and Web Services.
CO3	Design **[L5: Synthesis]** a responsive web site using HTML5 and CSS3
CO4	Design **[L5: Synthesis]** Dynamic web site using server side PHP Programming and Database connectivity.

Objective:

- To get familiar with basics of the Internet Programming.
- To acquire knowledge and skills for creation of web site considering both client and server side programming
- To gain ability to develop responsive web applications
- To explore different web extensions and web services standards

UNIT I	**Introduction to the Internet and the World Wide Web**	**8**
	Introduction, History of internet, Internet Design Principles, Internet Protocols - FTP, TCP/IP, SMTP, Telnet, etc., Client Server Communication, Web System architecture. Evolution of the Web, Web architectures, Web clients and servers, Static and Dynamic Web Applications, Front end and back end web development. HTML, CSS, JS, XML; HTTP, secure HTTP, etc; URL, Web Services – SOAP, REST	
UNIT II	**HTML & CSS**	**10**
	Introduction to Html, Html Document structure, Html Editors, Html element/tag & attributes, Designing simple page - Html tag, Head tag, Body tag; More Html tags - Anchor tag, Image tag, Table tag, List tag, Frame tag, Divtag ; Html forms - Input type, Text area, Select , Button, Images. Introduction to CSS, Syntax, Selectors ,Embedding CSS to Html, Formatting fonts, Text & background colour, Inline	

	styles, External and Internal Style Sheets, Borders & boxing.	
UNIT III	**XML and HTML5, CSS3**	**8**
	Introduction to XML, Difference b/w Html & XML, XML editors, XML Elements & Attributes XML DTD, XML Schema, XML Parser, Document Object Model (DOM), XML DOM. Introduction to HTML5,CSS3, New features, Local storage, Web Sockets, Server events, Canvas, Audio & Video, Geolocation, Microdata, Drag and Drop. Browser life cycle and browser rendering stages. Service workers.	
UNIT IV	**PHP Server side scripting**	**7**
	Introduction to PHP, Basic Syntax, Variables, constants and operators, Loops, Arrays and Strings, Environment &environment variables, responding to HTTP requests, Files, Cookies, Sessions, Examples.	
UNIT V	**Practical website development**	**7**
	Commonly used Web Servers and browsers, Setting up a server and domain name, website types and structures, web authoring tools, Web hosting, website maintenance, generating traffic to your website.	

Reference:

1. Introducing Web Development, Jorg Krause. Apress 2017.
2. HTML & CSS: The Complete Reference, Thomas Powell. McGraw Hill, Fifth Edition, 2010
3. Creating a Website: The Missing Manual, 3rd Edition, Mathew Macdonald. O'Reilly
4. Web Technologies - HTML, JavaScript, PHP, Java, JSP, ASP.NET, XML and Ajax Black, Kogen Learning Systems (Dreamtech Press), 5th Edition 2009.
5. HTML, XHTML & CSS Bible, Brian Pfaffenberger, Steven M.Schafer, Charles White, Bill Karow- Wiley Publishing Inc, 2010
6. HTML5 & CSS3 for the Real World, 2 Edition, Alexis Goldstein, Estelle Weyl, Louis Lazaris. Apress 2015.
7. HTML5 & CSS3 for Dummies, Andy Harris. Wiley 2014.
8. Learning PHP A Gentle Introduction to the Web's Most Popular Language, David Sklar. O'Reilly 2016.
9. Build Your Own Database Driven Web Site Using PHP & MySQL, Kevin Yank. Sitepoint , 4th Edition, 2009.

CO-PO/PSO MAPPING

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2									3	**1**		**1**
CO2	3	3	2	1	2							3		**2**	**1**
CO3	3	3	2	2	2							3	**1**		
CO4	3	2	3	2	2							2	**1**	**3**	**1**
1: Low Association 2: Average Association 3: Strong Association															

Integral University, Lucknow
Department of Computer Science and Engineering
Program: B. Tech. CSE (Cloud Technology and Information Security)
Subject Name: Theory of Automata and Complier DesignSubject Code: CS372
w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
None	None	3	1	0	4

CO1	*State* **[L1: Knowledge]** procedure to convert regular expression to NFA and NFA to DFA
CO2	*Discuss***[L2: Comprehension]** properties of different grammars and languages
CO3	*Solve* **[L3: Application]** problems related to string membership to an automata and respective Language
CO4	*Analyze***[L4: Analysis]** importance of governance in cloud
CO5	*Create***[L4: Synthesis]** grammar for specific language.

Objective:

- Demonstrate different language processing abstract machines.
- Explain relationship between different languages and automata
- Design automata and language under specific criteria.

UNIT I	**IIntroduction to Compiler, Phases and passes, Bootstrappingm**	**8**
	Formal Language and Regular Expressions: Languages, Definition Languages regular expressions, Finite Automata DFA, NFA. Conversion of regular expression to NFA, NFA to DFA. Applications of Finite Automata to lexical analysis, lex tools. Context Free grammars and parsing: Context free grammars, derivation, parse trees, ambiguity LL(K) grammars and LL(1) parsing	
UNIT II	**S R Parsers**	**8**
	Bottom up parsing handle pruning LR Grammar Parsing, LALR parsing, parsing ambiguous grammars, YACC programming specification. Semantics: Syntax directed translation, S-attributed and L-attributed grammars, Intermediate code – abstract syntax tree, translation of simple statements and control flow statements. Context Sensitive features – Chomsky hierarchy of languages and recognizers. Type checking, type conversions, equivalence of type expressions, overloading of functions and operations.	
UNIT III	**Push Down Automata (PDA)**	**7**

	Description and definition, Instantaneous Description, Language of PDA, Acceptance by Final state, Acceptance by empty stack, Deterministic PDA, Equivalence of PDA and CFG, CFG to PDA and PDA to CFG, Two stack PDA	
UNIT IV	**Turing machines (TM)**	**9**
	Basic model, definition and representation, Instantaneous Description, Language acceptance by TM, Variants of Turing Machine, TM as Computer of Integer functions, Universal TM, Church's Thesis, Recursive and recursively enumerable languages, Halting problem, Introduction to Undecidability, Undecidable problems about TMs. Post correspondence problem (PCP), Modified PCP, Introduction to recursive function theory.	
UNIT V	**Code generation** Machine dependent code generation, object code forms. Code optimization: Machine-Independent Optimizations, Loop optimization, DAG representation of basic blocks, value numbers and algebraic laws, Global Data-Flow analysis.	**8**

Reference:

1. Aho, Sethi & Ullman, "Compilers: Principles, Techniques and Tools", Pearson Education
2. V Raghvan, " Principles of Compiler Design", TMH Hopcroft and Ullman, "Introduction to Automata Theory Languages and Computation",Addison Wesley.
3. Mishra & Chandrasekhar, "Theory of Computer Sciences", PHI.
4. Martin, "Introduction to Languages & Theory of Computation", TMH.

CO-PO/PSO MAPPING

PO-PSO CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	3			2			1			3	**2**	**1**	
CO2	3	3	2	3		2			3	2		3			
CO3	3	3	2	2	2				3			3	**1**		**1**
CO4	3	2	2	2		1						2		**3**	
CO5	3	2	3		2				1			2	**2**		**2**
1: Low Association 2: Average Association 3: Strong Association															

Integral University, Lucknow

Department of Computer Science and Engineering

Program: B. Tech. CSE (Cloud Technology and Information Security)

Subject Name: Cloud Security Subject Code: CS373

w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
None	None	2	1	0	3

CO1	*State* **[L1: Knowledge]** the impact of virtualization in the context of security on business benefits.
CO2	*Discuss***[L2: Comprehension]** various preventive, detective and corrective security controls for Cloud computing.
CO3	*Demonstrate* **[L3: Application]** Business Continuity Management and Disaster Recovery in the Cloud.
CO4	*Analyze***[L4: Analysis]** security risk of cloud provider.
CO5	*Compare***[L4: Synthesis]** traditional IT and Cloud Security with appropriate example.

Objective:

- Introduces the basic concepts of security systems and cryptographic protocols.
- Multi tenancy operation, virtualized infrastructure security.
- Improve virtualization security.

UNIT I	**Introduction to Virtualization Security**	**8**
	Introduction to Virtualization, impact and business benefits of Virtualization in the context of Security, Risks of Virtualization including attacks on Virtualization infrastructure, Hyper jacking and Virtual Machine jumping. Hyper jacking attacks like Blue Pill, Sub Virt, Vitriol, attacks on Virtualization features and compliance and Management challenges. Strategies and counter measures for addressing Virtualization risks, securing hypervisors, virtual machines threats, vulnerabilities and mitigation measures.	
UNIT II	**Introduction to Cloud Security**	**9**

	Introduction to Cloud Computing, various Cloud Delivery models including Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS) in the context of Security, Cloud deployment models – public, private and hybrid in the context of Security, Trusted Cloud Initiative (TCI) and Cloud Trust Protocol (CTP), Transparency as a Service (TaaS) and Security as a Service (SecaaS), Cloud Security, Incident and Response (Cloud SIRT), Cloud Data Governance and Governance, Risk and Compliance (GRC) Stack, top threats to Cloud Security, comparison of traditional IT and Cloud Security	
UNIT III	**Cloud Security Architecture**	**7**
	Architectural considerations, Cloud storage and data security, identity management and access control, autonomic security, encryption and key strategies, secure connection, Privacy in Cloud, architecture changes for different Cloud deployment models, Business Continuity Management and Disaster Recovery in the Cloud, OpenStack Cloud Security, Cloud forensics.	
UNIT IV	**Cloud Security Controls**	**5**
	Introduction to Cloud Controls Matrix, 13 domains of Security controls, fundamental security principles, deterrent, preventive, detective and corrective security controls for Cloud computing, assessing security risk of a cloud provider.	
UNIT V	**Security of Cloud Services**	**6**
	Cloud Platform and Infrastructure security-physical environment, networking, computing, virtualization, storage, risks and countermeasures, Cloud application security, Cloud secure development lifecycle, Cloud application architecture, multi-factor authentication, SSO, Understanding legal challenges involved in Cloud, liability, copyright, data protection, IPR, data portability, inter-country legal frameworks, personal data protection and privacy, data controller and processor, contracts, provider's insolvency risk.	

References

1. Virtualization Security: Protecting Virtualized Environments by Dave Shackleford, Sybex (4 December 2012)
2. OpenStack Cloud Security by Fabio Alessandro Locati, Packt Publishing Limited (28 July 2015)
3. Cloud Security – A comprehensive Guide to Secure Cloud Computing by Ronald L. Krutz and Russel Dean Vines, Wiley, 2010
4. Cloud Security and Privacy by Mather Tim, Shroff Publishers & Distributers Private Limited - Mumbai; First edition (2009)
5. Securing the Cloud: Cloud Computer Security Techniques and Tactics by Vic (J.R.) Winkler, Syngress (1 June 2011)
6. Practical Cloud Security: A Cross-Industry View by Melvin B. Greer Jr., Kevin L. Jackson CRC Press; 1 edition (2 August 2016)

CO-PO/PSO MAPPING

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3									3	**1**	**1**	**3**
CO2	3	2	1						2						
CO3	3		3			1							**1**		**1**
CO4	3	3	2			1						3		**2**	
CO5	3		3						2				**3**		**3**
1: Low Association 2: Average Association 3: Strong Association															

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Integral University, Lucknow

Department of Computer Science and Engineering

Program: B. Tech. CSE (Cloud Technology and Information Security)

Subject Name: Principles of VirtualizationSubject Code: CS374

w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
None	None	3	1	0	4

CO1	Identify**[L61: Knowledge]** various constraints and challenges in setting up a data center
CO2	2. Demonstrate**[L3: Application]**, Enterprise level virtualization and access control in virtual machines
CO3	3. Perform**[L3: Application]** Resource monitoring and execute backup and recovery of virtual machines.

Objective:

This course focuses on the challenges in setting up a data center. Resource monitoring using hypervisors and access control to virtual machines will be covered in depth in this course. Setting up of a virtual data center and how to manage them with software interfaces will be discussed in detail.

UNIT I	**Basics of Virtualization**	
	Understanding Virtualization, Need of Virtualization and Virtualization Technologies: Server Virtualization, Storage Virtualization, I/O Virtualization, Network Virtualization, Client Virtualization, Application virtualization, Desktop virtualization, Understanding Virtualization Uses: Studying Server Consolidation, Development and Test Environments , Helping with Disaster Recovery.	
UNIT II	**Deploying and Managing an Enterprise Desktop Virtualization Environment**	
	Configure the BIOS to support hardware virtualization; Install and configure Windows Virtual PC: installing Windows Virtual PC on various platforms (32-bit, 64-bit), creating and managing virtual hard disks, configuring virtual machine resources including network resources, preparing host machines; create, deploy, and maintain images.	
UNIT III	**Deploying and Managing an Enterprise Desktop Virtualization Environment**	
	Prepare and manage remote applications: configuring application sharing, package applications for deployment by using Remote App, installing and configuring the RD Session Host Role Service on the server.	
UNIT IV	**Accessing Published Applications**	
	Access published applications: configuring Remote Desktop Web Access, configuring role-based application provisioning, and configuring Remote Desktop client connections. Configure client settings to access virtualized desktops: configuring client settings.	
UNIT V	**Understanding Virtualization Software**	
	List of virtualization Software available .Vmware- introduction to Vsphere, ESXi, VCenterServer and Vsphere client. Creating Virtual Machine. Introduction to	

	HYPER-V role. Create Virtual Machines. Create Hyper-v virtual networking, Use virtual Machine Snapshots. Monitor the performance of a Hyper-v server, Citrix XEN Desktop fundamentals.	

Reference:

1. Virtualization with Microsoft Virtual Server 2005 by TwanGrotenhuis, RogierDittner, Aaron Tiensivu, Ken Majors, Geoffrey Green, David Rule, Andy Jones, Matthijs ten Seldam, Syngress Publications, 2006
2. Virtualization--the complete cornerstone guide to virtualization best practices, Ivanka Menken, Gerard Blokdijk, Lightning Source Incorporated, 2008
3. Virtualization: From the Desktop to the Enterprise, Chris Wolf, Erick M. Halter, EBook, 2005

CO-PO/PSO MAPPING

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1								3	**1**	**3**	**2**
CO2	3	3	3	2	1	1						3	**1**		**1**
CO3	3	3	2	1	2	1						3	**1**	**1**	

Integral University, Lucknow

Department of Computer Science and Engineering

Program: B. Tech. CSE (Cloud Technology and Information Security)

Subject Name: Infrastructure Solutions on CloudSubject Code: CS375

w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
None	None	2	1	0	3

CO1	DescribeAzure AD and *list* **[L1: Knowledge]** its advantages
CO2	*Discuss***[L2: Comprehension]** various best practices for azure storage
CO3	*Build* **[L3: Application]** configure and use load balances in Azure
CO4	*Analyze***[L4: Analysis]** the identity and authentication in public cloud
CO5	*Create***[L4: Synthesis]** SQL tables in Microsoft Azure and adding data to it.

Objective:

- To Understand Microsoft Azure and Azure Storage.
- Creating a SQL, SQL DB, Tables and adding data to the table in Microsoft Azure
- To gain basic understanding of Azure storage and networking.

UNIT I	**Getting Started with Azure**	**8**
	Overview of Cloud Computing – Various Cloud Offerings – Azure Basics – Azure Services – Azure Portals – Preview Portal, Management Portal, Subscription Management – Billing – Pricing Calculator - Azure Virtual Machines :Virtual Machine(VM) Basics – Status, IP Address, Creating and Configuring Virtual Machines – Configuring VM disks – Virtual Machine Management	
UNIT II	**Azure Storage**	**8**
	Storage Basics – Storage Types – Azure Storage Offerings – Understanding Azure Regions – Using Storage Accounts – Enabling Larger and Faster Storage – Resizing Azure Disks – Using Premium Storage – Monitoring Azure Storage Accounts – Best Practices for Azure Storage – Azure VM Storage Types – Azure Files – Managing Azure Storage.	
UNIT III	**Azure Networking**	**8**

	Basics of Virtual Networks – Address Spaces, Subnets, DNS Servers – Creating and Using Virtual Networks – Network Security Groups – Virtual Appliances – Load Balancer basics – Configuring Load Balancers – Creating and Using Load balancers – Azure VPN	
UNIT IV	**Azure Active Directory**	**5**
	Introduction to Active Directory(AD), Identity and Authentication in Public Cloud – Introduction to Azure AD – Extending Active Directory into Azure – Azure AD and applications – Reporting and Monitoring Azure AD.	
Unit V	**Azure Databases** SQL Azure: Creating a SQL Server - Creating a SQL DB - Creating Tables - Adding Data to the Table - View Connection Strings - Security Configurations - Migrating on premise DB to SQL Azure. **Azure Websites:** Creating a Website, Settingdeployment credentials -Choosing a platform -Setting up Default page for website - Scaling - Auto Scaling by Time - Auto Scaling by Metric - Difference between Free, Shared, Basic and Standard websites - Creating a website using Visual studio	**6**

Reference:

1. Michael Collier, Robin Shahan, "Fundamentals of Azure – Microsoft Azure Essentials", Microsoft Press, 2015.
2. Michael W, "Implementing Microsoft Azure Infrastructure Solutions", Phi Learning Pvt Ltd, 2009

CO-PO/PSO MAPPING

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3						3			2	**1**	**1**	**1**
CO2	3	3	2	3					3			3		**2**	
CO3	3	3	2						3			2	**1**		**3**
CO4	3	2	3	3								3			
CO5	3	3	3									2	**1**		**1**
1: Low Association 2: Average Association 3: Strong Association															

Integral University, Lucknow

Department of Computer Science and Engineering

Program: B. Tech. CSE (Cloud Technology and Information Security)

Subject Name: Cyber Security Incident Response ManagementSubject Code: CS379

w.e.f Session 2020-21

Pre-requisite	Co-requisite	L	T	P	C
None	None	3	1	0	4

CO1	Define **[L1: Knowledge]** the importance and identify **[L1: Knowledge]** the need of CSIRM.
CO2	Apply **[L3: Application]** the security concepts to Handle a Cyber Security Incident.
CO3	Illustrate **[L3: Application]** the solution to Recovering from Cyber Security Incidents
CO4	Design **[L5: Synthesis]** the Cyber Security Incidents responses through Scenarios

Objective:

1. To get an overview of the cyber incidents.

2. To acquire knowledge and skills for responding to a cyber-incidents

3. To understand various solution to recover from cyber-security incidents

4. To learn various laws that can be applied on a given scenario of cyber incident

UNIT I	**Need for CSIRM**	**9**
	Differences between an event, incident and disaster, what are cyber security incidents, need for CSIRM, policy, plan and procedure, importance of communication protocol, key internal and external stakeholders, law enforcement, role of media, team structure and roles – important considerations.	
UNIT II	**Handling a Cyber Security Incident**	**8**

	Incident response lifecycle, incident handling infrastructure and facilities requirements, detection and analysis, process, tools and techniques, attack vectors, recognizing signs of an incident, precursors, indicators and historical organization data, incident correlation, review of logs and vital system parameters, incident handling checklist, documentation and reporting	
UNIT III	**Recovering from Cyber Security Incidents**	**9**
	Nature of incidents and the type of resources it affects, assessment of an incident's impact on business, IT operations and information, determining the amount of time and resources needed in recovering from an incident, prioritization, incident notification structure, containment, eradication and recovery – choosing a containment strategy, evidence gathering and handling, identifying the attack hosts, eradication and recovery, post-incident analysis, evidence retention and lessons learned.	
UNIT IV	**Preventing Cyber Security Incidents**	**8**
	Incident analytics as input to proactive security measures to prevent incidents, risk assessment, host security, network security, malware prevention, user awareness and training, analysis of cost of control versus cost of incident impact, best practices.	
UNIT V	**Cyber Security Incidents Analysis through Scenarios**	**6**
	Flow chart of scenario questions, scenarios – DoS attack on DNS server, worm and DDoS agent infestation, military-classified documents stolen by an insider, compromised database server, unauthorized access to payroll records, identities and credentials stolen by hackers, antisocial propaganda in media through compromised home wifi network, personal files stored in Cloud are compromised, remote hacking of smart home network, malware infection in home and office network simultaneously, large scale of citizens' biometric data stolen by cyber war groups. .	

Reference:

1. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole
2. Network Security Bible by Eric Cole

CO-PO/PSO MAPPING

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2									3	**2**		**2**
CO2	3	3	2	1	2							3	**1**	**3**	
CO3	3	3	2	2	2							3			
CO4	3	2	3	2	2							2	**1**	**1**	**1**

Infrastructure Solutions on Cloud Lab

Subject Code: CS376

(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	None	0	0	2	1

List of Programs:

1. Create and document the process of creating a windows azure account
2. Create a virtual machine from available releases of windows server images
3. Create a virtual machine using the option “quick Create”
4. Create a custom VM and Capture the image
5. Create a vm from a captured image
6. Add a VMs to a cluster and deploy load balancer on the same
7. Create and publish / host a webpage in windows azure
8. Create a website using Visual studio
9. Create a SQL server DB , Create tables and add data to the table
10. Test basic sql commands on the table created in the previous step.
11. Migrate an on premise DB to Azure
12. Create a storage account in Azure

Principles of Virtualization Lab

Subject Code: CS377

(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	None	0	0	2	1

List of Programs:

1. Installing VMware ESXi server.
2. Accessing ESXi through vSphere Client and Uploading ISO Images of OS into the Datastore of ESXi Server.
3. Creating Virtual machines in the ESXi Server
4. Monitoring the performance of ESXi Server.
5. Preparing Domain for vCenter Server as prerequisite.
6. Installing vCenter Server
7. Creating Datacenter and adding ESXi Server as Host to vCenter Server.
8. Cloning a Virtual Machine and Creating a Virtual Machine from cloned VM Template.
9. Configuring vNetwork Distributed Switch using vCenter Server.
10. Assigning permissions to users on Datacenter

Mini Project-I

Subject Code: CS399

(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	None	0	0	2	1

The students will undertake a project as part of their Sixth semester. The students can do independent projects or can take up projects in groups of two or more depending on the complexity of the project. The maximum group size will be four and in case of team projects there should be a clear delineation of the responsibilities and work done by each project member. The projects must be approved by the mentor assigned to the student. The mentors will counsel the students for choosing the topic for the projects and together they will come up with the objectives and the process of the project. From there, the student takes over and works on the project.

Project Evaluation Guidelines:

The Project evaluator(s) verify and validate the information presented in the project report.

The break-up of marks would be as follows:

1. Internal Evaluation
2. External Assessment
3. Viva Voce

Integral University, Lucknow
Department of Computer Science and Engineering
Program: B. Tech. CSE (Cloud Technology and Information Security)
Cyber Forensics & Investigation
Subject Code: CS461
(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	None	3	1	0	4

Unit I: Computer Forensics
Introduction to Computer Forensics, Forms of Cyber Crime, First Responder Procedure- Non-technical staff, Technical Staff, Forensics Expert and Computer Investigation procedure, Case Studies. [8]

Unit II: Storage Devices & Data Recover Methods
Storage Devices- Magnetic Medium, Non-magnetic medium and Optical Medium, Working of Storage devices-Platter, Head assembly, spindle motor, Data Acquisition, Data deletion and data recovery method and techniques, volatile data analysis, Case Studies.
[8]

Unit III: Forensics Techniques
Windows forensic, Linux Forensics, Network forensics – sources of network-based evidence, other basic technical fundamentals, Mobile Forensics – data extraction & analysis, Steganography, Password cracking-Brute force, Cross-drive analysis, Live analysis, deleted files, stochastic forensics, Dictionary attack, Rainbow attack, Email Tacking – Header option of SMTP, POP3, IMAP, examining browsers, Case Studies.
[9]

Unit IV: Cyber Law
Corporate espionage, digital evidences handling procedure, Chain of custody, Main features of Indian IT Act 2008 (Amendment), Case Studies, Incident specific procedures – virus and worm incidents, Hacker incidents, Social incidents, physical incident, Guidelines for writing forensic report. [7]

Unit V: Forensic Analysis of Web Application
Forensic analysis of web server, network analysis of web server compromise, web server log analysis, web application forensic, forensic analysis of web application security, intruder profiling, forensic for code injection attack, Case Studies
[8]

.

Reference Books:

1. Computer Forensics: Computer Crime Scene Investigation by John Vacca, Laxmi Publications, 1st ed; 2015
2. Digital Forensic: The Fascinating World of Digital Evidences by Nilakshi Jain, et.al, Wiley, 1st ed; 2016
3. The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics by John Sammons, Syngress, 2nd ed; 2014
4. Cyber Forensics in India: A Legal Perspective by Nishesh Sharma, Universal Law Publishing - an imprint of LexisNexis; First 2017 edition
5. Network Forensics:Tracking Hackers Throu by Davidoff, Pearson India, 1st ed; 2013
6. Hacking Exposed Computer Forensics by Aaron Philipp, David Cowen, McGraw Hill, 2nd ed; 2009
7. Mastering Mobile Forensics by Soufiane Tahiri, Packt Publishing, 1st ed; 2016
8. Computer Forensics: A Beginners Guide by David Cowen, McGraw Hill, 1st ed; 2013
9. Practical Digital Forensics Kindle Edition by Richard Boddington, Packt Publishing, 1st ed; July 2016.
10. Learning Network Forensics by Samir Datt, Packt Publishing, 1st ed; 2016.

Department of Computer Science and Engineering
Program: B. Tech. CSE (Cloud Technology and Information Security)

Cloud Web Services

Subject Code: CS462

(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	None	3	1	0	4

Unit I: Introduction to Cloud Computing and Amazon Web Services

Introduction to Cloud Computing, Cloud Service Delivery Models (IAAS, PAAS, SAAS), Cloud Deployment Models (Private, Public, Hybrid and Community), Cloud Computing Security, Case Study.Introduction to Amazon Web Services, Why Amazon? Use Cases, AWS Storage Options, AWS Compute Options, AWS Database Options, AWS Workflow Automation and Orchestration Options, AWS Systems Management and Monitoring Options, AWS Virtual Private Cloud Introduction, Pricing Concepts. [8]

Unit II: Introduction to EC2

Introduction To EC2, Instance Types And Uses, Auto scaling Instances, Amazon Machine Images (AMIS), Modifying Existing Images, Creating New Images of Running Instances, Converting An Instance Store AMI To An EBS AMI, Instances Backed By Storage Types, Elastic IPS, Elastic Load Balancing [7]

Unit III: Web Applications and Security

Introduction to Elastic Beanstalk, Deploying Scalable Application On AWS, Selecting And Launching An Application Environment, Provisioning Application Resources with Cloud formation, Introduction to CloudWatch, Describe Amazon Cloud Watch metrics and alarms, AWS Messaging Services(SNS,SQS,SES).Introduction to AWS Security, Describe Amazon Identity and Access Management (IAM), AWS Directory Service, AWS Key Management Service, Securing Data at Rest and In Motion [9]

Unit IV: AWS Storage

Amazon Storage, S3 Storage Basics, Buckets and Objects, Creating A Web Server Using S3 Endpoints, Managing Voluminous Information with EBS, Glacier Storage Service , Describe Amazon Dynamo, Understand key aspects of Amazon RDS, Launch an Amazon RDS instance. [8]

Unit V: AWS Networking

Introduction to AWS Networking , Access Control Lists (ACLs), Setting Up a Security Group, Setting Up VPC And Internet Gateway, Setting Up A VPN, Setting Up A Customer Gateway For VPN, Setting Up Dedicated Hardware For VPC, Scenario 1:VPC With A Public Subnet

Only (Standalone Web), Scenario 2: VPC with Public And Private Subnets (3 Tier App), Scenario 3:VPC With Public And Private Subnets And Hardware VPN Access (Web On The Cloud, Database and App On Prem) Scenario 4: VPC With A Private Subnet Only And Hardware VPN Access. (Extension of Your Corporate Network), Route53 for DNS System, Cloud front, Case Study

[8]

.

Reference Books:

1. Joe Baron, Hisham Baz , Tim Bixler , Biff Gaut , Kevin E. Kelly , Sean Senior , John Stamper , "AWS Certified Solutions Architect Official Study Guide: Associate Exam, John Wiley and Sons Publications, 2017
2. Yohan Wadia , "AWS Certified Solutions Architect Official Study Guide: Associate Exam, John Packt Publishing, 2016
3. Bernald Golden, "Amazon Web Services for Dummies", John Wiley & Sons, 2013

Department of Computer Science and Engineering
Program: B. Tech. CSE (Cloud Technology and Information Security)

Linux Administration

Subject Code: CS463

(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	None	3	1	0	4

Unit I: Introduction to Linux

Introduction to Operating system - Types of Operating system - Multi user operating system - Open source licensing - History of Linux - Unix Vs Linux - Flavors of Linux - Benefits and characteristics of Linux - Installation of Linux - Linux booting process - Log in and switch users in multiuser run levels - Shell and bash features - Linux kernel - sudo vs su - Date and time configuration – Linux run levels

Directories and files : Directory structure - System directory - Absolute path and relative path - Creating and removing directory - Changing directory path - Creating - removing - copying and moving files - File Permissions - Links – hard link and soft link - Input and output redirection - Filters and pipes - Locate - read - and use system documentation including man page [9]

Unit II: Package, User and group Management

RPM - YUM - Archive - Compress - unpack and uncompress files using tar - star - gzip - and bzip2 - Create - delete - and modify local user accounts - Change passwords for local user accounts - Create - delete - and modify local groups and group memberships - Changing owner and modes [6]

Unit III: Configuring local storage and filesystem

List - create - delete - and partition type for primary - extended - and logical partitions - Create and remove physical volumes - assign physical volumes to volume groups - Create and delete logical Volumes. - Create - mount - unmount - ext2 - ext3 - and ext4 file systems. - Mount - unmount - and LUKS-encrypted file systems - Access control list [7]

Unit IV: Managing system and infrastructure services

Managing system services - Shutting down - suspending and hibernating the system - Controlling systemd on remote machine - Creating and modifying systemd unit files – DHCP

Configuration - HTTP server Configuration - FTP server Configuration - Mail server Configuration - Samba server Configuration - NTP server Configuration - NFS server Configuration [7]

Unit V: OpenSSH and Linux security

OPENSSH - The SSH Protocol - Configuring OpenSSH and Starting an OpenSSH Server Key-Based Authentication in OpenSSH - OpenSSH Clients - Using the ssh Utility - scp Utility and sftp Utility - Configure firewall settings using system-config-firewall or iptables - Set enforcing and permissive modes for SELinux - List and identify SELinux file and process context. [6]

Reference Books:

1. Orsaria, Jang, "RHCSA/RHCE Red Hat Linux Certification Study Guide Exams EX200 & EX300", McGraw-Hill Education, July 2017.
2. Sander Van Vugt, "Red Hat RHCSA/RHCE 7 Cert Guide: Red Hat Enterprise Linux 7 (EX200 and EX300)", Phi Learning Pvt Ltd, 2009.

Department of Computer Science and Engineering
Program: B. Tech. CSE (Cloud Technology and Information Security)

Disaster Recovery and Business Continuity Management

Subject Code: CS464

(w.e.f. July 2018)

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Pre-requisite	Co-requisite	L	T	P	C
None	None	3	1	0	4

Unit I: Business Continuity Management

Introduction to Business Continuity Planning (BCP), Business Resumption Plan (BRP) or Disaster Recovery Plan (DRP), Common terminologies used in BCP and DRP, Business Continuity Management (BCM), NIST SP800-34 Emergency Action plan which includes the phases of Recover/Resume, Protect and Sustain, Causes of Disasters. [8]

Unit II: Stages in BCP

BCP objectives. Information Protection Environment. Security Technology and Tools. Steps involved in creating a BCP, Phase 1: Project Management and Initiation. Phase 2: Business Impact Analysis. Phase 3: Recovery Strategies, Phase 4: Plan Development and Implementation. [8]

Unit III: Business Recovery strategies

Facility and Supply Recovery strategies. User Recovery strategies. Technical Recovery strategies, Data Recovery strategies, Activation Phase- Major Disaster or Disruption, Intermediate Disaster or Disruption, Minor Disaster, Activating BC/DR Teams, Developing Triggers, Transition Trigger. Defining BC/DR Team and Key Personnel, Defining Tasks, Assigning Resources, Communication Plan. [7]

Unit IV: Testing, Maintenance, Awareness & Training Mechanisms

Different types of tests including structured walk-through, checklist test, simulation, parallel test and full interruption test. Steps required to maintain a BCP. [6]

Unit V: Preparation of BCP

Requirements for BCP awareness and training, Conduct a case study of IT Organization and prepare a Business Continuity Plan for the same using the learning from this course. [6]

Reference Books:

1. Business Continuity and Disaster Recovery Planning for IT Professionals by Susan Snedaker, Syngress; 2 edition (31 October 2013)
2. Business Continuity and Disaster Recovery Planning by Stuart Hotchkiss, BCS, The Chartered Institute for IT, 1st ed; 2011
3. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole, Wiley, 1st ed; 2008
4. Planning for Disaster: A Business Survival Guide by Harry Flowers, CreateSpace Independent Publishing Platform; 1 edition (15 August 2015)
5. Disaster Management: How to Conduct Business Continuity and Disaster Recovery During Disaster Planning, Response and Recovery: 3 (Disaster Management How To Series) by Ian Watts, CreateSpace Independent Publishing Platform; 1 edition (28 November 2016)
6. Simple Guidelines for Successful Disaster Recovery Planning: What are the steps to create an emergency response plan, and how would you utilize this plan by Harry R Fisher, CreateSpace Independent Publishing Platform (27 January 2015)
7. Business Continuity from Preparedness to Recovery: A Standards-Based Approach by Eugene Tucker, Butterworth-Heinemann; 1 edition (5 January 2015)

Department of Computer Science and Engineering
Program: B. Tech. CSE (Cloud Technology and Information Security)

Exchange Server Administration
Subject Code: CS468
(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	None	3	1	0	4

Unit I: Putting Exchange Server 2013 into context, Introducing Change in Exchange Server 2013

Significance of e-mail communication: Importance of Email, Messaging Services, Exchange Server, Many modes of access, The Universal Inbox, Architecture Overview. Controlling Mailbox growth, Personal folders or PST files, Email archiving, Public Folders, Things every Email-administrators should know, Tools. Exchange Server 2013: Getting to know Exchange Server 2013, Exchange Server Architecture, x64 processor requirement, Windows Server 2008 R2 and Widows Server 2012 Installer, Service Pack and Patching Improvements Server roles, Edge Transport Services, Unified Messaging and Client Connectivity. The managed store, High-Availability Features Content Storage, Exchange Server Management, Improved Message and Content Control, Built-in Archiving, Message Transport Rules, Message Classifications, Rights Management, Service Message Protection Programming Interfaces, New and Improved Outlook Web App, Mobile Clients and Improved Security.

[8]

Unit II: Understanding Availability, Recovery, Compliance, and Virtualization Server Exchange 2013:

What's in a Name, Backup and Recovery, Disaster Recovery, Management Frameworks, A Closer Look at Availability, Storage Availability , An Overview of Exchange Storage, Direct Attached Storage, Storage Area Networks, Compliance and Governance, The Bottom Line. Virtualization Overview, Understanding Virtualized Exchange, Understanding Your Exchange Environment Effects of Virtualization, Environmental Impact, Space Impact, Complexity Impact, Additional Considerations, Virtualization Requirements, Hardware Requirements, Software Requirements, Operations, Deciding What to Virtualized, Exchange Roles ,Testing, Possible Virtualization Scenarios, Small Office/Remote or Branch Office , Site Resilience, Mobile Access

[9]

Unit III: Introducing Power Shell, Exchange Management Shell and Getting Exchange Server Running

Why Use Power Shell, Understanding the Command Syntax, Verbs and Nouns, The -Identity Parameter, Cmdlet Parameters, Alias, Object-oriented Use of Power Shell, Filtering Output, Formatting Output, Directing Output to Other Cmdlets, Power Shell v3, Remote Power Shell, Tips and Tricks, Managing Output, Running Scripts, Running Scheduled Power Shell Scripts, Debugging and Troubleshooting from Power Shell, Auto discover Concepts, What Auto discover Provides, How Auto discover Works. Hardware, Operating Systems, Configuring Windows, Understanding Server Role and Configuration, Active Directory Requirements, Installing Exchange Server 2013, GUI-based Installation, Command-line Installation, Post-installation Configuration Steps, Final Configuration.

[9]

Unit IV: Understanding Server roles, configuration, Exchange server 2013 requirement and Installation

Server Roles, exchange server 2013 server roles, mailbox server, client access server, possible role configurations, combined-function server, scaling exchange server 2013 roles. Selecting the

right server hardware, the typical user, CPU recommendations, memory recommendations, network recommendations, disk recommendations, software recommendations, operating recommendations, windows 7/windows 8 management consoles, additional requirement, active directory requirement, installation and preparation permissions.

[7]

Unit V: Introducing Power Shell and Exchange Management Shell

Why Use Power Shell, Understanding the Command Syntax, Verbs and Nouns, The -Identity Parameter, Camlet Parameters, Alias, Object-oriented Use of Power Shell, Filtering Output, Formatting Output, Directing Output to Other Camlets, Power Shell v3 , Remote Power Shell, Tips and Tricks, Managing Output, Running Scripts, Running Scheduled Power Shell Scripts, Debugging and Troubleshooting from Power Shell, Auto discover Concepts, What Auto discover Provides , how Auto discover Works.

Getting Exchange Server Running. Hardware, Operating Systems, Configuring Windows, Understanding Server Role and Configuration,Active Directory Requirements, Installing Exchange Server 2013, GUI-based Installation, Command-line Installation, Post-installation Configuration Steps, Final Configuration [7]

.

Reference Books:

1. Mastering Exchange server 2013 by David Elfassy
2. “Microsoft Exchange Server 2013 Unleashed “ By Rand Morimoto, Michael Noel, Guy Yardeni, Chris Amaris, Andrew Abbate, Technical Edit by Ed Crowley, 2012 edition.

Department of Computer Science and Engineering
Program: B. Tech. CSE (Cloud Technology and Information Security)

Advance Virtualization

Subject Code: CS469

(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	None	3	1	0	4

Unit I: Security Concepts

Role Based Access Control(RBAC), Explicit Permissions, Managing User and Group Lists, Server Roles and Directory Services, Harden Virtual Machine, ESXi Hosts and vCenter Server, SSO Architecture and Components, Various Authentication Methods, SSO – Users, Installation and Policies [8]

Unit II: Storage

Storage LUNs, Configure LUNs, NFS Share, iSCSI initiator – Software, Hardware, Configure iSCSI initiator, Editing initiator Settings, Port binding, VSAN and VVOL architectural components, Managing Virtual SAN and Virtual Volumes, Storage Policies, Storage I/O Control. [8]

Unit III: Networking

Networking: Create, configure, and manage vNetwork standard switches, Create, configure, and manage network connections, Create, configure, and manage port groups, Storage: Configure ESX/ESXi with iSCSI, NFS, Create and manage vSphere data stores.
[8]

Unit IV: Virtual Machines

Virtual Machines: Deploy virtual machines using VMware vCenter Converter, Resource Monitoring, Control virtual machine access to CPU, memory, and I/O resources, Introduce VM kernel methods for optimizing CPU and memory usage Monitor resource usage using vCenter Server performance graphs and alarms, Data Protection: Back up and recover virtual machines using VMware Data Recovery. [8]

Unit V: Scalability

Manage multiple vCenter Server inventories using VMware vCenter Linked Mode, Manage ESX/ESXi configuration compliance using Host Profiles, Create, configure, and manage vNetwork distributed switches, network connections, and port groups, Configure and manage a VMware Distributed Resource Scheduler cluster High Availability, Configure and manage a VMware High Availability cluster, Configure fault-tolerant virtual machines using VMware

Fault Tolerance, Patch Management: Manage patching and patch compliance using vCenter Update Manager [8]

Reference Books:

1. John A. Davis, Steve Baca, Owen Thomas, "VCP6-DCV Official Cert Guide (Exam #2V0-621)", 3rd Edition, VMware Press.
2. "Nick Marshal, "Mastering VMware vSphere 6", 1st Edition, Wiley Publications

Department of Computer Science and Engineering
Program: B. Tech. CSE (Cloud Technology and Information Security)

Infrastructure Automation

Subject Code: CS470

(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	None	3	1	0	4

Unit I: Introduction to Chef

Idem potency/convergence - test & repair model - Common resources and their actions- Default actions- The ':nothing' action - The 'supports' directive - The 'not_if' and 'only_if' directives - Resource extensibility -RECIPES: What a recipe is - Importance of the resource order - How to use 'include_recipe' - What happens if a recipe is included multiple times in a run_list - The 'notifies' and 'subscribes' directives [8]

Unit II: COOKBOOKS and chef server

Cookbook contents - Naming conventions - Cookbook dependencies - The default recipe - How the Chef server acts as an artifact repository - How the Chef server acts as an index of node data - Chef solo vs Chef server - Chef server's distributed architecture - Scalability [7]

Unit III: Chef Client

The function of Chef client vs the function of Chef server - What 'why-run' is - How to use '--local-mode' - How the Chef client and the Chef server communicate - The Chef client configuration - What a node is - What a node object is - How a node object is stored on Chef server - How to manage nodes - How to query nodes - How to name nodes [8]

Unit IV: Puppet infrastructure & Resource and manifests

Introduction To Configuration Management - Importance of puppet - How To Access Your Working Files - Puppet Agents - Puppet Masters Systems Orchestration - Cross Platform Puppet. Introduction To Puppet Run Cycle - Gathering System Facts - Node Matching And Catalogue Compilation - Puppet Resources - How To Define System Resources - Applying A Simple Puppet Manifest - Puppet Types - The Package File Service Pattern - Applying Conditional - - Logic In Puppet - Fact Conditionals - Choosing A Course Of Action. [9]

Unit V: Puppet Environment and MCollective

Defining Nodes - Puppet Modules - Reusable Code - Forge Modules - Where To Find Reusable Code - Provisioning A Web Server - Class Parameters - Applying Variables - Hiera Parameters - Defining Variables - Executing Modules Against A Puppet Master With An Agent - Reporting With Puppet - MCollective And Live Management - MCollective With Puppet - Using

MCollective To Interact With Services - Using MCollective To Interact With Puppet
[8]

Reference Books:

1. Managing Infrastructure with Puppet Paperback – 29 Jun 2011 by James Loope
2. Chef Cookbook Paperback – Import, 3 Feb 2017 by Matthias Marschall (Author)
3. DevOps for Beginners: Hands-on Guide Kindle Edition by David Johnson– 2016 edtion

Department of Computer Science and Engineering
Program: B. Tech. CSE (Cloud Technology and Information Security)

IT Governance, Risk and Information Security Management

Subject Code: CS471

(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	None	3	1	0	4

Unit I: IT Governance-Part 1

Introduction & Concepts, Origin of Governance, Corporate Governance, Best Practices for IT Governance, Role of Governance in Information Security, Six outcomes of effective Security Governance, benefits of good governance, Cultural aspects in governance.

[8]

Unit II: IT Governance-Part 2

ITGovernance-Roles and Responsibilities, Role of IT Strategy Committee and Security Steering Committee, Standard IT Balanced Scorecard. Val-IT framework of ISACA, Governance in multi-department and multi-country enterprises, Importance of Governance in establishing a sustainable Security Culture in the organization.

[8]

Unit III: Information Systems Strategy

Role of Strategic Planning for IT, Strategic Direction and Alignment of Security Strategy with Business Objectives, Role of CISO, Security Metrics Program.

[8]

Unit IV: Risk Management Program

Develop a Risk Management Program. Risk Management Process, Roles and Responsibilities, Risk-IT Framework of ISACA, Strategic Security decisioning using Risk Management

[8]

Unit V: Information Security Management

Introduction, Performance Optimization, Management Information Security Forum, Segregation of Duties, Description of COBIT and other Frameworks, Security Program Effectiveness, Continuous Assessment and Improvement, In-sourcing versus Out-sourcing, Impact of ISM program across organization. [8]

Reference Books:

1. Information Security Governance by S.H. Solms, Rossouw Solms, Springer; 1st Edition. 2nd Printing, 2008 edition (12 December 2008)

2. IT Governance: How Top Performers Manage IT Decision Rights for Superior Results by Weill, Harvard Business Review Press; First edition (1 June 2004).
3. ISACA publications.
4. Managing Risk and Information Security by Malcolm Harkins, Apress; 1 edition, 2012
5. IT Governance: An International Guide to Data Security and ISO27001/ISO27002 by Alan Calder, Steve Watkins, Kogan Page; 6 edition (3 September 2015)
6. ISACA publications on COBIT, RiskIT and ValIT
7. Information Security Governance: Guidance for Information Security Managers by W. Krag Brotby and IT Governance Institute, Isaca (2 June 2008)
8. COBIT 5 Framework Perfect by Isaca, (10 April 2012)
9. Cobit 5 Foundation-reference and Study Guide by Ana Cecilia Delgado, CreateSpace Independent Publishing Platform; Stg edition (20 June 2016)
10. Governance of Enterprise IT Based on COBIT 5: A Management Guide by Geoff Harmer (Author), IT Governance Publishing, (6 February 2014)

Department of Computer Science and Engineering
Program: B. Tech. CSE (Cloud Technology and Information Security)

COBIT VALIT RISKIT

Subject Code: CS472

(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	None	3	1	0	4

Unit I: Introduction to COBIT

COBIT 5 – Its importance and relevance - 5 Principles of COBIT

a) Meeting Stakeholders needs
b) Covering the Enterprise End-to-End
c) Applying a Single Integrated Framework
d) Enabling a Holistic approach
e) Separating the Governance from the Management

Enablers of COBIT

a) Processes
b) Organizational Structures
c) Culture, Ethics & Behaviour
d) Principles, Policies & Frameworks
e) Information
f) Services Infrastructure Applications
g) People, Skills & Competencies. [10]

Unit II: Risk IT and Val IT – Importance and Relevance for Information Security

Interlinkages between Risk IT with COBIT & Val IT, three domains of Risk IT with their sub processes

Risk Governance

a) Establish and Maintain a Common Risk view
b) Integrate with Enterprise Risk Management (ERM)
c) Make Risk-aware Business Decisions

Risk Evaluation

a) Collect data
b) Analyze Risk
c) Maintain Risk Profile

Risk Response

a) Articulate Risk, Manage Risk, React to Events

ValIT, its importance and relevance, key ValIT terms, principles and domains

[9]

Unit III: Introduction to Information Security Governance (ISG)

Importance of ISG, Benefits of ISG, monitoring ISG through metrics, approach for implementing ISG, how ISG it connected to ITG and Corporate Governance [7]

Unit IV: Applying COBIT 5 principles, RiskIT, ValIT in Information Security Governance

How the Principles and Processes are connected to ISG, applying the principles in ISG, separating governance and management in ISG, benefits. [7]

Unit V: Framework on ISG

Overview of ISO/IEC 27014:2013 Information technology — Security techniques — Governance of information security, How ISG impacts Cloud, Mobile, Big Data, Analytics and AI? Case Studies on Corporate Governance, IT Governances and Information Security Governance. [7]

Reference Books:

1. Information Security Governance by S.H. Solms, Rossouw Solms, Springer; 1st Edition. 2nd Printing, 2008 edition (12 December 2008)
2. IT Governance: How Top Performers Manage IT Decision Rights for Superior Results by Weill, Harvard Business Review Press; First edition (1 June 2004)
3. ISACA publications
4. IT Governance: An International Guide to Data Security and ISO27001/ISO27002 by Alan Calder, Steve Watkins, Kogan Page; 6 edition (3 September 2015)
5. ISACA publications on COBIT, RiskIT and ValIT
6. Information Security Governance: Guidance for Information Security Managers by W. Krag Brotby and IT Governance Institute, Isaca (2 June 2008)
7. COBIT 5 Framework Perfect by Isaca, (10 April 2012)
8. Cobit 5 Foundation-reference and Study Guide by Ana Cecilia Delgado, CreateSpace Independent Publishing Platform; Stg edition (20 June 2016)
9. Governance of Enterprise IT Based on COBIT 5: A Management Guide by Geoff Harmer (Author), IT Governance Publishing, (6 February 2014)

Department of Computer Science and Engineering
Program: B. Tech. CSE (Cloud Technology and Information Security)

ISO 27001, PCI DSS & HIPAA

Subject Code: CS473

(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	None	3	1	0	4

Unit I: ISO 27001

Auditing: Principles of auditing, Conducting and Managing an Audit Program. Auditing Activities: Scoping and Pre audit Survey, Planning and preparation, Fieldwork, Analysis, Reporting, Closure, Competence and evaluation of auditors: Auditor competence, Information Security Management System Audit Testing: Information security management system, Management responsibility, Internal ISMS audits, Management review of the ISMS, ISMS improvement [8]

Unit II: Information Security Audit Check Listing

Security Policy, Organizing information security, Asset management, Human resources security, Physical and environmental security, Communications and operations management, Access control, Information systems acquisition, development and maintenance, Information security incident management, Business continuity management, Compliance.

[8]

Unit III: PCI DSS

Scope of PCI DSS Requirements, Best Practices for Implementing PCI DSS into Business-as-Usual Processes, PCI DSS Assessment Process, PCI DSS Requirements: Build and Maintain a Secure Network and Systems, Protect Cardholder Data, Maintain a Vulnerability Management Program, Implement Strong Access Control Measures , Regularly Monitor and Test Networks, Maintain an Information Security Policy.

[8]

Unit IV: HIPAA - Purpose and Scope

HIPAA Security Rule, Security Rule Goals and Objective, Security Rule Organization, Administrative Safeguards: Security Management Process, Assigned Security Responsibility, Workforce Security, Information Access Management, Security Awareness and Training, Security Incident Procedures, Contingency Plan, Evaluation, Business Associate Contracts and Other Arrangements. [8]

Unit V: Physical and Technical Safeguards

Physical Safeguards: Facility Access Controls, Workstation Use, Workstation Security, Device and Media Controls, Technical Safeguards: Access Control, Audit Controls, Integrity, Person or

Entity Authentication, Transmission Security, Organizational Requirements: Business Associate Contracts or Other Arrangements, Requirements for Group Health Plans.

[8]

Reference Books:

1. Information Security Policy Development for Compliance: ISO/IEC 27001, NIST SP 800-53, HIPAA Standard, PCI DSS V2.0, and AUP V5.0, Barry L. Williams, Auerbach Publications; 1 edition (6 March 2013)
2. Foundations of Information Security Based on ISO27001 and ISO27002 (Best Practice) by Hans Baars et.al., van Haren Publishing; 3rd Revised edition edition (15 April 2015)

Cyber Forensics & Investigation Lab
Subject Code: CS465
(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	**None**	**0**	**0**	**2**	**1**

List of Programs:

1. Physical Collection of electronic evidence using forensic standards
2. Dismantling and re-building PCs in order to access the storage media safely
3. Boot sequence and Power On Self-Test mode analysis
4. Examination of File systems of Windows, Linux and Mac
5. Analysing Word processing and Graphic file format
6. Network data sniffing and analysing
7. Password and encryption techniques
8. Internet forensic and Malware analysis
9. Data recovery techniques for hard drive
10. Data recovery techniques for Pen drive and CD

Cloud Web Services Lab
Subject Code: CS466
(w.e.f. July 2018)\

Pre-requisite	Co-requisite	L	T	P	C
None	None	0	0	2	1

List of Programs:

1. Introduction to Amazon Simple Storage Service (S3)
2. Introduction to Amazon Cloud Front
3. Introduction to AWS Key Management Service
4. Introduction to Amazon Elastic search Service
5. Introduction to Amazon Dynamo DB
6. Introduction to Amazon API Gateway
7. Introduction to Amazon Redshift
8. Introduction to Amazon Aurora
9. Introduction to Amazon Machine Learning
10. Introduction to AWS Database Migration Service
11. Introduction to AWS Lambda
12. Introduction to AWS Internet-of-Things (IoT)
13. Introduction to AWS Device Farm
14. Introduction to Amazon Kinesis Firehose
15. Introduction to Amazon Route 53
16. Introduction to Amazon Elastic File System (EFS)
17. Challenge Lab

Linux Administration Lab
Subject Code: CS467
(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	None	0	0	2	1

List of Programs:

1. Configure the following tasks & verify it. (Hint - use grep/cut/tr/sed)

a) List the lines containing "/sbin/nologin" from the /etc/passwd file.

b) List only lines of output from ps, which lists running processes that contain the string "in

c) Display the list of GIDs from /etc/passwd file.

d) Alter all the letters that starts from range "a-f" to "A-F" in /etc/passwd file.

2. Create an alias named eth0:0 using below credentials in RHEL 5 and verify it.

(a) IP ADRESS = 172.16.0.1
(b) 255.255.0.0
(c) Default Gateway = 172.16.0.254
(d) DNS 1 = 4.2.2.1

3. Configure password policy for user john with below arguments in RHEL 5. After configuration verify the policy applied.

(a) Minimum password age = 4 days
(b) Maximum password age = 15 days
(c) Inactive days = 2 days
(d) Account Expiration date = 6 months from today

4 Configure the following tasks:

(a) Add user accounts to your system: Joshua, alex, dax, bryan, zak, ed and manager. Assign each user this password: 123@iMs.

(b) Add the groups to your system: sales with GID: 1000, HR with GID: 1100 and web with GID: 1200.

(c) Add Joshua and alex to the sales group, dax and bryan to the HR group, zak and ed to the web group and add manager to all of these groups.

(d) Login with each user & verify using id command that they are in the appropriate groups.

5 Use ACL to accomplish these tasks:

(a) Create groups named Admin and Web.

(b) Create users named John and Jimmy.

(c) Create a new directory named /depts/tech/. Change the permission so that root is the owner and Admin is the group owner.

(d) Use ACL to give full permission for /depts/tech/ to the Web group.

(e) Allow John read/execute but not write permission on the /depts/tech/ directory.

(f) Allow Jimmy full permission on the /depts/tech/ directory.

6 You are tasked with finding all SUID & SGID files under the / directories.

7 Configure your system that boots to run level 3 by default. Configure X server using command in run level 3.

8 Devise a ps command that does the following. (Hint: sort/ps/top)

(a) List all processes.
(b) For each process, prints the information which displays the percentage of CPU usage, the process ID & name of the command that created it.
(c) The output is sorted by the %cpu value from highest to lowest

9 Explain the suid, sgid & sticky bit permission with example

10 Customize the Bash prompt as per given tasks (Hint - PS1)

(a) Display the current value of primary prompt string.
(b) Changes prompt to print a static string "ITIMS -'".
(c) Restore the original prompt.
(d) Insert the bash history prompt special character "\!" between the hostname and dollar-sign.

11 Configure given tasks for package management: (Hint: use rpm command)

(a) Check whether ftp package is installed or not.
(b) If it is not installed, install it & verify it.
(c) Display the configuration files available through this package.
(d) Be sure that ftp service must be enabled at startup.

12 Use rpm queries to answer the following questions.

(a) What files are in the "initscripts" package?
(b) Which installed packages have "gnome" in their names?
(c) Which RPM provides /etc/inittab?

13. Prepare a cron job that take the backup of /home at 5:00pm on every Saturday.

14. Change your system date to 1:00pm March 1990.

Mini Project-II
Subject Code: CS479
(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	None	0	0	2	1

The students will undertake a project as part of their seventh semester. The students can do independent projects or can take up projects in groups of two or more depending on the complexity of the project. The maximum group size will be four and in case of team projects there should be a clear delineation of the responsibilities and work done by each project member. The projects must be approved by the mentor assigned to the student. The mentors will counsel the students for choosing the topic for the projects and together they will come up with the objectives and the process of the project. From there, the student takes over and works on the project.

Project Evaluation Guidelines:
The Project evaluator(s) verify and validate the information presented in the project report.
The break-up of marks would be as follows:

1. Internal Evaluation
2. External Assessment
3. Viva Voce

Integral University, Lucknow

Department of Computer Science and Engineering

Program: B. Tech. CSE (Cloud Technology and Information Security)

IT Infrastructure Library

Subject Code: CS481

(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	None	2	1	0	3

Unit I: ITIL Overview and Service Strategy

ITIL History, Components of the ITIL Library, IT Service Management, Organizing for IT Service Management, Technology and Architecture, Overview of HPSM and OTRS as service management tool, Service Strategy: Service Strategy Lifecycle Stage, Service Portfolio Management, the Demand Management Process, the IT Financial Management Process, Introduction to ISO 20000 Standards [7]

Unit II: Service Design

Service Design Lifecycle Stage, The Service Catalog Management Process, The Service Level Management Process, The Availability Management Process, The Capacity Management Process, The Information Security, Management Process, The IT Service Continuity, Management Process, The Supplier Management Process

[7]

Unit III: Service Transition

Service Transition Lifecycle Stage, the Change Management Process, the Release and Deployment Management Process, the Service Asset and Configuration Management Process, Knowledge Management [6]

Unit IV: Service Operation, Continual Service Improvement

Service Operation Functions: Service Operation Lifecycle Stage, The Service Desk Function, The Technical Management Function, The Application Management Function, The IT Operations Management Function Service Operation Processes: The Event Management Process, The Incident Management Process, The Request Full fillment Process, The Access Management Process, The Problem Management Process [8]

Unit V: Continual Service Improvement

Continual Service Improvement principles - CSI and organizational change,Ownership, Role definitions , External and internal drivers , Service Level Management , The Deming Cycle, Service measurement ,Knowledge Management, Benchmarks , Governance ,Frameworks,

models, standards and quality systems Continual Service Improvement processes : 7step improvement process, Service reporting, Service management, return on in investment for CSI, business questions for CSI, Service level management [7]

Reference Books:

1. Introduction to ITIL, Jan van Bon Stationery Office Books, The Stationery Office, 2010
2. HP operation Manual from HP, 2010
3. A Guide to Service Desk Concepts Donna Knapp From Cengage Learning, 2010
4. The Shortcut Guide to Virtualization and Service Automation, Greg Shield Real-time Publishers, 2008
5. Service automation and dynamic provisioning techniques in IP/MPLS environments - Christian Jacquenet, Gilles Bourdon, Mohamed Boucadair John Wiley and Sons, 2008

Integral University, Lucknow
Department of Computer Science and Engineering
Program: B. Tech. CSE (Cloud Technology and Information Security)
B.Tech Project
Subject Code: CS499
(w.e.f. July 2018)

Pre-requisite	Co-requisite	L	T	P	C
None	None	0	0	8	4

The students will undertake a project as part of their final semester. The students can do independent projects or can take up projects in groups of two or more depending on the complexity of the project. The maximum group size will be four and in case of team projects there should be a clear delineation of the responsibilities and work done by each project member. The projects must be approved by the mentor assigned to the student. The mentors will counsel the students for choosing the topic for the projects and together they will come up with the objectives and the process of the project. From there, the student takes over and works on the project.
If the student chooses to undertake an industry project, then the topic should be informed to the mentor, and the student should appear for intermediate valuations. Prior to undertaking this project the students undergo a bridge course.

Bridge Course:
The bridge course ensures that all the students have the correct prerequisite knowledge before their industry interface. The purpose of a bridge course is to prepare for a healthy interaction with industry and to meet their expectations. It would be difficult to establish standards without appropriate backgrounds and therefore to bridge this gap, students are put through a week mandatory classroom participation where faculty and other experts will give adequate inputs in application based subjects, IT and soft skills.

The Project:
Each student will be allotted a Faculty Guide and an Industry Guide during the internship/project work. Students need to maintain a Project Diary and update the project progress, work reports in the project diary. Every student must submit a detailed project report as per the provided template. In the case of team projects, a single copy of these items must be submitted but each team member will be required to submit an individual report detailing their own contribution to the project.
Each student/group should be allotted a supervisor and periodic internal review shall be conducted which is evaluated by panel of examiners.

Project Evaluation Guidelines:
The Project evaluator(s) verify and validate the information presented in the project report.

The break-up of marks would be as follows:

1. Internal Evaluation
2. External Assessment
3. Viva Voce

Internal Evaluation:

Internal Evaluator of project needs to evaluate Internal Project work based on the following criteria:

- Project Scope , Objectives and Deliverables
- Research Work, Understanding of concepts
- Output of Results and Proper Documentation
- Interim Reports and Presentations– Twice during the course of the project

External Evaluation:

The Project evaluator(s) perform the External Assessment based on the following criteria.

- Understanding of the Project Concept
- Delivery Skill
- The Final Project Report
- Originality and Novelty

The Final Project Report Details:

- The report should have an excel sheet that documents the work of every project member

Viva Voce

- Handling questions
- Clarity and Communication Skill