



**PERIYAR
MANIAMMAI**
INSTITUTE OF SCIENCE & TECHNOLOGY
(Deemed to be University)
Established Under Sec. 3 of UGC Act, 1956 • NAAC Accredited
think • innovate • transform

Criterion 1 – Curricular Aspects

Key Indicator	1.1	Curriculum Design and Development
Metric	1.1.3	Average percentage of courses having focus on employability/ entrepreneurship/ skill Development offered by the department.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SYLLABUS COPY OF THE COURSES HIGHLIGHTING THE FOCUS ON EMPLOYABILITY/ ENTREPRENEURSHIP/ SKILL DEVELOPMENT

- List of courses for the programmes in order of

S. No.	Programme Name
i.	Bachelor of Technology(Computer Science and Engineering) (Full Time)

- Syllabus of the courses as per the list.

Legend : Words highlighted with **Blue Color** - Entrepreneurship
 Words highlighted with **Red Color** - Employability
 Words highlighted with **Purple Color** - Skill Development

1. List of Courses

Name of the Courses	Course Code	Year of Introduction	Activities bearing to Employability/ Entrepreneurship/ Skill development
B.Tech Computer Science and Engineering			
2021-2022			
Calculus and Linear Algebra	XMA101	2008-09	Skill Development- Assignment, Test Quiz, Seminar
Electrical and Electronic Engineering Systems	XBE102	2014-15	Employability- Assignment, Test Quiz, Seminar
Applied Chemistry for Engineers	XAC103	2008-09	Skill Development- Assignment, Test Quiz, Seminar
Basics of Electronic Devices and Circuits.	XEC104	2021-22	Employability- Assignment, Test Quiz, Seminar
Speech Communication	XGS105	2015-16	Skill Development- Assignment, Test Quiz, Seminar
Constitution of India	XUM106	2019-20	Skill Development- Assignment, Test Quiz, Seminar
Electrical and Electronic Engineering Systems Lab	XBE107	2014-15	Skill Development- Assignment, Test Quiz, Seminar
Applied Chemistry for Engineers Lab	XAC108	2008-09	Skill Development- Assignment, Test Quiz, Seminar
Calculus, Ordinary Differential Equations and Complex Variable	XMA201	2008-09	Skill Development- Assignment, Test Quiz, Seminar
Programming for Problem Solving	XCP202	2014-15	Employability- Assignment, Test Quiz, Seminar
Applied Physics for Engineers	XAP203	2008-09	Skill Development- Assignment, Test Quiz, Seminar
Technical Communication	XTC204	2016-17	Skill Development- Assignment, Test Quiz, Seminar
Workshop Practices	XWS205	2014-15	Skill Development- Assignment, Test Quiz, Seminar
Engineering Mechanics	XEM206	2014-15	Skill Development- Assignment, Test Quiz, Seminar
Programming for Problem Solving Lab	XCP207	2014-15	Skill Development- Assignment, Test Quiz, Seminar
Applied Physics for Engineers Lab	XAP208	2008-09	Skill Development- Assignment, Test Quiz, Seminar

Probability and Statistics	XPS301	2014-15	Skill Development- Assignment, Test Quiz, Seminar
Analog & Digital Electronic Circuits	XCS302	2019-20	Employability- Assignment, Test Quiz, Seminar
Data Structures & Algorithms	XCS303	2013-14	Employability- Assignment, Test Quiz, Seminar
Object oriented Programming	XCS304	2014-15	Employability- Assignment, Test Quiz, Seminar
Entrepreneurship Development	XES306	2013-14	Entrepreneurship - Assignment, Test Quiz, Seminar
Constitution of India	XCI307	2019-20	Skill Development- Assignment, Test Quiz, Seminar
Discrete Mathematics	XCS401	2008-09	Skill Development- Assignment, Test Quiz, Seminar
Computer Organization & Architecture	XCS402	2014-15	Employability- Assignment, Test Quiz, Seminar
Operating Systems	XCS403	2013-14	Employability- Assignment, Test Quiz, Seminar
Design & Analysis of Algorithms	XCS404	2014-15	Employability- Assignment, Test Quiz, Seminar
Total Quality Management	XUM405	2013-14	Skill Development- Assignment, Test Quiz, Seminar
Signals & Systems	XCS501	2013-14	Employability- Assignment, Test Quiz, Seminar
Formal Language & Automata Theory	XCS502	2013-14	Employability- Assignment, Test Quiz, Seminar
Database Management Systems	XCS503	2013-14	Employability- Assignment, Test Quiz, Seminar
Software Engineering	XCS504	2014-15	Employability- Assignment, Test Quiz, Seminar
IT Workshop	XCS505	2019-20	Employability- Assignment, Test Quiz, Seminar
Data Communication	XCSE53	2018-19	Employability- Assignment, Test Quiz, Seminar
In-Plant Training – II	XCS508	2012-13	Skill Development- Assignment, Test Quiz, Seminar
Programming with Python	XCSM01	2017-18	Skill Development- Assignment, Test Quiz, Seminar
Compiler Design	XCS601	2013-14	Employability- Assignment, Test Quiz, Seminar
Computer Networks	XCS602	2014-15	Employability- Assignment, Test Quiz, Seminar
Web and Internet Technology	XCSE61	2015-16	Employability- Assignment, Test Quiz, Seminar
Data Mining	XCSE65	2015-16	Employability- Assignment, Test Quiz, Seminar

Economics for Engineers	XUM606	2016-17	Skill Development- Assignment, Test Quiz, Seminar
Web designing	XCSM02	2015-16	Skill Development- Assignment, Test Quiz, Seminar
Computer Graphics	XCSE74	2013-14	Employability- Assignment, Test Quiz, Seminar
Machine Learning	XCSE78	2021-22	Employability- Assignment, Test Quiz, Seminar
Biology	XUM704	2021-22	Skill Development- Assignment, Test Quiz, Seminar
Disaster Management	XUM705	2015-16	Skill Development- Assignment, Test Quiz, Seminar
Project – I	XCS706	2013-14	Skill Development- Assignment, Test Quiz, Seminar
In plant Training – III	XCS707	2012-13	Skill Development- Assignment, Test Quiz, Seminar
R Programming	XCSM03	2021-22	Skill Development- Assignment, Test Quiz, Seminar
Cyber Security	XUM801	2015-16	Employability- Assignment, Test Quiz, Seminar
Project – II	XCS804	2013-14	Skill development - Group Discussion , Spoken and Written communication
Calculus and Linear Algebra	XMA101	2008-09	Skill Development- Assignment, Test Quiz, Seminar
Electrical and Electronic Engineering Systems	XBE102	2014-15	Employability- Assignment, Test Quiz, Seminar
Applied Chemistry for Engineers	XAC103	2008-09	Skill Development- Assignment, Test Quiz, Seminar
Basics of Electronic Devices and Circuits.	XEC104	2021-22	Employability- Assignment, Test Quiz, Seminar
Speech Communication	XGS105	2015-16	Skill Development- Assignment, Test Quiz, Seminar
Constitution of India	XUM106	2019-20	Skill Development- Assignment, Test Quiz, Seminar
Electrical and Electronic Engineering Systems Lab	XBE107	2014-15	Skill Development- Assignment, Test Quiz, Seminar
Applied Chemistry for Engineers Lab	XAC108	2008-09	Skill Development- Assignment, Test Quiz, Seminar
Calculus, Ordinary Differential Equations and Complex Variable	XMA201	2008-09	Skill Development- Assignment, Test Quiz, Seminar

Programming for Problem Solving	XCP202	2014-15	Employability- Assignment, Test Quiz, Seminar
Applied Physics for Engineers	XAP203	2008-09	Skill Development- Assignment, Test Quiz, Seminar
Technical Communication	XTC204	2016-17	Skill Development- Assignment, Test Quiz, Seminar
Workshop Practices	XWS205	2014-15	Skill Development- Assignment, Test Quiz, Seminar
Engineering Mechanics	XEM206	2014-15	Skill Development- Assignment, Test Quiz, Seminar
Programming for Problem Solving Lab	XCP207	2014-15	Skill Development- Assignment, Test Quiz, Seminar
Applied Physics for Engineers Lab	XAP208	2008-09	Skill Development- Assignment, Test Quiz, Seminar
Probability and Statistics	XPS301	2014-15	Skill Development- Assignment, Test Quiz, Seminar
Analog & Digital Electronic Circuits	XCS302	2019-20	Employability- Assignment, Test Quiz, Seminar
Data Structures & Algorithms	XCS303	2013-14	Employability- Assignment, Test Quiz, Seminar
Object oriented Programming	XCS304	2014-15	Employability- Assignment, Test Quiz, Seminar
Entrepreneurship Development	XES306	2013-14	Entrepreneurship - Assignment, Test Quiz, Seminar
Constitution of India	XCI307	2019-20	Skill Development- Assignment, Test Quiz, Seminar
Discrete Mathematics	XCS401	2008-09	Skill Development- Assignment, Test Quiz, Seminar
Computer Organization & Architecture	XCS402	2014-15	Employability- Assignment, Test Quiz, Seminar
Operating Systems	XCS403	2013-14	Employability- Assignment, Test Quiz, Seminar
Design & Analysis of Algorithms	XCS404	2014-15	Employability- Assignment, Test Quiz, Seminar
Total Quality Management	XUM405	2013-14	Skill Development- Assignment, Test Quiz, Seminar
Signals & Systems	XCS501	2013-14	Employability- Assignment, Test Quiz, Seminar
Formal Language & Automata Theory	XCS502	2013-14	Employability- Assignment, Test Quiz, Seminar
Database Management Systems	XCS503	2013-14	Employability- Assignment, Test Quiz, Seminar

Software Engineering	XCS504	2014-15	Employability- Assignment, Test Quiz, Seminar
IT Workshop	XCS505	2019-20	Employability- Assignment, Test Quiz, Seminar
Data Communication	XCSE53	2018-19	Employability- Assignment, Test Quiz, Seminar
In-Plant Training – II	XCS508	2012-13	Skill Development- Assignment, Test Quiz, Seminar
Programming with Python	XCSM01	2017-18	Skill Development- Assignment, Test Quiz, Seminar
Compiler Design	XCS601	2013-14	Employability- Assignment, Test Quiz, Seminar
Computer Networks	XCS602	2014-15	Employability- Assignment, Test Quiz, Seminar
Web and Internet Technology	XCSE61	2015-16	Employability- Assignment, Test Quiz, Seminar
Data Mining	XCSE65	2015-16	Employability- Assignment, Test Quiz, Seminar
Economics for Engineers	XUM606	2016-17	Skill Development- Assignment, Test Quiz, Seminar
Web designing	XCSM02	2015-16	Skill Development- Assignment, Test Quiz, Seminar
Computer Graphics	XCSE74	2013-14	Employability- Assignment, Test Quiz, Seminar
Machine Learning	XCSE78	2021-22	Employability- Assignment, Test Quiz, Seminar
Biology	XUM704	2021-22	Skill Development- Assignment, Test Quiz, Seminar
Disaster Management	XUM705	2015-16	Skill Development- Assignment, Test Quiz, Seminar
Project – I	XCS706	2013-14	Skill Development- Assignment, Test Quiz, Seminar
In plant Training – III	XCS707	2012-13	Skill Development- Assignment, Test Quiz, Seminar
R Programming	XCSM03	2021-22	Skill Development- Assignment, Test Quiz, Seminar
Cyber Security	XUM801	2015-16	Employability- Assignment, Test Quiz, Seminar
Project – II	XCS804	2013-14	Skill development - Group Discussion , Spoken and Written communication
Calculus and Linear Algebra	XMA101	2008-09	Skill Development- Assignment, Test Quiz, Seminar
Electrical and Electronic Engineering Systems	XBE102	2014-15	Employability- Assignment, Test Quiz, Seminar

Applied Chemistry for Engineers	XAC103	2008-09	Skill Development- Assignment, Test Quiz,Seminar
Basics of Electronic Devices and Circuits.	XEC104	2021-22	Employability- Assignment, Test Quiz,Seminar
Speech Communication	XGS105	2015-16	Skill Development- Assignment, Test Quiz,Seminar
Constitution of India	XUM106	2019-20	Skill Development- Assignment, Test Quiz,Seminar
Electrical and Electronic Engineering Systems Lab	XBE107	2014-15	Skill Development- Assignment, Test Quiz,Seminar
Applied Chemistry for Engineers Lab	XAC108	2008-09	Skill Development- Assignment, Test Quiz,Seminar
Calculus, Ordinary Differential Equations and Complex Variable	XMA201	2008-09	Skill Development- Assignment, Test Quiz,Seminar
Programming for Problem Solving	XCP202	2014-15	Employability- Assignment, Test Quiz,Seminar
Applied Physics for Engineers	XAP203	2008-09	Skill Development- Assignment, Test Quiz,Seminar
Technical Communication	XTC204	2016-17	Skill Development- Assignment, Test Quiz,Seminar
Workshop Practices	XWS205	2014-15	Skill Development- Assignment, Test Quiz,Seminar
Engineering Mechanics	XEM206	2014-15	Skill Development- Assignment, Test Quiz,Seminar
Programming for Problem Solving Lab	XCP207	2014-15	Skill Development- Assignment, Test Quiz,Seminar
Applied Physics for Engineers Lab	XAP208	2008-09	Skill Development- Assignment, Test Quiz,Seminar
Probability and Statistics	XPS301	2014-15	Skill Development- Assignment, Test Quiz,Seminar
Analog & Digital Electronic Circuits	XCS302	2019-20	Employability- Assignment, Test Quiz,Seminar
Data Structures & Algorithms	XCS303	2013-14	Employability- Assignment, Test Quiz,Seminar
Object oriented Programming	XCS304	2014-15	Employability- Assignment, Test Quiz,Seminar
Entrepreneurship Development	XES306	2013-14	Entrepreneurship - Assignment, Test Quiz, Seminar
Constitution of India	XCI307	2019-20	Skill Development- Assignment, Test

			Quiz,Seminar
Discrete Mathematics	XCS401	2008-09	Skill Development- Assignment, Test Quiz,Seminar
Computer Organization & Architecture	XCS402	2014-15	Employability- Assignment, Test Quiz,Seminar
Operating Systems	XCS403	2013-14	Employability- Assignment, Test Quiz,Seminar
Design & Analysis of Algorithms	XCS404	2014-15	Employability- Assignment, Test Quiz,Seminar
Total Quality Management	XUM405	2013-14	Skill Development- Assignment, Test Quiz,Seminar
Signals & Systems	XCS501	2013-14	Employability- Assignment, Test Quiz,Seminar
Formal Language & Automata Theory	XCS502	2013-14	Employability- Assignment, Test Quiz,Seminar
Database Management Systems	XCS503	2013-14	Employability- Assignment, Test Quiz,Seminar
Software Engineering	XCS504	2014-15	Employability- Assignment, Test Quiz,Seminar
IT Workshop	XCS505	2019-20	Employability- Assignment, Test Quiz,Seminar
Data Communication	XCSE53	2018-19	Employability- Assignment, Test Quiz,Seminar
In-Plant Training – II	XCS508	2012-13	Skill Development- Assignment, Test Quiz,Seminar
Programming with Python	XCSM01	2017-18	Skill Development- Assignment, Test Quiz,Seminar
Compiler Design	XCS601	2013-14	Employability- Assignment, Test Quiz,Seminar
Computer Networks	XCS602	2014-15	Employability- Assignment, Test Quiz,Seminar
Web and Internet Technology	XCSE61	2015-16	Employability- Assignment, Test Quiz,Seminar
Data Mining	XCSE65	2015-16	Employability- Assignment, Test Quiz,Seminar
Economics for Engineers	XUM606	2016-17	Skill Development- Assignment, Test Quiz,Seminar
Web designing	XCSM02	2015-16	Skill Development- Assignment, Test Quiz,Seminar
Computer Graphics	XCSE74	2013-14	Employability- Assignment, Test Quiz,Seminar
Machine Learning	XCSE78	2021-22	Employability- Assignment, Test Quiz,Seminar
Biology	XUM704	2021-22	Skill Development- Assignment, Test Quiz,Seminar
Disaster Management	XUM705	2015-16	Skill Development-

			Assignment, Test Quiz, Seminar
Project – I	XCS706	2013-14	Skill Development- Assignment, Test Quiz, Seminar
In plant Training – III	XCS707	2012-13	Skill Development- Assignment, Test Quiz, Seminar
R Programming	XCSM03	2021-22	Skill Development- Assignment, Test Quiz, Seminar
Cyber Security	XUM801	2015-16	Employability- Assignment, Test Quiz, Seminar
Project – II	XCS804	2013-14	Skill development - Group Discussion , Spoken and Written communication
Calculus and Linear Algebra	XMA101	2008-09	Skill Development- Assignment, Test Quiz, Seminar
Electrical and Electronic Engineering Systems	XBE102	2014-15	Employability- Assignment, Test Quiz, Seminar
Applied Chemistry for Engineers	XAC103	2008-09	Skill Development- Assignment, Test Quiz, Seminar
Basics of Electronic Devices and Circuits.	XEC104	2021-22	Employability- Assignment, Test Quiz, Seminar
Speech Communication	XGS105	2015-16	Skill Development- Assignment, Test Quiz, Seminar
Constitution of India	XUM106	2019-20	Skill Development- Assignment, Test Quiz, Seminar
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Applied Physics for Engineers	XAP203	2008-09	Skill Development- Assignment, Test Quiz, Seminar
Technical Communication	XTC204	2016-17	Skill Development- Assignment, Test Quiz, Seminar
Workshop Practices	XWS205	2014-15	Skill Development- Assignment, Test Quiz, Seminar
Engineering Mechanics	XEM206	2014-15	Skill Development- Assignment, Test

			Quiz,Seminar
Programming for Problem Solving Lab	XCP207	2014-15	Skill Development- Assignment, Test Quiz,Seminar
Applied Physics for Engineers Lab	XAP208	2008-09	Skill Development- Assignment, Test Quiz,Seminar
Probability and Statistics	XPS301	2014-15	Skill Development- Assignment, Test Quiz,Seminar
Analog & Digital Electronic Circuits	XCS302	2019-20	Employability- Assignment, Test Quiz,Seminar
Data Structures & Algorithms	XCS303	2013-14	Employability- Assignment, Test Quiz,Seminar
Object oriented Programming	XCS304	2014-15	Employability- Assignment, Test Quiz,Seminar
Entrepreneurship Development	XES306	2013-14	Entrepreneurship - Assignment, Test Quiz, Seminar
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Software Engineering	XCS504	2014-15	Employability- Assignment, Test Quiz,Seminar
IT Workshop	XCS505	2019-20	Employability- Assignment, Test Quiz,Seminar
Data Communication	XCSE53	2018-19	Employability- Assignment, Test Quiz,Seminar
In-Plant Training – II	XCS508	2012-13	Skill Development- Assignment, Test Quiz,Seminar
Programming with Python	XCSM01	2017-18	Skill Development- Assignment, Test Quiz,Seminar
Compiler Design	XCS601	2013-14	Employability- Assignment,

			Test Quiz,Seminar
Computer Networks	XCS602	2014-15	Employability- Assignment, Test Quiz,Seminar
Web and Internet Technology	XCSE61	2015-16	Employability- Assignment, Test Quiz,Seminar
Data Mining	XCSE65	2015-16	Employability- Assignment, Test Quiz,Seminar
Economics for Engineers	XUM606	2016-17	Skill Development- Assignment, Test Quiz,Seminar
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Computer Graphics	XCSE74	2013-14	Employability- Assignment, Test Quiz,Seminar
Machine Learning	XCSE78	2021-22	Employability- Assignment, Test Quiz,Seminar
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Disaster Management	XUM705	2015-16	Skill Development- Assignment, Test Quiz,Seminar
Project – I	XCS706	2013-14	Skill Development- Assignment, Test Quiz,Seminar
In plant Training – III	XCS707	2012-13	Skill Development- Assignment, Test Quiz,Seminar
R Programming	XCSM03	2021-22	Skill Development- Assignment, Test Quiz,Seminar
Cyber Security	XUM801	2015-16	Employability- Assignment, Test Quiz,Seminar
Project – II	XCS804	2013-14	Skill development - Group Discussion , Spoken and Written communication

2. Syllabus for the Courses

COURSE CODE			XMA101	L	T	P	C
COURSE NAME			CALCULUS AND LINEAR ALGEBRA	3	1	0	4
C	P	A		L	T	P	H
3	0.5	0.5		3	1	0	4
PREREQUISITE: Differentiation and Integration							
Course Outcomes			Domain	Level			
CO1	Apply orthogonal transformation to reduce quadratic form to canonical forms.		Cognitive	Remembering Applying			
CO2	Apply power series to tests the convergence of the sequences and series. Half range Fourier sine and cosine series.		Cognitive Psychomotor	Applying Remembering Guided Response			
CO3	Find the derivative of composite functions and implicit functions. Euler’s theorem and Jacobian		Cognitive Psychomotor	Remembering Guided Response			
CO4	Explain the functions of two variables by Taylors expansion, by finding maxima and minima with and without constraints using Lagrangian Method. Directional derivatives, Gradient, Curl and Divergence.		Cognitive Affective	Remembering Understanding Receiving			
CO5	Apply Differential and Integral calculus to notions of Curvature and to improper integrals.		Cognitive	Applying			

UNIT1 -MATRICES	15 Hours
Linear Transformation - Eigen values and Eigen vectors -Properties of Eigen values and Eigen vectors - Cayley-Hamilton Theorem – Diagonalisation of Matrices – Real Matrices: Symmetric - Skew-Symmetric and Orthogonal Quadratic form – canonical form - Nature of Quadratic form and Transformation of Quadratic form to Canonical form (Orthogonal only).	
UNIT2 -SEQUENCES AND SERIES	15 Hours
Sequences: Definition and examples-Series: Types and convergence- Series of positive terms – Tests of convergence: comparison test, Integral test and D'Alembert's ratio test-. Fourier series: Half range sine and cosine series- Parseval's Theorem.	
UNIT 3 -MULTIVARIABLE CALCULUS: PARTIAL DIFFERENTIATION	15 Hours
Limits and continuity –Partial differentiation – Total Derivative – Partial differentiation of Composite Functions: Change of Variables – Differentiation of an Implicit Function - Euler's Theorem- Jacobian.	
UNIT 4 - MULTIVARIABLE CALCULUS: MAXIMA AND MINIMA AND VECTOR CALCULUS	15 Hours
Taylor's theorem for function of Two variables- Maxima, Minima of functions of two	

variables: with and without constraints - Lagrange's Method of Undetermined Multipliers – Directional Derivatives - Gradient, Divergence and Curl.

UNIT 5 - DIFFERENTIAL AND INTEGRAL CALCULUS

15 Hours

Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

	LECTURE	TUTORIAL	TOTAL
	60	15	75

TEXT BOOKS

1. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill New Delhi, 11th Reprint, 2015. (Unit-1, Unit-3 and Unit-4).
2. N.P. Bali and Manish Goyal, "A text book of Engineering Mathematics", Laxmi Publications, Reprint, 2014. (Unit-2).
3. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 40th Edition, 2010. (Unit-5).

REFERENCE BOOKS

1. G.B. Thomas and R.L. Finney, "Calculus and Analytic geometry", 9th Edition, Pearson, Reprint, 2002.
2. Veerarajan T., "Engineering Mathematics for first year", Tata McGraw-Hill, New Delhi, 2008.
3. D. Poole, "Linear Algebra: A Modern Introduction", 2nd Edition, Brooks/Cole, 2005.
4. Erwin kreyszig, "Advanced Engineering Mathematics", 9th Edition, John Wiley & Sons, 2006.

Mapping of Cos with GAs:

	GA 1	GA 2	GA 3	GA 4	GA 5	GA 6	GA 7	GA 8	GA 9	GA1 0	GA1 1	GA1 2
CO 1	3	2			2					1		2
CO 2	3	1								1		1
CO 3	3	1								1		1
CO 4	3	2								1		1
CO 5	3	2			1					1		2
	15	8	0	0	3	0	0	0	0	5	0	7
Scale d Value	3	2			1					1		

1 – 5 → 1,

6 – 10 → 2,

11 – 15 → 3

0 - No Relation, 1 - Low Relation, 2- Medium Relation, 3- High Relation

COURSE CODE			XBE102		L	T	P	C
COURSE NAME			ELECTRICAL AND ELECTRONICS ENGINEERING SYSTEMS		3	1	0	4
Prerequisites			Physics		L	T	P	H
C	P	A			3	1	0	4
3	0	0						
Course Outcomes					Domain		Level	
CO1	Define and Relate the fundamentals of electrical parameters and build and explain AC, DC circuits by Using measuring devices				Cognitive		Understand	
CO2	Define and Explain the operation of DC and AC machines.				Cognitive		Understand	
CO3	Recall and Illustrate various semiconductor devices and their applications and displays the input output characteristics of basic semiconductor devices.				Cognitive		Understand	
CO4	Relate and Explain the number systems and logic gates. Construct the different digital circuit.				Cognitive		Understand	
CO5	Label and Outline the different types of microprocessors and their applications.				Cognitive		Understand	
UNIT - I FUNDAMENTALS OF DC AND AC CIRCUITS, MEASUREMENTS								9+3
Fundamentals of DC– Ohm’s Law – Kirchhoff’s Laws - Sources - Voltage and Current Relations –Star/Delta Transformation - Fundamentals of AC – Average Value, RMS Value, Form Factor - AC power and Power Factor, Phasor Representation of sinusoidal quantities, Simple Series, Parallel, Series Parallel Circuit - Operating Principles of Moving coil and Moving Iron Instruments (Ammeter, Voltmeter) and Dynamometer type meters (Watt meter and Energy meter).								
UNIT - II ELECTRICAL MACHINES								9+3
Construction, Principle of Operation, Basic Equations, Types and Application of DC Generators, DC motors - Basics of Single-Phase Induction Motor and Three Phase Induction Motor- Construction, Principle of Operation of Single-Phase Transformer, Three phase transformers, Auto transformer.								
UNIT - III SEMICONDUCTOR DEVICES								9+3
Classification of Semiconductors, Construction, Operation and Characteristics: PN Junction Diode – Zener Diode, PNP, NPN Transistors, Field Effect Transistors and Silicon Controlled Rectifier – Applications								
UNIT - IV DIGITAL ELECTRONICS								9+3
Basic of Concepts of Number Systems, Logic Gates, Boolean Algebra, Adders, Subtractors, multiplexer, demultiplexer, encoder, decoder, Flipflops, Up/Down counters, Shift Registers.								
UNIT - V MICROPROCESSORS								9+3
Architecture, 8085, pin diagram of 8085, ALU timing and control unit, registers, data and address bus, timing and control signals, Instruction types, classification of instructions, addressing modes, Interfacing Basics: Data transfer concepts – Simple Programming concepts.								
					LECTURE	TUTORIAL	TO	

HOURS			TAL
	45	15	60

TEXT BOOKS:

1. Metha V.K, Rohit Mehta, 2020. Principles of Electronics, 12th ed, S Chand Publishing.
2. Albert Malvino, David J. Bates., 2017. Electronics Principles. 7th ed, Tata McGraw-Hill. New Delhi.
3. Rajakamal, 2014. Digital System-Principle & Design. 2nd ed. Pearson education.
4. Morris Mano, 2015. Digital Design. Prentice Hall of India.
5. Ramesh, S. Gaonkar, 2013, Microprocessor Architecture, Programming and its Applications with the 8085, 6th ed, India: Penram International Publications.

REFERENCE BOOKS:

1. Cotton, H., 2005 Electrical Technology. CBS Publishers & Distributors Pvt Ltd.
2. Syed, A. Nasar, 1998, Electrical Circuits. Schaum Series.
3. Jacob Millman and Christos, C. Halkias, 1967, Electronics Devices, New Delhi: Tata McGraw-Hill.
4. Millman, J. and Halkias, C. C., 1972. Integrated Electronics: Analog and Digital Circuits and Systems, Tokyo: McGraw-Hill, Kogakusha Ltd.
5. Mohammed Rafiquzzaman, 1999. Microprocessors - Theory and Applications: Intel and Motorola. Prentice Hall International.

E-REFERENCES:

1. NPTEL, Basic Electrical Technology (Web Course), Prof. N. K. De, Prof. T. K. Bhattacharya and Prof. G.D. Roy, IIT Kharagpur.
2. Prof. L. Umanand, <http://freevideolectures.com/Course/2335/Basic-Electrical-Technology#>, IISc Bangalore.
3. <http://nptel.ac.in/Onlinecourses/Nagendra/>, Dr. Nagendra Krishnapura, IIT Madras.
4. Dr. L. Umanand, <http://www.nptelvideos.in/2012/11/basic-electrical-technology.html>, IISc Bangalore.

Mapping of COs with GAs

	GA 1	GA 2	GA 3	GA 4	GA 5	GA 6	GA 7	GA 8	GA 9	GA 10	GA 11	GA 12
CO 1	3	3	1	1	1	1			1	1	1	
CO 2	3	3	1	1	1	1			1	1	1	
CO 3	2	2	2	1	2	2	1	1	1	1	1	
CO 4	2	2	1	1	1	1	1	1	1	1	1	
CO 5	2	2	1	1	1	1	1	1	1	1	1	
Total	12	12	6	5	6	6	3	3	5	5	5	
Scaled	3	3	2	1	2	2	1	1	1	1	1	

1-5 → 1, 6-10 → 2, 11-15 → 3

0 – No Relation, 1 – Low Relation, 2 – Medium Relation, 3 – High Relation

COURSE CODE			XAC103		L	T	P	C
COURSE NAME			APPLIED CHEMISTRY FOR ENGINEERS		3	1	0	4
PREREQUISITES			NIL		L	T	P	H
C	P	A			3	1	0	4
2.5	1	0.5						
COURSE OBJECTIVES								
Understand the application of chemistry in engineering.								
COURSE OUTCOMES					DOMAIN		LEVEL	
CO1	Identify the periodic properties such as ionization energy, electron affinity, oxidation states and electro negativity. Describe the various water quality parameters like hardness and alkalinity.				Cognitive Psychomotor		Remembering Perception	
CO2	Explain and Measure microscopic chemistry in terms of atomic, molecular orbitals and intermolecular forces.				Cognitive Psychomotor		Understanding Set	
CO3	Interpret bulk properties and processes using thermodynamic and kinetic considerations.				Cognitive Psychomotor Affective		Applying Mechanism Receive	
CO4	Describe, Illustrate and Discuss the chemical reactions that are used in the synthesis of molecules.				Cognitive Psychomotor Affective		Remembering Analyzing Perception Responding	
CO5	Apply, Measure and Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques				Cognitive Psychomotor		Remembering, Applying Mechanism	
UNIT I		PERIODIC PROPERTIES AND WATER CHEMISTRY						8+3
Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries. Water Chemistry- Water quality parameters-Definition and explanation of hardness, determination of hardness by EDTA method-Introduction to alkalinity.								
UNIT II		USE OF FREE ENERGY IN CHEMICAL EQUILIBRIA						12+3
Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Corrosion-Types, factors affecting corrosion rate and Control methods. Use of free energy considerations in metallurgy through Ellingham diagrams. Advantages of electroless plating, electroless plating of nickel and copper on Printed Circuit Board (PCB).								
UNIT III		ATOMIC AND MOLECULAR STRUCTURE						10+3
Schrodinger equation. Particle in a box solution and their applications for conjugated molecules and nanoparticles.. Molecular orbitals of diatomic molecules and plots of the multicenter orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomic molecules. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.								
Intermolecular forces and potential energy surfaces								
Ionic, dipolar and Vander waals interactions. Equations of state of real gases and critical phenomena. Potential energy surfaces of H ₃ , H ₂ F and HCN and trajectories on these surfaces.								

UNIT IV	SPECTROSCOPIC TECHNIQUES AND APPLICATIONS			7+3
Principles of spectroscopy and selection rules. Electronic spectroscopy-chromophore, auxochromes, types of electronic transition and application. Fluorescence and its applications in medicine. Vibrational spectroscopy-types of vibrations, Instrumentation and applications. Rotational spectroscopy of diatomic molecules. Nuclear magnetic resonance spectroscopy-concept of chemical shift and applications-magnetic resonance imaging. Diffraction and scattering.				
UNIT V	STEREOCHEMISTRY AND ORGANIC REACTIONS			8+3
Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds				
<i>Organic reactions and synthesis of a drug molecule</i>				
Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization reactions and ring opening reactions. Synthesis of a commonly used drug molecule-Aspirin and paracetamol.				
HOURS		LECTURE	TUTORIAL	TOTAL
		45	15	60
TEXT BOOKS				
1.	Puri B.R. Sharma, L.R., Kalia K.K. Principles of Inorganic Chemistry, (23 rd edition), New Delhi, Shoban Lal Nagin Chand & Co., 1993.			
2.	Lee. J.D. Concise Inorganic Chemistry, UK, Black well science, 2006.			
3.	Trapp. C, Cady, M. Giunta. C, Atkins's Physical Chemistry, 10 th Edition, Oxford publishers, 2014.			
4.	Glasstone S., Lewis D., Elements of Physical Chemistry, London, Mac Millan & Co. Ltd, 1983.			
5.	Morrison R.T. and Boyd R.N. Organic Chemistry (6th edition), New York, Allyn & Bacon Ltd., 1976.			
6.	Banwell. C.N, Fundamentals of Molecular Spectroscopy, (3 th Edition), McGraw-Hill Book Company, Europe 1983.			
7.	Bahl B.S. and Arun Bahl, Advanced Organic Chemistry, (4 th edition), S./ Chand & Company Ltd. New Delhi, 1977.			
8.	P. S. Kalsi, Stereochemistry: Conformation and mechanism, (9 th Edition), New Age International Publishers, 2017.			
REFERENCES				
1.	Puri B R Sharma L R and Madan S Pathania, "Principles of Physical Chemistry", Vishalpublishing Co., Edition 2004.			
2.	Kuriocose, J C and Rajaram, J, "Engineering Chemistry", Volume I/II, Tata McGraw-Hill Publishing Co. Ltd. New Delhi, 2000.			
E- REFERENCES				
1.	http://www.mooc-list.com/course/chemistry-minor-saylororg			
2.	https://www.canvas.net/courses/exploring-chemistry			
3.	http://freevideolectures.com/Course/2263/Engineering-Chemistry-I			
4.	http://freevideolectures.com/Course/3001/Chemistry-I			
5.	http://freevideolectures.com/Course/3167/Chemistry-II			
6.	http://ocw.mit.edu/courses/chemistry/			

Mapping of CO with PO

CO Vs PO	CO1	CO2	CO3	CO4	CO5	Total	Scaled to 0,1,2 and 3
PO₁	3	2	3	3	3	13	3
PO₂	0	0	0	0	0	0	0
PO₃	0	0	0	0	0	0	0
PO₄	0	0	0	0	0	0	0
PO₅	0	0	0	0	0	0	0
PO₆	0	0	0	0	0	0	0
PO₇	2	1	2	3	2	10	2
PO₈	3	2	3	3	2	13	3
PO₉	3	2	3	3	3	14	3
PO₁₀	0	0	0	0	0	0	0
PO₁₁	0	0	0	0	0	0	0
PO₁₂	0	0	0	0	0	0	0
PSO₁	0	0	0	0	0	0	0
PSO₂	0	0	0	0	0	0	0

1-6 → 1, 7-12 → 2, 13-18 → 3

0 – No Relation, 1 – Low Relation, 2 – Medium Relation, 3 – High Relation

COURSE CODE			XGS105	L	T	P	SS	C
COURSE NAME			SPEECH COMMUNICATION	0	1	2	0	3
Pre-requisites				L	T	P	SS	H
C	P	A		0	1	4	0	5
2.6	0.4	0						
COURSE OUTCOMES:				Domain		Level		
CO1	<i>Ability</i> to recall the types of speeches			Cognitive		Remember		
CO2	<i>Apply</i> the techniques in public speaking			Cognitive		Apply		
CO3	<i>Identify</i> the common patterns in organizing a speech			Cognitive		Remember		
CO4	<i>Construct</i> the nature and style of speaking			Cognitive		Create		
CO5	<i>Practicing</i> the speaking skills			Psychomotor		Guided Response		
UNIT - I TYPES OF SPEECHES								9
1.1 - Four types of speeches								
1.2 - Analyzing the audience								
1.3 - Developing ideas and supporting materials								
UNIT - II PUBLIC SPEAKING								9
2.1 - Introduction to Public Speaking								
2.2 - Competencies Needed for successful speech making								
2.3 - <i>Speaking about everyday life situations</i>								
UNIT - III ORGANIZATION OF SPEECH								9
3.1 - Developing a speech out line								
3.2 - Organizing the speech								
3.3 - Introduction - development – conclusion								
UNIT - IV PRESENTATION								9
4.1 - Tips for preparing the draft speech								
4.2 - <i>Presentation techniques using ICT tools</i>								
4.3 - Using examples from different sources								
UNIT - V ACTIVITIES								9
5.1 - Reading activities								
5.2 - Creative presentations								
5.3 - Media presentation techniques								
SUGGESTED READINGS:								
(i) Michael Swan. <i>Practical English Usage</i> . OUP. 1995								
(ii) Sanjay Kumar and Pushp Lata. <i>Communication Skills</i> . Oxford University Press. 2011								

COURSE CODE		XUM106		L	T	P	C
COURSE NAME		CONSTITUTION OF INDIA		3	0	0	0
PREREQUISITE:		NIL		L	T	P	H
C:P:A		0:0:0		3	0	0	3
COURSE OUTCOMES				Domain		Level	
CO1	Understand the Constitutional History			Cognitive		Understanding	
CO2	Understand the Powers and Functions			Cognitive		Understanding	
CO3	Understand the Legislature			Affective		Remembering	
CO4	Understand the Judiciary			Affective		Remembering	
CO5	Understand the Centre State relations			Cognitive		Understanding	
UNIT - I							8
Constitutional History- The Constitutional Rights- Preamble- Fundamental Rights- Fundamental Duties- Directive principles of State Policy.							
UNIT - II							9
The Union Executive- The President of India (powers and functions)- Vice-President of India-The Council of Ministers-Prime Minister- Powers and Functions.							
UNIT - III							10
Union Legislature- Structure and Functions of Lok Sabha- Structure and Functions of Rajya Sabha- Legislative Procedure in India- Important Committees of Lok Sabha- Speaker of the Lok Sabha.							
UNIT - IV							9
The Union Judiciary- Powers of the Supreme Court- Original Jurisdiction- Appellate jurisdictions- Advisory Jurisdiction- Judicial review.							
UNIT - V							9
Centre State relations- Political Parties- Role of governor, powers and functions of Chief Minister-Legislative Assembly- State Judiciary- Powers and Functions of the High Courts.							
	LECTURE		TUTORIAL		PRACTICAL		TOTAL
	45		0		0		45
REFERENCES							
1. W.H.Morris Shores- Government and politics of India, NewDelhi,B.I.Publishers,1974.							
2. M.V.Pylee- Constitutional Government in India, Bombay, Asia Publishing House, 1977.							
3. R.Thanker- The Government and politics of India, London:Macmillon, 1995.							
4. A.C.Kapur- Select Constitutions S,Chand & Co.,NewDelhi, 1995							
5. V.D.Mahajan- Select Modern Governments,S,Chand &Co, NewDelhi,1995.							
6. B.C.Rout- Democratic Constitution of India.							
7. Gopal K.Puri- Constitution of India, India 2005.							

Mapping of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO 1	2			1					
CO 2	2			1					
CO 3	2			1					1
CO 4	2			1				1	1
CO 5	2	2		1				1	1
Total	10	2		5				2	3
Scaled to 0,1,2,3	2	1		1				1	1

1-5 →1, 6-10 →2, 11-15 →3

0 – No Relation, 1- Low Relation, 2- Medium Relation, 3- High Relation

COURSE CODE			XBE107			L	T	P	C
COURSE NAME			ELECTRICAL AND ELECTRONICS ENGINEERING SYSTEMS LABORATORY			0	0	1	1
Prerequisite			Physics			L	T	P	H
C	P	A				0	0	2	2
1.5	1	0.5							
COURSE OBJECTIVES: The course helps to <ul style="list-style-type: none">• Learn the basic concepts of electrical and electronics components.• Understand the basic wiring methods and connection.• Study the characteristics of diodes, Zener diodes, NPN transistors.• Verify the working of simple logic gates, adders and subtractors.									
Course Outcomes:						Domain		Level	
CO1	Apply the fundamental electrical concepts and differentiate the various electronic components.					Cognitive Psychomotor Affective		Understand Set Valuing	
CO2	Implement and execute the different types of wiring connections.					Cognitive Psychomotor Affective		Understand Set Valuing	
CO3	Demonstrate the Fluorescent lamp connection with choke.					Cognitive Psychomotor Affective		Understand Set Valuing	
CO4	Characterize and display the basic knowledge on the working of PN junction and Zener diode.					Cognitive Psychomotor Affective		Understand Set Valuing	
CO5	Implement and execute the various digital electronic circuits such as Adders and Subtractors.					Cognitive Psychomotor Affective		Understand Set Valuing	
List of Experiments:									
1. Study of Electrical Symbols, Tools and Safety Precautions, Power Supplies.									
2. Study of Active and Passive elements – Resistors, Inductors and Capacitors, Bread Board.									
3. Testing of DC Voltage and Current in series and parallel resistors which are connected in breadboard by using Voltmeter, Ammeter and Multimeter.									
4. Fluorescent lamp connection with choke.									
5. Staircase Wiring									
6. Forward and Reverse bias characteristics of PN junction diode.									
7. Forward and Reverse bias characteristics of zener diode.									
8. Input and Output Characteristics of NPN transistor.									
9. Construction and verification of simple logic gates.									
10. Construction and verification of adders and subtractors.									
						PRACTICAL		TOTAL	
						30		30	

Mapping of COs with GAs

	GA 1	GA 2	GA 3	GA 4	GA 5	GA 6	GA 7	GA 8	GA 9	GA 10	GA 11	GA 12
CO 1	3	3	1	1	1	1			1	1	1	
CO 2	3	3	1	1	1	1			1	1	1	
CO 3	2	2	2	1	2	2	1	1	1	1	1	
CO 4	2	2	1	1	1	1	1	1	1	1	1	
CO 5	2	2	1	1	1	1	1	1	1	1	1	
Total	12	12	6	5	6	6	3	3	5	5	5	
Scaled Value	3	3	2	1	2	2	1	1	1	1	1	

1-5 → 1, 6-10 → 2, 11-15 → 3

0 – No Relation, 1 – Low Relation, 2 – Medium Relation, 3 – High Relation

COURSE CODE			XAC108		L	T	P	C
COURSE NAME			APPLIED CHEMISTRYFOR ENGINEERS LAB		0	0	1	2
PREREQUISITES			NIL		L	T	P	H
C	P	A			0	0	1	3
0.25	1.5	0.25						
COURSE OUTCOMES					DOMAIN		LEVEL	
CO1	Ability to Identify the principles of chemistry relevant to the study of science and engineering				Cognitive Psychomotor		Remember Perception	
CO2	Analyze and Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, extent of hardness, chloride content of water, etc.				Cognitive Psychomotor Affective		Analyze Perception Receive	
CO3	Analyze the synthetic procedure and rate constants of reactions from concentration of reactants/products as a function of time				Cognitive		Apply	

LIST OF EXPERIMENTS

Ex. No	Experiments	COs
1.	Determination of chloride ion present in the water sample by Argentometric method.	CO1
2.	Determination of total, temporary and permanent hardness of water sample by EDTA method.	CO1
3.	Determination of cell constant and conductance of solutions.	CO2
4.	Potentiometry - determination of redox potentials and emfs.	CO2
5.	Determination of surface tension and viscosity.	CO3
6.	Adsorption of acetic acid by charcoal.	CO3
7.	Determination of the rate constant of a reaction.	CO4
8.	Estimation of iron by colorimetric method.	CO4
9.	Synthesis of a polymer/drug.	CO5
10.	Saponification/acid value of oil.	CO5

LECTURE:0 TUTORIAL: 0 PRACTICAL: 30 TOTAL:30

TEXT BOOKS

1. Laboratory Manual "Chemistry Lab", Department of Chemistry, PMIST, Thanjavur.

REFERENCE BOOKS

1. Mendham, Denney R.C., Barnes J.D and Thomas N.J.K., "Vogel's Textbook of Quantitative Chemical Analysis", 6th Edition, Pearson Education, 2004.
2. Garland, C. W.; Nibler, J. W.; Shoemaker, D. P. "Experiments in Physical Chemistry", 8th Ed.; McGraw-Hill: New York, 2003.

E-RESOURCES- MOOC's

1. <http://freevideolectures.com/Course/2380/Chemistry-Laboratory-Techniques>
2. <http://ocw.mit.edu/courses/chemistry/5-301-chemistry-laboratory-techniques>
3. <http://freevideolectures.com/Course/2941/Chemistry-1A-General-Chemistry-Fall-2011>

Mapping of CO with PO

CO Vs PO	CO1	CO2	CO3	Total	Scaled to 0,1,2 and 3
PO₁	3	2	2	7	2
PO₂	3	2	2	7	2
PO₃	3	2	2	7	2
PO₄	3	2	2	7	2
PO₅	2	1	1	4	1
PO₆	3	2	2	7	2
PO₇	3	2	2	7	2
PO₈	0	1	0	1	0
PO₉	1	1	1	3	1
PO₁₀	1	1	1	3	1
PO₁₁	1	1	0	2	1
PO₁₂	0	1	0	1	0
PSO₁	0	1	0	1	0
PSO₂	0	1	0	1	0

1-5 → 1, 6-10 → 2, 11-15 → 3

0 – No Relation, 1 – Low Relation, 2 – Medium Relation, 3 – High Relation

COURSE CODE			XMA201	L	T	P	C
COURSE NAME			CALCULUS, ORDINARY DIFFERENTIAL EQUATIONS AND COMPLEX VARIABLE	3	1	0	4
C	P	A		L	T	P	H
3	0.5	0.5		3	1	0	4
PREREQUISITE: Mathematics I (Calculus and Linear Algebra)							
Course Outcomes				Domain	Level		
CO1	Find double and triple integrals and to find line, surface and volume of an integral by Applying Greens, Gauss divergence and Stokes theorem.			Cognitive	Applying Remembering		
CO2	Solve first order differential equations of different types which are solvable for p, y, x and Clairaut's type.			Cognitive	Applying		
CO3	Solve Second order ordinary differential equations with variable coefficients using various methods.			Cognitive	Applying		
CO4	Use CR equations to verify analytic functions and to find harmonic functions and harmonic conjugate. Conformal mapping of translation and rotation. Mobius transformation.			Cognitive Psychomotor	Remembering Applying Guided Response		
CO5	Apply Cauchy residue theorem to evaluate contour integrals involving sine and cosine function and to state Cauchy integral formula, Liouville's theorem. Taylor's series, zeros of analytic functions, singularities, Laurent's series.			Cognitive Affective	Applying Receiving		
UNIT - I MULTIVARIABLE CALCULUS (Integration)							12
Multiple Integration: Double integrals (Cartesian) - change of order of integration in double integrals - Change of variables (Cartesian to polar) - Triple integrals (Cartesian), Scalar line integrals - vector line integrals - scalar surface integrals - vector surface integrals - Theorems of Green, Gauss and Stokes.							
UNIT - II FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS							12
Exact - linear and Bernoulli's equations - Euler's equations - Equations not of first degree: equations solvable for p - equations solvable for y- equations solvable for x and Clairaut's type.							
UNIT - III ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDERS							12
Second order linear differential equations with variable coefficients- method of variation of parameters - Cauchy-Euler equation- Power series solutions- Legendre polynomials- Bessel functions of the first kind and their properties.							
UNIT - IV COMPLEX VARIABLE – DIFFERENTIATION							12
Differentiation-Cauchy-Riemann equations- analytic functions-harmonic functions-finding harmonic conjugate- elementary analytic functions (exponential, trigonometric, logarithm) and their properties- Conformal mappings- Mobius transformations and their properties.							
UNIT - V COMPLEX VARIABLE - INTEGRATION							12
Contour integrals - Cauchy-Goursat theorem (without proof) - Cauchy Integral formula (without proof)-Liouville's theorem (without proof)- Taylor's series- zeros of analytic functions- singularities- Laurent's series – Residues- Cauchy Residue theorem (without proof)							

Evaluation of definite integral involving sine and cosine- Evaluation of certain improper integrals using the Bromwich contour.

HOURS	LECTURE	TUTORIAL	TOTAL
	45	15	60
TEXT BOOK			
1. B.S. Grewal, “Higher Engineering Mathematics”, Khanna Publishers, 40th th Edition, 2008.			
REFERENCE BOOKS			
1. G.B. Thomas and R.L. Finney, “Calculus and Analytic geometry”, 9 th Edition, Pearson, Reprint, 2002.			
2. Erwin kreyszig, “Advanced Engineering Mathematics”, 9 th Edition, John Wiley & Sons, 2006.			
3. W. E. Boyce and R. C. DiPrima, “Elementary Differential Equations and Boundary Value Problems”, 9 th Edn. Wiley India, 2009.			
4. S. L. Ross, “Differential Equations”, 3 rd Ed., Wiley India, 1984.			
5. E. A. Coddington, “An Introduction to Ordinary Differential Equations”, Prentice Hall India, 1995.			
6. E. L. Ince, “Ordinary Differential Equations”, Dover Publications, 1958.			
7. J. W. Brown and R. V. Churchill, “Complex Variables and Applications”, 7 th Ed., McGrawHill, 2004.			
8. N.P. Bali and Manish Goyal, “A text book of Engineering Mathematics”, LaxmiPublications, Reprint, 2008.			

Table 1: Mapping of Cos with GAs:

	GA 1	GA 2	GA 3	GA 4	GA 5	GA 6	GA 7	GA 8	GA 9	GA1 0	GA1 1	GA1 2
CO 1	3	2			2					1		2
CO 2	3	1								1		1
CO 3	3	1								1		1
CO 4	3	2								1		1
CO 5	3	2			1					1		2
	15	8	0	0	3	0	0	0	0	5	0	7
Scale d Value	3	2			1					1		

1 – 5 → 1, 6 – 10 → 2, 11 – 15 → 3

0 - No Relation, 1 - Low Relation, 2- Medium Relation, 3- High Relation

Course Code		:	XCS202		L	T	P	C
Course Name		:	PROGRAMMING FOR PROBLEM SOLVING		3	0	0	3
Prerequisite		:	Basic Understanding Skills		L	T	P	H
C	P	A			3	0	0	3
3	0	0						
Course Objectives								
<ul style="list-style-type: none"> To learn programming language basics and syntax To ignite logical thinking To understand structured programming approach To deal with user defined data types To know about data storage in secondary memory 								
Course Outcome: After the completion of the course, students will be able to					Domain C or P or A		Level	
CO1	Define programming fundamentals and Solve simple programs using I/O statements				Cognitive		Remember Understand Apply	
CO2	Define syntax and write simple programs using control structures and arrays				Cognitive		Remember Understand Apply	
CO3	Explain and write simple programs using functions and pointers				Cognitive		Remember Understand Apply	
CO4	Explain and write simple programs using structures and unions				Cognitive		Remember Understand Apply	
CO5	Explain and write simple programs using files and Build simple projects				Cognitive		Remember Understand Apply	
COURSE CONTENT								
UNIT- I		PROGRAMMING FUNDAMENTALS AND I/O STATEMENTS						9
Introduction to components of a computer system, Program – Flowchart – Pseudo code – Software – Introduction to C language – Character set – Tokens: Identifiers, Keywords, Constants, and Operators – sample program structure -Header files – Data Types- Variables - Output statements – Input statements.								
UNIT - II		CONTROL STRUCTURE AND ARRAYS						9
Control Structures – Conditional Control statements: Branching, Looping - Unconditional control structures: switch, break, continue, goto statements – Arrays: One Dimensional Array – Declaration – Initialization – Accessing Array Elements – Searching – Sorting – Two Dimensional arrays - Declaration – Initialization – Matrix Operations – Multi Dimensional Arrays - Declaration – Initialization. Storage classes: auto – extern – static. Strings: Basic operations on strings.								
UNIT - III		FUNCTIONS AND POINTERS						9
Functions: Built in functions – User Defined Functions - Parameter passing methods - Passing arrays to functions – Recursion - Programs using arrays and functions. Pointers - Pointer declaration - Address operator - Pointer expressions & pointer arithmetic - Pointers and function - Call by value - Call by Reference - Pointer to arrays - Use of Pointers in self-referential structures-Notion of linked list								
UNIT - IV		STRUCTURES AND UNIONS						9
Structures and Unions - Giving values to members - Initializing structure - Functions and structures - Passing structure to elements to functions - Passing entire function to functions - Arrays of structure - Structure within a structure and Union.								
UNIT - V		FILES						9
File management in C - File operation functions in C - Defining and opening a file - Closing a file								

- The getw and putw functions - The fprintf & fscanf functions - fseek function – Files and Structures.

	L	T	P	Total
	45	0	0	45

TEXT BOOKS

1. Byron Gottfried, "Programming with C", III Edition, (Indian Adapted Edition), TMH publications, 2010
2. Yeshwant Kanethker, "Let us C", BPB Publications, 2008

REFERENCE BOOKS

1. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill, 7th edition 2017.
2. Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", Pearson Education Inc. 2005
3. Johnson baugh R. and Kalin M., "Applications Programming in ANSI C", III Edition, Pearson Education India, 2003

E-REFERENCES

1. <https://www.indiabix.com/c-programming/questions-and-answers/>
2. <https://www.javatpoint.com/c-programming-language-tutorial>
3. <https://www.w3schools.in/c-tutorial/>

Mapping of CO with PO's

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO 1	3	2	0	0	3	0	0	0	0	0	2	3	2	0
CO 2	3	2	0	0	2	0	0	0	0	0	2	3	2	0
CO 3	2	2	1	2	2	0	0	0	0	0	2	2	2	0
CO 4	2	2	1	2	2	0	0	0	0	0	2	2	2	0
CO 5	2	2	1	0	2	0	0	1	0	2	2	2	2	0
Total	12	10	3	4	11	0	0	1	0	2	10	12	10	0
Scaled Value	3	2	1	1	3	0	0	1	0	1	2	3	2	0

1 – 5 → 1, 6 – 10 → 2, 11 – 15 → 3

0 - No Relation, 1 - Low Relation, 2- Medium Relation, 3- High Relation

COURSE CODE			XAP203	L	T	P	C
COURSE NAME			APPLIED PHYSICS FOR ENGINEERS	3	1	0	4
PREREQUISITE			Basic Physics in HSC level	L	T	P	H
C	P	A		3	1	0	4
2.8	0.8	0.4					
COURSE OUTCOMES				Domain	Level		
CO1	<i>Identify</i> the basics of mechanics, <i>explain</i> the principles of elasticity and <i>determine</i> its significance in engineering systems and technological advances.			Cognitive: Psychomotor:	Remember, Understand Mechanism		
CO2	<i>Illustrate</i> the laws of electrostatics, magneto-statics and electromagnetic induction; <i>use</i> and <i>locate</i> basic applications of electromagnetic induction to technology.			Cognitive: Psychomotor: Affective:	Remember, Analyze, Mechanism Respond		
CO3	<i>Understand</i> the fundamental phenomena in optics by measurement and <i>describe</i> the working principle and application of various lasers and fibre optics.			Cognitive: Psychomotor: Affective:	Understand, Apply Mechanism Receive		
CO4	<i>Analyse</i> energy bands in solids, <i>discuss</i> and <i>use</i> physics principles of latest technology using semiconductor devices.			Cognitive: Psychomotor: Affective:	Understand, Analyze Mechanism Receive		
CO5	<i>Develop</i> Knowledge on particle duality and <i>solve</i> Schrodinger equation for simple potential.			Cognitive:	Understand, Apply		
UNIT - I MECHANICS OF SOLIDS						9+3	
<p>Mechanics: Force - Newton's laws of motion - work and energy - impulse and momentum - torque - law of conservation of energy and momentum - Friction.</p> <p>Elasticity: Stress - Strain - Hooke's law - Stress strain diagram - Classification of elastic modulus - Moment, couple and torque - Torsion pendulum - Applications of torsion pendulum - Bending of beams - Experimental determination of Young's modulus: Uniform bending and non-uniform bending.</p>							
UNIT - II ELECTROMAGNETIC THEORY						9+3	
<p>Laws of electrostatics - Electrostatic field and potential of a dipole; Dielectric Polarisation, Dielectric constant, internal field - Clausius Mossotti Equation - Laws of magnetism - Ampere's Faraday's law; Lenz's law - Maxwell's equation - Plane electromagnetic waves; their transverse nature - expression for plane, circularly and elliptically polarized light - quarter and half wave plates - production and detection of plane, circularly and elliptically polarized light.</p>							
UNIT- III OPTICS, LASERS AND FIBRE OPTICS						9+3	
<p>Optics: Dispersion- Optical instrument: Spectrometer - Determination of refractive index and dispersive power of a prism- Interference of light in thin films: air wedge - Diffraction: grating.</p> <p>LASER: Introduction - Population inversion -Pumping - Laser action - Nd-YAG laser - CO₂ laser</p>							

- Applications

Fibre Optics: Principle and propagation of light in optical fibre - Numerical aperture and acceptance angle - Types of optical fibre - Fibre optic communication system (Block diagram).

UNIT - IV SEMICONDUCTOR PHYSICS

9+3

Semiconductors: Energy bands in solids - Energy band diagram of good conductors, insulators and semiconductors - Concept of Fermi level - Intrinsic semiconductors - Concept of holes - doping - Extrinsic semiconductors - P type and N type semiconductors - Hall effect.

Diodes and Transistors: P-N junction diode - Forward bias and reverse bias - Rectification action of diode - Working of full wave rectifier using P N junction diodes - PNP and NPN transistors - Three different configurations - Advantages of common emitter configuration - working of NPN transistor as an amplifier in common emitter configuration.

UNIT - V QUANTUM PHYSICS

9+3

Introduction to quantum physics, black body radiation, Compton effect, de Broglie hypothesis, wave – particle duality, uncertainty principle, Schrodinger wave equation (Time dependent and Time independent), particle in a box, Extension to three dimension - Degeneracy.

	LECTURE	TUTORIAL	TOTAL
Hours	45	15	60

TEXT BOOKS

1. Gaur R. K. and Gupta S. L., "Engineering Physics", Dhanpat Rai Publications, 2009.
2. Avadhanulu M. N. "Engineering Physics" (Volume I and II), S. Chand & Company Ltd., New Delhi, 2010.

REFERENCE BOOKS

1. Palanisamy P. K., "Engineering Physics", Scitech Publications (India) Pvt. Ltd, Chennai.
2. Arumugam M., "Engineering Physics" (Volume I and II), Anuradha Publishers, 2010.
3. Senthil Kumar G., "Engineering Physics", 2nd Enlarged Revised Edition, VRB Publishers, Chennai, 2011.
4. Mani P., "Engineering Physics", Dhanam Publications, Chennai, 2007.

E RESOURCES

NPTEL , Engineering Physics, Prof. M. K. Srivastava, Department of Physics, IIT, Roorkee.

Mapping of CO's with PO:

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS1	PS2
CO1	3	2	2	2	1	-	-	-	1	-	-	1		
CO2	3		1		1	-	-	-		-	-	1		
CO3	3	2	2	2	1	-	-	-	1	-	-	1		
CO4	3	2	2	2	1	-	-	-	1	-	-	1		
CO5	3		2			-	-	-		-	-	1		
Total	15	6	9	6	4				3			5		
Scaled to 0,1,2,3 scale	3	2	2	2	1				1			1		

1 – 5 → 1, 6 – 10 → 2, 11 – 15 → 3

0-No Relation, 1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE			XGS204			L	T	P	SS	C
COURSE NAME			TECHNICAL COMMUNICATION			2	0	0	0	2
PREREQUISITE						L	T	P	SS	H
C	P	A				2	0	0	0	2
3	0	0								
COURSE OUTCOMES:						Domain		Level		
CO1	<i>Ability</i> to understand the basic principles					Cognitive		Remember		
CO2	<i>Apply</i> the techniques in writing					Cognitive		Apply		
CO3	<i>Identify</i> communicative styles					Cognitive		Remember		
CO4	<i>Construct</i> the nature of writing					Cognitive		Create		
UNIT - I BASIC PRINCIPLES										9
1.1 – Basic Principles of Technical Writing										
1.2 – Styles used in Technical Writing										
1.3 – Language and Tone										
UNIT - II TECHNIQUES										9
2.1 – Special Techniques used in writing										
2.2 – Definition & Description of mechanism										
2.3 – Description- Classification-Interpretation										
UNIT - III COMMUNICATION										9
3.1 – Modern development in style of writing										
3.2 - New letter writing formats										
UNIT - IV REPORT WRITING										9
4.1 – Types of Report writing										
4.2 – Project writing formats										
SUGGESTED READINGS										
(i) John Sealy, Writing and Speaking Author; Oxford University Press, New Delhi, 2009										
(ii) Williams K.S, Communicating Business. Engage Learning India Pvt Ltd, 2012										

SUB CODE			XWP205	L	T	P	C
SUB NAME			WORKSHOP PRACTICES	1	0	2	3
C	P	A		L	T	P	H
1	2	0		1	0	4	5
PREREQUISITE:							
Course outcomes				Domain	Level		
CO1	Summarize the machining methods and Practice machining operation.			Cognitive Psychomotor	Understanding Guided response		
CO2	Defining metal casting process, moulding methods and relates Casting and Smithy applications.			Cognitive Psychomotor	Remembering Perception		
CO3	Plan basic carpentry and fitting operation and Practice carpentry and fitting operations.			Cognitive Psychomotor	Applying Guided response		
CO4	Summarize metal joining operation and Practice welding operation.			Cognitive Psychomotor	Understanding Guided response		
CO5	Illustrate the, electrical and electronics basics and Makes appropriate connections.			Cognitive Psychomotor	Understanding Origination		
COURSE CONTENT							
EXP. NO	TITLE					CO RELATION	
1	Introduction to Machining Process					CO1	
2	Plain Turning using Lathe Operation					CO1	
3	Introduction to CNC					CO1	
4	Demonstration of Plain Turning using CNC					CO1	
5	Study of Metal Casting Operation					CO2	
6	Demonstration of Molding Process					CO2	
7	Study of Smithy Operation					CO2	
8	Study of Carpentry Tools					CO3	
9	Half lap joint – Carpentry					CO3	
10	Mortise and Tenon joint – Carpentry					CO3	
11	Study of fitting tools					CO3	
12	Square fitting					CO3	
13	Triangular fitting					CO3	
14	Study of Welding Tools					CO4	
15	Square butt joint - welding					CO4	
16	Tee joint – Welding					CO4	
17	Introduction to house wiring					CO5	
18	One lamp controlled by one switch					CO5	
19	Two lamps controlled by single switch					CO5	
20	Staircase wiring					CO5	
TEXT BOOKS							
1. Workshop Technology I,II,III, by S K Hajra, Choudhary and A K Chaoudhary. Media Promoters and Publishers Pvt. Ltd., Bombay							
2. Workshop Technology by Manchanda Vol. I,II,III India Publishing House, Jalandhar.							

REFERENCES

1. Manual on Workshop Practice by K Venkata Reddy, KL Narayana et al; MacMillan India Ltd.
2. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi
3. Workshop Technology by B.S. Raghuvanshi, Dhanpat Rai and Co., New Delhi.
4. Workshop Technology by HS Bawa, Tata McGraw Hill Publishers, New Delhi.

E RESOURCES

1. <http://nptel.ac.in/courses/112107145/>

Mapping of CO's with PO'S:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
CO1	2	1	2	2	1			1	1		1	2
CO2	2	1	2	2	1			1	1		1	2
CO3	2	1	2	2	1			1	1		1	2
CO4	2	1	2	2	1			1	1		1	2
CO5	2	1	2	2	1			1	1		1	2
Total												
Scale d												

0- No relation

1- Low relation

2- Medium relation

3- High relation

COURSE CODE	XEM206	L	T	P	C
COURSE NAME	ENGINEERING MECHANICS	0	0	3	3
PREREQUISITES	NIL	L	T	P	H
C:P:A= 3.5:0.25:0.25		0	0	3	3
COURSE OBJECTIVES					
Upon successful completion of the course, student will have: <ul style="list-style-type: none">• Ability to apply mathematics, science, and engineering.• Ability to design and conduct experiments, as well as to analyze and interpret data.• Ability to identify, formulate, and solve engineering problems.• Ability to apply modern engineering tools, techniques and resources to solve complex mechanical engineering activities with an understanding of the limitations.• Ability to comprehend the thermodynamics and their corresponding processes that influence the behavior and response of structural components.• Ability to apply principles of engineering, basic science, and mathematics (including multivariate calculus and differential equations) and thermodynamics to model, analyze, design, and realize physical systems, components, or processes.					
COURSE OUTCOMES		DOMAIN		LEVEL	
CO1	Explain the principles forces, laws and their applications.	Cognitive		Understanding, Apply	
CO2	Classification of friction, and apply the forces in Trusses and beams.	Cognitive		Understanding, Apply	
CO3	Explain and Apply moment of Inertia and Virtual work	Cognitive		Understanding, Apply	
CO4	Outline and Examine Dynamics	Cognitive		Understanding, Apply	
CO5	Explain free and forced vibration	Cognitive		Remember, Understanding	
UNIT I	INTRODUCTION TO ENGINEERING MECHANICS				9L+3T
Force Systems Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static indeterminacy.					
UNIT II	FRICTION AND BASIC STRUCTURAL ANALYSIS				9L+3T
Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, wedge friction, screw jack & differential screw jack; Equilibrium in three dimensions; Method of Sections; Method of Joints; How to determine if a member is in tension or compression; Simple Trusses; Zero force members; Beams & types of beams; Frames & Machines.					
UNIT III	CENTROID , CENTRE OF GRAVITY AND VIRTUAL WORK AND ENERGY METHOD				9L+3T
Centroid of simple figures from first principle, centroid of composite sections; Centre of Gravity and its implications; Area moment of inertia- Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Mass moment inertia of circular plate, Cylinder, Cone, Sphere, Hook. Virtual displacements, principle of virtual work for particle and ideal system of rigid bodies,					

degrees of freedom. Active force diagram, systems with friction, mechanical efficiency. Conservative forces and potential energy (elastic and gravitational), energy equation for equilibrium. Applications of energy method for equilibrium. Stability of equilibrium.

UNIT IV	REVIEW OF PARTICLE DYNAMICS AND INTRODUCTION TO KINETICS OF RIGID BODIES	9L+3T
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Rectilinear motion; Plane curvilinear motion (rectangular, path, and polar coordinates). 3-D curvilinear motion; Relative and constrained motion; Newton's 2nd law (rectangular, path, and polar coordinates). Work-kinetic energy, power, potential energy. Impulse-momentum (linear, angular); Impact (Direct and oblique). Types of motion, Instantaneous centre of rotation in plane motion and simple problems; D'Alembert's principle and its applications in plane motion and connected bodies; Work energy principle and its application in plane motion of connected bodies; Kinetics of rigid body rotation.

UNIT V	MECHANICAL VIBRATIONS	9L+3T
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Basic terminology, free and forced vibrations, resonance and its effects; Degree of freedom; Derivation for frequency and amplitude of free vibrations without damping and single degree of freedom system, simple problems, types of pendulum, use of simple, compound and torsion pendulums.

TEXT BOOKS/REFERENCE BOOKS

1.	Irving H. Shames (2006), Engineering Mechanics, 4th Edition, Prentice Hall
2.	F. P. Beer and E. R. Johnston (2011), Vector Mechanics for Engineers, Vol I - Statics, Vol II, – Dynamics, 9th Ed, Tata McGraw Hill
3.	R. C. Hibbler (2006), Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press.
4.	Andy Ruina and Rudra Pratap (2011), Introduction to Statics and Dynamics, Oxford University Press.
5.	Shanes and Rao (2006), Engineering Mechanics, Pearson Education.
6.	Hibler and Gupta (2010), Engineering Mechanics (Statics, Dynamics) by Pearson Education.
7.	Reddy Vijaykumar K. and K. Suresh Kumar (2010), Singer's Engineering Mechanics.
8.	Bansal R.K. (2010), A Text Book of Engineering Mechanics, Laxmi Publications.
9.	Khurmi R.S. (2010), Engineering Mechanics, S. Chand & Co.
10.	Tayal A.K. (2010), Engineering Mechanics, Umesh Publications.

LECTURE: 45	TUTORIAL: 15	PRACTICAL: 0	TOTAL: 60
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XEM206 - Mapping of CO with PO

CO Vs PO	CO1	CO2	CO3	CO4	CO5	Total	Scaled to 0,1,2 and 3
PO₁	1	1	1	1	1	5	1
PO₂	2	2	2	2	3	11	3
PO₃	3	3	3	3	3	15	3
PO₄	1	1	1	1	1	5	1
PO₅	0	0	0	0	0	0	0
PO₆	3	3	3	3	3	15	3
PO₇	1	1	1	1	1	5	1
PO₈	0	3	0	1	3	7	2
PO₉	3	3	3	3	3	15	3
PO₁₀	1	1	1	3	3	9	2
PO₁₁	2	2	2	3	3	12	3
PO₁₂	2	2	2	3	3	12	3
PSO₁	2	2	2	3	3	12	3
PSO₂	2	2	2	3	3	12	3
TOTAL	23	26	23	30	33	-	-

1-6 → 1, 7-12 → 2, 13-18 → 3

0 – No Relation, 1 – Low Relation, 2 – Medium Relation, 3 – High Relation

COURSE CODE			XCS207	L	T	P	C
COURSE NAME			PROGRAMMING FOR PROBLEM SOLVING LAB	0	0	1	1
PREREQUISITES			Basic Understanding Skills	L	T	P	H
C	P	A		0	0	2	2
0.75	0	0.25					

LEARNING OBJECTIVES

- To learn programming language basics and syntax
- To ignite logical thinking
- To understand structured programming approach
- To deal with user defined data types
- To know about data storage in secondary memory

COURSE OUTCOMES			DOMAIN	LEVEL
CO1	<i>Solve</i> simple programs using I/O statements		Cognitive Psychomotor	Apply Responding
CO2	<i>Solve</i> programs using control structures and arrays		Cognitive Psychomotor	Apply Responding
CO3	<i>Solve</i> programs using functions and pointers		Cognitive Psychomotor	Apply Responding
CO4	<i>Solve</i> programs using structures		Cognitive Psychomotor	Apply Responding
CO5	<i>Solve</i> programs using files		Cognitive Psychomotor	Apply Responding

S.No	List of Experiments	COs		
1	Program to display a Leave Letter as per proper format	CO1		
2	i. Program for addition of two numbers ii. Program to solve any mathematical formula.	CO1		
3	Program to find greatest of 3 numbers using Branching Statements	CO2		
4	Program to display divisible numbers between n1 and n2 using looping Statement	CO2		
5	Program to search an array element in an array.	CO2		
6	Program to find largest / smallest element in an array.	CO2		
7	Program to perform string operations.	CO3		
8	Program to find area of a rectangle of a given number use four function types.	CO3		
9	Programs to pass and receive array and pointers using four function types	CO3		
10	Programs using Recursion for finding factorial of a number	CO3		
11	Program to read and display student mark sheet of a student structures with variables	CO4		
12	Program to read and display student marks of a class using structures with arrays	CO4		
13	Program to create linked list using structures with pointers	CO4		
14	Program for copying contents of one file to another file.	CO5		
15	Program using files to store and display student mark list of a class using structures with array	CO5		
HOURS		TUTORIAL	PRACTICAL	TOTAL
		0	30	30

Mapping of CO with PO's

	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO 1	3	2	0	0	3	0	0	0	0	0	2	3	2	0
CO 2	3	2	0	0	2	0	0	0	0	0	2	3	2	0
CO 3	2	2	1	2	2	0	0	0	0	0	2	2	2	0
CO 4	2	2	1	2	2	0	0	0	0	0	2	2	2	0
CO 5	2	2	1	0	2	0	0	1	0	2	2	2	2	0
Total	12	10	3	4	11	0	0	1	0	2	10	12	10	0
Scaled Value	3	2	1	1	3	0	0	1	0	1	2	3	2	0

0- No relation

1- Low relation

2- Medium relation

3- High relation

COURSE CODE			XAP208	L	T	P	C
COURSE NAME			APPLIED PHYSICS FOR ENGINEERS LAB	0	0	2	2
PREREQUISITE:			Basic Physics in HSC level	L	T	P	H
C	P	A		0	0	3	3
0	1.5	0.5					
COURSE OUTCOMES				Domain		Level	
CO1	<i>Identify</i> the basics of mechanics, and <i>determine</i> its significance in engineering systems and technological advances.			Psychomot or:		Mechanism	
CO2	<i>Use</i> and <i>locate</i> basic applications of electromagnetic induction to technology.			Psychomot or: Affective:		Analyze, Mechanism Respond	
CO3	<i>Describe</i> the working principle and application of various lasers and fibre optics.			Psychomot or: Affective:		Apply Mechanism Receive	
CO4	<i>Analyse</i> energy bands in solids, <i>discuss</i> and <i>use</i> physics principles of latest technology using semiconductor devices.			Psychomot or: Affective:		Analyze Mechanism Receive	

LABORATORY

1. Torsional Pendulum - determination of moment of inertia and rigidity modulus of the given material of the wire.
2. Uniform Bending - Determination of the Young's Modulus of the material of the beam.
3. Non-Uniform Bending - Determination of the Young's Modulus of the material of the beam.
4. Meter Bridge - Determination of specific resistance of the material of the wire.
5. Spectrometer - Determination of dispersive power of the give prism.
6. Spectrometer - Determination of wavelength of various colours in Hg source using grating.
7. Air wedge - Determination of thickness of a given thin wire.
8. Laser - Determination of wavelength of given laser source and size of the given micro particle using Laser grating.
9. Post office Box - Determination of band gap of a given semiconductor.
10. PN Junction Diode - Determination of V-I characteristics of the given diode.

REFERENCE BOOKS

1. Samir Kumar Ghosh, "A text book of Advanced Practical Physics", New Central Agency (P) Ltd, 2008.
2. Arora C.L., "Practical Physics", S. Chand & Company Ltd., New Delhi, 2013.
3. UmayalSundari AR., "Applied Physics Laboratory Manual", PMU Press, Thanjavur, 2012.

	PRACTICAL	TOTAL HOURS
Hours	30	30

COURSE CODE	XMA301			L	T	P	C
COURSE NAME	PROBABILITY AND STATISTICS			3	1	0	4
C	P	A		L	T	P	H
4.0	0	0.0		3	1	0	4
	.						
	0						
PREREQUISITE: CALCULUS AND LINEAR ALGEBRA							
COURSE OUTCOMES:							
Course outcomes:			Domain	Level			
CO1	Explain conditional probability, independent events, find expected values and Moments of Discrete random variables with properties.		Cognitive	Understanding Remembering			
CO2	Find distribution function, Marginal density function, conditional density function, define density function of conditional distribution functions normal, exponential and gamma distributions.		Cognitive	Remembering			
CO3	Find measures of central tendency and to determine statistical parameters of Binomial, Poisson and Normal and to find correlation, regression and Rank Correlation coefficient of two variables.		Cognitive	Remembering			
CO4	Explain large sample test for single proportion, difference of proportion, single mean, difference of means and difference of standard deviations with simple problems.		Cognitive	Understanding			
CO5	Explain small sample test for single mean, difference of mean and correlation coefficients, variance test, chisquare test with simple Problems.		Cognitive	Understanding			

UNIT I: BASIC PROBABILITY	10
Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Chebyshev's Inequality.	
UNIT II: CONTINUOUS PROBABILITY DISTRIBUTIONS	10
Continuous random variables and their properties, distribution functions and densities, normal, exponential and gamma densities.	
UNIT III: BIVARIATE DISTRIBUTIONS	10
Bivariate distributions and their properties, distribution of sums and quotients, conditional densities, Bayes' rule.	
UNIT IV: BASIC STATISTICS	10
Measures of Central tendency: Moments, skewness and Kurtosis - Probability distributions: Binomial, normal and Poisson - evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation.	
UNIT V: APPLIED STATISTICS	10

Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

UNIT VI: SMALL SAMPLES

10

Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

	LECTURE	TUTORIAL	TOTAL
	45	15	60

Textbooks/References

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
3. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
4. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
6. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
7. Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.

Cos Versus GA mapping

Table 1: Mapping of Cos with GAs:

	GA											
	1	2	3	4	5	6	7	8	9	10	11	12
CO 1	3	2	0	0	2	0	0	0	0	1	0	2
CO 2	3	1	0	0	0	0	0	0	0	1	0	1
CO 3	3	1	0	0	0	0	0	0	0	1	0	1
CO 4	3	2	0	0	0	0	0	0	0	1	0	1
CO 5	3	2	0	0	1	0	0	0	0	1	0	2
Total	15	8	0	0	3	0	0	0	0	5	0	7
Scaled Value	3	2	0	0	1	0	0	0	0	1	0	3

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO 1	3	2	1	1	2	1	0	0	0	0	0	1	1	1
CO 2	3	2	1	1	2	1	0	0	0	0	0	1	1	1
CO 3	3	2	1	1	2	1	0	0	0	0	0	1	1	1
CO 4	3	2	1	1	2	1	0	0	0	0	0	1	1	1
CO 5	3	2	1	1	2	1	0	0	0	0	0	1	1	1
Total	15	10	5	5	10	5	0	0	0	0	0	5	5	5
Scaled Value	3	2	1	1	2	1	0	0	0	0	0	1	1	1

1 – 5 → 1, 6 – 10 → 2, 11 – 15 → 3
 1 - Low Relation, 2- Medium Relation, 3- High Relation

COURSE CODE			XCS302	L	T	P	C
COURSE NAME			ANALOG AND DIGITAL ELECTRONIC CIRCUITS	3	0	2	5
C	P	A		L	T	P	H
3.0	1.0	1.0		3	0	4	7
Course outcome				DOMAIN	LEVEL		
CO1	Classify and describe the basics of devices and discuss the applications			Cognitive Psychomotor	Understanding Set		
CO2	Apply op-amp concept to analyze and design the applications circuits			Cognitive Psychomotor	Understanding Remembering Set		
CO3	Apply the Boolean algebra to design the digital logic families			Cognitive Psychomotor	Understanding Mechanism		
CO4	Describe and design the Combinational digital circuits			Cognitive Psychomotor Affective	Understanding Remembering Set Respond		
CO5	Discuss and design the Sequential digital circuits			Cognitive Psychomotor Affective	Understanding Remembering Set Respond		
COURSE CONTENT							Hours
UNIT I	SEMICONDUCTOR DEVICES AND CIRCUITS						9 + 12
	Basics and characteristics – p-n junction diode, Zener diode, BJT and MOSFET –applications, rectifier, clipper, clamper and amplifier circuits. Differential amplifier and Direct coupled Multistage amplifier. List of Experiments: 1. Design and implementation of rectifiers, clipper and Clamper Circuits 2. Design and implementation of amplifier circuits.						
UNIT II	LINEAR AND NON LINEAR APPLICATIONS OF OP-AMP						9 + 12
	Introduction to op-amp-Linear applications; Inverting and non-inverting amplifier, differential amplifier, Integrator, active filter, voltage regulator, We in bridge and Phase shift oscillators Nonlinear applications; Comparator, Zero crossing Detector, wave and triangular wave generators. List of Experiments 3. Design and implementation of Op-amp linear applications. 4. Design and implementation of Op-amp non-linear applications						
UNIT III	FUNDAMENTALS OF DIGITAL SYSTEMS AND LOGIC FAMILIES						9 + 12
	Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive –OR operations, Boolean algebra, examples of IC gates. Number Systems – binary, signed binary, octal and hexadecimal number-arithmetic calculation-digital logic families; TTL, Schottky TTL and CMOS logic. A/D and D/A converter. List of Experiments: 5. Verification of Boolean theorems using digital logic gates.						

UNIT IV	COMBINATIONAL DIGITAL CIRCUITS			9 + 12
	Standard representation for logic function, K-map representation, Multiplexer, Demultiplexer, Adders, Subtractors, Digital comparator and code converters. List of Experiments: 6. Design and implementation of combinational circuits using basic gates for code converters. 7. Design and implementation of binary adder / subtractor using basic gates. 8. Design and implementation of Multiplexers/Demultiplexers.			
UNIT V	SEQUENTIAL DIGITAL CIRCUITS, MEMORIES AND PLD			9 + 12
	Sequential digital circuits; Flipflops-SR, J-K, T and D flip flops-Shift Register types and applications-Counters types and applications. Memory organization and operation, expanding memory size, classification and characteristics of memories, read only memory, random access memory, addressable memory, PLD (Programmable Logic Device). Memory and List of Experiments: 9. Design and implementation of Shift registers. 10. Design and implementation of counters.			
		LECTUR E	PRACTICAL	TOTAL
		45	60	105

TEXT BOOKS / REFERENCE BOOKS

1. R.L.Boylestad, L. Nashelsky, Electronic devices, and circuit theory, Prentice Hall, 2002
2. A.S.Sedra and K.C.Smith,"Microelectronic Circuits",New York, Oxford University Press, 7th edition
3. R.P.Jain,"Modern Digital Electronics", McGraw Hill Education,2009
4. M.M. Mano,"Digital logic and Computer design",Pearson Education India,2016.
5. A.Kumar 'Fundamentals of Digital circuits",Prentice hall India,2016.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	1	1	1	1	1	1	1	1	0	0	0	0	2	0
CO2	1	1	1	1	1	1	1	1	0	0	0	0	2	0
CO3	3	3	3	2	3	3	3	1	0	0	0	0	3	1
CO4	3	3	3	2	3	3	3	1	0	0	0	0	3	1
CO5	3	3	3	2	3	3	3	1	0	0	0	0	3	1

1 – 5 → 1, 6 – 10 → 2, 11 – 15 → 3

1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XCS303			L	T	P	C
COURSE NAME	DATA STRUCTURE AND ALGORITHMS			3	0	2	5
C	P	A		L	T	P	H
4.0	1.0	0.0		3	0	4	7
Course outcome				Domain		Level	
CO1	<i>Understand and apply</i> linear data structures			Cognitive Psychomotor		Understand Apply Guided Response	
CO2	<i>Understand and apply</i> nonlinear data structures			Cognitive Psychomotor		Understand Apply Guided Response	
CO3	<i>Understand and apply</i> sorting techniques			Cognitive Psychomotor		Understand Apply Guided Response	
CO4	<i>Understand and apply</i> graph algorithms			Cognitive Psychomotor		Understand Apply Guided Response	
CO5	<i>Design</i> different algorithm techniques.			Cognitive		Understand Apply	

COURSE CONTENT			Hours
UNIT I	LINEAR DATA STRUCTURE		9 + 18
	Theory ADT – List ADT – Stack ADT – Queue ADT. Practical <ol style="list-style-type: none"> 1. Singly Linked List 2. Doubly linked List 3. Circular Linked List 4. Stack Using Array implementation 5. Queue Using Array Implementation 6. Program for Balancing symbol 7. Program for Postfix expression evaluation 		
UNIT II	NON LINEAR DATA STRUCTURE		9 + 14
	Theory Trees – Binary Trees – Binary Search Trees – AVL Trees – Splay Trees – Tree Traversal – B Trees- B+ Tree Practical <ol style="list-style-type: none"> 8. Binary Search Tree 		

UNIT III	SORTING	12 + 14
	Theory Insertion sort – Shell sort – Heap sort – Merge sort – Quick sort – Bucket sort – External Sorting Practical 9. Insertion Sort 10. Heap Sort 11. Merge Sort 12. Quick Sort	
UNIT IV	GRAPH ALGORITHMS	12 + 14
	Theory Topological sort – Shortest path algorithms – Network Flow problems – Minimum Spanning Tree – Applications of Depth First search – NP completeness. Practical 13. Dijkstra's Algorithm	
UNIT V	ALGORITHM DESIGN TECHNIQUES	12
	Theory Greedy Algorithms – Divide and Conquer – Dynamic Programming – Randomized Algorithms – Backtracking algorithms	
	LECTURE	TUTORIAL
	45	0
	PRACTICAL	TOTAL
	60	105

TEXT BOOKS /REFERENCE BOOKS

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", Second Edition, Pearson Education, Reprint 2011.
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", Second Edition, Mcgraw Hill, 2002
3. Reema Thareja, "Data Structures Using C", Oxford University Press, 2011
4. Algorithms, Data Structures, and Problem Solving with C++, Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
5. "How to Solve it by Computer", 2nd Impression by R. G. Dromey, Pearson Education

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	1	1	1	1	0	0	0	1	0	1	1	3	2
CO2	3	2	1	1	1	0	0	0	1	0	1	1	3	2
CO3	3	1	1	1	1	0	0	0	1	0	1	1	3	2
CO4	3	2	1	2	1	0	0	0	1	0	1	1	3	2
CO5	3	1	1	2	0	0	0	0	0	0	1	2	3	2

1 – 5 → 1, 6 – 10 → 2, 11 – 15 → 3

1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE			XCS304	L	T	P	C
COURSE NAME			OBJECT ORIENTED PROGRAMMING	2	0	2	4
C	P	A		L	T	P	H
3.0	0.5	0.5		2	0	4	6
COURSE OUTCOME				Domain		Level	
CO1	To <i>understand</i> the basic concepts of OOP and classes and objects in C++.			Cognitive Psychomotor Affective		Understand Guided Response Set	
CO2	To <i>develop</i> a solution to problems and demonstrating the <i>usage</i> of file handling in C++.			Cognitive, Psychomotor Affective		Apply Create Guided Response Set	
CO3	To <i>understand</i> the basic concepts of OOP in Java and design patterns.			Cognitive Psychomotor Affective		Understand Guided Response Set	
CO4	To <i>apply</i> the ability to program with Multithreading and Exception handling in java.			Cognitive Psychomotor Affective		Understand Apply Guided Response Set	
CO5	To <i>demonstrate</i> the ability to <i>develop</i> a solution to various I/O manipulation operations and connectivity to database.			Cognitive Psychomotor Affective		Understand Apply Guided Response Set	
COURSE CONTENT							Hours
UNIT- I PROGRAMMING IN C++							6 + 12
C++ fundamentals, Classes and objects, Abstract data types, ADT implementation- Concrete state space- concrete invariant- abstraction function. Implementing operations Constructors and destructors, operator overloading – inheritance, functions and polymorphism. List of Experiments: 1. Design C++ classes with static members, methods with default arguments, friend functions. 2.Implement complex number class with necessary operator overloading and type conversions such as integer to complex, double to complex, complex to double etc.							
UNIT - II FILE HANDLING IN C++							6 + 12
C++ streams – console streams – console stream classes-formatted and unformatted console I/O operations, manipulators - File streams - classes file modes file pointers and manipulations file I/O – Exception handling. List of Experiments: 3. Implement Matrix class with dynamic memory allocation and necessary methods. Give proper constructor, destructor, copy constructor, and overloading of assignment operator.							

TEXT BOOKS /REFERENCE BOOKS
1. K.R.Venugopal, Rajkumar Buyya, T.Ravishankar, "Mastering C++", TMH, 2003
2. Bjarne Stroustrup, "The C++ programming language", Addison Wesley, 2000
3. Herbert Schidt and Dale Srien, "Java Fundamentals - A comprehensive Introduction", TMH.
4. Herbert Schildt, "The Complete Reference (Fully updated for jdk7)", Oracle press 8 th Edition, 2012
5. Barbara Liskov, Program Development in Java, Addison-Wesley, 2001
6. Java for Programmers, P.J. Deitel and H.M. Deitel, Pearson education
7. Java: How to Program P.J. Deitel and H.M. Deitel, PHI.

8. Object Oriented Programming through Java, P. Radha Krishna, Universities Press.
9. Thinking in Java, Bruce Eckel, Pearson Education
10. Ira Pohl, "Object oriented programming using C++", Pearson Education Asia, 2003
11. John R. Hubbard, "Programming with C++", Schaums outline series, TMH, 2003
12. E. Balagurusamy "Object Oriented Programming with C++", TMH 2/e
13. Cay S. Horstmann and Gary Cornell, "Core Java Programming Volume – I", 9th Edition, 2012.
14. Programming in Java, Bruce Eckel, Pearson Education
15. Programming in Java, S. Malhotra and S. Choudhary, Oxford Univ. Press.
16. Deitel & Deitel, "Java How to Program", Prentice Hall, 9th Edition, 2012

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	3	3	2	2	2	1	0	0	2	1	1
CO2	3	3	3	3	3	2	2	2	1	0	0	2	1	1
CO3	2	2	2	3	3	3	2	2	1	0	0	1	2	1
CO4	2	2	2	2	0	0	0	0	0	0	0	0	2	1
CO5	3	2	3	3	3	0	2	2	2	0	0	0	1	1

1 – 5 → 1, 6 – 10 → 2, 11 – 15 → 3
1 - Low Relation, 2- Medium Relation, 3- High Relation

COURSE CODE			XES306		L	T	P	C
COURSE NAME			ENTREPRENEURSHIP DEVELOPMENT		2	0	0	2
C	P	A			L	T	P	H
1.2	0.0	0.8			2	0	0	2
COURSE OUTCOME					Domain		Level	
CO1	Recognise and describe the personal traits of an entrepreneur.				Cognitive Affective		Understand Receiving	
CO2	Determine the new venture ideas and analyze the feasibility report.				Cognitive		Understand Analyze	
CO3	Develop the business plan and analyze the plan as an individual or in team.				Cognitive Affective		Receiving Analyze	
CO4	Describe various parameters to be taken into consideration for launching and managing small business.				Cognitive		Understand	
CO5	Describe Technological management and Intellectual Property Rights				Cognitive		Understand	
UNIT I ENTREPRENEURIAL TRAITS AND FUNCTIONS							6	
Definition of Entrepreneurship; competencies and traits of an entrepreneur; factors affecting Entrepreneurship Development; Role of Family and Society ; Achievement Motivation; Entrepreneurship as a career and national development.								
UNIT -II NEW PRODUCT DEVELOPMENT AND VENTURE CREATION							6	
Ideation to Concept development; Sources and Criteria for Selection of Product; market assessment ; Feasibility Report ;Project Profile; processes involved in starting a new venture; legal formalities; Ownership; Case Study.								
UNIT –III ENTREPRENEURIAL FINANCE							6	
Financial forecasting for a new venture; Finance mobilization; Business plan preparation; Sources of Financing, Angel Investors and Venture Capital; Government support in startup promotion.								
UNIT –IV LAUNCHING OF SMALL BUSINESS AND ITS MANGEMENT							6	
Operations Planning - Market and Channel Selection - Growth Strategies - Product Launching – Incubation, Monitoring and Evaluation of Business - Preventing Sickness and Rehabilitation of Business Units.								
UNIT-V TECHNOLOGY MANAGEMENT, IPR PORTFOLIO FOR NEW PRODUCT VENTURE							6	
Technology management; Impact of technology on society and business; Role of Government in supporting Technology Development and IPR protection; Entrepreneurship Development Training and Other Support Services.								
				LECTURE		TUTORIAL		TOTAL
				30		0		30
TEXT BOOKS								
<ul style="list-style-type: none"> Hisrich, 2016, <i>Entrepreneurship</i>, Tata McGraw Hill, New Delhi. S.S.Khanka, 2013, <i>Entrepreneurial Development</i>, S.Chand and Company Limited, New Delhi. 								

REFERENCE BOOKS

- Mathew Manimala, 2005, *Entrepreneurship Theory at the Crossroads, Paradigms & Praxis*, Biztrantra ,2nd Edition.
- Prasanna Chandra, 2009, *Projects – Planning, Analysis, Selection, Implementation and Reviews*, Tata McGraw-Hill.
- P.Saravanavel, 1997, *Entrepreneurial Development*, Ess Pee kay Publishing House, Chennai.
- Arya Kumar,2012, *Entrepreneurship: Creating and Leading an Entrepreneurial Organisation*, Pearson Education India.
- Donald F Kuratko, T.V Rao, 2012, *Entrepreneurship: A South Asian perspective*, Cengage Learning India.
- Dinesh Awasthi, Raman Jaggi, V.Padmanand, *Suggested Reading / Reference Material for Entrepreneurship Development Programmes (EDP/WEDP/TEDP)*, EDI Publication, Entrepreneurship Development Institute of India, Ahmedabad. Available from: <http://www.ediindia.org/doc/EDP-TEDP.pdf>

WEB SITES AND WEB RESOURCES:

- Jeff Hawkins, “ Characteristics of a successful entrepreneur”, ALISON Online entrepreneurship courses, “<https://alison.com/learn/entrepreneurial-skills>
- Jeff Cornwall, “Entrepreneurship -- From Idea to Launch”, Udemy online Education, <https://www.udemy.com/entrepreneurship-from-idea-to-launch/>

TABLE :1 MAPPING COURSE OUTCOME WITH GRADUATE ATTRIBUTES:

Course Outcomes	GA											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	0	0	0	0	0	0	0	0	3	3	3	1
CO2	0	0	1	2	3	2	1	1	1	2	3	0
CO3	0	0	0	0	0	1	0	2	3	3	0	2
CO4	0	0	0	0	0	1	1	2	3	0	3	3
CO5	0	0	0	0	0	1	1	3	0	0	0	3
Total	0	0	1	2	3	5	3	8	10	8	9	9
Scaled Value			1	1	1	2	1	2	3	2	2	2

1 – 5 →1, 6 – 10→ 2, 11 – 15→ 3

1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE			XCI307	L	T	P	C
COURSE NAME			CONSTITUTION OF INDIA	3	0	0	3
C	P	A		L	T	P	H
2.0	0.0	1.0		3	0	0	3
COURSE OUTCOME				Domain	Level		
CO1	<i>Understand</i> the Constitutional History			Cognitive	Understanding		
CO2	<i>Understand</i> the Powers and Functions			Cognitive	Understanding		
CO3	<i>Understand</i> the Legislature			Affective	Remembering		
CO4	<i>Understand</i> the Judiciary			Affective	Remembering		
CO5	<i>Understand</i> the Centre State relations			Cognitive	Understanding		
UNIT I							8
Constitutional History - The Constitutional Rights- Preamble- Fundamental Rights- Fundamental Duties- Directive principles of State Policy.							
UNIT II							9
The Union Executive - The President of India (powers and functions)- Vice-President of India- The Council of Ministers-Prime Minister- Powers and Functions.							
UNIT III							10
Union Legislature - Structure and Functions of Lok Sabha- Structure and Functions of Rajya Sabha- Legislative Procedure in India- Important Committes of Lok Sabha- Speaker of the Lok Sabha.							
UNIT IV							9
The Union Judiciary - Powers of the Supreme Court- Original Jurisdiction- Appelete jurisdictions- Advisory Jurisdiction- Judicial review.							
UNIT V							9
Centre State relations - Political Parties- Role of governor, powers and functions of Chief Minister-Legislative Assembly- State Judiciary- Powers and Functions of the High Courts.							
LECTURE				TUTORIAL	PRACTICAL	TOTAL	
45				0	0	45	
REFERENCES							
1. W.H.Morris Shores- Government and politics of India, NewDelhi,B.1.Publishers,1974.							
2. M.V.Pylee- Constitutional Government in India, Bombay, Asia Publishing House, 1977.							
3. R.Thanker- The Government and politics of India, London:Macmillon, 1995.							
4. A.C.Kapur- Select Constitutions S,Chand & Co.,NewDelhi, 1995							
5. V.D.Mahajan- Select Modern Governments,S,Chand &Co, NewDelhi,1995.							
6. B.C.Rout- Democractic Constitution of India.							
7. Gopal K.Puri- Constitution of India, India 2005.							

Table 1: Mapping of COs with POs

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO 1	2	0	0	1	0	0	0	0	0	0	0	0	0	0
CO 2	2	0	0	1	0	0	0	0	0	0	0	0	0	0
CO 3	2	0	0	1	0	0	0	0	1	0	0	0	0	0
CO 4	2	0	0	1	0	0	0	1	1	0	0	0	0	0
CO 5	2	2	0	1	0	0	0	1	1	0	0	0	0	0
Total	10	2	0	5	0	0	0	2	3	0	0	0	0	0
Scaled Value	2	1	0	1	0	0	0	1	1	0	0	0	0	0

1-5 →1, 6-10 →2, 11-15 →3

1- Low Relation, 2- Medium Relation, 3- High Relation

COURSE CODE	XPS401	L	T	P	C
COURSE NAME	DISCRETE MATHEMATICS	3	1	0	4
C	P	A	L	T	P
4	0	0	3	1	0

PREREQUISITE: CALCULUS AND LINEAR ALGEBRA

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	Define and Explain Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets.	Cognitive	Remembering Understanding
CO2	Define and Explain Basic counting techniques- inclusion and exclusion, pigeon-hole principle, permutation and combination.	Cognitive	Remembering Understanding
CO3	Define and Explain The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers.	Cognitive	Remembering Understanding
CO4	Define and Explain Algebraic Structures with one Binary Operation and two Binary Operations.	Cognitive	Remembering Understanding
CO5	Define and Explain Graphs and their properties.	Cognitive	Remembering Understanding

UNIT I: SETS, RELATION AND FUNCTION

12

Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set, Sum and Product of Functions, Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem.

Principles of Mathematical Induction:

The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic.

UNIT II:

12

Basic counting techniques- inclusion and exclusion, pigeon-hole principle, permutation and combination.

UNIT III: PROPOSITIONAL LOGIC

12

Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers. Proof Techniques: Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency.

UNIT IV: ALGEBRAIC STRUCTURES AND MORPHISM

12

Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Boolean Algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form.

UNIT V: Graphs and Trees**12**

Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Colouring, Colouring maps and Planar Graphs, Colouring Vertices, Colouring Edges, List Colouring, Perfect Graph, definition properties and Example, rooted trees, trees and sorting, weighted trees and prefix codes, Bi-connected component and Articulation Points, Shortest distances.

LECTURE**TUTORIAL****TOTAL****45****15****60****SUGGESTED BOOKS:**

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

SUGGESTED REFERENCE BOOKS:

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and It's Application to Computer Science", TMG Edition, Tata McGraw-Hill
2. Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press. Schaum's Outlines Series, Seymour Lipschutz, Marc Lipson,
3. Discrete Mathematics, Tata McGraw - Hill

Cos Versus GA mapping**Table 1: Mapping of Cos with GAs:**

	GA											
	1	2	3	4	5	6	7	8	9	10	11	12
CO 1	3	2	0	0	2	0	0	0	0	1	0	2
CO 2	3	1	0	0	2	0	0	0	0	1	0	2
CO 3	3	1	0	0	1	0	0	0	0	1	0	2
CO 4	3	2	0	0	1	0	0	0	0	1	0	2
CO 5	3	2	0	0	1	0	0	0	0	1	0	2
Total	15	8	0	0	7	0	0	0	0	5	0	10
Scaled Value	3	2	0	0	2	0	0	0	0	1	0	2

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO 1	3	2	1	1	2	1	0	0	0	0	0	1	1	1
CO 2	3	2	1	1	2	1	0	0	0	0	0	1	1	1
CO 3	3	2	1	1	2	1	0	0	0	0	0	1	1	1
CO 4	3	2	1	1	2	1	0	0	0	0	0	1	1	1
CO 5	3	2	1	1	2	1	0	0	0	0	0	1	1	1
Total	15	10	5	5	10	5	0	0	0	0	0	5	5	5
Scaled Value	3	2	1	1	2	1	0	0	0	0	0	1	1	1

1 – 5 → 1, 6 – 10 → 2, 11 – 15 → 3

0 - No Relation, 1 - Low Relation, 2- Medium Relation, 3- High Relation

COURSE CODE			XCS402	L	T	P	C
COURSE NAME			COMPUTER ARCHITECTURE AND ORGANIZATION	3	0	2	5
C	P	A		L	T	P	H
4.0	1.0	0.0		3	0	4	5
COURSE OUTCOME				DOMAIN		LEVEL	
CO1	<i>Describe</i> functional unit of computer and <i>Recognize</i> various Addressing modes.			Cognitive Psychomotor		Remember, Understand Guided Response	
CO2	<i>Describe and Analyze</i> of arithmetic unit.			Cognitive Psychomotor		Remember, Analyze Guided Response	
CO3	<i>Describe</i> and <i>Recognize</i> the basic processing unit.			Cognitive Psychomotor		Remember, Understand Guided Response	
CO4	<i>Explain</i> and <i>Illustrate</i> the memory System.			Cognitive Psychomotor		Remember, Analyze Guided Response	
CO5	<i>Explain and Analyze</i> the I/O Organization.			Cognitive Psychomotor		Remember, Analyze Guided Response	

COURSE CONTENT		Hours
UNIT I BASIC STRUCTURE OF COMPUTERS		9+9
	Functional units - Basic operational concepts - Bus structures - Software performance – Memory locations and addresses – Memory operations – Instruction and instruction sequencing – Addressing modes – Assembly language – Basic I/O operations – Stacks and queues- Measuring, Reporting and Summarizing Performance – Quantitative principles of computer design Practical: 1. String Manipulations, Sorting And Searching- Ascending & Descending Largest & Smallest.	
UNIT II ARITHMETIC UNIT		9+6
	Addition and subtraction of signed numbers – Design of fast adders – Multiplication of positive numbers - Signed operand multiplication and fast multiplication – Integer division – Floating point numbers and operations. Practical: 3.16 Bit Arithmetic Operation a. Addition b. Subtraction c. Multiplication d. Division 4. Logical Operations.	
UNIT III BASIC PROCESSING UNIT		9
	Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control. Pipelining – Basic concepts – Data hazards – Instruction hazards – Influence on Instruction sets – Data path and control consideration – Superscalar	

	operation.	
UNIT IV MEMORY SYSTEM		9+9
	Basic concepts – Semiconductor RAMs - ROMs – Speed - size and cost – Cache memories - Performance consideration – Virtual memory- Memory Management requirements – Secondary storage. Practical: Simulate the mapping techniques of Cache memory 5. Direct Mapped cache 6. Associative Mapped cache 7. Set Associative Mapped cache.	
UNIT V I/O ORGANIZATION		9+6
	Accessing I/O devices – Interrupts – Direct Memory Access – Buses – Interface circuits – Standard I/O Interfaces (PCI, SCSI, USB). Practical: 8. Traffic light control 9. Stepper motor control 10. Key board and Display	
	LECTURE	PRACTICAL
	45	30
		TOTAL
		75

TEXT BOOKS /REFERENCE BOOKS

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, 6th Edition “Computer Organization”, McGraw- Hill, 2012.
2. John L. Hennessey and David A. Patterson, " Computer Architecture: A Quantitative Approach", 5th Edition, Morgan Kaufmann, 2011
3. William Stallings, “Computer Organization and Architecture – Designing for Performance”, 9th Edition, Pearson Education, 2010
4. John P. Hayes, “Computer Architecture and Organization”, 3rd Edition, McGraw Hill, 1998

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	2	3	2	2	1	1	0	0	0	2	2	3	1
CO2	3	2	3	1	2	1	2	0	0	0	1	1	3	1
CO3	3	2	2	2	2	1	1	0	0	0	3	1	3	1
CO4	3	2	2	1	2	1	1	0	0	0	1	1	3	1
CO5	3	2	3	2	1	1	1	0	0	0	2	1	3	1
Total	15	10	13	8	9	5	6	0	0	0	9	6	15	5

1 – 5 → 1,

6 – 10 → 2,

11 – 15 → 3

0 - No Relation, 1 - Low Relation, 2- Medium Relation, 3- High Relation

COURSE CODE			XCS403	L	T	P	C
COURSE NAME			OPERATING SYSTEMS	3	0	2	5
C	P	A		L	T	P	H
4.0	1.0	0.0		3	0	4	5
COURSE OUTCOME				Domain		Level	
CO1	<i>Understand</i> the fundamental concepts of Operating system			Cognitive Psychomotor		Remembering Understand	
CO2	<i>Understand</i> and <i>implement the</i> process management, CPU scheduling algorithms, threads and Real time scheduling.			Cognitive Psychomotor		Understand Apply	
CO3	<i>Understand</i> and <i>implement</i> recognize the inter-process communication, synchronization and deadlocks.			Cognitive Psychomotor		Understand Apply	
CO4	<i>Understand</i> and <i>implement</i> the <i>memory</i> management techniques.			Cognitive Psychomotor		Understand Apply	
CO5	<i>Understand</i> the concepts of storage management, Disk Management and file management.			Cognitive Psychomotor		Understand	

COURSE CONTENT		Hours
UNIT I OPERATING SYSTEMS OVERVIEW		9 + 6
	<p><u>Introduction:</u> Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System.</p> <p><u>Practical</u></p> <ol style="list-style-type: none"> 1. Basic Commands in Linux 2. Write programs using the process related system calls of UNIX operating system like fork, exec, exit, wait, getuid, geteuid, close, kill etc... 3. Write C programs to simulate UNIX commands like ls, grep, etc... 	
UNIT II PROCESS MANAGEMENT		9+6
	<p>Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching</p> <p>Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads</p> <p>Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor Scheduling: Real Time scheduling: RM and EDF.</p> <p><u>Practical</u></p> <ol style="list-style-type: none"> 4. Write programs using the I/O system calls of UNIX operating system (open, read, write, etc) 5. Implement the various scheduling algorithms like FCFS and SJF 	

	scheduling, Priority and Round robin scheduling.	
UNIT III	INTER-PROCESS COMMUNICATION	9+6
	<p>Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer/Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dining Philosopher Problem etc.</p> <p>Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, and Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.</p> <p>Practical</p> <ol style="list-style-type: none"> 6. Simulate Inter Process Communication 7. Implement the semaphores like Producer – Consumer problem 8. Implementation of Banker's Algorithm 	
UNIT IV	MEMORY MANAGEMENT	9+6
	<p>Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition – Internal and External fragmentation and Compaction; Paging: Principle of Operation – Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging.</p> <p>Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault, Working Set, Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not Recently used (NRU) and Least Recently used (LRU).</p> <p>Practical</p> <ol style="list-style-type: none"> 9. Implementation of Memory Management Scheme- Paging <ol style="list-style-type: none"> a. Implementation of Best Fit algorithm b. Implementation of First Fit Algorithm c. Implement the contiguous file allocation technique d. Implementation of FIFO Page Replacement Algorithm e. Implementation of LRU Page Replacement Algorithm 	
UNIT V	I/O SYSTEMS	9+6
	<p>I/O Hardware: I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms.</p> <p>Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks.</p> <p>File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance.</p> <p>Practical</p> <ol style="list-style-type: none"> 1. Simulate Storage Features using virtual box component 	

		LECTURE	PRACTICAL	TOTAL	
		45	30	75	

a

TEXT BOOKS /REFERENCE BOOKS

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, 9th Edition, John Wiley and Sons Inc., 2012.
2. William Stallings, “Operating Systems – Internals and Design Principles”, 7th Edition, Prentice Hall, 2011
3. Charles Crowley, “Operating Systems: A Design-Oriented Approach”, Tata McGraw Hill Education, 1996.
4. Gary J. Nutt ,”Operating Systems: A Modern Perspective”, 2nd Edition, Addison-Wesley,2000
5. Maurice Bach ,”Design of the Unix Operating Systems”, 8th Edition, Prentice-Hall of India,2012
6. Daniel P. Bovet, Marco Cesati, “Understanding the Linux Kernel”, 3rd Edition, , O'Reilly and Associates,2005

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PROGRAM OUTCOMES												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	1	3	0	0	0	0	0	1	0	0	1	3	1
CO2	3	3	3	1	0	0	0	0	0	0	1	2	3	1
CO3	2	3	3	1	1	0	0	0	1	0	1	2	3	1
CO4	3	2	0	1	1	1	1	0	1	0	0	2	3	1
CO5	3	2	0	1	1	1	1	0	1	0	0	2	3	1

1 – 5 → 1, 6 – 10 → 2, 11 – 15 → 3
1 - Low Relation, 2- Medium Relation, 3- High Relation

COURSE CODE			XCS404	L	T	P	C
COURSE NAME			DESIGN AND ANALYSIS OF ALGORITHMS	3	0	2	5
C	P	A		L	T	P	H
4.0	1.0	0.0		3	0	4	5
Course Outcome							
			Domain	Level			
CO1	Explain and classify the characteristics and analysis of algorithm and propose the correct algorithmic strategy to solve any problem.			Cognitive	Understanding		
CO2	Design algorithms for any problem based on the strategy and sorting and searching problems.			Cognitive Psychomotor	Apply Guided Response		
CO3	Analyze any given algorithm and express its complexity in asymptotic notation			Cognitive Psychomotor	Analyze Guided Response		
CO4	Explain the limitations of algorithm and Identify any problem as belonging to the class of P, NP-Complete or NP-Hard			Cognitive Psychomotor	Understand Guided Response		
CO5	Propose approximation algorithm for any NP problem			Cognitive Psychomotor	Analyze Guided Response		
COURSE CONTENT							Hours
UNIT I	ANALYSING ALGORITHMS						9
	Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior - Performance measurements of Algorithm, Time and space trade-offs - Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters’ theorem. The Role of Algorithms in Computing - Growth of Functions – Recurrences - The Substitution Method - The Recurrence Tree Method - The Master Method - Probabilistic Analysis and Randomized Algorithms – Amortized Analysis – Aggregate Analysis – Accounting Method.						
UNIT II	DIVIDE AND CONQUER & GREEDY DESIGN STRATEGIES						9 + 9
	Fundamental Algorithmic Strategies: Brute-Force, Greedy,Dynamic Programming, Branch and-Bound and Backtracking methodologies for the design of algorithms - Topological sorting - Analysis of Sorting Algorithm – Quick Sort, Merge Sort – Quick Sort Randomized Version – Sorting in Linear Time - Lower Bounds for Sorting - Selection in Expected Linear Time - Selection in Worst case Linear Time – Greedy Algorithms - Elements of Greedy Strategy - Huffman Code, Dijkstra’s Shortest Path Algorithm – Heuristics - characteristics and their application domains. List of Experiments: 1. Sort a given set of elements using the Quicksort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be						

	<p>generated using the random number generator.</p> <p>2. Using OpenMP, implement a parallelized Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.</p> <p>3. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.</p>	
UNIT III	DYNAMIC PROGRAMMING AND OTHER DESIGN STRATEGIES	9 + 9
	<p>Dynamic Programming – Matrix Chain Multiplication - Elements of Dynamic programming –Longest Common Sequences – Warshall's and Floyd's Algorithm – Transitive Closure – Minimum Spanning Tree - All Pairs Shortest Path Algorithm – Analysis – Backtracking – Graph Coloring Problem – Branch and Bound Strategy - Knapsack Problem - Kruskal's algorithm – Prims algorithm.</p> <p>List of Experiments:</p> <p>4. Compute the transitive closure of a given directed graph using Warshall's algorithm.</p> <p>5. Obtain the Topological ordering of vertices in a given digraph.</p> <p>6. Implement 0/1 Knapsack problem using Dynamic Programming.</p> <p>7. Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm.</p> <p>8. Implement All-Pairs Shortest Paths Problem using Floyd's algorithm. Parallelize this algorithm, implement it using OpenMP and determine the speed-up achieved.</p> <p>9. Implement N Queen's problem using Back Tracking.</p> <p>10. Implement the spanning tree algorithm using Prims Algorithm</p>	
UNIT IV	FLOW NETWORKS AND STRING MATCHING	8 + 6
	<p>Flow Networks – Network Flow Algorithm - Ford Fulkerson Method - String Matching - Naive String Matching Algorithm – Knuth Morris Pratt Algorithm - Analysis.</p> <p>List of Experiments:</p> <p>11. Implement the Ford-Fulkerson Algorithm for Maximum Flow Problem.</p> <p>12. Implement the Knuth Morris Pratt Algorithm</p>	
UNIT V	NP PROBLEMS	9 + 6
	<p>NP-Completeness – Polynomial Time Verification – Theory of Reducibility – Circuit Satisfiability – NP - Completeness Proofs – NP Complete Problems: Vertex Cover, Hamiltonian Cycle and Traveling Salesman Problems - Cook's theorem– Approximation Algorithms – Approximation Algorithms to Vertex - Cover and Traveling Salesman Problems - Randomized algorithms - Class of problems beyond NP – P SPACE.</p> <p>List of Experiments:</p> <p>13. Implement travelling salesman problem using the dynamic programming approach.</p> <p>14. Implement the Hamiltonian Cycle using the dynamic programming approach.</p>	

		LECTURE	TUTORIAL	PRACTICAL	TOTAL	
		45	-	30	75	

TEXT BOOKS /REFERENCE BOOKS

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, Introduction to Algorithms, Third Edition, Prentice Hall, 2010.
2. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms Second Edition, Universities Press, 2008.
3. Kenneth A. Berman and Jerome L. Paul, Algorithms, Cengage Learning India, 2010.
4. Alfred V Aho, John E Hopcroft and Jeffrey D Ullman, The Design and Analysis of Computer Algorithms, First Edition, Pearson Education, 2006
5. Ding-Zhu Du, Ker-I Ko, Xiaodong Hu, Design and Analysis of Approximation Algorithms, Springer Optimization and Its Applications, First Edition, 2011.
6. I. Zámecníková, J. Hromkovic, Design and Analysis of Randomized Algorithms: Introduction to Design Paradigms (Texts in Theoretical Computer Science. An EATCS Series), 2005.

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PROGRAM OUTCOMES												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	1	2	1	0	0	0	0	1	0	0	1	1	1
CO2	2	3	2	1	1	0	0	0	0	0	1	1	2	2
CO3	2	3	2	1	1	0	0	0	1	0	1	1	2	3
CO4	3	2	2	1	1	1	1	0	1	0	0	0	2	3
CO5	2	2	2	1	1	1	1	0	1	0	0	1	1	2

1 – 5 → 1, 6 – 10 → 2, 11 – 15 → 3

1- Low Relation, 2-Medium Relation, 3-High Relation

COURSE CODE	XUM405			L	T	P	C
COURSE NAME	TOTAL QUALITY MANAGEMENT			3	0	0	3
C	P	A		L	T	P	H
3.0	0.0	0.0		3	0	0	3
Course outcome							
				Domain	Level		
CO1	<i>List</i> and <i>Explain</i> the basic concepts of total quality concepts and its limitations.			Cognitive	Remembering, Understanding		
CO2	<i>Analyze</i> and <i>Explain</i> the Customer satisfaction, Employee involvement, supplier selection and appraise the performance by TQM principle.			Cognitive	Analyzing Evaluating		
CO3	<i>Explain</i> and <i>Apply</i> the Statistical Process Control Tools.			Cognitive	Understanding, Applying		
CO4	<i>Select</i> and <i>Explain</i> the different TQM tools and their significance.			Cognitive	Remembering, Understanding		
CO5	<i>Explain</i> the importance aspects of different quality systems			Cognitive	Understanding		

COURSE CONTENT		Hours
UNIT I INTRODUCTION		9
	Definition of quality – Dimensions of quality – Quality planning – Quality costs – Analysis techniques for quality costs – Basic concepts of Total Quality Management – Historical review –Principles of TQM – Leadership – Concepts – Role of senior management – Quality Council –Quality statements – Strategic planning – Deming philosophy – Barriers to TQM implementation	
UNIT II TQM PRINCIPLES		9
	Customer satisfaction – Customer perception of quality – Customer complaints – Service quality –Customer retention – Employee involvement – Motivation, empowerment, teams, recognition and reward – Performance appraisal – Benefits – Continuous process improvement – Juran trilogy – PDSA cycle – 5S – Kaizen – Supplier partnership – Partnering – Sourcing – Supplier selection – Supplier rating – Relationship development – Performance measures – Basic concepts – Strategy – Performance measure.	
UNIT III STATISTICAL PROCESS CONTROL (SPC)		9
	The seven tools of quality – Statistical fundamentals – Measures of central tendency and dispersion – Population and sample – Normal curve – Control charts for variables and attributes – Process capability – Concept of six sigma – New seven management tools.	
UNIT IV TQM TOOLS		9
	Benchmarking – Reasons to benchmark – Benchmarking process – Quality Function Deployment (QFD) – House of quality – QFD process – Benefits – Taguchi quality loss function – Total Productive Maintenance (TPM) – Concept – Improvement needs – FMEA – Stages of FMEA.	

UNIT V QUALITY SYSTEMS				9
	Need for ISO 9000 and other quality systems – ISO 9000:2000 quality system – Elements –Implementation of quality system – Documentation – Quality auditing – TS 16949 – ISO 14000 –Concept, requirements and benefits.			
	LECTURE	TUTORIAL	TOTAL	
	45	0	45	

TEXT BOOKS

REFERENCES

E- REFERENCES

MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

1 - 5 → 1, 6 - 10 → 2, 11 - 15 → 3
1 - Low Relation, 2- Medium Relation, 3- High Relation

COURSE CODE		XCS501	L	T	P	C
COURSE NAME		SIGNALS AND SYSTEMS	3	0	0	3
C:P:A		3:0:0	L	T	P	H
			3	0	0	3
PREREQUISITES						
COURSE OUTCOMES			Domain	Level		
CO1	Describe and classify the signals & systems		Cognitive	Remembering Understanding		
CO2	Find and analyze the properties of continuous time signal using Fourier and Laplace Transform,		Cognitive	Remembering, Analyzing		
CO3	Find and solve the continuous time LTI system performance of Fourier and Laplace Transform.		Cognitive	Remembering, Applying		
CO4	Find ,apply and analyze the properties of discrete time signal using Fourier and Z Transform.		Cognitive	Remembering, Applying Analyzing,		
CO5	Explain,Solve and determinethe performance of Discrete Time LTI system in Fourier and Z Transform.		Cognitive	Understanding Applying, Evaluating		
UNIT I - CLASSIFICATION OF SIGNALS AND SYSTEMS						9
Continuous time signals (CT signals) - Discrete time signals (DT signals) - Step, Ramp, Pulse,Impulse, Sinusoidal, Exponential, Classification of CT and DT signals - Periodic & Aperiodic signals, Deterministic& Random signals, Energy & Power signals - CT systems and DT systems Classification of systems – Static & Dynamic, Linear & Nonlinear, Time-variant &Time-invariant,Causal&Noncausal, Stable & Unstable.						
UNIT II - ANALYSIS OF CONTINUOUS TIME SIGNAL						9
Fourier series analysis-spectrum of Continuous Time (CT) signals- Fourier and Laplace Transforms in CT Signal Analysis - Properties.						
UNIT III - LINEAR TIME INVARIANT- CONTINUOUS TIME SYSTEMS						9
Differential Equation-Block diagram representation-impulse response, convolution integrals- Fourier and Laplace transforms in Analysis of CT systems.						
UNIT IV - ANALYSIS OF DISCRETE TIME SIGNALS						9
Baseband Sampling of CT signals- Aliasing, Reconstruction of CT signal from DT signals DTFT and properties, Z-transform & properties.						
UNIT V - LINEAR TIME INVARIANT-DISCRETE TIME SYSTEMS						9
Difference Equations-Block diagram representation-Impulse response - Convolution sum- Discrete Fourier and Z Transform Analysis of Recursive & Non-Recursive systems.						
	LECTURE	TUTORIAL	PRACTICAL	TOTAL		
HOURS	45	0	0	45		
TEXT BOOKS						
1. P.Ramakrishna Rao, “Signals and Systems”, Tata McGraw Hill Publications, 2008.						
2. B.P.Lathi, “Principles of Linear Systems and Signals”, 2 nd Edition, Oxford University						

Press, 2009.

REFERENCES

1. R.EZeimer, W.H.Tranter. and .R.D.Fannin, “Signals & Systems - Continuous and Discrete”, Pearson Education, 2009.
1. John Alan Stuller, “An Introduction to Signals and Systems”, Thomson Learning , 2007.
2. M.J .Roberts, “Signals & Systems Analysis using Transform Methods & MATLAB”, Tata McGraw Hill, 2007.
3. Allan V.Oppenheim, S.Wilsky and S.H.Nawab, “Signals and Systems”, Pearson Education, Indian Reprint, 2007.

E-REFERENCES

1. <http://nptel.ac.in/courses/117104074> (Prof.K.S.Venktesh, “NPTEL, Signals and Systems”, IIT- Kanpur)
2. http://tutorialspoint.com/signals_and_systems/index.htm
3. <http://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/lecture-notes/>

COURSE CODE			XCS502			L	T	P	C
COURSE NAME			FORMAL LANGUAGE & AUTOMATA THOERY			2	1	0	3
C:P:A = 3:0:0									
C	P	A				L	T	P	H
3.0	0.0	0.0				2	2	0	4
COURSE OUTCOMES						DOMAIN		LEVEL	
CO1	Explain and Fundamental of the basic kinds of finite automata and their capabilities					Cognitive		Knowledge	
CO2	Describe regular and context-free languages					Cognitive		Knowledge	
CO3	Describe transform regular expressions to grammars					Cognitive and Affective		Knowledge, Create	
CO4	Explain Constructions of Turing Machines					Cognitive		Knowledge,	
CO5	Describe the key results in algorithmic complexity, computability.					Cognitive and Affective		Knowledge, Create	
UNIT I FINITE AUTOMATA									9
Introduction- Basic Mathematical Notation and techniques- Finite State systems – Basic Definitions – Finite Automaton – DFA & NDFA – Finite Automaton with ϵ -moves – Regular Languages- Regular Expression – Equivalence of NFA and DFA – Equivalence of NDFA's with and without ϵ -moves – Equivalence of finite Automaton and regular expressions –Minimization of DFA- - Pumping Lemma for Regular sets – Problems based on Pumping Lemma.									
UNIT II GRAMMARS									9
Grammar Introduction– Types of Grammar - Context Free Grammars and Languages– Derivations and Languages – Ambiguity- Relationship between derivation and derivation trees – Simplification of CFG – Elimination of Useless symbols - Unit productions - Null productions – Greiback Normal form – Chomsky normal form – Problems related to CNF and GNF.									
UNIT III PUSHDOWN AUTOMATA									9
Pushdown Automata- Definitions – Moves – Instantaneous descriptions –Deterministic pushdown automata – Equivalence of Pushdown automata and CFL - pumping lemma for CFL – problems based on pumping Lemma.									
UNIT IV TURING MACHINE									9
Turing Machines- Introduction – Formal definition of Turing machines –Instantaneous descriptions- Turing Machine as Acceptors – Turing Machine as Transducers Computable Languages and functions – Turing Machine constructions – Modifications of Turing Machines.									
UNIT V COMPUTATIONAL COMPLEXITY									9
Undecidability- Basic definitions- Decidable and undecidable problems - Properties of Recursive and Recursively enumerable languages – Introduction to Computational Complexity: Definitions- Time and Space complexity of TMs –complexity classes – introduction to NP-Hardness and NP-Completeness.									
						LECTURE	TUTORIAL	TOTAL	

	45	0	45
TEXT BOOKS			
1. Hopcroft J.E., Motwani R. and Ullman J.D, “Introduction to Automata Theory, Languages and Computations”, Second Edition, Pearson Education, 2008.			
REFERENCES			
1. John.C.Martin, “Introduction to Languages and the Theory of Computation” McGraw-Hill Education, 01-May-2010.			
2. Michael Sipser, “Introduction to the Theory of Computation” Cengage Learning, 2012.			
E-REFERENCES			
Theory of Computation by Prof. Somenath Biswas, Computer Science and Engineering, IIT Kanpur			

Mapping of COs with POs:

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2	2	3	0	0	0	1	1	1	0	0	0	0
CO2	2	3	2	3	0	0	0	0	0	1	0	2	2	1
CO3	2	2	3	1	1	2	1	2	2	0	0	0	0	2
CO4	3	2	2	2	0	0	0	0	0	1	0	1	0	2
CO5	1	1	3	3	1	2	1	1	1	0	0	2	2	2
Total	10	10	12	12	2	4	2	4	4	3	0	5	4	11

Courses	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO 1	PSO 2
Original	10	10	12	12	2	4	2	4	4	3	0	5	4	11
Scaled to 0,1,2,3 Scale	2	2	3	3	1	1	1	1	1	1	0	1	1	3

COURSE CODE			XCS503	L	T	P	C
COURSE NAME			DATABASE MANAGEMENT SYSTEMS	3	0	2	5
C	P	A		L	T	P	H
2.8	0.8	0.0		3	0	4	7

Learning Objectives:

This course aims at

- facilitating the student to understand the various concepts and functionalities of Database Management Systems, the method and model to store data.
- How to manipulate through query languages, the effective designing of relational database .
- How the system manages the concurrent usage of data in multi user environment.

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	Construct queries with relational database system with the basics of SQL	Cognitive Psychomotor	Remember, Create Guided Response
CO2	Relate and Apply the design principles for logical design of databases, including ER model and normalization approach	Cognitive Psychomotor	Understand, Apply Guided Response
CO3	Define and Explain the basic database storage structures and access techniques: file and page organizations, indexing methods including B-tree, B+ tree and hashing.	Cognitive	Remember, Understand
CO4	Define and Explain the basic issues of transaction processing and concurrency control.	Cognitive	Remember , Understand
CO5	Work successfully in a team by design and development of database application systems.	Cognitive Psychomotor	Understand, Apply Guided Response

UNIT I INTRODUCTION

9+3

Introduction to File and Database systems- Database system structure – Data Models – Types of Data models – ER model – Relational Model – Keys – Relational Algebra and Calculus.

List of Experiments:

- ## 1. Database design using E-R model and Normalization

UNIT II RELATIONAL MODEL

9+21

SQL – Data definition- **Queries in SQL**- Updates- Views – Integrity and Security – Relational Database design – Functional dependencies and Normalization for Relational Databases – Decomposition - Desirable Properties of Decomposition - Boyce-Codd Normal Form.

List of Experiments:

2. Data Definition Language (DDL) commands in RDBMS
3. Data Manipulation Language (DML) and Data Control Language (DCL)
4. High level language extensions with cursors
5. High level language extension with Triggers
6. Views
7. Procedures and Functions
8. Embedded SQL

UNIT III DATA STORAGE AND QUERY PROCESSING

9

Overview of Physical Storage Media – Magnetic Disks – RAID – Tertiary storage – File Organization – Organization of Records in Files – Indexing and Hashing – Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing.

UNIT IV TRANSACTION MANAGEMENT

9

Transaction Processing – Introduction- Need for Concurrency control- Desirable properties of Transaction- Schedule and Recoverability- Serializability and Schedules – Concurrency Control – Types of Locks- Two Phases locking- Deadlock- Time stamp based concurrency control – Recovery Techniques – Immediate Update- Deferred Update - Shadow Paging.

UNIT V ADVANCED DATABASES

9+6

Distributed databases - Homogenous and Heterogeneous - Distributed data Storage Object Oriented Databases - Need for Complex Data types - OO data Model- Nested relations - Complex Types - Inheritance Reference Types - XML - Structure of XML Data - XML Document Schema - Querying and Transformation - Data Mining and Data Warehousing -Web database-Spatial database -Temporal database - Multimedia database.

List of Experiments:

9. Develop the following applications

- Design and implementation of payroll processing system
- Design and implementation of Banking system
- Design and implementation of Library Information System
- Design and implementation of Student Information System

	LECTURE	PRACTICAL	TOTAL
	45	30	75

TEXT BOOKS

- Abraham Silberschatz, Henry F. Korth and S. Sudharshan, “Database System Concepts”, Sixth Edition, Tata Mc Graw Hill, 2011.

REFERENCES

- Ramez Elmasri and Shamkant B. Navathe, “Fundamentals of Database Systems”, Fifth Edition, Pearson Education, 2008.

E-RESOURCES

- <http://spoken-tutorial.org>
- <http://vlab.co.in/>

Mapping of COs with POs:

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	0	2	1	0	0	0	0	0	0	0	0	3	1
CO2	3	2	1	1	0	0	0	0	0	0	0	0	3	1
CO3	3	0	0	0	0	0	0	0	0	0	0	0	3	1
CO4	3	0	0	0	0	0	0	0	0	0	0	0	3	1
CO5	0	3	3	3	2	0	0	0	2	1	0	0	3	3

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
Original	12	5	6	5	2	0	0	0	2	1	0	0	15	7
Scaled to 0,1,2,3 scale	3	1	2	1	1	0	0	0	1	1	0	0	3	2

COURSE CODE			XCS504	L	T	P	C
COURSE NAME			SOFTWARE ENGINEERING	3	0	4	5
C	P	A		L	T	P	H
2.8	0.8	0.4		3	0	4	7

Objective:

Objective of software engineering course are understand the software life cycle models and software development process and elicit, analyze and specify software requirements, design, develop correct and robust software products, testing and adaptation of software maintenance and emerging trends in software engineering.

COURSE OUTCOMES		DOMAIN	LEVEL
CO1	<i>Describe, understand and compare</i> various methods of software development activities and software development process models.	Cognitive Psychomotor	Describe, Understand, Apply
CO2	<i>Describe, Ability to develop, classify and analyze</i> the knowledge of human-computer interaction and design software architecture for various application.	Cognitive Psychomotor Affect	Describe Create, Analyze
CO3	<i>Describe, apply, Analyze, evaluate and test</i> the basics of software testing and metrics.	Cognitive Psychomotor Affect	Describe Create, Apply
CO4	<i>Describe, apply, Analyze, evaluate and test</i> the basics of software maintenance and software project management concepts	Cognitive Psychomotor Affect	Describe Create, evaluate Apply
CO5	Understand and , <i>Explain, develop and utilize</i> the advanced software engineering concepts and software engineering development tools	Cognitive Psychomotor Affect	Describe Create, Apply

UNIT-I

SOFTWARE PROCESS AND REQUIREMENTS

9+ 12

Introduction – Hardware Vs. Software - A Generic view of Process – **SDLC - Process life cycle models (Water Fall, Incremental, Evolutionary, Specialized, Agile)** – Agile development - System Engineering. Requirements Engineering - Requirement gathering techniques - Requirements Engineering tasks – Process - Requirement Analysis - Eliciting Requirements - Building the analysis Model - Data Modeling Concepts - Object Oriented Analysis.

List of Experiments:

1. Feasibility study for any two application
2. Project Planning for the above application
3. Software requirement analysis for any two application
4. Write SRS for any two application
5. Create traceability matrix for any two applications

UNIT -II

DESIGN CONCEPTS AND PRINCIPLES

9 + 6

Design Engineering – Design Process and Design Concepts and Model-Architectural design - software architecture – data design – architectural design – transform and transaction mapping- Modeling the Component Level Design –Introduction-Designing Class-based Components- User interface analysis and design - Coupling and Cohesion- Design elements of interface, component level and deployment level.

List of Experiments:

6. Draw use-case, class for any two applications.

7. Draw sequence and collaboration diagram for any two applications.				
8. Draw activity and state chart for any two applications.				
9. Component, package and deployment diagram for any two applications.				
UNIT-III	TESTING	9 + 12		
Testing Strategies - A strategic approach to software testing - Strategic Issues - Test strategy for Conventional software, Object oriented software – SQA - Validation Testing - System testing and debugging - Testing fundamentals - Black Box testing - White Box testing - Basis Path testing - control structure testing - Test case - Performance testing - Object oriented testing.				
List of Experiments:				
10. Generate and Implementation of skeleton code for any two application				
11. Writing test cases for any two application				
12. Testing process for any two application				
13. Check verification & Validation for any two applications.				
UNIT -IV	SOFTWARE PROJECT MANAGEMENT	9		
Project Management life cycle – Need of application maintenance – Management spectrum - Testing Rationale Management – Configuration Management – Project Management – project process product measures and metrics – Estimation of software projects – Decomposition techniques and empirical estimation models - Risk analysis and mitigation plans - Procurement management.				
UNIT V	ADVANCED TOPICS IN SOFTWARE ENGINEERING	9		
Formal Methods – Basic Concepts – Mathematical preliminaries-Appling Mathematical notations for formal specification – Formal specification languages-Clean room software Engineering-Clean room Approach-Functional specification-Component-Based Development-Reengineering-Software Reengineering-Reverse Engineering- Forward Engineering- Introduction to CASE tools and testing tools – Software process improvement –Automation testing tools.				
		LECTUR E	PRACTICA L	TOTAL
		45	30	75
TEXT BOOKS				
1. Roger S.Pressman, Software engineering- A practitioner’s Approach, McGraw- Hill International Edition, 8 th edition, 2015.				
REFERENCES				
1. Ian Sommerville, Software engineering, Pearson education Asia, 10 th edition, 2016.				
2. Pankaj Jalote- An Integrated Approach to Software Engineering, 3 rd edition 2011.				
3. C.Ravindranath Pandian, “Software metrics – A guide to planning, analysis and application”, AUERBACH publication, Newyork 2011.				
4. Ali Behforooz, Frederick J Hudson, “Software Engineering Fundamentals”, second edition, Oxford University Press, Noida, 2009.				
E REFERENCES				
1. NPTEL Course Prof. N. L. Sarda, IIT Bombay				
2. http://vlab.co.in/				
3. http://staruml.io/				
4. http://argouml.tigris.org/				
5. http://www.seleniumhq.org				
6. IBM Rational Rose Enterprise Edition 8.1				

Mapping of COs with POs:

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO 1	1	2	1	0	0	1	0	0	0	0	0	2	2	1
CO 2	2	3	3	2	2	1	3	0	0	0	0	1	3	2
CO 3	3	3	3	1	1	3	0	1	2	0	3	3	3	3
CO 4	3	3	3	1	1	3	0	1	2	0	3	3	3	3
CO 5	1	3	0	0	3	0	1	0	0	1	0	1	3	1
	10	14	10	4	7	8	4	2	4	1	6	10	14	10

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
Original value	10	14	10	4	7	8	4	2	4	1	6	10	14	10
Scaled to 0,1,2,3 scale	2	3	2	1	2	2	1	1	1	1	2	2	3	2

COURSE CODE	XCS505	L	T	P	C
COURSE NAME	IT WORKSHOP(SCILAB/MATLAB)	1	0	4	3
PREREQUISITES	Working knowledge of some basic application software (Excel). Basic knowledge of computer programming and an understanding of matrix and linear algebra are highly beneficial.	L	T	P	H
C:P:A	0.25:2.0:0.75	1	0	4	5
Learning Objectives					
<ul style="list-style-type: none"> Understanding the MATLAB environment Being able to do simple calculations using MATLAB Being able to carry out simple numerical computations and analyses using MATLAB 					
COURSE OUTCOMES		DOMAIN	LEVEL		
CO1	Understand the main features of the MATLAB development environment	Cognitive, Psychomotor Affective	Understand Guided Response Responding		
CO2	Use the MATLAB GUI effectively	Cognitive Psychomotor	Understand Guided Response Responding		
CO3	Design simple algorithms to solve problems	Cognitive Psychomotor Affective	Apply Guided Response Responding		
CO4	Write simple programs in MATLAB to solve scientific and mathematical problems	Cognitive Psychomotor Affective	Apply Guided Response Responding		
CO5	graphical representations and tips for designing and implementing MATLAB code	Cognitive Psychomotor Affective	Apply Guided Response Responding		
THEORY					
MATLAB basics, The MATLAB environment , Basic computer programming Variables and constants, operators and simple calculations ,Formulas and functions, MATLAB toolboxes Matrix and linear algebra review ,Vectors and matrices in MATLAB,Matrix operations and functions in MATLAB Reading and writing data, file handling ,Personalized functions ,Toolbox structure ,MATLAB graphic functions					15
EXPERIMENTS					30
1. Study of Introduction to MATLAB 2. Study of basic matrix operations 3. To solve linear equation 4. Solution of Linear equations for Underdetermined and over determined cases. 5. Determination of Eigen values and Eigen vectors of a Square matrix. 6. Solution of Difference Equations. 7. Solution of Difference Equations using Euler Method. 8. Solution of differential equation using 4th order Runge- Kutta method. 9. Determination of roots of a polynomial. 10. Determination of polynomial using method of Least Square Curve Fitting. 11. Determination of polynomial fit, analyzing residuals, exponential fit and error bounds from the given data.					

	LECTURE	TUTORIAL	TOTAL
HOURS	45	0	45
REFERENCES			
1. Amos Gilat 'MATLAB, An Introduction With Applications', 3 rd edition, Wiley publishers, 2008			
2. Stephen J. Chapman 'MATLAB Programming for Engineers' 5 th edition, Cengage learninb, 2016			
3. Holly Moore 'MATLAB for Engineers', 5 th edition, Pearson, 2012			

Table 1: Mapping of COs with POs:

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1				1	3							1		
CO2	2	2		1	3							1		
CO3		2	1	2	2							1		
CO4					2									
CO5				2	2									
Total	2	4	1	6	12							3		
Scale d value	1	1	1	2	3							1		

1-5→1, 6-10→2, 11-15→3

0 - No Relation, 1 - Low Relation, 2 - Medium Relation, 3 - High Relation

SUBCODE		XCSM01	L	T	P	C
SUB NAME		Programming with Python	0.5	0	0.5	1
PREREQUISITES		-	L	T	P	H
C:P:A			1	0	1	2
COURSE OUTCOMES			Domain		Level	
CO1	<i>Describe</i> the evolution of python program and the handle installation process with different OS.		Cognitive		Remember	
CO2	<i>Understand</i> the data types and operators with dictionaries.		Cognitive		Remember ,Understand	
UNIT I INSTALLATION				6		
Downloading and installation: overview of python – installing python on windows –installing python on Linux – feature – History and philosophy of python – interactive mode – structure with identification.						
UNIT II DATA TYPE AND STATEMENT				6		
Identification- Data Types and Variables - Operators -input and raw input via the keyboard - Conditional Statements -While Loops -For Loops -Formatted output -Output with Print - Sequential Data Types - Dictionaries -Sets and Frozen Sets -Shallow and Deep Copy.						
UNIT III FUNCTION AND REGULAR EXPRESSION				6		
Functions - Recursion and Recursive Functions - Tests, DocTests, UnitTests - Memoization and Decorators - Passing Arguments- Namespaces - Global vs. Local Variables- File Management - Modular Programming and Modules - Introduction in Regular Expressions - Regular Expressions, Advanced -Lambda Operator, Filter, Reduce and Map -List Comprehension-Generators						
UNIT IV OBJECT ORIENTED PROGRAMMING				6		
Exception Handling - Object Oriented Programming - Inheritance Example - Slots - Classes and Class Creation -Road to Metaclasses -Metaclasses – files input and output - inheritance, polymorphism, operator overloading – Multithreading.						
UNIT V APPLICATION OF PYTHON PROGRAMMING				6		
Graphical user interfaces; event-driven programming paradigm; tkinter module, creating simple GUI; buttons, labels, entry fields, dialogs; widget attributes - sizes, fonts, colors layouts, nested frames-, Networks, and Client/Server Programming; introduction to HTML, interacting with remote HTML server, running html-based queries, downloading pages; CGI programming, programming a simple CGI form						
		LECTURE	TUTORIAL	PRACTICAL	TOTAL	
		15	0	15	30	
TEXT BOOKS						
1. Fundamentals of Python: First Programs Author: Kenneth Lambert Publisher: Course Technology, Cengage Learning, 2012 ISBN-13: 978-1-111-82270-5						
E-REFERENCES						
1. https://wiki.python.org/moin/BeginnersGuide/Overview						
2. https://docs.python.org/2/license.html						
3. http://www.python-course.eu/blocks.php						
4. http://www.tutorialspoint.com/python						

COURSE CODE	XCS601	L	T	P	C
COURSE NAME	COMPILER DESIGN	3	0	1	4
C:P:A	2.8:0.8:0.4				
		L	T	P	H
		3	0	2	5
COURSE OUTCOMES		DOMAIN		LEVE	
				L	
CO1	Describe the compilers and its construction tools and specification of tokens.	Cognitive		Remember	
CO2	Describe and apply various parsing techniques for parsing the string.	Cognitive, Psychomotor		Understand Guided Response	
CO3	Illustrate and construct intermediate language.	Cognitive, Psychomotor		Understand Guided Response	
CO4	Describe the code generation and make use of code generator to generate target code.	Cognitive, Psychomotor		Understand Guided Response	
CO5	Explain code optimization and apply the optimization technique	Cognitive, Psychomotor		Understand Guided Response	
UNIT I INTRODUCTION TO COMPILING					9 + 12
Compilers – analysis of the source program – phases of a compiler – cousins of the compiler – grouping of phases – compiler construction tools – lexical analysis – role of lexical analyzer – input buffering – specification of tokens- Lex- Simple Program using Lex.					
List of Programs					
1. Construction of NFA					
2. Construction of Minimized DFA					
3. Implementation of Lexical Analyzer Using LexTool.					
4. Generation of Tokens for Given Lexeme.					
5. Conversion of Infix to Postfix Expression					
6. Implementation of Symbol Table					
UNIT II SYNTAX ANALYSIS					9 + 8
Role of the parser –Writing Grammars –Context-Free Grammars – Top Down parsing – Recursive Descent Parsing – Predictive Parsing – Bottom-up parsing – Shift Reduce Parsing – Operator Precedent Parsing – LR Parsers – SLR Parser – Canonical LR Parser – LALR Parser- YACC –Simple Program using YACC.					
List of Programs					
7. Syntax Analysis using YACC.					
8. Implementation of Shift Reduce Parsing Algorithm.					
9. Construction of LR Parsing Table.					
10. Construction of Operator Precedence Parse Table.					
UNIT III INTERMEDIATE CODE GENERATION					9 + 5
Intermediate languages – Declarations – Assignment Statements – Boolean Expressions – Case Statements – Back patching – Procedure calls.					

List of Programs

11. Implementation of Quadruples
12. Implementation of Triples.
13. Implementation of Intermediate Code Generation.

UNIT IV CODE GENERATION**9 + 2**

Issues in the design of code generator – The target machine – Runtime Storage management – Basic Blocks and Flow Graphs – Next-use Information – **A simple Code generator** – DAG representation of Basic Blocks – Peephole Optimization.

List of Programs

14. Implementation of Code Generation

UNIT V CODE OPTIMIZATION AND RUN TIME ENVIRONMENTS**9 + 3**

Introduction– **Principal Sources of Optimization** – Optimization of basic Blocks – Introduction to Global Data Flow Analysis – Runtime Environments – Source Language issues – Storage Organization – Storage Allocation strategies – Access to non-local names – Parameter Passing.

List of Programs

15. Implementation of Code Optimization Techniques

	LECTURE	PRACTICAL	TOTAL
	45	30	75

TEXT BOOKS

1. Alfred V.Aho, Jeffrey D.Ullman, Ravi Sethi, "Compilers- Principles, Techniques, and Tools(Second Edition)", Pearson Education India, 2008.

REFERENCES

1. Allen I. Holub "Compiler Design in C", Prentice Hall of India, 2003.
2. C. N. Fischer and R. J. LeBlanc, "Crafting a compiler with C", Benjamin Cummings, 2003.
3. J.P. Bennet, "Introduction to Compiler Techniques", Second Edition, Tata McGraw-Hill, 2003.
4. Henk Alblas and Albert Nymeyer, "Practice and Principles of Compiler Building with C", PHI, 2001.
5. Kenneth C. Loudon, "Compiler Construction: Principles and Practice", Thompson Learning, 2003.

E REFERENCES

1. <http://nptel.ac.in/downloads/106108113/>
2. <http://www.svecw.edu.in/Docs%5CCSECDLNotes2013.pdf>
3. <https://www.wiziq.com/tests/compiler-design>
4. <http://spoken-tutorial.org/>
5. <http://vlab.co.in/>

Mapping of COs with POs:

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO 1	2	3	2	3	2	1	0	0	2	1	0	2	3	2
CO 2	2	3	2	3	2	1	0	0	2	1	0	1	3	2
CO 3	1	3	3	2	1	1	0	0	1	1	0	2	3	2
CO 4	2	2	2	2	2	1	0	0	1	1	0	1	3	2
CO 5	2	3	3	1	1	1	0	0	1	1	0	1	3	2
Total	9	14	12	11	8	5	0	0	7	5	0	7	15	10

COURSE CODE			XCS602	L	T	P	C
COURSE NAME			COMPUTER NETWORKS	3	0	1	4
C	P	A					
2.8	0.8	0.4		L	T	P	H
				3	0	2	5
COURSE OUTCOMES				DOMAIN		LEVEL	
CO1	<i>Understanding</i> the networks components and <i>Analyzing</i> the various network components.			Cognitive		Understand,	
CO2	<i>Describe and Recognize</i> the network error detection and correction methods.			Cognitive		Remember, Apply,	
CO3	<i>Identify and interpret the</i> network switching and addressing methods and <i>develop</i> the various routing simulations.			Cognitive Psychomotor		Remember, Understand, Guided response	
CO4	<i>Analyse</i> a transport layer functions and <i>setup</i> connection oriented protocol.			Cognitive Psychomotor		Analyze, Create Perception	
CO5	<i>Describe</i> the Application layer functions and network security and <i>Build</i> simple NS2 simulations			Cognitive Psychomotor Affective		Understand Guided Response Receive	
UNIT I DATA COMMUNICATIONS							9
Components- Direction of Data flow-networks- Components and Categories – types of connections- Topologies- Protocols and Standards – ISO/OSI model – Transmission Media – Coaxial Cable – Fiber Optics – Line Coding – Modems.							
UNIT II DATA LINK LAYER							9 +15
Error – Detection and Correction – Parity – LRC - CRC – Hamming code – low Control and Error control – stop and wait – go back –N ARQ – selective repeat ARQ – Sliding window – HDLC – LAN – Ethernet IEEE 802.3 - IEEE 802.5 - IEEE 802.11 – FDDI – SONET – Bridges.							
List of Programs							
1. (a) Implement Single Bit Parity generator and checker using ‘C’ program.							
(b) Implement two dimensional parity generator and checker using ‘C’ program.							
2. (a) Implement Cyclic Redundancy checks sender and receiver using c program.							
(b) Implement checksum sender and receiver using ‘C’ program.							
3. Simulate Stop & Wait protocol.							
4. Implement error detection in data transmission using Hamming code.							
5. Implement bit stuffing sender and receiver using c program.							
UNIT III NETWORK LAYER							9 + 6
Internetworks – Packet switching and Datagram approach – IP addressing methods – subnetting – Routing – Distance Vector Routing – Link State Routing – Routers.							
List of Programs							
7. Simulate the distance vector routing algorithm.							

8. Simulate the link state routing algorithm.			
UNIT IV TRANSPORT LAYER			9 + 6
Duties of Transport Layer – Multiplexing – De multiplexing – Sockets – User Datagram Protocol(UDP) – Transmission Control Protocol (TCP) – Congestion Control – Quality of Service (QOS) – Integrated Services.			
List of Programs			
9. Implement echo Server sender and receiver using TCP.			
10. Implement the Time Server sender and receiver using TCP.			
UNIT V APPLICATION LAYER			9 + 3
Domain Name Space (DNS) – SMTP – POP 3 – FTP – HTTP – WWW- Security - Cryptography Case study on TCP/IP Architecture.			
List of Experiments:			
11. Simulate the file transfer protocol using TCP.			
12. Implement byte stuffing sender and receiver using c program.			
13. To study NS2-Simple programs.			
	LECTURE	PRACTICAL	TOTAL
	45	30	75
TEXT BOOKS			
1. Behrouz A Forouzan “Data Communications Networking” 4th Edition Tata McGraw Hill, 2008.			
2. Andrew S. Tanenbaum, David J. Wetherall, “Computer Networks”, 5th Edition, 2010, ISBN-10: 0132126958, ISBN-13: 978-0132126953			
E REFERENCES			
1. http://nptel.ac.in/courses/106105081/			
2. Nptel videos Computer Networks by Prof. Sujoy Ghosh Department of Computer Science & Engineering Indian Institute of Technology, Kharagpur.			
3. E-Tools: https://www.wireshark.org/			
1.W. STALLINGS, "Data and Computer Communication", 8th edition, Pearson Education, 2006,			
2. Larry L. Peterson and Peter S.Davie , “Computer Networks”, Harcourt Asia Pvt Ltd., Second Edition			
E REFERENCES			
1. http://nptel.ac.in/downloads/106108113/			
2. http://www.svecw.edu.in/Docs%5CCSECDLNotes2013.pdf			
3. https://www.wiziq.com/tests/compiler-design			
4. http://spoken-tutorial.org/			
5. http://vlab.co.in/			

COURSE CODE	XUM606	L	T	P	C
COURSE NAME	ECONOMICS FOR ENGINEERS	3	0	0	3
PREREQUISITES		L	T	P	H
C:P:A	2.64:0.24:0.12	3	0	0	3
Learning Objectives					
<ul style="list-style-type: none">➤ To provide comprehensive coverage of economical concepts for precise decision makings in engineering domains.➤ To develop the ability of engineers to analysis the cost and revenue by using economical tools.					
COURSE OUTCOMES		DOMAIN		LEVEL	
CO1	<i>Explain</i> the concepts of economics in engineering and <i>identify</i> element of cost to prepare cost sheet	Cognitive Psychomotor		Understand Perception	
CO2	<i>Calculate and Explain</i> the Break-even point and marginal costing	Cognitive Psychomotor		Understand &Apply Perception	
CO3	<i>Summarize</i> and <i>Use</i> value engineering procedure for cost analysis	Cognitive Affective		Understand Receive	
CO4	<i>Estimate</i> replacement problem	Cognitive		Understand	
CO5	<i>Compute, Explain</i> and <i>make Use of</i> different methods of depreciation	Cognitive		Understand &Apply	
UNIT I: INTRODUCTION TO ECONOMICS					08
Flow in an economy, Law of supply and demand, Concept of Engineering Economics – Engineering efficiency, Economic efficiency, Scope of engineering economics- types of costing, element of costs, preparation of cost sheet and estimation, Marginal cost, Marginal Revenue, Sunk cost, Opportunity cost					
UNIT II: BREAK-EVEN ANALYSIS&SOCIAL COST BENEFIT ANALYSIS					12
Margin of Safety, Profit, Cost & Quantity analysis-Product Mix decisions and CVP analysis, Profit/Volume Ratio (P/V Ratio), Application of Marginal costing, Limitations Social Cost Benefit Analysis: compare different project alternatives, Calculate direct, indirect and external effects; Monetizing effects; Result of a social cost benefit analysis.					
UNIT III:DEPRECIATION					10
Depreciation- Introduction, Straight line method of depreciation, declining balance method of depreciation-Sum of the years digits method of depreciation, sinking fund method of depreciation/ Annuity method of depreciation, service output method of depreciation.					
UNIT IV: REPLACEMENT AND MAINTENANCE ANALYSIS					07
Replacement and Maintenance analysis – Types of maintenance, types of replacement problem, determination of economic life of an asset, Replacement of an asset with a new asset – capital recovery with return and concept of challenger and defender, Simple probabilistic model for items which fail completely.					
UNIT V:INFLATION AND PRICE CHANGE					08
Definition, Effects, Causes, Price Change with Indexes, Types of Index, Composite vs Commodity Indexes, Use of Price Indexes in Engineering Economic Analysis, Cash Flows that inflate atdifferent Rates.					
		LECTURE	TUTORIAL	TOTAL	
HOURS		45	0	45	

TEXT BOOKS

1. G. Rajendra et.al., “Engineering Economy 1st Edition”, New Age International, 2006
2. S.P.Jain & Narang, “Cost accounting – Principles and Practice”, Kalyani Publishers, Calcutta, 2012.

REFERENCES

1. James L. Riggs, David D. Bedworth, Sabah U. Randhawa : Economics for Engineers 4e , Tata McGraw-Hill
2. Donald Newnan, Ted Eschembach, Jerome Lavelle : Engineering Economics Analysis, OUP
3. John A. White, Kenneth E. Case, David B. Pratt : Principle of Engineering Economic Analysis, John Wiley
4. Sullivan and Wicks: Engineering Economy, Pearson

Table 1 : Mapping of CO's with POs

	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PO ₁₂
CO1	1	2	0	1	0	0	1	1	1	2	2	3
CO2	2	2	1	2	0	0	2	1	1	2	3	3
CO3	2	2	1	3	0	0	2	2	1	2	2	3
CO4	1	2	1	2	0	0	0	1	1	1	2	3
CO5	1	2	0	1	0	0	1	1	0	1	2	3
Scaled	1	2	1	2	0	0	1	1	1	2	2	3

0 – No relation

1- Low relation

2- Medium relation 3 – High relation

SUBCODE		XCSM02	L	T	P	C
SUB NAME		WEB DESIGN	0.5	0	0.5	1
PREREQUISITES		HTML and Designing Tools	L	T	P	H
C:P:A 0.5:0.5:0			1	0	1	2
COURSE OUTCOMES			Domain		Level	
CO1	<i>Understand</i> and perform the learning principles and techniques of client-side programming with HTML5.		Cognitive Psychomotor		Understanding Guided Response	
CO2	<i>Understand, demonstrate</i> and <i>use</i> the Joomla Tool.		Cognitive Psychomotor		Understanding Apply Guided Response	
UNIT I HTML5						6
HTML5 – Overview – Syntax – Attributes – Events – Web Forms 2.0 – SVG – Math ML - Web Store – Web SQL Database – Server Sent Events - Web Sockets – Canvas – Audio and Video – Geolocation – microdata – Drag and Drop – Web Workers – IndexDDB – Web Messaging – CORS – Web RTC.						
UNIT II JOOMLA BASICS						6
Introduction – Installation – Architecture – Control Panel – Toolbar – Menus – Content Menu – Components Menu – Extensions Menu – Help Menu.						
UNIT III JOOMLA MENUS						6
Create Menus – Adding Menu Items – Modifying Menu Items – Creating Submenus						
UNIT IV JOOMLA MODULES						6
Create Modules – Breadcrumb Module – Feed Display Module – Footer Module – Latest News module - Search Module – Random Image Module – Who’s Online Module – Syndicate module – Donation Module						
UNIT V JOOMLA ADVANCED						6
Template Manager – Customize Template – Adding Template – Creating Template – Customize Logo – Category Management – Adding Content – Formatting Content – Article Metadata – Adding Banners – Adding Contacts – Adding News Feed – Adding Forum – Adding Web links – Plugin Manager – Extension Manager – Website Backup – Website SEO.						
			LECTURE	TUTORIAL	PRACTICAL	TOTAL
			15	0	15	30
TEXT						
1. Eric Meyer on CSS: Mastering the Language of Web Design. 2003. Eric Meyer. New Riders Publishing. 2. A. Thomas Powell, “The complete reference – HTML and CEE (Covers HTML5)” McGraw Hill, Fifth Edition, 2010. 3. Kogent Learning Solutions Inc. “HTML5 Black Book: Covers CSS3, Javascript, XML, XHTML, Ajax, PHP and JQuery – Black Book”, Dreamtech Press, 2011. 4. Kogent Learning Solutions Inc “Web Technologies: HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black Book”, Dreamtech Press, 2009. 5. Jennifer Marriott, Elin Waring, “The Official Joomla! Book – 2 nd Edition”, Addison-Wesley Professional, 2012.						
REFERENCES						
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COURSE CODE			XUM801	L	T	P	C
COURSE NAME			CYBER SECURITY	3	0	0	3
C	P	A		L	T	P	H
3	0	0		3	0	0	3
COURSE OUTCOMES				DOMAIN	LEVEL		
CO1	To <i>identify, learn, practice, and understand</i> the basic concepts of networks and cyber-attacks.			Cognitive	Remember, Analyse, Apply.		
CO2	To <i>define</i> the concepts of system vulnerability scanning and the scanning tools			Cognitive	Remember		
CO3	To <i>demonstrate, describe, and differentiate</i> the network defense mechanisms and <i>identify and apply</i> the tools used to detect and quarantine network attacks.			Cognitive	Understand, Analyze, Apply.		
CO4	To <i>describe, differentiate, apply</i> the different tools for scanning.			Cognitive	Understand, Analyze, Apply.		
CO5	To <i>identify</i> and <i>list</i> the types of cybercrimes, cyber laws and cyber-crime investigations.			Cognitive	Remember		
UNIT I – INTRODUCTION							9
History of Information Systems and its Importance, Basics, Changing Nature of Information Systems, Need for Distributed Information Systems: Role of Internet and Web Services. Information System Treats and attacks, Classification of Threats and assessing Damages Security in mobile and Wireless Computing-Security Challenges in Mobile Devices, authentication service Security, Security Implication for Organizations, Laptops security Concepts in Internet and World Wide Web: Brief review of Internet Protocols TCP/IP, IPV4, and IPV6. Functions of various networking components-routers, bridges, switches, hub, gateway and Modulation Techniques.							
UNIT II - SYSTEMS VULNERABILITY SCANNING							9
Overview of vulnerability scanning, Open Port / Service Identification, Banner / Version Check, Traffic Probe, Vulnerability Probe, Vulnerability Examples, OpenVAS, Metasploit. Networks Vulnerability Scanning - Netcat, Socat, understanding Port and Services tools - Datapipe, Fpipe, WinRelay, Network Reconnaissance – Nmap, THC-Amap and System tools. Network Sniffers and Injection tools – Tcpdump and Windump, Wireshark, Ettercap, Hping Kismet.							
UNIT III - NETWORK DEFENCE TOOLS							9
Firewalls and Packet Filters: Firewall Basics, Packet Filter Vs Firewall, How a Firewall Protects a Network, Packet Characteristic to Filter, Stateless VsStateful Firewalls, Network Address Translation (NAT) and Port Forwarding, the basic of Virtual Private Networks, Linux Firewall, Windows Firewall, Snort: Introduction Detection System, Cryptool.							

UNIT IV – TOOLS FOR SCANNING				9
Scanning for web vulnerabilities tools: Metasploit tool, Nikto, W3af, HTTP utilities - Curl, OpenSSL and Stunnel, Application Inspection tools – Zed Attack Proxy, Sqlmap. DVWA, Webgoat, Password Cracking and Brute-Force Tools – John the Ripper, L0htcrack, Pwdump, THC-Hydra.				
UNIT V - INTRODUCTION TO CYBER CRIME AND LAW				9
Cyber Crimes, Types of Cybercrime, Hacking , Attack vectors, Cyberspace and Criminal Behavior, Clarification of Terms, Traditional Problems Associated with Computer Crime, Introduction to Incident Response, Digital Forensics, Computer Language, Network Language, Realms of the Cyber world, A Brief History of the Internet, Recognizing and Defining Computer Crime, Contemporary Crimes, Computers as Targets, Contaminants and Destruction of Data, Indian IT ACT 2000. Introduction to Cyber Crime Investigation: Password Cracking, Key loggers and Spyware, Virus and Worms, Trojan and backdoors, Steganography, DOS and DDOS attack, SQL injection, Buffer Overflow, Attack on wireless Networks.				
		LECTURE	TUTORIAL	TOTAL
		45	0	45
TEXT BOOKS				
1. Nina Godbole, “Information Systems Security: Security Management, Metrics, Frameworks and Best Practices, w/cd”, Wiley Publications, 2008, ISBN 10: 8126516925, ISBN 13 : 9788126516926 2. Thomas J. Mowbray, “Cybersecurity: Managing Systems, Conducting Testing and Investigating Intrusions”, Wiley Publications, 2013, Kindle Edition, ISBN 10: 812654919X, ISBN 13 : 9788126549191 3. D.S. Yadav, “Foundations of Information Technology”, New Age International publishers, 3 rd Edition, 2006, ISBN-10: 8122417620, ISBN-13: 978-8122417623.				
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1. Mike Shema, “Anti-Hacker Tool Kit”, McGraw Hill Education, 4 th edition, 2014, 2. Nina Godbole, SunitBelapure, “Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives”, Wiley publications, 2013, ISBN 10 : 8126521791, ISBN 13 : 9788126521791. 3. Corey Schou, Daniel Shoemaker, “Information Assurance for the Enterprise: A Roadmap to Information Security (McGraw-Hill Information Assurance & Security)”, Tata McGraw Hill, 2013, ISBN-10: 0072255242, ISBN-13: 978-0072255249. 4. VivekSood, “Cyber Laws Simplified”, McGraw Hill Education (INDIA) Private Limited in 2001, ISBN-10: 0070435065, ISBN-13: 978-0070435063. 5. Steven M.Furnell, “Computer Insecurity”, Springer Publisher, 2005 Edition.				

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Table 1: Mapping of COs with POs

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3	3	3	3	0	2	2	2	0	0	0	3	2
CO2	3	3	3	3	2	1	1	1	2	0	0	0	3	2
CO3	0	3	2	2	0	1	2	2	0	0	0	0	0	0
CO4	2	2	2	2	0	0	0	0	0	0	0	0	0	0
CO5	3	2	3	3	3	0	2	2	2	0	0	0	3	2
Total	11	13	13	13	8	2	7	7	6	0	0	0	9	6

	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
Original	11	13	13	13	8	2	7	7	6	0	0	0	9	6
Scaled to 0,1,2,3 scale	3	3	3	3	2	1	2	2	2	0	0	0	2	2