RADHA GOVIND UNIVERSITY
RAMGARH, JHARKHAND

Department of Computer Science & Engineering

Under Faculty of Engineering and Technology

Choice Based Credit System Curriculum for B.Tech
In Computer Science & Engineering

(Effective from Academic Session 2025-26)

1st SEMESTER
COURSE CONTENTS

1st semester course structure

Sl. No.	Category	Course Code	Course Title	Hours Per Week			Credit	Marks		
				L	T	P		IA	ESE	Total
Theory										
1	Basic Science Course	BSC101	Physics I	3	1	0	4	30	70	100
2	Basic Science Course	BSC103	Mathematics – I	3	1	0	4	30	70	100
3	Engineering Science Courses/ Basic Science Course	ESC101/ BSC102	Basic Electrical Engineering/ Chemistry I	3	1	0	4	30	70	100
Total(A)							**12**	**90**	**210**	**300**
Practical/Drawing/Design										
4	Engineering Science Courses	ESC102	Engineering Graphics & Design	1	0	4	3	25	25	50
5	Basic Science Course	BSC101P	Physics Lab	0	0	3	1.5	25	25	50
6	Engineering Science Courses/ Basic Science Course	ESC101P/ BSC102P	Basic Electrical Engineering Lab / Chemistry Lab	0	0	2	1	25	25	50
Total(B)							**5.5**	**75**	**75**	**150**
Grand Total(A+B)							**17.5**	**165**	**285**	**450**

L-Lecture, T-Tutorial, P-Practical
IA- Internal Assessment, ESE-End Semester Examination

29/3/25

2nd SEMESTER
COURSE CONTENTS

2nd semester course structure

Sl. No.	Category	Course Code	Course Title	Hours Per Week			Credit	Marks		
				L	T	P		IA	ESE	Total
Theory										
1	Basic Science Course	BSC105	Physics -II	3	1	0	4	30	70	100
2	Engineering Science Courses/ Basic Science Course	ESC101/ BSC102	Basic Electrical Engineering/ Chemistry I	3	1	0	4	30	70	100
3	Basic Science Course	BSC104	Mathematics – II	3	1	0	4	30	70	100
4	Engineering Science Courses	ESC103	Programming for Problem Solving	3	1	0	4	30	70	100
5	Humanities and Social Sciences including Management Courses	HSMC101	English	2	0	2	3	30	70	100
Total(A)							**19**	150	350	500
Practical/Drawing/Design										
6	Engineering Science Courses	ESC104	Workshop/ Manufacturing Practices	1	0	4	3	25	25	50
7	Engineering Science Courses/ Basic Science Course	ESC101P/ BSC102P	Basic Electrical Engg. Lab / Chemistry Lab	0	0	2	1	25	25	50
8	Engineering Science Courses	ESC103P	Programming for Problem Solving	0	0	2	1	25	25	50
Total(B)							**5**	**75**	**75**	**150**
Grand Total(A+B)							**24**	**225**	**425**	**650**

L-Lecture, T-Tutorial, P-Practical
IA- Internal Assessment, ESE-End Semester Examination

29/3/25

Scheme of Teaching and Examination for

Semester- III

Computer Science & Engineering

Course Contents

Sl. No.	Course Code	Subject	L	T	P	Credit
01	CS301	Data Structures And Algorithms	3	1	0	3
02	IT301	Object Oriented Programming	3	1	0	3
03	EC301	Basic Electronics	3	1	0	3
04	EC302	Digital Electronics And Logic Design	3	1	0	3
05	BSC301	Mathematics-III	3	1	0	4
06	BSC302	Environmental Science	2	0	0	0
01	CS301P	Data Structures And Algorithms Lab	0	0	3	1
02	IT301P	Object Oriented Programming Lab	0	0	3	1
03	EC302P	Digital Electronics & Logic Design Lab	0	0	3	1
04	EX301	Extra Activities (NSO/NSS/NCC/Yoga/ Creative Arts/Mini Project)	0	0	2	1
05	HS301	Communication Skill Lab	0	0	2	1
Total credit						**21**

Scheme of Teaching and Examination for

Semester- IV

Computer Science & Engineering

Course Contents

Sl. No.	Course code	Subject	L	T	P	Credit
01	CS401	Operating System	3	1	0	3
02	CS402	Design And Analysis Of Algorithms	3	1	0	3
03	CS403	Formal Language And Automata Theory	3	1	0	3
04	BSC401	Discrete Mathematics	3	1	0	3
05	IT401	Database Management Systems	3	1	0	3
06	EN401/ IT402	Engineering Economics / Cyber Security	2	0	0	0
01	CS401P	Operating System Lab	0	0	3	1
02	CS402P	Design And Analysis Of Algorithms Lab	0	0	3	1
03	CS403P	Formal Language And Automata Theory Lab	0	0	3	1
04	EX401	Extra Activities (NSO/NSS/NCC/Yoga/ Creative Arts/Mini Project)	0	0	2	1
05	IN401	Internship/ Tour & Training/Industrial Training	0	0	0	2
Total credit						**21**

Nishma Bhatt

23/3/25

Scheme of Teaching and Examination for

Semester- VI

Computer Science & Engineering

Course Contents

	Course Code	Category	Subject	L	T	P	Credit
1	ITO601	Professional Core-I	Internet Of Things (IOT)	3	1	0	4
2	CSC602	Professional Core-II	Data Science	2	1	0	3
3	CSC603	Professional Core-III	Image Processing	2	1	0	3
4	CSP608	Professional Electives-II	List of Professional Electives -II	2	1	0	3
5	CSO610	Open Elective-II	List of Open Elective-II	2	1	0	3

LABORATORY/SESSIONAL

Sl. No	Course Code	Category	Subject	L	T	P	Credit
1	CS601P	Laboratory-I	Computer Network Lab	0	0	2	1
2	CS602P	Laboratory –II	Data Science Lab	0	0	2	1
3	CS603P	Laboratory –III	Image Processing Lab	0	0	2	1
4	CS608P	Laboratory- IV	Professional Electives-II Lab	0	0	2	1
5		Laboratory-V	Internship/Tour& Training/Industrial Training	0	0	2	2

Scheme of Teaching and Examination for

Semester- V

Computer Science & Engineering

Course Contents

Sl.No	Course Code	Category	Subject	L	T	P	Credit
1	CSC501	Professional Core-I	Computer Organizationand Architecture	3	1	0	4
2	CSC502	Professional Core-II	Compiler Design	2	1	0	3
3	CSC503	Professional Core-III	Computer Graphics	2	1	0	3
4	ITP501	Professional Electives-I	List of Professional Electives -I	2	1	0	3
5	ITO502	Open Elective-1	List of Open Elective-1	2	1	0	3

LABORATORY/SESSIONAL

Sl. No	Course Code	Category	Subject	L	T	P	Credit
1	CS501P	Laboratory-I	Computer Organization Architecture lab	0	0	2	1
2	CS502P	Laboratory -II	Compiler Design Lab	0	0	2	1
Z	CS503P	Laboratory –III	Computer Graphics Lab	0	0	2	1
4	CS504P	Laboratory- IV	Professional Electives –I Lab	0	0	2	1
5	CS505G	Laboratory-V	Seminar	0	0	2	2
TOTAL Credits (Theory + Sessional) = 22							

Scheme of Teaching and Examination for

Semester- VII

Computer Science & Engineering

Course Contents

S.N.	Code	Course Title	Lecture	Tutorial	Practical	Credits
1	CSC701	Artificial Intelligence	3	0	0	3
2	PEC-III	**Professional Elective –III**	3	0	0	3
3	PEC-IV	**Professional Elective –IV**	3	0	0	3
4	OEC III	**Open Elective –III**	3	0	0	3
5	OEC IV	**Open Elective –IV**	3	0	0	3
6	CS701P	Artificial Intelligence Lab.	0	0	2	1
7	CS702D	Project-I	0	0	4	2
8	CS703I	Internship Assessment II	0	0	2	2
					Total credits	20

Vishwa Deepak

29/3/25

Scheme of Teaching and Examination for

Semester- VIII

Computer Science & Engineering

Course Contents

S.N.	Code	Course Title	L	T	P	Credits
1.	CS801D	Project-II			16	08
					Total Credit	08

RADHA GOVIND UNIVERSITY
RAMGARH, JHARKHAND

Department of Computer Science & Engineering
Under Faculty of Engineering and Technology

Choice Based Credit System Curriculum for
Bachelor of Technology

SEMESTER I

(Effective from Academic Session 2020-21)

Semester of Study	Category of course	Course Code	Subjects	Mode of delivery & credits L-Lecture; T-Tutorial; P-Practical			Total Credits C-Credits
First	Basic Science Course	BSC101	Physics I	3	1	0	4
	Basic Science Course	BSC103	Mathematics – I	3	1	0	4
	Engineering Science Courses/Basic Science Course	ESC101/ BSC102	Basic Electrical Engineering/ Chemistry I	3	1	0	4
	Total (A) = 12 Credits						
	LABORATORIES						
	Engineering Science Courses	ESC102	Engineering Graphics & Design	1	0	4	3
	Basic Science Course	BSC101P	Physics Lab	0	0	3	1.5
	Engineering Science Courses/Basic Science Course	ES C10 1P/ BS C10 2P	Basic Electrical Engineering Lab / Chemistry Lab	0	0	2	1
Total (B) = 5.5 Credits Grand Total (A) + (B) = 17.5 Credits							
Second	Basic Science Course(BSE)	BSC105	Physics II	3	1	0	4
	Engineering Science Courses/Basic ScienceCourse	ESC101/ BSC102	Basic Electrical Engineering/ Chemistry I	3	1	0	4
	Basic Science Course	BSC104	Mathematics – II	3	1	0	4
	Engineering Science Courses	ESC103	Programming for Problem Solving	3	1	0	4
	Humanities and Social Sciences includingManagement Courses	HSMC101	English	2	0	2	3
	LABORATORIES					Total (A) = 19 Credits	
	Engineering Science Courses	ESC104	Workshop/ Manufacturing Practices	1	0	4	3
	Engineering Science Courses/Basic ScienceCourse	ES C10 1P/ BS C10 2P	Basic Electrical Engg. Lab / Chemistry Lab	0	0	2	1
	Engineering Science Courses	ESC103P	Programming for Problem Solving	0	0	2	1
	Total (B) = 5 Credits Grand Total (A) + (B) = 24 Credits Grand Total for 1st Year = 41.5 Credits						

Course Code	**BSC 101**
Category	**Basic Science Course**
Course Title	**Physics-I**

(i) Introduction to Electromagnetic Theory – For ME
(ii) Introduction to Mechanics – For Civil, MEMS
(iii) Oscillation, Waves and Optics - For EEE
(iv) Semiconductor Physics – For ECE, CSE
(v) Basics of Electricity, Magnetism & Quantum Mechanics- For Chemical Engg.

Scheme & Credits	**L**	**T**	**P**	**Credit**	**Semester**	**I**
	3	**1**	**0**	**4**		

Pre-requisites Mathematics course with vector calculus, High-school education Mathematics course on differential equations and linear algebra

PHYSICS- I
INTRODUCTION TO ELECTROMAGNETIC THEORY **38hrs**

COURSE OBJECTIVES:

1. Understand the fundamental principles of electrostatics in vacuum, including the calculation of electric fields and potentials for various charge distributions, and solve Laplace's and Poisson's equations.
2. Apply the principles of electrostatics in linear dielectric media, including the effects of electric polarization, electric displacement, and solve problems involving dielectrics.
3. Analyze magnetostatics, including the application of the Bio-Savart law, calculation of static magnetic fields, and understanding the concept of vector potential.
4. Apply the principles of magnetostatics in linear magnetic media, including the effects of magnetization and bound currents, and solve problems involving magnetic materials.
5. Understand Faraday's law of electromagnetic induction, including the calculation of EMF produced by changing magnetic flux, and analyze applications of electromagnetic braking.
6. Analyze Maxwell's equations, including the derivation of the differential form of Faraday's law

Module 1: Electrostatics in vacuum **8 hrs**

Electric field and electrostatic potential for a charge distribution; Laplace's and Poisson's equations for electrostatic potential and uniqueness of their solution. Boundary conditions of electric field and electrostatic potential; method of images; energy of a charge distribution and its expression in terms of electric field.

Module 2: Electrostatics in a linear dielectric medium **4 hrs**

Electrostatic field and potential of a dipole. Bound charges due to electric polarization; Electric displacement; boundary conditions on displacement; Solving simple electrostatics problems in presence of dielectrics – Point charge at the centre of a dielectric sphere, charge in front of a dielectric slab, dielectric slab and dielectric sphere in uniform electric field.

Module 3: Magneto static **6 hrs**

Bio-Savart law, Static magnetic field; vector potential and calculating it for a given magnetic field; the equation for the vector potential and its solution for given current densities.

Module 4: Magneto statics in a linear magnetic medium **4 hrs**

Magnetization and associated bound currents; auxiliary magnetic field; Boundary conditions on **B** and **H**. Solving for magnetic field due to simple magnets like a bar magnet; magnetic susceptibility and ferromagnetic, paramagnetic and diamagnetic materials; Qualitative discussion of magnetic field in presence of magnetic materials.

Module 5: Faraday's law and Maxwell's equations **8 hrs**

Faraday's law in terms of EMF produced by changing magnetic flux; equivalence of Faraday's law and motional EMF; Lenz's law; Electromagnetic breaking and its applications; Differential form ofFaraday's law expressing curl of electric field in terms of time-derivative of magnetic field andcalculating electric field due to changing magnetic fields in quasi-static approximation; energy storedin a magnetic field.

Continuity equation for current densities; Modifying equation for the curl of magnetic field to satisfy continuity equation; displace current and magnetic field arising from time dependent electric field; calculating magnetic field due to changing electric fields in quasistatic approximation. Maxwell's equation in vacuum and non-conducting medium; Energy in an electromagnetic field; Flow of energy and Pointing.

Module 6: Electromagnetic waves **8 hrs**

The wave equation; Plane electromagnetic waves in vacuum, their transverse nature and polarization; Relation between electric and magnetic fields of an electromagnetic wave; energy carried by waves. Momentum carried by electromagnetic waves and resultant pressure. Reflection and transmission of electromagnetic waves from a non-conducting medium- vacuum interface for normal incidence.

COURSE OUTCOMES:

CO1 understand the basics of electrostatics in vacuum.
CO2 understand the basics of electrostatics in material medium. CO3 Analyze the basics of magneto statics in vacuum.
CO4 Apply the basics of magneto in magnetic material medium.
CO5 Students to get familiarized with the Faraday's Law and Maxwell's equation leading to the application of EMW in vacuum and in media.
CO6 Design and development of engineering system

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

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

Text Book:

- Introduction to Electrodynamics, D.J. Griffiths, 3rd Edition, 1998, Benjamin Cummings.

Reference books:

- Fundamentals of Physics Electricity and Magnetism, Halliday and Resnick, tenth edition(published 2013).
- W. Saslow, Electricity, magnetism and light, 1st edition
- Electricity, Magnetism & Electromagnetic Theory, S. Mahajan and Choudhury, 2012, TataMcGraw
- Elements of Electromagnetics, M.N.O. Sadiku, 2010, Oxford University Press.

Course Code	**BSC 103**				
Category	**Basic Science Course**				
Course Title	**Mathematics - I** Calculus and Linear Algebra **(Option 1) for All Branch excluding CSE** Calculus and Linear Algebra **(Option 2) for CSE**				
Scheme & Credits	**L**	**T**	**P**	**Credit**	**Semester I**
	3	**1**	**0**	**4**	
Pre-requisites	**Pre-requisites:** High-school education				

MATHEMATICS-I

CALCULUS AND LINEAR ALGEBRA 40hrs

Option 1 (For all branches) excluding CSE

COURSE OBJECTIVES:

1. Understand and apply the concepts of evolutes and involutes, and evaluate definite and improper integrals, including the use of Beta and Gamma functions and their properties.
2. Apply calculus techniques such as Rolle’s Theorem, Mean value theorems, Taylor’s and Maclaurin theorems with remainders, and L'Hospital's rule to solve problems related to indeterminate forms and Maxima and minima.
3. Analyze sequences and series, including convergence tests, power series, Taylor's series, and Fourier series, and apply them to solve problems involving exponential, trigonometric, and logarithm functions, as well as evaluate surface areas and volumes of revolutions.
4. Understand and apply concepts of multivariable calculus, including limit continuity and partial derivatives, directional derivatives, total derivative, tangent planes and normal lines, and solve optimization problems using the method of Lagrange multipliers.
5. Analyze matrices, including the calculation of inverse and rank of a matrix, solving systems of linear equations, properties of symmetric, skew symmetric, and orthogonal matrices, determinants, eigenvalues and eigenvectors, diagonalization of matrices, and apply them to solve problems involving orthogonal transformations and the Cayley-Hamilton Theorem.

Module 1: Calculus- **I6 hrs**

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.

Module 2: Calculus-II **6 hrs**

Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; indeterminate forms and L-Hospital's rule; Maxima and minima.

Module 3: Sequences and series **10 hrs**

Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

Module 4: Multivariable Calculus (Differentiation) **8 hrs**

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

Module 5: Matrices **10 hrs**

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

COURSE OUTCOMES:

CO1 : To Understsnd the idea of applying differential and integral calculus to notions of curvature and improper integrals.
CO2 : To apply the fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
CO3 : To develop the tool of power series and Fourier series for learning advanced EngineeringMathematics.
CO4 : the student will able to analyze with functions of several variables that is essential in most branches ofEngineering.
CO5 : To develop the essential tool of matrices and linear algebra in a comprehensive manner.
CO6 : To solve various engineering problems

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	2	3	2	-	-	-	-	-	-	2	-	
CO2	2	3	2	2	1	2	1	-	-	-	-	-	2	-	-
CO3	2	-	-	2	3	1	-	1	-	1	-	-	2	-	-
CO4	1	3	2	2	1	2	1	1	-	1	1	-	2	-	-
CO5	1	-	2	-	1	1	-	-	-	-	-	-	2	-	-
CO6	3	3	2	-	2	2	-	-	-	-	-	-	2	-	-

Text books/References:

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

Course Code	**ESC 101**				
Category	**Engineering Science Course**				
Course Title	**Basic Electrical Engineering**				
Scheme & Credits	**L**	**T**	**P**	**Credit**	**Semester I**
	3	**1**	**0**	**4**	
Pre-requisites	**Intermediate level Electricity**				

BASIC ELECTRICAL ENGINEERING 40hrs

COURSE OBJECTIVES:

1. Understand electrical circuit elements (R, L, and C), voltage and current sources.
2. Calculate real power, reactive power, apparent power, and power factor in AC circuits.
3. Understand auto-transformer and three-phase transformer connections.
4. Analyze loss components and efficiency, starting, and speed control of induction motor.
5. Describe single-phase and three-phase voltage source inverters, and sinusoidal modulation.
6. Describe types of batteries, and important characteristics for batteries.

Module 1: DC Circuits **7 hrs**

Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time- domain analysis of first-order RL and RC circuits.

Module 2: AC Circuits **7 hrs**

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

Module 3: Transformers **6 hrs**

Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

Module 4: Electrical Machines **8 hrs**

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

Module 5: Power Converters **6 hrs**

DC-DC buck and boost converters, duty ratio control. Single-phase and three-phase voltage source inverters; sinusoidal modulation.

Module 6: Electrical Installations **6 hrs**

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Course Outcomes:

CO1: To understand and analyze basic electric and magnetic circuits.
CO2: To Understand the working principles of electrical machines and power converters.
CO3: To Analyse the components of low voltage electrical installations.
CO4: Apply electric machine for industrial applications
CO5: Design power converters
CO6: Design and implementation of electrical installations

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	PO 1	PO2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	1	2	-	-	-	-	-	-	1	3	2	
CO2	2	1	1	2	-	-	1	2	-	-	-	1	2	2	1
CO3	1	2	1	1	2	1	-	-	-	1	-	1	1	1	1
CO4	3	3	-	-	-	-	2	-	-	-	-	1	3	3	3
CO5	2	2	-	1	2	1	-	-	3	1	-	1	-	-	-
CO6	3	3	-	-	2	-	-	-	-	-	-	-	-	-	-

Text / Reference Books:

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

Course Code	**ESC 102**				
Category	**Engineering Science Course**				
Course Title	**Engineering Graphics & Design(Theory & Lab)**				
Scheme & Credits	**L**	**T**	**P**	**Credit**	**Semester I**
	1	**0**	**4**	**3**	
Pre-requisites	**Basic knowledge of Computer and Solid Geometry**				

ENGINEERING GRAPHICS & DESIGN Lecture – 10hrs & Lab – 60hrs

COURSE OBJECTIVES:

1. Understand the principles of Engineering graphics and their significance.
2. Explain the principles of orthographic projections and conventions.
3. Create floor plans that include windows, doors, and fixtures such as WC, bath, sink, shower, etc.
4. Project right angular solids, including prism, cylinder, pyramid, cone, and their auxiliary views.
5. Convert isometric views to orthographic views and vice versa, following conventions.
6. Create isometric views of lines, planes, simple, and compound solids using CAD software.

Traditional Engineering and Computer Graphics **10 hrs**

Principles of Engineering Graphics; Orthographic Projection; Descriptive Geometry; Drawing Principles; Isometric Projection; Surface Development; Perspective; Reading a Drawing; Sectional Views; Dimensioning & Tolerances; True Length, Angle; intersection, Shortest Distance. Engineering Graphics Software; -Spatial Transformations; Orthographic Projections; Model Viewing; Co-ordinate Systems; Multi-view Projection; Exploded Assembly; Model Viewing; Animation; Spatial Manipulation; Surface Modeling; Solid Modeling; Introduction to Building Information Modeling (BIM)

(Lab modules also include concurrent teaching)

Lab Module 1: Introduction to Engineering Drawing **5 hrs**

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales;

Lab Module 2: Orthographic Projections **5 hrs**

Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes;

Lab Module 3: Projections of Regular Solids **5 hrs**

Those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

Lab Module 4: and Sectional Views of Right Angular Solids **5 hrs**

Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids

-Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)

Lab Module 5: Isometric Projections **6 hrs**

Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions.

Lab Module 6: Overview of Computer Graphics **8 hrs**

Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids];

Lab Module 7: Customization & CAD Drawing 8 hrs

Consisting of set up of the drawing page and the printer, including scale settings, setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing; Orthographicconstraints, Snap to objects manually and automatically; Producing drawings by using variouscoordinate input entry methods to draw straight lines, Applying various ways of drawing circles;

Lab Module 8: Annotations, layering & other functions 9 hrs

Applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layersto create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and projectthe true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies. Parametric and non- parametric solid, surface, and wireframe models.Part editing and two-dimensional documentation of models. Planar projection theory, including sketching of perspective, isometric, multi view, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerancing techniques; dimensioning and scale multi views of dwelling;

Lab Module 9: Demonstration of a simple team design project 9 hrs

Geometry and topology of engineered components: creation of Engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; meshed topologies for Engineering analysis and tool-path generation for component manufacture; geometric dimensioning and tolerancing; Use of solid-modeling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM).

COURSE OUTCOMES:

All phases of manufacturing or construction require the conversion of new ideas and design concepts into the basic line language of graphics. Therefore, there are many areas (civil, mechanical, Electrical, architectural and industrial) in which the skills of the CAD technicians play major roles in the design and development of new products or construction. Students prepare for actual work situations through practical training in a new state-of-the-art computer designed CAD laboratory using Engineering software. This course is designed to address:

CO1 Able to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health andsafety, manufacturability, and sustainability

CO2 Able to prepare to communicate effectively to use the techniques, skills, and modern Engineering tools necessary forEngineering practice.

CO3 Able to analyze Engineering design and its place in society Exposure to the visual aspects of Engineering design

CO4 analyze Engineering graphics standards and solid modelling

CO5 apply computer-aided geometric design for engineering problems

CO6 design and development of creating working drawings and Engineering communication

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

Suggested Text/Reference Books:

- Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engg Drawing, Charotar Pub House

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	1	-	-	-	-	-	-	-	2	-	-
CO2	3	3	2	1	-	2	-	-	1	-	-	2	2	2	-
CO3	2	1	-	1	2	-	2	-	2	1	2	-	2	2	-
CO4	2	1	-	-	1	2	-	-	-	-	-	-	2	-	-
CO5	2	-	-	1	3	-	-	-	-	2	1	1	2	-	-
CO6	3	3	2	-	1	-	-	-	-	1	-	-	2	2	-

- Shah, M.B. & Rana B.C. (2008), Engg Drawing & Comp. Graphics, Pearson Education
- Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
- Narayana, K.L. & P Kannaiah (2008), Text book on Engg Drawing, Scitech Publishers
- Corresponding set of CAD Software Theory and User Manuals

PHYSICS LABORATORY

Code: BSC101P

Choice of 08-10 experiments from the following:

- Experiments on electromagnetic induction and electromagnetic breaking;
- LC circuit and LCR circuit
- Resonance phenomena in LCR circuits
- Magnetic field from Helmholtz coil
- Measurement of Lorentz force in a vacuum tube
- Coupled oscillators
- Experiments on an air-track
- Experiment on moment of inertia measurement
- Experiments with gyroscope
- Resonance phenomena in mechanical oscillators
- Frank-Hertz experiment
- Photoelectric effect experiment
- Recording hydrogen atom Spectrum
- Diffraction and interference experiments (from ordinary light or laser pointers)
- Measurement of speed of light on a table top using modulation
- Minimum deviation from a prism

LABROTARY OUTCOMES:

Students to have hands on experiences with experiments on the basic's laws and principles of Physics in the field of Mechanics, Optics, Electricity, Magnetism, Modern Physics, etc.

BASIC ELECTRICAL ENGINEERING LABORATORY Code: SC101P

List of experiments/demonstrations:

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

LABORATORY OUTCOMES:

- Get an exposure to common electrical components and their ratings.
- Make electrical connections by wires of appropriate ratings.
- Understand the usage of common electrical measuring instruments.
- Understand the basic characteristics of transformers and electrical machines.

RADHA GOVIND UNIVERSITY
RAMGARH, JHARKHAND

Department of Computer Science & Engineering
Under Faculty of Engineering and Technology

Choice Based Credit System Curriculum for
Bachelor of Technology

SEMESTER II

(Effective from Academic Session 2020-21)

Course Code	**BSC 105**
Category	**Basic Science Course**
Course Title	**Course contents in Physics** (i) Introduction to Quantum Mechanics for Engineers – For EEE, CSE (ii) Semiconductor Optoelectronics – For ECE (iii) Mechanics of Solid – For Civil, ME, MEMS (iv) Optics & Fiber Optics – For Chemical Engineering
Scheme & Credits	**L T P Credit Semester II** **2 1 0 3**
Pre-requisites	Mathematics course on differential equations and linear algebra Introduction to Electromagnetic Theory Semiconductor Physics

Physics-II

MECHANICS OF SOLIDS 40hrs

COURSE OBJECTIVES:

1. Understand and apply free body diagrams for typical supports and joints.
2. Understand stress transformation and principal stresses using Mohr's circle.
3. Describe one-dimensional material behavior, including concepts of elasticity, plasticity, strain hardening, and failure
4. Calculate bending stress, shear stress, and analyze cases of combined stresses.
5. Analyze deflection due to bending and integrate the moment-curvature relationship for simple boundary conditions.

Module 1: Statics 10 hrs

Free body diagrams on modelling of typical supports and joints; Condition for equilibrium in three- and two- dimensions; Friction: limiting and non-limiting cases; Force displacement relationship; Geometric compatibility for small deformations.

Module 2: Stress and Strain at a point 6 hrs

Concept of stress at a point; Planet stress: transformation of stresses at a point, principal stressesand Mohr’s circle; Displacement field; Concept of strain at a point; Planet strain: transformation of strain at a point, principal strains and Mohr’s circle

Module 3: Material behavior **7 hrs**

One-dimensional material behaviour; Concepts of elasticity, plasticity, strain hardening, failure (fracture / yielding); Idealization of one- dimensional stress-strain curve; Generalized Hooke's law withand without thermal strains for isotropic materials.

Module 4: Force analysis **8 hrs**

Force analysis — axial force, shear force, bending moment and twisting moment diagrams of slender members (without using singularity functions); Moment curvature relationship for pure bending of beams with symmetric cross-section; Bending stress; Shear stress; Cases of combined stresses.

Module 5: Strain energy **9 hrs**

Concept of strain energy; Yield criteria; Deflection due to bending; Integration of the moment-curvature relationship for simple boundary conditions; Method of superposition (without using singularity functions); Strain energy and complementary strain energy for simple structural elements (i.e, those under axial load, shear force, bending moment and torsion).

COURSE OUTCOME:

CO1: To familiarize students of civil and mechanical Engineering with the understanding of the elasticand plastic behavior of solids.
CO2: To understand the importance of stress and strain at a point on solid.
CO3: To be able to do force analysis and understand strain energy of solid.
CO4: Apply force analysis for engineering applications
CO5: Design sustainable engineering system
CO6: Implementation of engineering physics into complex system design for industrial applications

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	-	-	-	2	1	3	-	-	2		2		
CO2	2	2	2	3	2	2	-	3	-	2	-	-	-	-	-
CO3	2	2	-	3	2	3	2	3	2	3	2	-	-	-	-
CO4	3	3	3	3	2	3	-	-	3	3	2	-	-	-	-
CO5	2	2	-	-	2	3	2	2	2	2	2	-	-	-	-
CO6	3	3	2	-	-	3	2	-	2	-	-	-	-	-	-

Reference books

- An Introduction to the Mechanics of Solids, 2nd ed. with SI Units – SH Crandall, NC Dahl & TJ Lardner
- Engineering Mechanics: Statics, 7th ed. — JL Meriam
- Engineering Mechanics of Solids — EP Popov

Course Code	**BSC 102**				
Category	**Basic Science Course**				
Course Title	**Chemistry-I**				
	Contents				
	(i) Chemistry-I (Concepts in chemistry for Engineering)				
	(ii) Chemistry Laboratory				
Scheme & Credits	**L**	**T**	**P**	**Credit**	**Semester I**
	3	**1**	**0**	**4**	
Pre-requisites	**Knowledge of intermediate level chemistry**				

COURSE OBJECTIVES:

1. Describe the forms of hydrogen atom wave functions and their spatial variations.
2. Analyze electronic spectroscopy, fluorescence, and their applications in medicine.
3. Explain equations of state of real gases and critical phenomena.
4. Estimate entropy and free energies, and their applications in chemical equilibria.
5. Describe effective nuclear charge, penetration of orbitals, and variations of s, p, d, and f orbital energies in the periodic table.
6. Introduce reactions involving substitution, addition, elimination, oxidation, reduction, cyclization, and ring openings.

CHEMISTRY-I

CONCEPTS IN CHEMISTRY FOR ENGINEERING 42hrs

Module 1: Atomic and molecular structure 12 hrs

Schrodinger equation. Particle in a box solution and their applications for conjugated molecules and nanoparticles. Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations. Molecular orbitals of diatomic molecules and plots of the multi centre orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of di-atomics. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

Module 2: Spectroscopic techniques and applications 8 hrs

Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterization techniques. Diffraction and scattering.

Module 3: Intermolecular forces and potential energy surfaces 4 hrs

Ionic, dipolar and van Der Waals interactions. Equations of state of real gases and critical phenomena. Potential energy surfaces of H3, H2F and HCN and trajectories on these surfaces.

Module 4: Use of free energy in chemical equilibria 6 hrs

Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Water chemistry. Corrosion. Use of free energy considerations in metallurgy through Ellingham diagram

Module 5: Periodic properties and Stereochemistry 8 hrs

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

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

Module 6: Organic reactions and synthesis of a drug molecule 4 hrs

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule.

COURSE OUTCOMES:

CO1: Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecularforces.
CO2: Rationalise bulk properties and processes using thermodynamic considerations.
CO3: Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
CO4: Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
CO5: List major chemical reactions that are used in the synthesis of molecules.
CO6: Apply chemical reactions in industry applications

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	2	2	2	2	1	2	-	-	-	-	-	-
CO2	3	3	2	2	2	2	2	2	2	-	-	-	2	-	-
CO3	2	2	1	2	2	2	3	2	-	-	-	2	-	-	2
CO4	2	1	1	3	3	1	3	-	1	-	-	-	-	-	-
CO5	3	2	3	1	3	3	1	-	2	-	-	-	2	-	-
CO6	3	3	-	-	3	-	1	-	-	-	-	2	-	-	-

Textbooks:

- University chemistry, by B. H. Mahan
- Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
- Fundamentals of Molecular Spectroscopy, by C. N. Banwell
- Engg Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
- Physical Chemistry, by P. W. Atkins
- Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5thEdition http://bcs.whfreeman.com/vollhardtschore5e/default.asp

Course Code	**BSC 104**
Category	**Basic Science Course**
Course Title	**Mathematics – II** **Contents** **Calculus, Ordinary Differential Equations and Complex Variable (Option 1) for All branches excluding CSE** **Probability and Statistics (Option I1) for CSE**

Scheme & Credits	**L**	**T**	**P**	**Credit**	**Semester**
	3	**1**	**0**	**0**	**II**

Pre-requisites **Elementary Knowledge of calculus, Probability and Statistics**

COURSE OBJECTIVES:

1. Understand multiple integration, including double integrals in Cartesian coordinates, change of order of integration, and change of variables to polar coordinates.
2. Solve exact, linear, and Bernoulli's equations, as well as Euler's equations.
3. Solve Cauchy-Euler equations.
4. Understand elementary analytic functions such as exponential, trigonometric, and logarithmic functions and their properties.
5. Understand Taylor's series, zeros of analytic functions, singularities, and Laurent's series.

MATHEMATICS – II

CALCULUS, ORDINARY DIFFERENTIAL EQUATIONS AND COMPLEX VARIABLE 40hrs

Module 1: **Multivariable Calculus (Integration): 10 hrs**

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

Module 2: First order ordinary differential equations: 6 hrs

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.

Module 3: Ordinary differential equations of higher orders: 8 hrs

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.

Module 4: Complex Variable – Differentiation 8 hrs

Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonicconjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties;Conformal mappings, Mobius transformations and their properties.

Module 5: Complex Variable - Integration: 8 hrs

Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof),Liouville's theorem and Maximum-Modulus theorem (without proof); Taylor's series, zeros of analyticfunctions, 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.

COURSE OUTCOME:

CO1: To familiarize the prospective engineers with techniques in multivariate integration, ordinary and partial differential equations and complex variables.

CO2: To equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.
CO3: Analyze high order ordinary differential equation
CO4: Apply complex variables for differentiation
CO5: Apply Integration of complex variables for different problems.
C06: Design and implementation of mathematical analysis for problem solving in engineering application

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	-	2	-	-	-	-	-	-	-	-
CO2	2	2	3	1	2	1	3	2	-	-	-	-	1	-	-
CO3	1	3	1	2	3	2	2	1	-	-	-	-	-	-	2
CO4	1	3	2	2	3	2	-	2	1		-	-		2	
CO5	3	2	2	2	1	3	-	2	-	1	-	-	1	-	-
CO6	3	1	1	3	1	-	-	-	-		-	-		-	-

Textbooks/References:

- G.B. Thomas & R.L. Finney, Calculus & Analytic geometry, Pearson, Reprint, 2002.
- Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.
- W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary ValueProblems, 9th Edition., Wiley India, 2009.
- S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
- E. A. Coddington, An Introduction to Ordinary Differential Equations, PHI, 1995.
- E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
- J. W. Brown & R. V. Churchill, Complex Variables & Appln, Mc-Graw Hill, 2004.
- N.P. Bali and Manish Goyal, Engineering Mathematics, Laxmi Pub, Reprint, 2008.
- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

Course Code	**ESC 103**				
Category	**Engineering Science Course**				
Course Title	**Programming for Problem Solving**				
Scheme & Credits	**L**	**T**	**P**	**Credit**	**Semester II**
	3	**0**	**0**	**3**	
Pre-requisites	Basic Knowledge of Computer and Mathematics				

COURSE OBJECTIVES:

1. Define an algorithm and its representation using flowcharts or pseudo code.
2. Understand conditional branching and loops.
3. Define and utilize arrays, including 1-D and 2-D arrays.
4. Implement basic sorting algorithms such as Bubble, Insertion, and Selection sort.
5. Understand parameter passing in functions, including call by value.
6. Define structures and arrays of structures

PROGRAMMING FOR PROBLEM SOLVING 40hrs

Module 1: Introduction to Programming 6 hrs

Introduction to components of a computer system (disks, memory, processor, where a program is storedand executed, operating system, compilers etc.). Idea of Algorithm: steps to solve logical and numericalproblems. Representation of Algorithm: Flowchart/Pseudo code with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and LogicalErrors in compilation, object and executable code.

Module2: Arithmetic expressions and precedencies 12 hrs

Conditional Branching and Loops Writing and evaluation of conditionals and consequent branching**,** Iteration and loops.

Module 3: Arrays3

Arrays (1-D, 2-D), Character arrays and Strings

Module 4: Basic Algorithms, Searching, Basic Sorting Algorithms 4 hrs

(Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

Module 5: Function and Pointers 6 hrs

Functions (including using built in libraries), Parameter passing in functions, call by value,Passing arrays to functions: idea of call by reference Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation).

Module 6: Recursion and Structure 9 hrs

Recursion, as a different way of solving problems. Example programs, such as Finding, Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort Structures, Defining structures and Array of Structures

COURSE OUTCOMES:

CO1: Able to formulate simple algorithms for arithmetic and logical problems

CO2: able to translate the algorithms to programs (in C language).

CO3: able to apply test and execute the programs and correct syntax and logical errors.

CO4: able to implement conditional branching, iteration and recursion.

CO5: To use arrays, pointers and structures to formulate algorithms and programs.

CO6: To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	-	2	-	-	-	-	-	-	-	-
CO2	2	2	3	1	2	1	3	2	-	-	-	-	1	-	-
CO3	1	3	1	2	3	2	2	1	-	-	-	-	-	-	2
CO4	1	3	2	2	3	2	-	2	1		-	-		2	
CO5	3	2	2	2	1	3	-	2	-	1	-	-	1	-	-
CO6	3	3	3	3	1	-	-	-	-		-	-	2	2	2

Suggested Text Books:

- Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
- E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

Suggested Reference Books:

- Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, PrenticeHall of India.

Course Code	**HSMC 101**				
Category	**Humanities and Social Sciences including Management Courses**				
Course Title	**English**				
Scheme & Credits	**L**	**T**	**P**	**Credit**	**Semester II**
	2	**0**	**2**	**3**	
Pre-requisites	**Basic Knowledge of English grammar and composition**				

COURSE OBJECTIVES:

1. Learn synonyms, antonyms, and standard abbreviations.
2. Understand sentence structures and the use of phrases and clauses.
3. Identify and correct errors in subject-verb agreement, noun-pronoun agreement, misplaced modifiers, articles, prepositions, redundancies, and clichés.
4. Learn techniques for describing, defining, classifying, providing examples or evidence in writing.
5. Learn the art of précis writing and essay writing.
6. Improve pronunciation, intonation, stress, and rhythm in oral communication.

ENGLISH **38hrs**

Module 1: Vocabulary Building **6 hrs**

The concept of Word Formation, Root words from foreign languages and their use in English, Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives, Synonyms, antonyms and standard abbreviations.

Module 2: Basic Writing Skills **6 hrs**

Sentence Structures, Use of phrases and clauses in sentences, Importance of proper punctuation, creating coherence, organizing principles of paragraphs in documents, Techniques for writing precisely.

Module 3: Identifying Common Errors in Writing **7 hrs**

Subject-verb agreement, Noun-pronoun agreement, Misplaced modifiers, Articles, Prepositions, Redundancies, Clichés.

Module 4: Nature and Style of sensible Writing **6 hrs**

Describing, Defining, Classifying, providing examples or evidence, Writing introduction andconclusion.

Module 5: Writing Practices **6 hrs**

Comprehension, Précis Writing, Essay Writing,

Module 6: Oral Communication **7 hrs**

(This unit involves interactive practice sessions in Language Lab)

Listening Comprehension, Pronunciation, Intonation, Stress and Rhythm, Common Everyday, Situations: Conversations and Dialogues, Communication at Workplace, Interviews, Formal Presentations.

COURSE OUTCOMES:

CO1:The student will acquire basic proficiency in English
CO2: Apply proficiency in English for enhancing basic writing skills
CO3: Apply proficiency in English for identify common errors in writing. CO4: analyze different nature and style of writing.
CO5: development of writing skill in individuals
CO6: enhance communication lead to draft engineering project proposals.

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	3	2	-	2	-	-	-	-	-	-	-	-
CO2	2	2	3	1	2	1	3	2	-	-	-	-	1	-	-
CO3	1	3	1	2	3	2	2	1	-	-	-	-	-	-	2
CO4	1	3	2	2	3	2	-	2	1		-	-		2	
CO5	3	2	2	2	1	3	-	2	-	1	-	-	1	-	-
CO6	3	3	3	3	1	-	-	-	-		-	-	2	2	2

Suggested Textbooks:

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

Course Code	**ESC 104**				
Category	**Engineering Science Course**				
Course Title	**Workshop/Manufacturing Practices (Theory & Lab)**				
Scheme & Credits	**L**	**T**	**P**	**Credit**	**Semester II**
	1	**0**	**4**	**3**	
Pre-requisites	Basic Knowledge of Physics, Chemistry and Mathematics				

WORKSHOP/MANUFACTURING PRACTICES **10 hrs**

1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturingmethods **3hrs**
2. CNC machining, Additive manufacturing **1hr**
3. Fitting operations & power tools **1hr**
4. Electrical & Electronics **1hr**
5. Carpentry **1hr**
6. Plastic Moulding, glass cutting **1hr**
7. Metal casting **1hr**
8. Welding (arc welding & gas welding), brazing **1hr**

Suggested Text/Reference Books:

- Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
- Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition,Pearson Education India Edition, 2002.
- Gowri P. Hariharan & A. Suresh Babu, "Mfg. Tech- I" Pearson Education, 2008.
- Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, PHl, 1998.
- Rao P.N., "Manufacturing Technology", Vol. I & Vol. II, Tata McGrawHill House, 2017.

COURSE OUTCOMES:

Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using different materials.

WORKSHOP PRACTICE **60hrs**

1. Machine shop	**10hrs**
2. Fitting shop	**8hrs**
3. Carpentry	**6hrs**
4. Electrical & Electronics	**8hrs**
5. Welding shop	**8hrs (Arc welding 4 hrs + gas welding 4 hrs)**
6. Casting	**8hrs**
7. Smithy	**6hrs**
8. Plastic Moulding & Glass Cutting	**6hrs**

LABORATORY OUTCOMES:

- Upon completion of this laboratory course, students will be able to fabricate componentswith their own hands.
- They will also get practical knowledge of the dimensional accuracies and dimensionaltolerances possible with different manufacturing processes.
- By assembling different components, they will be able to produce small devices of theirinterest.

CHEMISTRY LABORATORY Code: BSC 102P

Choice of 08-10 experiments from the following:

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

LABORATORY OUTCOMES:

- The chemistry laboratory course will consist of experiments illustrating the principles ofchemistry relevant to the study of science and Engineering. The students will learn to:
- Estimate rate constants of reactions from concentration of reactants/products as afunction of time
- Measure molecular/system properties such as surface tension, viscosity, conductance ofsolutions, redox potentials, chloride content of water, etc
- Synthesize a small drug molecule and analyse a salt sample

LABORATORY - PROGRAMMING FOR PROBLEM SOLVING Code: ESC103P

Tutorial 1: Problem solving using computers:

Lab1: Familiarization with programming environment

Tutorial 2: Variable types and type conversions:

Lab 2: Simple computational problems using arithmetic expressions

Tutorial 3: Branching and logical expressions:

Lab 3: Problems involving if-then-else structures

Tutorial 4: Loops, while and for loops:

Lab 4: Iterative problems e.g., sum of series

Tutorial 5: 1D Arrays: searching, sorting:

Lab 5: 1D Array manipulation

Tutorial 6: 2D arrays and Strings

Lab 6: Matrix problems, String operations

Tutorial 7: Functions, call by value:

Lab 7: Simple functions

Tutorial 8 & 9: Numerical methods (Root finding, numerical differentiation, numerical integration):

Lab 8 and 9: Programming for solving Numerical methods problems

Tutorial 10: Recursion, structure of recursive calls

Lab 10: Recursive functions

Tutorial 11: Pointers, structures and dynamic memory allocation

Lab 11: Pointers and structures

Tutorial 12: File handling:

Lab 12: File operations

LABORATORY OUTCOMES:

- To formulate the algorithms for simple problems.
- To translate given algorithms to a working and correct program.
- To be able to correct syntax errors as reported by the compilers.
- To be able to identify and correct logical errors encountered at run time.
- To be able to write iterative as well as recursive programs.
- To be able to represent data in arrays, strings and structures and manipulate them through aprogram.
- To be able to declare pointers of different types and use them in defining self- referentialstructures.
- To be able to create, read and write to and from simple text files.

RADHA GOVIND UNIVERSITY
RAMGARH, JHARKHAND

Department of Computer Science & Engineering
Under Faculty of Engineering and Technology

Choice Based Credit System Curriculum for
Bachelor of Technology

SEMESTER III

(Effective from Academic Session 2020-21)

Computer Science & Engineering

3rd semester course structure

Sl. No.	Course Code	Subject	L	T	P	Credit
01	CS301	Data Structures And Algorithms	3	1	0	3
02	IT301	Object Oriented Programming	3	1	0	3
03	EC301	Basic Electronics	3	1	0	3
04	EC302	Digital Electronics And Logic Design	3	1	0	3
05	BSC301	Mathematics-III	3	1	0	4
06	BSC302	Environmental Science	2	0	0	0
01	CS301P	Data Structures And Algorithms Lab	0	0	3	1
02	IT301P	Object Oriented Programming Lab	0	0	3	1
03	EC302P	Digital Electronics & Logic Design Lab	0	0	3	1
04	EX301	Extra Activities (NSO/NSS/NCC/Yoga/ Creative Arts/Mini Project)	0	0	2	1
05	HS301	Communication Skill Lab	0	0	2	1
Total credit						**21**

Computer Science & Engineering and Information Technology					
Code: BSC301	**MATHEMATICS III**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**3**

COURSE OBJECTIVES:

1. To develop abstract, logical and critical thinking and the ability to reflect critically upon their work.
2. To study various mathematical tools like differential equations, integral transforms, vector calculus, probability and partial differential equations to devise engineering solutions for given situations.

Module –I **8hrs**

Laplace Transformation:

Laplace Transformation and its properties, Periodic function, Unit step function and impulse function .Inverse Laplace Transformation, Convolution Theorem, Applications of Laplace transforms in solving certain initial value problems & simultaneous differential equations**.**

Module- II **10hrs**

Numerical Method:

Finite difference, Symbolic relations, Interpolation and Extrapolation, Newton - Gregory forward and backward formula, Lagrange's formula, Inverse Interpolation by Lagrange's formula. Numerical Differentiation and Numerical Integration, Newton Cotes Quadrature formula, Trapezoidal rule. Simpson's 1/3" rule, Simpson's 3/8" rule.

Module -III **8hrs**

Fourier Series & Fourier Transform:

Expansion of - Algebraic, Exponential &Trigonometric functions in Fourier series, Change of interval, Even and odd function, half range sine and cosine series, Complex form of Fourier series. Fourier Transformation and inverse Fourier Transformation, Fourier sine & cosine transforms. Convolution theorem for Fourier transforms with simple illustrations.

Module- IV **6hrs**

Z-Transform & Inverse Z-Transform-

Properties - Initial and Final value theorems, Convolution theorem- Difference equations. Solution of difference equations using Z-Transformation.

Module –V **8hrs**

Probability & Statistics:

Moments, Skewness, Kurtosis. Correlation, coefficient of Correlation, Regression, linear only.Rank correlation. Sampling & Testing of Hypothesis-Null and alternate Hypothesis, level of significance, The t-distribution, The F- distribution & Chi-square test

COURSE OUTCOMES:

CO	COURSE OUTCOMES
CO 1	Compute the electric circuit parameters for simple problems
CO 2	Explain the working principle and applications of electrical machines
CO 3	Analyze the characteristics of analog electronic devices
CO 4	Explain the basic concepts of digital electronics
CO 5	Explain the operating principles of measuring instruments
CO6	Can be able to understand the concept of Amplifier

Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L2	3	2	1	-	-	-	-	-	-	-	-	-	1	-	-
CO2	L2	3	2	1	-	-	-	-	-	-	-	-	-	1	-	-
CO3	L1	3	2	1	-	-	-	-	-	-	-	-	-	1	-	-
CO4	L5	3	2	1	-	-	-	-	-	-	-	-	-	1	-	-
CO5	L4	3	2	1	-	-	-	-	-	-	-	-	-	1	-	-
CO6	L5	3	2	1	-	-	-	-	-	-	-	-	-	1	-	-

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

Text Books

1. Irwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,

2. Ramana R. V ., Higher Engineering Mathematics, Tata McGraw Hill New Delhi,2010.

3. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition,

Reference Books

1. R. J. Beerends .H. G. Ter Morsche, J. C. Van Den Berg. L. M. Van De Vrie, Fourier and Laplace Transforms, Cambridge University Press.
2. Sastry S.S. Introductory Methods of Numerical Analysis, PHI

Computer Science & Engineering and Information Technology					
Code: EC301	**BASIC ELECTRONICS**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**3**

COURSE OBJECTIVES:

This course provides the student with the fundamental skills to understand the basic of semiconductor and components like diode, transisitor, FET, MOSFET and operational amplifier. It will build mathematical and numerical background for design of electronics circuit and component value

Detailed Syllabus

Module I **9Hr**

Basic Electronic Components

Active and Passive Components, Types of resistors and Colour coding, Capacitors, Inductors applications of Resistor, Capacitor and Inductor, Relay, LDR, Basic IntegratedCircuits (IC 7805, 7809, 7812, 555 etc.). Measuring Instruments like CRO, Power supply, multi-meters etc.

Module II **9Hr**

Semiconductors

Difference between Insulators, Semiconductors and Conductors, Mobility and Conductivity, Intrinsic and Extrinsic Semiconductors, Fermi Level, Energy band, Charge Densities in Semiconductors, Mass Action Law, Current Components in Semiconductors, Drift and Diffusion Current, The Continuity Equation, Injected Minority Charge Carrier, Hall Effect, P-N Junction Diode, construction, working, characteristics and diode equation Application of Diode, Rectifier: Half Wave, Full Wave and Bridge Rectifier, Zener Diode and its Applications, Varactor Diode, Schottky Diode, Regulated Power Supply using Zener Diode and Regulated ICs, LED, Photodetector.

Module III: **9Hr**

Transistors

Construction, Working, Modes and Configuration of BJT, Input and Output Characteristics of all Configurations, Comparison of all Configuration & Modes, BJT Switch and as an Amplifier. JFET Construction, working and characteristics. MOSFET Construction, working and Characteristics, Types of MOSFET.

Module IV: **9Hr**

Power electronic devices &Communication engineering

Construction, characteristics and working of SCR, DIAC, TRIAC and UJT. Introduction, Characteristics and applications of Operational Amplifier (Ic741).

Modulation and its types.

Module V: **9Hr**

Digital Logic and basic circuit Design

Number systems and conversion (DECIMAL, OCTAL, HEXADECIMAL, BINARY, BCD etc.),binary addition and subtraction, Logic Gates and their truth-table ,Boolean algebra .Design of Single Stage Amplifier, LED Driver Circuit, Infrared Transmitter Receiver Circuit, LDR Driver Circuit, Relay Driver Circuit, Square Wave and Fix Frequency Generator using 555 IC.

CO	COURSE OUTCOMES
CO 1	Compute the electric circuit parameters for simple problems
CO 2	Explain the working principle and applications of electrical machines
CO 3	Analyze the characteristics of analog electronic devices
CO 4	Explain the basic concepts of digital electronics
CO 5	Explain the operating principles of measuring instruments
CO6	Can be able to understand the concept of Amplifier

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO 6	PO7	PO 8	PO9	PO1 0	PO11	PO12	PSO1	PSO2	PSO3
CO 1	L3	1	1	1	2	-	-	2	-	-	-	_	-	3	3	_-
CO 2	L2	2	2	2	1	-	-	2	-	-	-	-	-	2	1	-
CO 3	L4	2	1	1	1	-	-	-	2	-	-	-	-	2	1	-
CO 4	L5	1	1	1	1	--	-	-	-	-	-	-	-	1	3	-
CO 5	L2	3	3	1	1	-	-	-	-	-	-	-	-	1	3	-
CO 6	L2	1	1	1	1	-	-	1	-	-	-	-	-	1	3	-

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

Text Books

1. Basic Electronics and Linear Circuits by N. N. Bhargava, D. C. Kulshreshtha and S. C. Gupta, TMH Publications.
2. Op-Amps and Linear Integrated Circuits by Ramakant A. Gayakwad, PHIPublications.
3. Electronic Devices and Circuits by Godse and Bakshi Technical, Vol-1 Technical Publication Pune.

Reference Books

1. Integrated Devices & Circuits by Millman & Halkias, TMH Publications.
2. Electronics Devices and Circuit Theory by R. Boylestad & L. Nashelsky, Pearson Publication
3. Electronic Communication System by G. Kennedy, TMH Publications.
4. Basic Electronics by Sanjeev Kumar & Vandana Sachdeva, Paragaon International Publication

Computer Science & Engineering and Information Technology					
Code: CS301	**DATA STRUCTURES AND ALGORITHMS**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**3**

COURSE OBJECTIVES:

- To understand the concepts of ADTs.
- To learn linear data structures – lists, stacks, and queues.
- To understand non-linear data structures – trees and graphs.
- To understand sorting, searching and hashing algorithms.
- To apply Tree and Graph structures.

Detailed syllabus:

Module 1 **9hr**

LISTS

Abstract Data Types (ADTs) – List ADT – Array-based implementation – Linked list implementation – Singly linked lists – Circularly linked lists – Doubly-linked lists – Applications of lists – Polynomial ADT – Radix Sort – Multilists.

Module 2 **9hr**

STACKS AND QUEUES

Stack ADT – Operations – Applications – Balancing Symbols – Evaluating arithmetic expressions-Infix to Postfix conversion – Function Calls – Queue ADT – Operations – Circular Queue – DeQueue – Applications of Queues.

Module 3 **9hr**

TREES

Tree ADT – Tree Traversals - Binary Tree ADT – Expression trees – Binary Search Tree ADT – AVL Trees – Priority Queue (Heaps) – Binary Heap.

Module 4 **9hr**

MULTIWAY SEARCH TREES AND GRAPHS

B-Tree – B+ Tree – Graph Definition – Representation of Graphs – Types of Graph - Breadth-first traversal – Depth-first traversal — Bi-connectivity – Euler circuits – Topological Sort – Dijkstra's algorithm – Minimum Spanning Tree – Prim's algorithm – Kruskal's algorithm

Module 5 **9hr**

SEARCHING, SORTING AND HASHING TECHNIQUES

Searching – Linear Search – Binary Search. Sorting – Bubble sort – Selection sort – Insertion sort – Shell sort –. Merge Sort – Hashing – Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing

,

CO	COURSE OUTCOMES
CO 1	Define linear and non-linear data structures.
CO 2	Implement linear and non–linear data structure operations.
CO 3	Use appropriate linear/non–linear data structure operations for solving a given problem.
CO 4	Apply appropriate graph algorithms for graph applications.
CO 5	Students can able to explain and identify Euler and Hamiltonian cycle
CO6	Analyze the various searching and sorting algorithms

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO 6	PO7	PO 8	PO9	PO1 0	PO11	PO12	PSO1	PSO2	PSO3
CO 1	L1	1	1	1	2	-	-	2	-	-	-	_	-	3	3	_-
CO 2	L3	2	2	2	1	-	-	2	-	-	-	-	-	2	1	-
CO 3	L4	2	1	1	1	-	-	-	2	-	-	-	-	2	1	-
CO 4	L3	1	1	1	1	--	-	-	-	-	-	-	-	1	3	-
CO 5	L2	1	3	1	1	-	-	-	-	-	-	-	-	1	3	-
CO 6	L4	1	1	1	1	-	-	1	-	-	-	-	-	1	3	-

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation Text Books:

1. Data Structures Using C – A.M. Tenenbaum (PHI)
2. Introduction to Data Structures with Applications by J. Tremblay and P. G.Sorenson (TMH)
3. Data Structures, Algorithms and Application in C, 2nd Edition, Sartaj Sahni
4. Data Structures and Algorithms in C, M.T. Goodrich, R. Tamassia and D. Mount,Wiley India.

Reference Books:

1. Data Structure and Program Design in C by C.L. Tondo.
2. Data Structures with C++, J. Hubbard, Schaum's Outlines, TMH.
3. Data Structures and Algorithms in C, M.T. Goodrich, R. Tamassia and D. Mount, WileyIndia

Computer Science & Engineerin,g and Information Technology					
Code: IT301	**OBJECT ORIENTED PROGRAMMING**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES:

- To understand Object Oriented Programming concepts and basics of Java programming language
- To know the principles of packages, inheritance and interfaces
- To develop a java application with threads and generics classes
- To define exceptions and use I/O streams
- To design and build Graphical User Interface Application using JAVAFX

Module 1 **9hr**

INTRODUCTION TO OOP AND JAVA

Overview of OOP – Object oriented programming paradigms – Features of Object Oriented Programming – Java Buzzwords – Overview of Java – Data Types, Variables and Arrays – Operators – Control Statements – Programming Structures in Java – Defining classes in Java – Constructors-Methods -Access specifiers - Static members- Java Doc comments

Module 2

INHERITANCE, PACKAGES AND INTERFACES **9hr**

Overloading Methods – Objects as Parameters – Returning Objects –Static, Nested and Inner Classes. Inheritance: Basics– Types of Inheritance -Super keyword -Method Overriding – Dynamic Method Dispatch – Abstract Classes – final with Inheritance. Packages and Interfaces: Packages – Packages and Member Access –Importing Packages – Interfaces.

Module 3 **9hr**

EXCEPTION HANDLING AND MULTITHREADING

Exception handling basics – Multiple catch Clauses – Nested try Statements – Java's Built-in Exceptions – User defined Exception. Multithreaded Programming: Java Thread Model–Creating a Thread and Multiple Threads – Priorities – Synchronization – Inter Thread Communication- Suspending –Resuming, and Stopping Threads –Multithreading. Wrappers – Auto boxing.

Module 4 **9hr**

I/O, GENERICS, STRING HANDLING

I/O Basics – Reading and Writing Console I/O – Reading and Writing Files. Generics: Generic Programming – Generic classes – Generic Methods – Bounded Types – Restrictions and Limitations. Strings: Basic String class, methods and String Buffer Class.

Module 5 **9hr**

JAVAFX EVENT HANDLING, CONTROLS AND COMPONENTS

JAVAFX Events and Controls: Event Basics – Handling Key and Mouse Events. Controls: Checkbox, ToggleButton – RadioButtons – ListView – ComboBox – ChoiceBox – Text Controls – ScrollPane. Layouts – FlowPane – HBox and VBox – BorderPane – StackPane – GridPane. Menus – Basics – Menu – Menu bars – MenuItem

CO	COURSE OUTCOMES
CO 1	Apply the concepts of classes and objects to solve simple problems
CO 2	Develop programs using inheritance, packages and interfaces
CO 3	Make use of exception handling mechanisms and multithreaded model to solve real worldproblems
CO 4	Build Java applications with I/O packages, string classes, Collections and generics concepts
CO 5	Integrate the concepts of event handling and JavaFX components and controls for developing GUI based applications.
CO6	Can able to code basic programs in java programming language.

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO 6	PO7	PO 8	PO9	PO1 0	PO11	PO12	PSO1	PSO2	PSO3
CO 1	L3	3	1	1	1	1	-	2	-	-	-	-	-	1	3	3
CO 2	L6	2	2	2	3	1	-	2	-	-	-	-	-	2	2	2
CO 3	L6	2	1	1	2	1	-	-	-	-	-	-	-	2	1	1
CO 4	L6	1	1	1	1	--	-	-	-	-	-	-	-	1	1	2
CO 5	L4	1	3	1	1	-	-	-	-	-	-	-	-	1	2	2
CO 6	L3	1	1	1	1	-	-	1	-	-	-	-	-	1	3	2

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

TEXT BOOK:

1. Introduction to Java Programming: Liang, Pearson Education, 7th Edition.
2. Java the Complete Reference: Herbert Schildt, TMH, 5th Edition.

REFERENCE BOOKS:

1. Balguruswamy, Programming with Java, TMH.
2. Programming with Java: Bhave&Patekar, Person Eduction.
3. Big Java: Horstman, Willey India, 2nd Edition.

,

Computer Science & Engineering and Information Technology					
Code: EC302	DIGITAL ELECTRONICS AND LOGIC DESIGN	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

COURSE OBJECTIVES:

- To introduce the basics of electric circuits and analysis
- To impart knowledge in the basics of working principles and application of electrical machines
- To introduce analog devices and their characteristics
- To educate on the fundamental concepts of digital electronics
- To introduce the functional elements and working of measuring instruments

Module I: **9hr**

Binary Codes and Boolean algebra

Analog and Digital, Binary Number System. Addition, Subtraction, Multiplication,Division of binary numbers, Subtraction using 2's complement method. Binary codes:weighted and non-weighted codes, self-complementary codes, BCD, Excess-3, Graycodes, Alphanumeric codes, ASCII Codes. *Boolean algebra*: Boolean Laws and Expression using Logic Gates, Realization of different gates using Universal gates, DeMorgan's Theorem, Duality Theorems.

Module II: **9hr**

Boolean function minimization Techniques

Standard forms: SOP, POS, Simplification of Switching function & representation (Maxterm & Minterm), Boolean expression & representation using logic gates, Propagation delay in logic gate. *Karnaugh map*: K-map(up to 5 variables), mapping and minimization of SOP and POS expression, Don't care condition, conversion fromSOP to POS and POS to SOP form using K-map, Minimization of multiple output circuits, Quine Mc-cluskey method minimization technique, prime implicant table, Don't care condition.

Module III: **9hr**

Combinational Circuits Design

Adder & Subtractor (Half and Full), Parallel Binary adder, BCD Adder, Binary multipliers, Code Converters, parity bit generator, Comparators, Decoder, BCD to7segment Decoder, Encoders, Priority Encoders, Multiplexers, De Multiplexers.

Module IV: **9hr**

Sequential Circuits Elements

Introduction to sequential circuit, Flip-flop & Timing Circuits: SR latch, Gated latch,Tri state logic, Edge triggered flip- plop: - D, JK, T Flip-flop, flip-flop asynchronous inputs ,characteristic table of Flip-flop, excitation table of Flip-flop, master slave JK flip flop, inter conversion of Flip-flop. Study of timing parameters of flip-flop.

Shift registers: buffer register, controlled buffer register. Data transmission in shift resistorSISO, SIPO, PISO, PIPO, Bidirectional shift register, universal shift registers.

***Counter*:** Classification, Ripple or asynchronous counter, Effect of propagation delayin ripple counters, up-down counter, Design of Mod-n counter, synchronous counter,Ring counter, Johnson counter. Introduction to FSM. Design of synchronous FSM, Algorithmic State Machines charts. Designing synchronous circuits like Pulse train generator.

,

Module V: **9hr**

Logic Families and VLSI Design flow

Logic Families and Semiconductor Memories: TTL NAND gate, Specifications, Noisemargin, Propagation delay, fan- in, fan-out, TTL, ECL, CMOS families and their interfacing, Memory elements, Concept of Programmable logic devices like FPGA, Logic implementation using Programmable Devices

VLSI Design flow: Design entry, Schematic, FSM & HDL, different modelling styles in VHDL, Data types and objects,Dataflow, Behavioural and Structural Modelling, Synthesis and Simulation VHDL constructs and codes for combinational and sequential circuits

CO	COURSE OUTCOMES
CO 1	Compute the electric circuit parameters for simple problems
CO 2	Explain the working principle and applications of electrical machines
CO 3	Analyze the characteristics of analog electronic devices
CO 4	Explain the basic concepts of digital electronics
CO 5	Explain the operating principles of measuring instruments
CO6	To develop skill to build and troubleshoot digital circuits.

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO 6	PO7	PO 8	PO9	PO1 0	PO11	PO12	PSO1	PSO2	PSO3
CO1	L3	3	1	1	1	-	-	2	-	-	-	-	-	1	3	_-
CO2	L2	2	2	2	1	-	-	2	-	-	-	-	-	2	3	-
CO3	L4	2	1	1	1	-	-	-	-	-	-	-	-	2	3	-
CO4	L2	1	1	1	1	--	-	-	-	-	-	-	-	1	3	-
CO5	L4	1	3	1	1	-	-	-	-	-	-	-	-	1	3	-
CO6	L6	1	1	1	1	-	-	1	-	-	-	-	-	1	3	-

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

Text Books:

1. Kharate "Digital Electronics" OXFORD Publication
2. Anand Kumar 'Fundamentals of Digital Circuits'. PHI Publications
3. R.P. Jain-'Modern Digital Electronics' IIIrd Edition- Tata Mc Graw Hill, Publication
4. Douglas Perry, "VHDL", Tata McGraw Hill, 4th edition, 2002.
5. Charles Roth, "Digital System Design using VHDL", Tata McGraw Hill 2nd edition
6. Bhaskar VHDL BASED DESIGN ,PEARSON EDUCATION

Reference Books:

1. Rajkamal 'Digital Systems Principals and Design' Pearson Education
2. A.P. Malvino, D.P. Leach 'Digital Principles & Applicatios' -VIth Edition-TMHpublication.
3. M. Morris Mano 'Digital Design' (Third Edition). PHI Publications

,

Computer Science & Engineering and Information Technology					
Code: BSC302	**ENVIRONMENTAL SCIENCE**	**L**	**T**	**P**	**C**
		2	**0**	**0**	**2**

COURSE OBJECTIVES:

The course objectives for an environmental science course typically aim to equip students with a comprehensive understanding of environmental issues, their causes, impacts, and potential solutions.

Detail syllabus:

Module-1 **2hr**

Concept and scope of Environment science, components of environment, environmental segment and their importance.

Module-II **4hr**

Ecology: Ecosystem and its characteristics features, structure and function of forest ecosystem,grassland ecosystem, desert ecosystem and aquatic ecosystem, ecological balance and consequences of imbalance.

Module-III **4hr**

Atmosphere: Atmospheric composition, energy balance, climate, weather, depletion of ozone layer, greenhouse effect, acid rain, particles, ions and radicals in the atmosphere, chemical and photochemical reactions in the atmosphere.

Module-IV **5hr**

Air pollution and control: Air pollutants, sources and effect of air pollutants, primary and secondary pollutants, photochemical smog, fly ash, inorganic and organic particulate matter. Air quality standards,sampling, monitoring and control measures for pollutants.

Module-V **4hr**

Water pollution and control: Aquatic environment, water pollution, sources and their effect, lake and ground water pollution, eutrophication, water quality standard and water pollution control measures, waste water treatment.

Module-VI **5hr**

Land pollution; Lithosphere, composition of soil, acid base and ion exchange reactions in soil, soilerosion, landslides, desertification, pollutants (municipal, industrial, commercial, agricultural , hazardous solid wastes), origin and effects, collection and disposal of solid wastes, recovery and conversion methods.

Module-VII **4hr**

Noise pollution; Noise classification and its sources, effects and measurement, noise pollution hazards,standards and noise pollution control.

CO	COURSE OUTCOMES
CO 1	Students understood Sewage quantity and quality for better treatment so as to reduce scarcity by recycling waste water.
CO 2	Students understood industrial waste water quantity and quality for achieving better sanitation in society.
CO 3	Study of pollution control methods, mechanism and devices.
CO 4	Simple and complex modelling for point source, line source and area source.
CO 5	Develop the knowledge on various natural resources, their causes and their effects.
CO 6	Explain various environmental acts and disaster management.

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	4	2	-	-	3	-	-	-	2	-	-	-	-	1	-	-
CO2	6	2	-	2	-	-	-	-	3	-	-	-	-	1	-	-
CO3	5	-	-	2	-	-	-	-	3	-	-	-	-	-	-	-
CO4	4	1	3	3	-	-	-	-	3	-	-	-	-	-	2	2
CO5	2	2	2	2	-	-	-	-	2	-	-	-	-	-	2	2
CO6	1	1	2	3	-	-	-	-	3	-	-	-	-	-	2	2

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

Books:

1. Master, G.M Introduction to environment engineering and science, Pearson Education.
2. Nebel, B.J., Environment science, Prentice Hall Inc.

References

1. Odum, E.P. Ecology: The link between the natural and social sciences. IBH Publishing CompanyDelhi
2. De, A.K. Environmental Chemistry, Merrut.
3. Sharma B.K Envrionmental Chemistry, Krishna Prakashan Media Merrut.
4. Kaushik, A and Kaushik, C.P. Perspectives in Environmental studies, New Age InternationalPublication.
5. Menon, S.E. Environmental Chemistry.

,

DATA STRUCTURE LAB

Course code -CS 301P

Course Objective: The objective is to develop linear and non-linear data structure, express different operation on AVL tree, evaluate infix to postfix expression, and apply searching and sorting algorithms in real life applications.

1. C Programs on : Bubble sort
   - Selection sort
   - Insertion sort,
   - Quick sort
   - Heap sort, Merge Sort
2. C Programs on : Sequential Search
   - Binary Search
3. Write a C Program to create a stack using an array and perform
   - Push operation, Pop operation
4. Write a C Program that uses Stack Operations to perform the following:-
   - Converting an infix expression into postfix expression
   - Evaluating the postfix expression
5. Write a C Program to create a queue and perform
   - Push, Pop, Traversal
6. Write a C Program that uses functions to perform the following operations on a single linked list : i)Creation, ii) Insertion, iii) Deletion, iv) Traversal
7. Write a C Program that uses functions to perform the following operations on a double linked list: i)Creation, ii) Insertion, iii) Deletion
8. Write a C Program that uses functions to perform the following operations on a Binary Tree : i)Creation, ii) Insertion, iii) Deletion
9. Write a C Program for Single Source Shortest Paths using Dijkstra's Algorithm
10. Write a C Program for All-Pairs Shortest Paths using Floydd's Algorithm

NOTE: At least ten experiments are to be performed, minimum seven experiments should be performed from above list. Remaining three experiments may either be performed fromthe above list or designed & set by the concerned institution as per the scope of the syllabus.

,

OBJECT ORIENTED PROGRAMMINGLAB

Coursecode -IT 301P

Course Outcome:

1. Able to do program in object-oriented concept.
2. Able to create user defined exception.
3. Able to create GUI.
4. Able to understand JDBC and ODBC concept.

To do various Java Programs on:

1. Introduction, compiling & executing a Java program.
2. Data types & variables, decision control structures: if, nested if etc.
3. Loop control structures: do while, for etc.
4. Classes and objects.
5. Data abstraction & data hiding, inheritance, polymorphism.
6. Using concept of package.
7. Threads, exception handlings and applet programs.
8. Interfaces and inner classes, wrapper classes, generics.
9. Programs on JDBC.
10. Creating GUI.

NOTE: At least ten experiments are to be performed, minimum seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllab

,

DIGITAL ELECTRONICS AND LOGIC DESIGN LAB

Course code EC 302P

List of Experiments (Minimum 10)

1. Study of TTL gates – AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR.
2. Design & realize a given function using K-maps and verify its performance.
3. To verify the operation of multiplexer & Demultiplexer.
4. To verify the operation of comparator.
5. To verify the truth tables of S-R, J-K, T & D type flip flops.
6. To verify the operation of bi-directional shift register.
7. To design & verify the operation of 3-bit synchronous counter.
8. Design all gates using VHDL.
9. Design a multiplexer using VHDL
10. Design a decoder using VHDL
11. Write VHDL programs for the following circuits, check the wave forms and the hardware generated a. half adder b. full adder
12. Write VHDL programs for the following circuits, check the wave forms and the hardware generated a. multiplexer b. demultiplexer

NOTE: At least ten experiments are to be performed, minimum seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus. For VHDL Xilinx software may be used.

COMMUNICATION SKILL LAB

Course code HS301

This lab paper involves interactive practice sessions in Language Lab along with some class lectures to enable the students to be confident enough in language and professional sphere of life.

Module I: Listening Comprehension **10 Hr**

- To comprehend spoken material in standard Indian English/ British English & AmericanEnglish
- Current situation in India regarding EnglishAmerican English Vs. British English

Module II: Phonetics & Phonology **8 Hr**

- Introduction to Phonetics & PhonologyOrgans of Speech/ Speech Mechanism
- Pronunciation, Intonation**,** Stress and Rhythm, Syllable division Consonants/Vowels/Diphthongs Classification

Module III: Common Everyday Situations: Conversations and Dialogues **4 Hr**

Module IV: Communication at Workplace **2 Hr**

Module V: Telephonic Conversation **6 Hr**

Introduction

Listening/Speaking

Telephonic Skills Required

Problems of Telephonic Conversation

Intensive Listening

Module VI: Interviews **7 Hr**

The Interview Process

Purpose/Planning/Two-way Interaction/Informality

Pre-interview Preparation Techniques

Projecting a Positive Image

Answering strategies

Module VII: Formal Presentations **6 Hr**

Introduction

Nature/Importance of Presentation

Planning

Objective with central idea, main ideas, role of supporting materials

Handling Stage Fright\

Module VIII: **7 Hr**

Forms of Technical Communication: Technical Report: Definition &importance; Thesis/Project writing: structure & importance; synopsis writing: Methods;Technical research Paper writing: Methods & style; Seminar & Conference paper writing; Expert Technical Lecture: Theme clarity; Analysis & Findings; C.V./Resume writing; Technical Proposal: Types, Structure & Draft.

Module IX: **8 Hr**

Technical Presentation: Strategies & Techniques Presentation: Forms; interpersonal Communication;Classroom presentation; style; method;

Individual conferencing: essentials: Public Speaking: method; Techniques: Clarity of substance; emotion;Humour; Modes of Presentation; Overcoming Stage Fear; Audience Analysis & retention of audience interest; Methods of Presentation: Interpersonal; Impersonal; Audience Participation:Quizzes & Interjections.

Module X: **8 Hr**

Technical Communication Skills: Interview skills; Group Discussion: Objective & Method; Seminar/Conferences Presentation skills: Focus; Content; Style; Argumentation skills: Devices: Analysis; Cohesion & Emphasis; Critical thinking; Nuances: Exposition narration & Description; effective business communication competence: Grammatical; Discourse competence: combination of expression & conclusion; Socio-linguistic competence: Strategic competence: Solution of communication problems with verbal and nonverbal means.

RADHA GOVIND UNIVERSITY
RAMGARH, JHARKHAND

Department of Computer Science & Engineering
Under Faculty of Engineering and Technology

Choice Based Credit System Curriculum for
Bachelor of Technology

SEMESTER IV

(Effective from Academic Session 2020-21)

Computer Science & Engineering

Course structure

Sl. No.	Course code	Subject	L	T	P	Credit
01	CS401	Operating System	3	1	0	3
02	CS402	Design And Analysis Of Algorithms	3	1	0	3
03	CS403	Formal Language And Automata Theory	3	1	0	3
04	BSC401	Discrete Mathematics	3	1	0	3
05	IT401	Database Management Systems	3	1	0	3
06	EN401/ IT402	Engineering Economics / Cyber Security	2	0	0	0
01	CS401P	Operating System Lab	0	0	3	1
02	CS402P	Design And Analysis Of Algorithms Lab	0	0	3	1
03	CS403P	Formal Language And Automata Theory Lab	0	0	3	1
04	EX401	Extra Activities (NSO/NSS/NCC/Yoga/ Creative Arts/Mini Project)	0	0	2	1
05	IN401	Internship/ Tour & Training/Industrial Training	0	0	0	2
Total credit						**21**

Computer Science & Engineerin›g and Information Technology					
Code: CS401	**OPERATING SYSTEM**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**3**

COURSE OBJECTIVES:

1. To explain main components of OS and their working.
2. To familiarize the operations performed by OS as a resource Manager.To impart various scheduling policies of OS.
3. To teach the different memory management techniques.

Module - I **9hr**

OPERATING SYSTEMS OVERVIEW: Introduction, Evolution of operating system, operating system operations, operating system structure, System Calls, Types of System Calls

Module – II **9hr**

PROCESS MANAGEMENT: Process concepts, process state, process control block, scheduling queues, process scheduling, Interposes Communication, Threads and implementation of threads.

CPU SCHEDULING: Objective and Criteria, CPU scheduling algorithms: FCFS, SJF, Priority Scheduling, Round robin, multilevel queue scheduling and multilevel feedback queue scheduling.

Module- III **9hr**

CONCURRENCY AND SYNCHRONIZATION: Process synchronization, critical section problem, and its solutions. Semaphores, classical problems of synchronization: readers and writers problem, dining philosophers problem, sleeping barber problem.

Module- IV **9hr**

DEADLOCKS: Introduction, deadlock characterization, Resource allocation graph, Methods for Handling Deadlocks: deadlock prevention, avoidance and deadlock detection, recovery from deadlock.

Module V **9hr**

MEMORY MANAGEMENT: Introduction, memory allocation techniques, paging, implementation of paging, segmentation and its implementation, segmentation with paging, virtual memory, demand paging, page- replacement algorithms, thrashing and its solution.

Module VI **9hr**

FILE SYSTEM: Concept of a file, access methods, directory structure, file system mounting, file sharing, protection. File system implementation: file system structure, directory implementation, allocation methods, free- space management, efficiency and performance.

Mass-Storage Structure: Overview of mass storage structure, disk structure, disk scheduling algorithm

CO	COURSE OUTCOMES
CO 1	Analyze various scheduling algorithms and process synchronization.
CO 2	Explain deadlock prevention and avoidance algorithms.
CO 3	Compare and contrast various memory management schemes.
CO 4	Explain the functionality of file systems, I/O systems, and Virtualization
CO 5	Compare iOS and Android Operating Systems.
CO 6	Understand the concept of mass storage structure

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L4	3	1	2	2	-	-	-	-	3	2	3	1	1	2	2
CO2	L2	2	2	3	1	1	-	-	-	2	1	1	2	2	1	2
CO3	L5	1	3	2	2	1	-	-	-	2	2	1	1	1	2	2
CO4	L2	1	3	3	3	-	-	-	-	1	2	1	2	1	3	2
CO5	L5	3	1	2	1	1	-	-	-	3	2	3	2	2	2	1
CO6	L2	1	3	2	1	3				-	-	-	-	1	-	1

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

TEXT BOOKS:

1. ABRAHAM SILBERSCHATZ, PETER BAER GALVIN, GREG GAGNE (2012), Operating System Principles, 9th edition, Wiley India Private Limited, New Delhi.

REFERENCE BOOKS:

1. William Stallings, Operating Systems, Internals and Design Principles, 7th edition, Pearson Education,India.
2. Andrew S. Tanenbaum (2007), Modern Operating Systems, 2nd edition, Prentice Hall of India,India.

,

To Computer Science & Engineering and Information Technology					
Code: CS402	**DESIGN AND ANALYSIS OF ALGORITHM**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**3**

Course Objective:

1. To introduce various techniques and methods for algorithm.
2. Performance analysis of Algorithms using asymptotic and empirical approaches.
3. Demonstrate a familiarity with major algorithms and data structures.

MODULE-I **8hr**

INTRODUCTION & ANALYSIS:

Analyzing Algorithms, Recurrence Equations, Growth Function: Asymptotic Notation, Standard Notation & Common Functions, Recurrence Relation, Different Methods of Solution of Recurrence Equations with Examples.

MODULE-II **12hr**

ALGORITHM DESIGN TECHNIQUES

Divide and Conquer methodology: Finding maximum and minimum - Merge sort - Quick sort Dynamic programming: Elements of dynamic programming — Matrix-chain multiplication - Multi stage graph — Optimal Binary Search Trees. Greedy Technique: Elements of the greedy strategy- Activity-selection problem –- Optimal Merge pattern — Huffman Trees.

MODULE-III **10hr**

GRAPH ALGORITHMS

Graph algorithms: Representations of graphs - Graph traversal: DFS – BFS - applications - Connectivity, strong connectivity, bi-connectivity - Minimum spanning tree: Kruskal's and Prim's algorithm- Shortest path: Bellman-Ford algorithm - Dijkstra's algorithm - Floyd-Warshall algorithm Network flow: Flow networks - Ford-Fulkerson method – Matching: Maximum bipartite matching

MODULE-IV **10hr**

NP-COMPLETE AND APPROXIMATION ALGORITHM

Tractable and intractable problems: Polynomial time algorithms – Venn diagram representation -NP-algorithms - NP-hardness and NP-completeness – Bin Packing problem - Problem reduction: TSP – 3-CNF problem. Approximation Algorithms: TSP - Randomized Algorithms: concept and application - primality testing - randomized quick sort - Finding kth smallest number.

,

CO	COURSE OUTCOMES
CO 1	Analyse the performance of algorithms.
CO 2	To compare appropriate algorithm design techniques for solving problems.
CO 3	To critically analyze the efficiency of graph algorithms
CO 4	To understand the concepts behind NP Completeness, Approximation algorithms and randomized algorithms.
CO 5	Evaluate the hardness of NP-Hard problems using simple reductions.
CO6	To illustrate the running time and prove the correctness of basic algorithms.

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO 1	PO2	PO 3	PO4	PO 5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	L4	1	3	2	3	-	-	-	-	1	1	2	3	1	3	2
CO 2	L2	1	2	3	2	1	-	-	-	3	3	2	3	3	1	2
CO 3	L4	2	2	3	2	1	-	-	-	-	3	1	2	1	2	2
CO 4	L2	2	1	2	1	-	-	-	-	1	3	3	2	1	3	2
CO 5	L5	2	2	2	1	1	-	-	-	1	1	3	2	3	1	3
CO 6	L3	1	3	2	3	-	-	-	-	1	1	2	3	1	3	2

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

Text Books:

1. Introduction to Algorithms (Second Edition); Cormen, Leserson, Rivert; PHI.
2. Fundamentals of Algorithms, Sahni& Horowitz; Galgotia.

Reference Books:

1. The Design & Analysis of Computer Algorithms, Hopcroft-Aho-Ullman, AWL.
2. Handbook of Algorithms & Data Structures, G.H. Gonnet, AWL.
3. Introduction to Design & Analysis of Algorithms, Levitin, PE-LPE.

Computer Science & Engineering and Information Technology					
Code: CS403	**FORMAL LANGUAGES AND AUTOMATA THEORY**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**3**

COURSE OBJECTIVES:

1. To understand foundations of computation including automata theory
2. To construct models of regular expressions and languages.
3. To design context free grammar and push down automata
4. To understand Turing machines and their capability
5. Understand undecidability and NP class problems

Detailed syllabus:

MODULE-I **9hr**

AUTOMATA AND REGULAR EXPRESSIONS

Need for automata theory - Introduction to formal proof – Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Equivalence between NFA and DFA – Finite Automata with Epsilon transitions – Equivalence of NFA and DFA- Equivalence of NFAs with and without ε-moves- Conversion of NFA into DFA – Minimization of DFAs.

MODULE-II **9hr**

REGULAR EXPRESSIONS AND LANGUAGES

Regular expression – Regular Languages- Equivalence of Finite Automata and regular expressions– Proving languages to be not regular (Pumping Lemma) – Closure properties of regular languages.

MODULE-III **9hr**

CONTEXT FREE GRAMMAR AND PUSH DOWN AUTOMATA

Types of Grammar - Chomsky‘s hierarchy of languages -Context-Free Grammar (CFG) and Languages – Derivations and Parse trees – Ambiguity in grammars and languages – Push Down Automata (PDA): Definition – Moves - Instantaneous descriptions -Languages of pushdown automata – Equivalence of pushdown automata and CFG-CFG to PDA-PDA to CFG – Deterministic Pushdown Automata.

MODULE-IV **9hr**

NORMAL FORMS AND TURING MACHINES

Normal forms for CFG – Simplification of CFG- Chomsky Normal Form (CNF) and Greibach Normal Form (GNF) – Pumping lemma for CFL – Closure properties of Context Free Languages – Turing Machine: Basic model – definition and representation – Instantaneous Description – Language acceptance by TM – TM as Computer of Integer functions – Programming techniques for Turing machines (subroutines).

MODULE-V **9hr**

UNDECIDABILITY

Unsolvable Problems and Computable Functions –PCP-MPCP- Recursive and recursively enumerable languages – Properties - Universal Turing machine -Tractable and Intractable problems P and NP completeness – Kruskal’s algorithm – Travelling Salesman Problem- 3-CNF SAT problems

,

CO	COURSE OUTCOMES
CO 1	Construct automata theory using Finite Automata
CO 2	Write regular expressions for any pattern
CO 3	Design context free grammar and Pushdown Automata
CO 4	Design Turing machine for computational functions
CO 5	Able to understand the types of grammar
CO 6	Differentiate between decidable and undecidable problems

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO 6	PO7	PO 8	PO9	PO1 0	PO11	PO12	PSO1	PSO2	PSO3
CO 1	L6	1	3	2	3	-	-	-	-	1	1	2	3	1	3	2
CO 2	L1	2	2	3	2	1	-	-	-	3	3	2	3	3	1	2
CO 3	L6	2	2	3	2	1	-	-	-	1	3	1	2	1	2	2
CO 4	L6	3	1	2	1		-	-	-	1	3	3	2	1	3	2
CO 5	L2	2	2	2	1	1	-	-	-	1	1	3	2	3	1	3
CO 6	L4	2	2	1	1	-	-	-	-	1	2	1	1	1	1	1

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

TEXT BOOKS:

1. Theory of Computer Science (Automata Language and Computation) K.L.P. Mishra and N. Chandrasekran, PHI.
2. Introduction to Automata Theory, Language and Computation, John E, Hopcropt and Jeffery D. Ullman, Narosa Publishing House.

REFERENCE BOOKS:

1. Theory of Automata and Formal Language, R.B. Patel & P. Nath, Umesh Publication.
2. An Introduction and Finite Automata Theory, Adesh K. Pandey, TMH.
3. Theory of Computation AM Natrajan, Tamilarasi, Bilasubramani, New Age International Publishers, and Chhattisgarh Swami Vivekan.
4. An introduction to Formal Languages and Automata by Peter Linz, Narosa Publication.

Computer Science & Engineering and Information Technology					
Code: IT401	**DATABASE MANAGEMENT SYSTEMS**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**3**

COURSE OBJECTIVES:

- To learn the fundamentals of data models, relational algebra and SQL
- To represent a database system using ER diagrams and to learn normalization techniques
- To understand the fundamental concepts of transaction, concurrency and recovery processing
- To understand the internal storage structures using different file and indexing techniques which will help in physical DB design
- To have an introductory knowledge about the Distributed databases, NOSQL and database security

Module 1

RELATIONAL DATABASES 10hr

Purpose of Database System – Views of data – Data Models – Database System Architecture – Introduction to relational databases – Relational Model – Keys – Relational Algebra – SQL fundamentals – Advanced SQL features – Embedded SQL– Dynamic SQL

Module 2 8hr

DATABASE DESIGN

Entity-Relationship model – E-R Diagrams – Enhanced-ER Model – ER-to-Relational Mapping – Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form

Module 3 9hr

TRANSACTIONS

Transaction Concepts – ACID Properties – Schedules – Serializability – Transaction support in SQL – Need for Concurrency – Concurrency control –Two Phase Locking- Timestamp – Multiversion – Validation and Snapshot isolation– Multiple Granularity locking – Deadlock Handling – Recovery Concepts – Recovery based on deferred and immediate update – Shadow paging – ARIES Algorithm

Module 4 **9hr**

IMPLEMENTATION TECHNIQUES

RAID – File Organization – Organization of Records in Files – Data dictionary Storage – Column Oriented Storage– Indexing and Hashing –Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Algorithms for Selection, Sorting and join operations – Query optimization using Heuristics - Cost Estimation.

,

Module 5 **9hr**

ADVANCED TOPICS

Distributed Databases: Architecture, Data Storage, Transaction Processing, Query processing and optimization – NOSQL Databases: Introduction – CAP Theorem – Document Based systems – Key value Stores – Column Based Systems – Graph Databases. Database Security: Security issues – Access control based on privileges – Role Based access control – SQL Injection – Statistical Database security – Flow control – Encryption and Public Key infrastructures – Challenges

Course Outcomes:

CO	COURSE OUTCOMES
CO 1	Construct SQL Queries using relational algebra
CO 2	Design database using ER model and normalize the database
CO 3	Construct queries to handle transaction processing and maintain consistency of the database
CO 4	Compare and contrast various indexing strategies and apply the knowledge to tune the performance of the database
CO 5	Appraise how advanced databases differ from Relational Databases and find a suitable database for the given requirement
CO 6	Learning will help to improve and manage data accessing

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L6	1	3	2	3	-	-	-	-	1	1	2	3	1	3	2
CO2	L1	2	2	3	2	1				3	3	2	3	3	1	2
CO3	L6	2	2	3	2	1				1	3	1	2	1	2	2
CO4	L6	3	1	2	1					1	3	3	2	1	3	2
CO5	L2	2	2	2	1	1				1	1	3	2	3	1	3
CO6	L4	2	2	1	1	-				1	2	1	1	1	1	1

H-High(1), M- Moderate(2), L- Low(3), '-' for No correlation

TEXT BOOKS

1. Korth, Silbertz, Sudarshan," Database Concepts", McGraw Hill
2. Date C J, "An Introduction to Database Systems", Addision Wesley
3. Elmasri, Navathe, " Fundamentals of Database Systems", Addision Wesley
4. O'Neil, Databases, Elsevier Publication.
5. RAMAKRISHNAN"Database Management Systems",McGraw Hill
6. Leon & Leon,"Database Management Systems", Vikas Publishing House
7. Bipin C. Desai, " An Introduction to Database Systems", Gagotia Publications
8. Majumdar & Bhattacharya, "Database Management System", TMH R.P. Mahapatra, Database Management System, Khanna Publishing House

Computer Science & Engineering and Information Technology					
Code: BSC401	**DISCRETE MATHEMATICS**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**3**

COURSE OBJECTIVES:

1. To extend student's logical and mathematical maturity and ability to deal with abstraction.
2. To introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.
3. To understand the basic concepts of combinatory and graph theory.
4. To familiarize the applications of algebraic structures.
5. To understand the concepts and significance of lattices and Boolean algebra which are widely used in computer science and engineering.

Module 1 **9hr**

LOGIC AND PROOFS

Propositional logic – Propositional equivalences - Predicates and quantifiers – Nested quantifiers – Rules of inference - Introduction to proofs – Proof methods and strategy.

Module 2 **9hr**

COMBINATORICS

Mathematical induction – Strong induction and well ordering – The basics of counting – The pigeonhole principle – Permutations and combinatorics – Recurrence relations – Solving linear recurrence relations – Generating functions – Inclusion and exclusion principle and its applications.

Module 3 **9hr**

GRAPHS

Graphs and graph models – Graph terminology and special types of graphs – Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamilton paths.

Module 4 **9hr**

ALGEBRAIC STRUCTURES

Algebraic systems – Semi groups and monoids - Groups – Subgroups – Homomorphism's – Normal subgroup and cosets – Lagrange's theorem – Definitions and examples of Rings and Fields.

Module 5 **9hr**

LATTICES AND BOOLEAN ALGEBRA

Partial ordering – Posets – Lattices as posets – Properties of lattices - Lattices as algebraic systems – Sub lattices – Direct product and homomorphism – Some special lattices – Boolean algebra – Sub Boolean Algebra – Boolean Homomorphism.

,

CO	COURSE OUTCOMES
CO 1	Have knowledge of the concepts needed to test the logic of a program.
CO 2	Have an understanding in identifying structures on many levels.
CO 3	Be aware of a class of functions which transform a finite set in- to another finite set whichrelates to input and output functions in computer science.
CO 4	Be aware of the counting principles.
CO 5	Be exposed to concepts and properties of algebraic structures such as groups, rings andfields.
CO6	Able to model and solve real world problems using graphs and tress.

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO 6	PO7	PO 8	PO9	PO1 0	PO11	PO12	PSO1	PSO2	PSO3
CO 1	L1	3	3	2	-	-	-	-	-	-	-	-	2	-	-	-
CO 2	L2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 3	L1		3	2	-	-	2	-	-	-	3	-	-	-	-	-
CO 4	L1	-	2	2	2	-	-	-	-	-	-	-	-	-	-	-
CO 5	L5	-	2	2	2	-	-	-	-	-	2	-	-	-	-	-
CO 6	L6	1	3	2	1	-	-	-	-	-	1	-	-	-	-	-

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

TEXT BOOKS:

1. Discrete Mathematical Structures with Applications to Computer Science, J.P. Tremblay, R. Manohar, McGraw Hill Education (India) Private Limited (Units-I, II).
2. Discrete Mathematics for Computer Scientists & Mathematicians, Joe L. Mott, Abraham Kandel, Theodore P. Baker, Pearson, 2nd Edition (Units- III, IV, V).

REFERENCE BOOKS:

1. Discrete Mathematics and its Applications, Kenneth H. Rosen, 7th Edition, McGraw Hill Education (India) Private Limited.
2. Discrete Mathematics D.S. Malik & K. K. Sen, Revised Edition Cengage Learning.
3. Elements of Discrete Mathematics, C.L. Liu and D.P. Mohapatra, 4th Edition, McGraw Hill Education (India) Private Limited.
4. Discrete Mathematics with Applications, Thomas Koshy, Elsevier.
5. Discrete and Combinatorial Mathematics, R. P. Grimaldi, Pearson.
6. Discrete Mathematical Structures by Bernard Kolman, Robert C. Busby and Sharon Cutler Ross, Pearson Education.

,

Computer Science & Engineering and Information Technology

Code: **IT402**

CYBER SECURITY

L	T	P	C
2	0	0	0

COURSE OBJECTIVE:

The course is designed in a way that a candidate can identify, analyze and remediate computer security breaches by learning and implementing the real-world scenarios in Cyber Investigations Laboratory, Network Security Laboratory and in Security and Penetration Testing Laboratory

Module I: **5hr**

Introduction to Cybercrime:

Introduction, Cybercrime, and Information Security, who are Cybercriminals, Classifications of Cybercrimes, and Cybercrime: The legal Perspectives and Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes.

Module II: **5hr**

Cyber Offenses:

How Criminals Plan Them: Introduction, How Criminals plan the Attacks, Social Engineering, Cyber stalking, Cyber Cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing.

Module III: **9hr**

Cybercrime:

Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies a Measures in Mobile Computing Era, Laptops.

Module – IV: **8hr**

Tools and Methods Used in Cybercrime :

Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horse and Backdoors, Steganography, DoS and DDoS attacks, SQL Injection, Buffer Overflow.

Module V: **8hr**

Cyber Security:

Organizational Implications Introduction, Cost of Cybercrimes and IPR issues, Web threats for Organizations, Security and Privacy Implications, Social media marketing: Security Risks and Perils for Organizations, Social Computing and the associated challenges for Organizations.

,

CO	COURSE OUTCOMES
CO 1	Analyze and evaluate the cyber security needs of an organization.
CO 2	Determine and analyze software vulnerabilities and security solutions to reduce the risk of exploitation.
CO 3	Measure the performance and troubleshoot cyber security systems.
CO 4	Implement cyber security solutions and use of cyber security, information assurance, and cyber/computer forensics software/tools.
CO 5	Comprehend and execute risk management processes, risk treatment methods, and key risk and performance indicators
CO6	Classify cyber security solutions and information assurance.

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO 6	PO7	PO 8	PO9	PO1 0	PO11	PO12	PSO1	PSO2	PSO3
CO 1	L4	2	2	1	1	3	-	1	3	-	1	-	3	-	-	1
CO 2	L4	2	2	1	2	-	-	2	3	-	2	-	3	-	-	1
CO 3	L5	1	2	1	2	-	-	1	3	-	1	-	3	-	-	1
CO 4	L5	2	2	1	3	-2	-	1	3	-	-	-	3	-	-	2
CO 5	L4	1	2	1	1	3	-	-	3	-	-	--	3	-	-	3
CO 6	L4	2	1	1	1	1	-	-	3	-	-	-	3	-	-	1

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

TEXT BOOK:

- Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and Sunil Belapure, Wiley INDIA.

REFERENCE BOOK:

- Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
- Introduction to Cyber Security , Chwan-Hwa(john) Wu,J.David Irwin.CRC Press T&F Group

,

Computer Science & Engineering					
Code: EN 401	**ENGINEERING ECONOMICS**	**L**	**T**	**P**	**C**
		2	**0**	**0**	**0**

COURSE OBJECTIVE:

The basic purpose of this course is to provide a sound understanding of concepts and principles of engineering economy and to develop proficiency with methods for making rational decisions regarding problems likely to be encountered in professional practice.

Module I **8hr**

Introduction of Engineering Economics and Demand Analysis:

Meaning and nature of Economics,Relation between science, engineering, technology and economics; Nature of Economic problem, Production possibility curve, Concepts and measurement of utility, Law of Diminishing Marginal Utility, Law of equi-marginal utility – its practical application and importance.Meaning of Demand, Individual and Market demand schedule, Law of demand, shape of demand curve,Elasticity of demand, measurement of elasticity of demand, practical importance & applications of theconcept of elasticity of demand.

Module –II **8hr**

Meaning of production and factors of production; Law of variable proportions, Returns to scale, Internal and External economics and diseconomies of scale.Various concepts of cost – Fixed cost, variable cost, average cost, marginal cost, money cost, real cost,opportunity cost. Shape of average cost, marginal cost, total cost, Cost curves.

Module III **8hr**

Meaning of Market, Types of Market – Perfect Competition, Monopoly, Oligopoly, Monopolistic Competition (Main features of these markets) Pricing Policies- Entry Deterring policies, Predatory Pricing, Peak load Pricing. Product Life cycle Firm as an organisation- Objective of the Firm, Type of the Firm, Vertical and HorizontalIntegration, Diversification, Mergers and Takeovers.

Module –IV **8hr**

Nature and characteristics of Indian economy (brief and elementary introduction), Privatization – meaning, merits and demerits. Globalization of Indian economy – merits and demerits. Elementary Concepts of VAT, WTO, GATT & TRIPS agreement, Business cycle, Inflation

,

CO	COURSE OUTCOMES
CO 1	Describe and determine the effect of financial analysis and its impact on budgeting of projects and their outcomes.
CO 2	The course enable students to acquire the ability to work individually and on multi - disciplinary teams to identify, formulate and analyze financial problems.
CO 3	Use modern computer-based tools such a spread sheets in performing engineering economic analysis.
CO 4	Quantify and include elements of uncertainty and risk into an economic analysis.
CO 5	Identify the characteristics of various methods used for the generation of financial management decisions..
CO 6	Develop and analysis information on investment planning and cost controls, and conduct cost/benefit analysis.

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L3	3	3	3	3	3	-	-	1	-	-	-	2	3	3	3
CO2	L5	3	3	3	3	3	-	-	1	-	-	-	2	3	3	3
CO3	L1	3	3	3	3	3	-	-	1	-	-	-	2	3	3	3
CO4	L6	3	3	3	3	3	-	-	1	-	-	-	2	3	3	3
CO5	L4	3	3	3	3	3	-	-	1	-	-	-	2	3	3	3
CO6	L1	3	3	3	3	3	-	-	1	-	-	-	2	3	3	3

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

RECOMMENDED BOOKS: -

1. R.Paneer Seelvan: Engineering Economics, PHI
2. Managerial Economics, D.N.Dwivedi, Vikash Publication
3. Managerial Economics, H.L. Ahuja, S. Chand and Co. Ltd.
4. Managerial Economics, Suma Damodaran, Oxford.
5. R.molrishnd Ro T.V S 'Theory of firms : Economics and Managerial Aspects'. Affiliated East West Press Pvt Ltd New Delhi
6. Managerial Economics, H. Craig Petersen &W. Cris Lewis, Pearson Education.

DESIGN AND ANALYSIS OF ALGORITHM LAB

Course Code- CS402P

L-0,T-0,P-3(Credit 1)

Course Outcome:

1. Able to analyse the Real-World Problem and Solv it.
2. Able to analyse Any Algorithm in Terms of Complexity.
3. Able to Compare Different Sorting Algorithm.
4. Able to Design Algorithm by Following Different Approach.

list of experiments:

1. Using a Stack of Characters, Covert an Infix String of Postfix String (I Class)
2. Implement Insertion, Deletion, Searching of a BST, (I Class)
3. (a) Implement Binary Search and Liner Search in a Program. (b) Implement a Heap Sort Using a Max Heap.
4. (a) Implement DFS/BFS for a Connected Graph.
   (b) Implement Dijkstra's Shortest Path Algorithm Using BFS.
5. (a) Write a Program to Implement Huffman's Algorithm.
   (b) Implement MST Using Kruskal/Prim Algorithm
6. (a) Write a Program on Quick Sort Algorithm.
   (b) Write a Program on Merge Sort Algorithm.
   Take Different Input Instance for Both the Algorithm and Show the Running Time.
7. Implement Matrix Chain Order Algorithm.
8. Write Down a Program to Find Out a Solution for 0/1 Knapsack Problem.
9. Using Dynamic Programming Implement LCS.
10. (a) Find Out the Solution on the N-Queen Problem. (b) Implement Back Tracking Using Game Trees.

NOTE: At least ten experiments are to be performed, minimum seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus

,

OPERATING SYSTEM LAB

Course Code- CS401P

L-0,T-0,P-3(Credit 1)

1. Study of hardware and software requirements of different operating systems (UNIX,LINUX,WINDOWS XP, WINDOWS7/8
2. Execute various UNIX system calls for i. Process management ii. File management iii. Input/output Systems calls
3. Implement CPU Scheduling Policies: i. SJF ii. Priority iii. FCFS iv. Multi-level Queue
4. Implement file storage allocation technique: i. Contiguous (using array) ii. Linked –list (using linked-list) iii. Indirect allocation (indexing)
5. Implementation of contiguous allocation techniques: i. Worst-Fit ii. Best- Fit iii. First- Fit
6. Calculation of external and internal fragmentation i. Free space list of blocks from system ii. List process file from the system
7. Implementation of compaction for the continually changing memory layout and calculate total movement of data
8. Implementation of resource allocation graph RAG)
9. Implementation of Banker's algorithm
10. Conversion of resource allocation graph (RAG) to wait for graph (WFG) for each type of method used for storing graph.
11. Implement the solutionfor Bounded Buffer (producer-consumer)problem using inter process communication techniques-Semaphores
12. Implement the solutions for Readers-Writers problem using inter process communication technique Semaphor.

,

FORMAL LANGUAGES AND AUTOMATA THEORY

Course Code- CS403P

L-0,T-0,P-3(Credit 1)

1. Write a program for Pattern searching?
2. Write a program to simulate Nondeterministic Finite Automata (NFA)
3. Write a program to simulate deterministic Finite Automata (DFA)
4. Write a Program to remove Useless Production in a C.F.G
5. Write a Program to remove Unit Production in a C.F.G
6. Create a pushdown automata for string translation

RADHA GOVIND UNIVERSITY
RAMGARH, JHARKHAND

Department of Computer Science & Engineering
Under Faculty of Engineering and Technology

Choice Based Credit System Curriculum for
Bachelor of Technology

SEMESTER V

(Effective from Academic Session 2020-21)

Syllabus for B. Tech course in Computer Science & Engineering

Course Structure for 5th Semester CSE

Sl.No	Course Code	Category	Subject	L	T	P	Credit
1	CSC501	Professional Core-I	Computer Organizationand Architecture	3	1	0	4
2	CSC502	Professional Core-II	Compiler Design	2	1	0	3
3	CSC503	Professional Core-III	Computer Graphics	2	1	0	3
4	ITP501	Professional Electives-I	List of Professional Electives -I	2	1	0	3
5	ITO502	Open Elective-1	List of Open Elective-1	2	1	0	3

LABORATORY/SESSIONAL

Sl. No	**Course Code**	**Category**	**Subject**	**L**	**T**	**P**	**Credit**
1	CS501P	Laboratory-I	Computer Organization Architecture lab	0	0	2	1
2	CS502P	Laboratory -II	Compiler Design Lab	0	0	2	1
Z	CS503P	Laboratory –III	Computer Graphics Lab	0	0	2	1
4	CS504P	Laboratory- IV	Professional Electives –I Lab	0	0	2	1
5	CS505G	Laboratory-V	Seminar	0	0	2	2
TOTAL Credits (Theory + Sessional) = 22							

PROFESSIONAL ELECTIVE 1

COURSE NO	**SUBJECT NAME**
ITP501	Web Technology
CSP504	Linux Programming
CSP505	System Analysis and Design
ITP502	Semantics Web

OPEN ELECTIVE 1

COURSE NO	SUBJECT NAME
CSO506	Data Science*
CSO507	Computer Architecture*
ITO501	Data Base Management System
ITO502	Data Communication

Syllabus for B. Tech course in Computer Science & Engineering

Detailed Syllabus

Computer Science & Engineering					
Code: CSC501	**Computer Organization and Architecture**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**4**

Course Objective:
Students undergoing this course are able to learn the basic structure and operation of a computer and also they can learn the arithmetic and logic unit and the basics of pipelined execution.

MODULE-I: **10hr**
Fundamentals of Digital logic: Boolean algebra, Logic Gates, And Simplification of Logic, Circuits: Algebraic Simplifications, Karnaugh Maps. Combinational Circuits: Adder, Mux, Demux, Sequential Circuits: Flip- Flops (SR, JK, D), Counters: Synchronous and Asynchronous Counter

MODULE II: **6hr**
Computer System: Comparisons of Computer Architecture & Organization, Computer Components Functions, Interconnection Structures. Bus Interconnections, Input/Output: I/O Module, Programmed I/O, Interrupt Driven I/O, Direct Memory Access.

MODULE III: **8hr**
Processor Organization: Processor Organization, Structure and Function, Instruction Formats, Instruction sets, Addressing Modes examples with Assembly Language [8085/8086 CPU}, .Register Organization. Instruction Pipelining, Introduction to RISC and CISC Architecture, Instruction Level Parallelism and Superscalar Processors: Design Issues.

MODULE IV: **8hr**
Memory System Organization: Classification and design parameters, Memory Hierarchy, Internal Memory: RAM, SRAM, and DRAM, Interleaved and Associative Memory.
Cache Memory: Design Principles, Memory mappings, Replacement Algorithms, Cache performances, Cache Coherence. Virtual Memory, External Memory: Magnetic Discs, Optical memory, Flash Memories, RAID levels.

MODULE V: **4hr**
Control Unit: Hardwired Implementation, Micro programmed controls. Micro –Operations, Functional Requirements, Processor Control.

MODULE VI: **8hr**
Fundamentals of advanced Computer Architecture:
Parallel Architecture: Classification of parallel Systems, Flynn's Taxonomy, Array Processors, Clusters, and NUMAC Computers. Multiprocessor System : Structure & Interconnection Networks Multi-Core Computers: Introduction,Organization and Performance.

CO	COURSE OUTCOMES
CO 1	Ability to describe the organization of computer and machine instructions and programs
CO 2	Ability to analyze Input/Output Organization
CO 3	Analyze the working of the memory system and basic processing unit.
CO 4	Ability to solve problems of multicores, multiprocessors and clusters.
CO 5	Choose optical to range media suitable for multimedia applications.
CO 6	Students Can understand the concept of computer architecture.

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L2	1	2	2	_-	-	-	-	-	-	-	-	-	2	3	1
CO2	L1	1	1	2	2	-	-	-	-	-	-	-	-	2	2	3
CO3	L4	2	2	2	2	-	-	-	-	-	-	-	-	2	1	1
CO4	L3	1	3	2	2	-	-	-	-	-	-	-	-	2	1	1
CO5	L5	1	1	2	2	-	-	-	-	-	-	-	-	2	3	1
CO6	L2	3	1	22	-	-	-	-	-	-	-	-	-	2	3	1

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

Text Books:

1. Computer System Architecture by Morris Mano, Prentice hall, 3rd Edition, (2007)

References:

1. Computer Organization by Carl Hamacher, ZvonkoVranesic, SafwatZaky, Tata McGraw Hill, 5th Edition, (2011)

2. Computer Architecture : A Quantitative Approach by Hennessy, J. L, David A Patterson, and Goldberg, Pearson Education, 4th Edition, (2006)

Computer Science & Engineering					
Code: CSC502	**Compiler Design**	**L**	**T**	**P**	**C**
		2	**1**	**0**	**3**

Course Objective:

Knowledge of automata theory, context free languages, computer architecture, data structures and simple graph algorithms, logic or algebra.

MODULE-I: **8hr**

Introduction to compiler and Finite automata

Compilers, Analysis of source programs, Tokens, patterns, lexemes, Phases of compilers, Parsing, Parse trees, Ambiguity, Associativity and precedence of operators, Top -down parsing, Bottom-up parsing, Left recursion, Syntax directed translation. Classification of grammars, NFA, DFA, Conversion of NFA to DFA, RE to NFA (Thompson's Construction), Optimization of NFA/DFA using FIRSTPOS, LASTPOS, FOLLOWPOS.

MODULE-II: **8hr**

Context Free Grammar

RE vs. CFG, Eliminating ambiguity and left recursion, Left factoring.

MODULE-III: **8hr**

Compiler Parser

Top down parsing-LL parser, LL grammars. Bottom up parsing - LR parser, SLR parser, CLR parser, LALR parser. Polishing expressions Operator precedence grammar. LR grammars. Comparison of parsing methods. Error handling.

MODULE-IV: **8hr**

Run time environments

Symbol tables, Language facilities for dynamic storage allocation, Dynamic storage allocation technique, Organization for non-block and block structured languages.

MODULE-V: **8hr**

Intermediate code generation

Intermediate languages, graphical representations, Synthesized and inherited attributes, Dependency graph, Syntax directed translation, S and L- attributed definitions, Polish notation, Three address, quadruples, triples, indirect triples Flow of control statement.

MODULE-VI: **8hr**

Code optimization and code generation

Basic blocks and flow graphs, Optimization of basic blocks, Code optimization techniques, Issues in design of code generator, Target machine code and simple code generator.

CO	COURSE OUTCOMES
CO 1	Identify the issue that arises in the design and construction of translator for programming language.
CO 2	Analyze RE and CFG to specify the lexical and syntactic structure of programming language.
CO 3	Design different parsers from given specification.
CO 4	Assess the various program transformations.
CO 5	Design a compiler for a programming language.
CO 6	Students can able to use code optimization techniques for optimizing the code

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L2	3	3	2	2	-	-	-	-	-	1	-	-	2	-	-
CO2	L4	2	3	-	2	-	-	-	-	-	-	-	-	2	-	-
CO3	L6	3	-	2	2	-	-	-	-	-	2	-	-	2	-	-
CO4	L5	2	2	-	2	-	-	-	-	-	-	-	-	2	-	-
CO5	L6	2	-	2	1	-	-	-	-	-	1	-	-	2	-	-
CO6	L3	1	1	1	1	-	-	-	-	-	-	-	-	2	-	-

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

Suggested Text Books

- Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman, Monica S. Lam, *Compilers: Principles, Techniques, and Tools*. Addison-Wesley, 2006 (optional).
- Thomas W. Parsons, *Introduction to Compiler Construction*. Computer Science Press,**1992.**

Suggested Reference books

- Compiler design in C, A.C. Holub, PHI.
- Compiler construction (Theory and Practice), A.Barret William and R.M. Bates, Galgotia Publication.
- Compiler Design, Kakde.

Syllabus for B. Tech course in Computer Science & Engineering

Computer Science & Engineering					
Code: CSC503	**Computer Graphics**	**L**	**T**	**P**	**C**
		2	**1**	**0**	**3**

Course Objective :

This course covers basics of computer graphics. Computer graphics are pictures and films created using computers. Usually, the term refers to computer -generated image data created with the help of specialized graphical hardware and software. It is a vast and recently developed area of computer science. Computer graphics is responsible for displaying art and image data effectively and meaningfully to the consumer. It is also used for processing image data received from the physical world. Computer graphics development has had a significant impact on many types of media and has revolutionized animation, movies, advertising, video games, and graphic design in general.

Detail Syllabus

Module – I: **8hr**

Introduction to computer graphics and graphics systems. Raster and vector graphics systems, video display devices, physical and logical input devices, simple color models.

Module – II: **8hr**

Points & lines, Line drawing algorithms; DDA algorithm, Brenham's line algorithm, Circle generation algorithm; scan line polygon, fill algorithm, boundary fill algorithm, flood fill algorithm.

Module – III: **8hr**

2D Transformation : Basic transformations : translation, rotation, scaling ; Matrix representations & homogeneous coordinates, transformations between coordinate systems ; reflection shear ; Transformation of points, lines, parallel lines, intersecting line

Module – IV: **8hr**

Viewing pipeline, Window to Viewport co-ordinate transformation, clipping operations, point clipping, line clipping, clipping circles, polygons & ellipse.

Module – V: **8hr**

Hidden Surfaces: Depth comparison, Z-buffer algorithm, Back face detection, BSP tree method, the Printer's algorithm, scan-line algorithm; Hidden line elimination, wire frame methods, fractal - geometry. Rendering of a polygonal surface; Flat, Gouraud, and Phong shading; Texture mapping, bump texture, environment map; Introduction to ray tracing; Image synthesis, sampling techniques, and anti-aliasing.

CO	COURSE OUTCOMES
CO 1	Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
CO 2	Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.
CO 3	Use of geometric transformations on graphics object and the application in composite form.
CO 4	Extract scene with different clipping methods and its transformation to graphics display device.
CO 5	Render projected objects to naturalize the scene in 2Dview and use of illumination models for this
CO6	Students will learn how to develop interactive graphics applications, including games, simulations, and multimedia presentations

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO 3	PO4	PO 5	PO6	PO 7	PO8	PO 9	PO10	PO11	PO12	PSO1	PSO 2	PSO 3
CO 1	L2	-	3	-	-	-	-	-	-	-	2	-	-	1	-	3
CO 2	L4	3	2	3	2	3	1	-	-	-	-	-	-	1	-	3
CO 3	L3	1	-	3	-	2		-	-	2	-	-	-	1	-	-
CO 4	L3	2	2	3	-	2	1	-	-	-	-	-	-	-	-	-
CO 5	L3	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 6	L5	2	2	3	-	2	1	-	-	-	-	-	-	-	-	-

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

Text Books

1. Donald Hearn and Pauline Baker Computer Graphics, Prentice Hall, New Delhi, 2012

2. Steven Harrington, "Computer Graphics- A programming approach", McGraw 3. Hill, 2nd Edition, 1987.

Reference Book

3. Foley J.D., Van Dam A, "Fundamentals of Interactive Computer Graphics", Addison Wesle

Computer Science & Engineering					
Code: ITP501	**Web Technology**	**L**	**T**	**P**	**C**
		2	**1**	**0**	**3**

Course Objective:

The focus in this course is on the World Wide Web continues to provide a foundation for the developmentofabroadrangeofincreasinglyinfluentialandstrategictechnologies,supporting a large variety of applications and services, both in the private and public sectors. There is a growing need for management and decision makers to gain a clearer understanding of the application development process, from planning through to deployment and maintenance. In this course, you will learn about the HTTP communication protocol, the markup languages HTML, XHTML and XML, the CSS standards for formatting and transforming web content, interactive graphics, multimedia content on the web, client - sideprogramming using JavaScript; an understanding of approaches to more dynamic and mobile content; anddemonstrate how you can analyze requirements, plan, design, implement and test arrange of web applications.

Module – I **8hr**

Web Basics and Overview: Introduction to Internet, World Wide Web, Web Browsers, URL, MIME, HTTP, Web Programmer Toolbox.

HTML Common Tags: List, Tables, images, forms, frames, Cascading Style Sheets (CSS) & its Types. Introduction to Java Script, Declaring variables, functions, Event handlers (on click, onsubmit,etc..)And Form Validations.

Module – II **8hr**

Introduction to XML: Document type definition, XML Schemas, Presenting XML, Introduction to XHTML, Using XML Processors: DOM and Sax...

PHP: Declaring Variables, Data Types, Operators, Control structures, Functions.

Module – III **8hr**

Web Servers and Servelts : Introduction to Servelts,Lifecycle of a servlet,JSDk, Deploying Servlet, The ServletAPI The javax.Servlet package, reading Servlet parameters, reading Initialization parameters. The Javax.servlet Http package, Handling Http Request 7& Responses, Cookies and session Tracking.

Module – IV **8hr**

Database access: database Programming using JDBC, JDBC drivers, Studying javax.sql.* package, Connecting to database in PHP, Execute Simple Queries, Accessing a Database from a Servlet. Introduction to struts frameworks.

Module – V **8hr**

JSP Application Development: The Anatomy of a JAP page, JSP Processing. JSP Application Design and JSP Environment, JSP Declaration, Directives, Expressions, Scripting Elements, implicit objects.

Java Beans: Introduction to Beans, deploying Java Beans in a JSP page.

CO	COURSE OUTCOMES
CO 1	Describe various web technology and application development issues and trends.
CO 2	Design static and dynamic web pages using HTML, CSS and JavaScript.
CO 3	Design and implement webservices from the server and client side.
CO 4	Build interactive Web applications using JSP and Servlet.
CO 5	Identify the engineering structural design of XM Land parse construction tree model.
CO6	Students will acquire skills in integrating databases into web applications and managing .

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L2	3	-	1	3	-	-	-	-	2	-	-	-	-	-	-
CO2	L6	1	2	3	3	-	-	-	-	1	-	-	-	-	-	-
CO3	L6	3	-	-	3	-	-	-	-	1	-	-	-	-	-	-
CO4	L4	3	-	3	3	-	-	-	-	1	-	-	-	-	-	-
CO5	L2	2	-	2	3	-	-	-	-	1	-	-	-	-	-	-
CO6	L5	3	-	3	3	-	-	-	-	1	-	-	-	-	-	-

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

Text Books:

1. Chris Bates, "Web Programming: Building Internet Applications", Wiley Dream Tech, 2nd Edition, 2002.
2. Jeffrey C K Jackson, Web Technologies", Pearson Education, 1stEdition, 2006.
3. Jason Hunter, William Crawford Java Servlet Programming‖ O'Reilly Publications, 2nd Edition, 2001.

References:

1. W Hans Bergsten, "Java Server Pages", O"Reilly, 3rd Edition, 2003.
2. D. Flanagan, "Java Script", O"Reilly, 6th Edition, 2011.
3. Jon Duckett, "Beginning Web Programming", WROX, 2nd Edition, 2008.
4. Herbert Schildt, "Java the Complete Reference", Hill - Osborne, 8th Edition, 2011

Computer Science & Engineering					
Code: CSP504	**Linux Programming**	**L**	**T**	**P**	**C**
		2	**1**	**0**	**0**

Course Objective:

Provide the skills needed to develop and customize Linux shell programs and to make effective use of a wide range of standard Linux programming and development tools.

Module -I: **10hr**

Linux Utilities:

File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters, Text processing utilities, Backup utilities;

Shell programming with Bourne Again Shell (bash): Introduction, Shell responsibilities, Pi pes and redirection, here documents, Running a shell script, Shell as a programming language, Shell meta characters, File -name substitution, Shell variables, Command substitution, Shell commands, The environment, Quoting, test command, Control structures, Arithmetic in shell, Shell script examples, Interrupt processing functions, Debugging shell scripts.

Module-II: **8hr**

Files and Directories:

File concepts, File types File system structure, file metadata - Inodes, kernel support for files, System calls for the file I/O operations- open,create,read,wrirte,close,lseek,dup2,file status information -stat family, file and record locking-fcntl function, file permissions- chmod, fchmod, file ownership- chown, lchown, fchown, links -soft links and hard links- symlink, link, unlink.

Directories: Creating, removing and changing Directories - mkdir, rmdir, chdir, obtaining current working directory- getcwd, directory contents, scanning directories - opendir, readdir, rewin functions.

Module- III: **8hr**

Process: Process concept, Layout of a C program image in main memory, Process environment – environment list, environment variables, getenv, setenv, Kernel support for process, Process identification, Process control - Process creation, replacing a process image, waiting for process, Process termination, Zombie process, Orphan process,
,system call interface for process management – fork, vfork, exit, wait, waitpid, exec family, process groups, sessions and controlling Terminal, differences between threads and processes.

Signals: Introduction to signals, Signal generation, Signal handling, Kernel support for signals, signal function, Unreliable signals, Reliable signals, Signal functions: kill, raise, alarm, pause, abort, sleep.

Module- IV: **8hr**

Inter process Communication: Introduction to IPC, IPC between processes on a single computer system, IPC between processes on different systems, Pipes-creation IPC between related processes using FIFOs (Named pipes), differences between unnamed and named pipes, popen and pclose library functions.

Message Queues: Kernel support for messages, APIs for message queues, Client/Serve example

Semaphores: Kernel support for semaphores, APIs for semaphores, file locking with semaphores.

Module-V: **5hr**

Shared Memory: Kernel support for Shared Memory, APIs for Shared Memory, Shared Memory example.

Sockets: Introduction to Berkley Sockets, IPC over a network, client – server model, Socket address structures (Unix domain and internet domain), Socket system calls for connection oriented protocol and connectionless protocol, example- client/server programs- single server- client connection, multiple simultaneous clients, socket options- setsockopt and fcntl system calls, comparison of IPC mechanisms.

CO	COURSE OUTCOMES
CO 1	Able to understand the basic commands of Linux operating system and can write shell scripts.
CO 2	Able to create file systems and directories and operate them
CO 3	Students will be able to create processes background and foreground etc. by fork() system calls
CO 4	Able to create shared memory segments, pipes, message queues and can exercise inter process communication
CO 5	Students can be able to understand the inter process or different server. Communication between programs running on the servers
CO6	Learners will develop proficiency in using the Linux command-line interface (CLI) for performing common tasks such as file manipulation,

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L1	1	1	1	3	-	-	-	-	2	-	-	-	2	-	-
CO2	L4	2	2	3	3	-	-	-	-	1	-	-	-	2	1	-
CO3	L5	1	1	-	3	-	-	-	-	1	-	-	-	2	1	-
CO4	L6	2	-	3	1	-	-	-	-	1	-	-	-	2	1	-
CO5	L1	1	-	2	3	-	-	-	-	1	-	-	-	-	-	-
CO6	L3	1	1	-	1	-	-	-	-	1	-	-	-	2	1	-

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

TEXT BOOKS:-

1. Unix System Programming using C++, T. Chan, PHI.
2. UNIX concepts and Applications, 4th Edition, Sumitabha Das, TMH.
3. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones, Wrox, Willey India Edition.

REFERRENCE BOOKS:

1. Linux System Programming. Robert Love, O'Reilly, SPD.
2. Advanced Programming in the Unix environment, 2nd Edition, W.R.Stevens, Pearson Education.
3. NIX Network Programming, W.R.Steven, PHI.
4. UNIX for Programming and users, 3rd Edition, Graham Glass, King Ables, Pearson Edition.
5. UNIX and shell Programming, B.A.Forouzan and R.F.Koretsky, S.A.Sarawar, Pearson edition.
6. Unix The Text book, 2nd edition, S.M.Sarawar, Koretsky, S.A.Sarawar, Pearson Edition

Computer Science & Engineering					
Code: CSP505	**System Analysis and Design**	**L**	**T**	**P**	**C**
		2	**1**	**0**	**3**

Course Objective:

The objective of this course is to provide adequate understanding of systems concept, system analysis and system design, which would help them in having efficient and workable information System for management.

MODULE- I: **8hr**

INTRODUCTION

System definition and concepts: Characteristics and types of system, Manual and automated systems Real-life Business sub-systems: Production, Marketing, Personal, Material Finance Systems models types of models: Systems environment and boundaries, Real-time and distributed systems, Basic principles of successful systems

MODULE- II: **10hr**

SYSTEMS ANALYST

Role and need of systems analyst, Qualifications and responsibilities, Systems Analyst as and agent of change, Introduction to systems development life cycle (SDLC): Various phases of development: Analysis , Design, Development, Implementation, Maintenance Systems documentation considerations: Principles of systems documentation, Types of documentation and their importance, enforcing documentation discipline in an organization.

System Planning

Data and fact gathering techniques: Interviews, Group communication, Presentations, Sitevisits. Feasibility study and its importance, Types of feasibility reports System Selection plan and proposal Prototyping

Cost-Benefit and analysis: Tools and techniques

Input and Output Classification of forms: Input/output forms design, User-interface design, Graphical interfaces

System Implementation and Maintenance

Planning considerations, Conversion methods, producers and controls, System acceptance Criteria, System evaluation and performance, Testing and validation, Systems quality Control and assurance, Maintenance activities and issues.

MODULE- III: **8hr**

SYSTEMS DESIGN AND MODELING

Process modeling, Logical and physical design, Design representation, Systems flowcharts and structured charts,

Data flow diagrams, Common diagramming conventions and guidelines using DFD and ER diagrams. Data modeling and systems analysis, designing the internals: Program and Process design, Designing Distributed Systems.

Input and Output Classification of forms:

Input/output forms design, User-interface design, Graphical interfaces

MODULE- IV: **8hr**
MODULAR AND STRUCTURED DESIGN

Module specifications, Module coupling and cohesion, Top-down and bottom-up design

System Implementation and Maintenance

Planning considerations, Conversion methods, producers and controls, System acceptance Criteria, System evaluation and performance, Testing and validation, Systems quality Control and assurance, Maintenance activities and issues.

MODULE- V: **5hr**

SYSTEM AUDIT AND SECURITY

Computer system as an expensive resource: Data and Strong media Procedures and norms for utilization of computer equipment, Audit of computer system usage,Audit trails
Types of threats to computer system and control measures: Threat to computer system and control measures, Disaster recovery and contingency planning

Object Oriented Analysis and design

Introduction to Object Oriented Analysis and design life cycle, object modeling: Class Diagrams, Dynamic modeling: state diagram, Dynamic modeling: sequence diagramming.

CO	COURSE OUTCOMES
CO 1	Understand and explain the overall architecture of semantic web and to illustrate the overview of design principles and technologies in semantic web.
CO 2	Design and implement a small ontology that is semantically descriptive of your chosen problem domain, implement applications that can access, use and manipulate the ontology, represent data from a chosen problem in XML with appropriate semantic tags obtained or derived from the ontology.
CO 3	Describe the semantic relationships among the data elements using Resource Description Framework(RDF).
CO 4	Design and implement a web services application that ―discovers the data and/or other web services via the semantic web (which includes the RDF, data elements in properly tagged XML, and the ontology), discover the capabilities and limitations of semantic web technology for different applications.
CO 5	Students can able to use different semantic tools
CO6	Software Design Patterns and Best Practices

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L2	-	3	2	-	-	-	2	-	-	1	-	-	-	3	2
CO2	L1	-	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO3	L4	-	-	2	-	-	3	-	-	-	2	-	-	-	-	2
CO4	L6	-	2	-	-	-	-	-	-	-	-	-	-	-	2	-
CO5	L3	-	-	2	-	-	-	-	-	-	1	-	-	-	-	2
CO6	L5	-	2	-	-	-	-	-	-	-	-	-	-	-	2	-

H- High(3), M- Moderate(2), L- Low(1), '-' for No correlation

TEXT BOOKS: -

1. System Analysis and Design Methods, Whitten, Bentaly and Barlow, Galgotia Publication.
2. System Analysis and Design Elias M. Award, Galgotia Publication

REFERENCES

1. Modern System Analysis and Design, Jeffrey A. Hofer Joey F. George JosephS. Valacich Addison Weseley

Computer Science & Engineering					
Code: ITP502	**Semantics Web**	**L**	**T**	**P**	**C**
		2	**1**	**0**	**3**

Course Objective:
The aim of this course is to teach the students the concepts, technologies and techniques underlying and making up the Semantic web.

DETAIL SYLLABUS:

MODULE-I: **8hr**

INTRODUCTION

Introduction to the Syntactic Web and Semantic Web – Evolution of the Web – the Visual and Syntactic Web – Levels of Semantics – Metadata for Web Information – the Semantic Web Architecture and Technologies – Contrasting Semantic with Conventional Technologies– Semantic Modelling -Potential of Semantic Web Solutions and Challenges of Adoption Design Principles.

MODULE-II: **8hr**

KNOWLEDGE REPRESENTATION AND ONTOLOGIES

Knowledge Representation and Reasoning - Ontologies- Taxonomies –Topic Maps – Classifying Ontologies - Terminological Aspects: Concepts, Terms, Relations Between Them – Complex Objects - Subclasses and Sub- properties definitions –Upper Ontologies – Quality – Uses - Types of Terminological Resources for Ontology Building – Methods and Methodologies for Building Ontologies – Multilingual Ontologies -Ontology Development Process and Life Cycle – Methods for Ontology Learning – Ontology Evolution – Versioning Ontologies in Semantic Web.

MODULE-3: **8hr**

STRUCTURING AND DESCRIBING WEB RESOURCES

Structured Web Documents - XML – Structuring – Namespaces – Addressing – Querying – Processing - RDF –

RDF Data Model – Serialization Formats- RDF Vocabulary –Inferencing RDFS – basic Idea – Classes – Properties- Utility Properties – RDFS Modelling for Combinations and Patterns- Transitivity.

MODULE-4: **8hr**

WEB ONTOLOGY LANGUAGE

OWL – Sub-Languages – Basic Notions -Classes- Defining and Using Properties – Domain and Range – Describing Properties - Data Types – Counting and Sets- Negative Property Assertions – Advanced Class Description – Equivalence – OWL Logic.

MODULE-5: **8hr**

SEMANTIC WEB TOOLS AND APPLICATIONS

State - of- the- Art in Semantic Web Community-Development Tools for Semantic Web – Jena Framework – SPARL –Querying Semantic Web- Semantic Desktop – Semantic Wikis - Semantic Web Services – Application in Science – Business

TEXTBOOKS:

1. LiyangYu,‖A Developer's Guide to the Semantic Web‖, Springer, First Edition, 2011.
2. John Hebeler, Matthew Fisher, Ryan Blace and Andrew Perez-opez, ―Semantic Web Programming‖, First Edition, Wiley, 2009.
3. Grigoris Antoniou, Frank van Harmelen, ―A Semantic Web Primer‖, Second Edition, MIT Press, 2008.
4. Robert M.Colomb,‖Ontology and the Semantic Web‖, Frontiers in Artificial Intelligence and Applications, IOS Press, 2007.
5. Dean AllemangandJamesHendler,‖Semantic Web for the Working Ontologist: Effective Modeling in RDFS and OWL‖, Second Edition, Morgan Kaufmann, 2011.

REFERENCES:

1. Michael C. Daconta, Leo J.Obrst and Kevin T. Smith, ―The Semantic Web: A Guide to the Future of XML,
2. Web Services, and Knowledge Management‖, First Edition, Wiley, 2003
3. Karin Breitman, MarcoAntonio Casanova and Walt Truszkowski, ―Semantic Web:
4. Concepts, Technologies and Applications(NASA Monographs in Systems and Software Engineering) Springer.

Computer Science & Engineering					
Code: CSO507	**Computer Architecture***	**L**	**T**	**P**	**C**
		2	**1**	**0**	**3**

***This course open to all branch except**

CSE/IT. Course Objective:

This Course is intended to teach the basics involved in data representation and digital logic circuits used in the computer system and also students can get the knowledge of the basic arctiture of processing , memory and I/O organistaion in a computer system.

MODULE-I: **8hr**

Basics of Digital Electronics: Multiplexers and De multiplexers, Decoder andEncoder, Codes, Logic gates, Flipflops, Registers. **Register Transfer and Micro Operations:** Bus and Memory Transfer, Logic Micro Operations, Shift Micro Operations, Register transfer and register transfer language, Design of arithmetic logic unit.

MODULE-II: **5hr**

Basic Computer Organization: Instruction codes, Computer instructions, Timing and Cont rol, Instruction cycle, Memory reference Instruction, Complete computer description, Design of basic computer, Input output and interrupt.

MODULE-III: **8hr**

Control Unit: Hardwired controls, Micro programmed controls. **Central Processing Unit** : Program control, Reduced instruction set computer, Complex instruction set computer, Data Transfer, Manipulation, General register and stack organization, Addressing mode.

MODULE-IV: **3hr**

Computer Arithmetic: Addition and subtraction algorithm, Multiplication algorithm, Division algorithms.

MODULE-V: **5hr**

Input-Output Organization: Priority interrupt, Peripheral devices, Input output interface, Data transfer schemes, Program control and interrupts, Direct memory access transfer, Input/output processor.

Memory Unit: High speed memories, Memory hierarchy, Processor Vs Memory speed, Cache memory, Associative memory, Inter leave, Virtual memory, Memory management.

MODULE-VI: **5hr**

Introduction to Parallel Processing: Pipelining, Characteristics of multiprocessors, Interconnection structures, Inter processor arbitration, Inter processor communication, Synchronization.

CO	COURSE OUTCOMES
CO 1	Ability to describe the organization of computer and machine instructions and program
CO 2	Ability to analyse Input/output Organization
CO 3	Analyse the working of the memory system and basic processing unit.
CO 4	Ability to solve problems of multicores, multiprocessors and clusters.
CO 5	Choose optical to rage media suitable formulate media applications.
CO 6	Understand the concept of parallel processing

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L1	1	-	1	-	-	-	-	-	2	-	-	-	-	-	-
CO2	L4	3	-	3	-	-	-	-	-	1	-	-	-	-	1	-
CO3	L4	3	-	-	-	-	-	-	-	1	-	-	-	-	1	-
CO4	L3	2	-	3	-	-	-	-	-	1	-	-	-	-	1	-
CO5	L5	3	-	2	3	-	-	-	-	1	-	-	-	-	-	-
CO6	L1	3	-	-	3	-	-	-	-	1	-	-	-	-	-	-

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

Text Books:

1. Computer System Architecture by Morris Mano, Prentice hall, 3rd Edition, (2007)

References:

1. Computer Organization by Carl Hamacher, ZvonkoVranesic, SafwatZaky, Tata Mcgraw Hill, 5th Edition, (2011)
2. Computer Architecture : A Quantitative Approach by Hennessy, J. L, David A Patterson, and Goldberg, Pearson Education, 4th Edition, (2006)

Computer Science & Engineering					
Code: ITC501	**Information System**	**L**	**T**	**P**	**C**
		2	**1**	**0**	**3**

Course Objective:
The purpose of the course is to provide students with solid grounding in business uses of information technology in a rapidly changing environment ,and to provide discussion of critical issues surrounding the use of IT
in organizations.

Module 1– 8hr
Introduction to Information systems
Information system, Fundamental roles of IS in business, Trends in information systems, The roles of IS in business, Types of Information systems; Components of Information Systems, Information system resources, information system activities, recognizing information systems; Fundamentals of strategic advantage, Using information technology for strategic advantage.

Module 2: 8hr
Information Technology
Computer hardware; Computer software: Application software and System software; Data resourcemanagement: database management, database structures, data warehouse and data mining;Telecommunication and networks: Networking the enterprise, Telecommunication network alternatives; types of telecommunication networks.

Module 3: 8hr
Business Applications
Enterprise business systems, Enterprise Resource Management, Customer relationship Management, Supply Chain Management, Benefits and challenges; E -Commerce systems, Decision support system, Executive information systems, knowledge management systems,Artificial intelligence technologies in business.

Module 4: 8hr
Development Process
System analysis and design, Systems development life cycle, starting the systems development process, systems analysis, systems design, End User development, Implementation activities, implementation challenges.

Module 5: 8 h r
Management Challenges
Business/IT security, ethics and society; ethical responsibility of business professionals, Privacy issues, computer crime, tools of security management, internetworked security defenses, security measures, System controls and audits; Managing information technology, Global IT management

CO	COURSE OUTCOMES
CO 1	Define fundamental concepts of the information system
CO 2	Relate the basic concepts and technologies used in the field of information systems
CO 3	Understand various applications of IS in business environment and management.
CO 4	Able to design and develop information systems.
CO 5	Apply and analyse the different security challenges and ethical measures
CO6	Information Security and Risk Management , and cybersecurity frameworks

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L1	1	1	1	3	-	-	2	-	2	-	-	-	2	-	-
CO2	L1	3	2	3	3	-	-	-	-	1	-	-	-	2	1	-
CO3	L2	3	1	-	3	-	-	2	-	1	-	-	2	2	1	-
CO4	L6	2	-	3	3	-	-	-	-	1	-	-	-	2	1	-
CO5	L3	3	-	2	3	-	-	2	-	1	-	-	-	-	-	-
CO6	L4	2	-	2	3	-	-	2	-	1	-	-	1	-	-	2

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

Textbooks:

1. O'Brien J. A. and Marakas G. M., Introduction to Information Systems, 14th Edition, McGraw-Hill Irwin, 2008.

Reference:

1. Kenneth C. Laudon, Jane Price Laudon, "Management Information Systems: Managing the digital firm", Pearson Education, PHI, Asia.
2. "Management Information Systems – The ManagersView", Tata McGraw Hill, 2008. Davis, Gorden B. Olson, M.H,
3. Jawadekar W S, "Management Information Systems", Second Edition, 2002, Tata.

Computer Science & Engineering					
Code: ITO502	**Data Communication**	**L**	**T**	**P**	**C**
		2	**1**	**0**	**3**

Course Objective:

To understand the basic concepts of data communications, layered model, protocols and inter working Between computer networks and switching components in telecommunications systems.

Module 1: **8hr**

Introduction to Data Communication and networking:

Standard organization for data Communications, Layered Network Architecture, open System interconnection, Data Communications circuits , Serial and Parallel Daata Transmission, Data communications circuit Arrangements, Data communications Networks , Alternate Protocol Suites.

Signals, Noise, Modulation and Demodulation: Signal Analysis, Electrical Noise and signal to noise Ratio, Analog Modulation System, Information Capacity, Bits<Bit Rate,Baud , and M-ary Encoding Digital Modulation.

Module 2: **12hr**

Metallic Cable Transmission Media:

Metallic Transmission lines, Transverse Electromagnetic Waves, Characteristics of Electromagnetic Waves, and Transmission line classification, Metallic Transmission Line types, Metallic line losses.

Optical Fiber Transmission Media: Advantages of optical fiber cables, Disadvantages of optical fiber cable, Electromagnetic spectrum, optical Fiber communication system block diagram, optical fiber construction, propagation of light through an optical fiber cable, optical fiber Modes and classification, losses in optical fiber cables ,light sources, light detectors, lasers.

Digital Transmission : Pulse Modulation pulse Code Modulation, Dynamic Range , signal Voltage –to-Quantization Noise Voltage Ratio,Companding, PCM line speed, Time Division Multiplexing , Frequency Division Multiplexing, Wavelength-Division multiplexing.

Module 3: **8hr**

Wireless Communication Systems: Electromagnetic Polarization, Rays and Wave fronts Electromagnetic Radiation, Wave Attenuation and Absorption, Microwave Communications System, Satellite Communications Systems.

Telephone Instruments and signals: The Subscriber Loop, Standard Telephone Set, Basic Telephone call procedures, Cordless Telephones, Caller ID, and Electronic Telephones, paging systems.

Cellular Telephone systems: First Generation Analog Cellular Telephone, Personal communications systems, second generation cellular Telephone Systems, N-AMPS, Digital Cellular Telephone, North American Cellular and OCS summary, Global system for Mobile Communications, personal Communications satellite system.

Module 4: **8hr**

Data Communication codes, error control and data formats: Data Communications Character Codes, Bar codes, Error control, Error Detection, Error Correction, Character Synchronization.

Module 5: **8hr**

Data Communications Equipment: Digital service unit and channel service unit, Voice Band Data communication modem, Bell systems-compatible voice-Band Modems, voice band modem block diagram, Voice –Band modem classification, Asynchronous Voice-Bands Modem, Synchronous Voice-Band Modems, Modem Synchronization, Cable Modem probability of error and Bit Error rate.

Data Link protocols: Data Link protocols functions, Character and Bit oriented protocols, Data Transmission Modes, Asysnchronous Data –link protocols, Synchronous Data link Protocols, Synchronous Data –Link Control,High –Level Data-Link control.

CO	COURSE OUTCOMES
CO 1	Interpret the components, tools and techniques of communication systems
CO 2	To determine the various modulation and error detection and correction technique And their application in communication systems
CO 3	understand the conversion of the signals from digital to digital, Analog to digital, And Digital to Analog Conversion, bandwidth utilization technique
CO 4	Illustrate the TCP/IP and OSI Reference model and identify their differences in implementation within and across enterprises
CO 5	Students can understand how data link layer takes data bits and frames and creates packets of the data
CO 6	Understand the and contrast the concept of Signals,OSI and TCP.

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L2	1	2	-	-	-	-	-	-	2	-	-	-	2	-	-
CO2	L3	1	2	-	-	-	-	-	-	1	-	-	-	2	1	-
CO3	L2	2	2	-	-	-	-	-	-	1	-	-	-	2	1	-
CO4	L3	3	1	2	2	-	-	-	-	1	-	-	-	2	1	-
CO5	L2	2	1	-	-	-	-	-	-	1	-	-	-	-	-	-
CO6	L2	3	3	-	-	-	-	-	-	1	-	-	-	-	-	-

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

Reference books:-

1. "Data and Computer Communication" by William Stallings
2. "Data Communication and Networking" by Behrouz A Forouzan
3. "Computer Networks" by Andrew S Tanenbaum
4. "Communication Systems" by B P Lathi
5. "Communication Systems: Analog and Digital" by Sanjay

Computer Science & Engineering					
Code: CS501P	**Computer Organization and Architecture Lab**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

List of Experiments:

1. To design Half adder and Full adder circuit using Multi -Sim and verify the truth table.
2. To design Half sub-tractor and Full sub-tractor circuit using Multi-Sim and verify the truth table.
3. To construct and verify the operation of Parit y Bit Generator and Checker.
4. To construct and verify operation of 4x1, 8x1 Multiplexer.
5. To construct and verify the operation of 3x8 Decoder and 8x3 Encoder.
6. To design 2-bit arithmetic and logic unit and verify the truth table.
7. To design 4-bit universal shift register and verify the truth table.
8. To design the 4-bit ALU and verify the truth table.
9. To generate digital clock signal using 555 Timer.
10. To design 4-bit Binary Up Counter and verify the truth table.
    a. To study Cache Memory.
    b. To study Hardwired Control Unit&Micro-programmed Control Unit.

Computer Science & Engineering					
Code: CS502P	**Compiler Design Lab**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

List of Experiments

1. To Design a lexical analyzer for given language to recognize a few patterns in C (Ex. identifiers, constants, comments, operators etc.) and the lexical analyzer should ignore redundant spaces, tabs, and new lines.
2. To test whether a given identifier is valid or not.
3. To find out the FIRSTPOS and FOLLOWPOS for a given expression.
4. To implement LL (1) parser.
5. To implement Recursive Descent parser.
6. To implement a Symbol Table.
7. To identify that, for a given set of grammar, whether the string belongs to that grammar or not.

Computer Science & Engineering					
Code: CS503P	**Computer Graphics Lab**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

List of Experiments:

1. To implement DDA Line Drawing Algorithm.
2. To implement Bresenham's Line Drawing Algorithm.
3. To implement Mid-Point Circle Drawing Algorithm.
4. To implement Mid-Point Ellipse Drawing Algorithm.
5. To implement 2-D Transformation.
6. To implement Boundary Fill Algorithm.
7. To implement Flood Fill Algorithm.
8. To implement Cohen Sutherland Line Clipping Algorithm.
9. To implement Sutherland Hodgeman Polygon Clipping Algorithm.

Computer Science & Engineering					
Code: CS504P	**Linux Programming Lab**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

List of experiments:

1. Execute various Linux shell commands in bash shell and explore various options and arguments using man page.

2. Shell Script basics

   i. Write a shell script that accepts a file name, starting and ending line numbers as arguments and displays all the lines between the given line numbers
   ii. Write a shell script that deletes all lines containing a specified word in one or more files supplied as arguments to it
   iii. Write a shell script that displays a list of all files in the current directory to whi ch the user has read, write and execute permissions.
   iv. Write a shell script that receives any number of file names as its arguments, checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file, the number of lines on it is also reported.

   v. Write a shell script that receives any number of file names as its arguments, counts and reports the occurrence of each word that is present in the first argument file on other argument files.
   vi. Write a shell script to list all of the directory files in a directory.

3.
   i. Write a C program that makes a copy of a file using standard I/O and system calls.
   ii. Write a C program to emulate the Unix 'ls -l' command.
   iii. Write client and server programs (using C) for interaction between server and client processes using Unix Domain sockets.
   iv. Write a C program to list every file in a directory, its inode number and file name.
   v. Implement in C the following Linux commands using system calls:
   (a) cat (b) ls (c) mv

   vi. Write a C program to emulate the UNIX ls –l command.
   vii. Write a C program to list for every file in a directory, its inode number and file name.
   viii. Write a C program that demonstrates redirection of standard output to a file.

Ex: ls > f1.

4. Write a C program to create a child process and allow the parent to display “parent” and the child to display “child” on the screen.
5. Write a C program to create a Zombie process and orphan process.
6. Write a C program that illustrates how to execute two commands concurrently with a command pipe. Ex: – ls –l | sort
7. Write C programs that illustrate communication between two unrelated processes using named pipe

8. Write a C program to create a message queue with read and write permissions to write 3 messages to it with different priority numbers.
9. Write a C program to allow cooperating processes to lock a resource for exclusive use, using a) Semaphores b) flock or lockf system calls.
10. Write a C program that illustrates suspending and resuming processes using signals.
11. Write a C program that implements a producer-consumer system with two processes. (Using Semaphores).
12. Write client and server programs (using c) for interaction between server and client processes using Unix Domain sockets.
13. Write client and server programs (using c) for interaction between server and client processes using Internet Domain sockets.
14. Write a C program that illustrates two processes communicating using shared memory.

Computer Science & Engineering					
Code: IT501P	**Information System Lab**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

List of Experiments:

1. Develop a student management system.

- It should contain all the information of University or a school.
- It should contain all the information of University Infrastructure or a school.
- It should contain all the information of University Students.

2. Design a marketing information system with fundamental inputs and

outputs Inputs: 1. Sales on units by each salesman for a period.

2. Estimated sales in units of competitor corresponding to above.

3. Economic conditions and trends.

Outputs: 1. Sales by product i .e. month wise and till date.

2. Sales by salesman i.e. month wise and till date.

3. Sales by trend analysis.

4. Sales forecasting

3. Given a fact table with sales data (for example sales (market#, product#, time#, amount) – see the lecture notes) and relevant dimension tables, write an SQL statement that slices the cube to select sales only in week 2, and dice it by regions.

4. To design a Personal Management Information System using XML to implement E -Commerce Marketing Strategies.

5. To identify top retail web sites and online sales volume of those websites and perform pattern analysis using data mining concepts.

6. To design an online learning database application with DBMS operations, working with tables, queries, forms, reports and data analysis.

7. To develop a transaction processing application to discover or identify similar patterns from transaction data using data mining techniques.

8. Case study 1

9. Case study 2

10. Mini Project

Computer Science & Engineering					
Code: IT502P	**Web Technology Lab**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

List of Experiments

1. Design a web page using HTML which includes the following:

- To display your education details in a tabular format.
- To illustrate the usage of HTML Lists.
- To embed an image and create a link such that clicking on image takes user to other page.
- To embed an image map in a web page.
- To embed Audio and Video in a web page.

2. Design a static web page using HTML which includes the following:

- To create a frameset having header, navigation and content sections.
- To create frames such that page is divided into 3 frames 20% on left to show contents of pages, 60% in center to show body of page, remaining on right to show remarks.

3. Write an HTML program to design an Entry form of student details and send it to store at database server like SQL, Oracle or MS Access.

4. Design a web page using CSS which includes the following:

- Use different font styles.
- Set background image for both the page and single elements on page.
- Control the repetition of image with background -repeat property
- Define style for links as a:link, a:active, a:hover, a:visited
- Add customized cursors for links.
- Work with layers.

5. Write a Java applet program:

- To display moving text or content.
- To draw lines, ovals, and rectangles.
- To display a Digital Clock.
- To select a URL from my Applet and send the browser to that page.

6. Write a JavaScript program:

- To design the scientific calculator and make event for each button.
- To compute the squares and cubes of the numbers from 0 to 10 and outputs HTML text that displays the resulting values in an HTML table format.

7. Write JavaScript to validate the following fields of the above registration page:

- Name (Name should contains alphabets and the length should not be less than 6 characters).
- Password (Password should not be less than 6 characters length).
- E-mail id (should not contain any invalid and must follow the standard pattern name@domain.com).
- Phone number (Phone number should contain 10 digits only).

8. Write a JavaBeans program to converts value of INR (Indian Rupees) into equivalent American/Canadian/Australian Dollar value.

9. Write a Java servlet programs to conduct online examination and to display student mark list available in a

Database.

10. Write an XML program:

- To display the Book information which includes the following:
- Title of the book
- Author Name
- ISBN number
- Publisher name
- Edition
- Price

RADHA GOVIND UNIVERSITY
RAMGARH, JHARKHAND

Department of Computer Science & Engineering
Under Faculty of Engineering and Technology

Choice Based Credit System Curriculum for
Bachelor of Technology

SEMESTER VI

Course Structure for 6th Semester CSE

	Course Code	Category	Subject	L	T	P	Credit
1	ITO601	Professional Core-I	Internet Of Things (IOT)	3	1	0	4
2	CSC602	Professional Core-II	Data Science	2	1	0	3
3	CSC603	Professional Core-III	Image Processing	2	1	0	3
4	CSP608	Professional Electives-II	List of Professional Electives -II	2	1	0	3
5	CSO610	Open Elective-II	List of Open Elective-II	2	1	0	3

LABORATORY/SESSIONAL

Sl. No	Course Code	Category	Subject	L	T	P	Credit
1	CS601P	Laboratory-I	Computer Network Lab	0	0	2	1
2	CS602P	Laboratory –II	Data Science Lab	0	0	2	1
3	CS603P	Laboratory –III	Image Processing Lab	0	0	2	1
4	CS608P	Laboratory- IV	Professional Electives-II Lab	0	0	2	1
5		Laboratory-V	Internship/Tour& Training/Industrial Training	0	0	2	2

List of Electives 6th Semester, CSE

Professional Elective-II

Course No.	Subject Name
CSP604	Soft Computing
CSP605	System Software
CSP606	Distributed System
CSP607	Natural Language Processing
CSP608	Software Engineering

OPEN ELECTIVE 2

COURSE NO	SUBJECT NAME
ITO601	**Information Retrieval**
CSO609	**AI and Machine Learning**
CSO610	**Computer Network***
ITO601	**Internet Of Things (IOT)**

Computer Science & Engineering					
Code: CSC601	**Computer Networks**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**4**

Course Objective:

This course includes learning about computer network organization and implementation. Students are introducedto computer network design and its operations, and discuss the topics of OSI communication model; error detection and recovery; LANs; network naming and addressing; and basics of cryptography and network security.

Course Detail:

MODULE 1: **8hr**

Data communication Components: Representation of data and its flow in Networks, Various Connection Topology, Protocols and Standards, OSI model. Physical Layer: LAN technologies (Ethernet), Multiplexing, Transmission Media, Switching Techniques.

MODULE 2: **8hr**

Data Link Layer: Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective RepeatARQ, and Sliding Window. Multiple access protocols -Pure ALOHA, Slotted ALOHA, CSMA/CD, CDMA/CA. Error Detection and Error Correction - Fundamentals, Block coding, CRC, Hamming Code.

MODULE 3: **8hr**

Network Layer: Internetworking Devices. IP Addressing and Subnetting, Network Layer Protocols: IPV4, IPV6and ICMP. Address Mapping: ARP, RARP and DHCP. Routing algorithms (link state and distance vector).

MODULE 4: **8hr**

Transport Layer: Process to Process Delivery: UDP and TCP, Congestion Control and Quality of Services.

MODULE 5: **8hr**

Application Layer: Application layer protocols (DNS, SMTP, POP, FTP, HTTP). Basics of Wi-Fi.

MODULE 6: **8hr**

Network security: authentication, basics of public key and private key cryptography, digital signatures and certificates, firewalls.

CO	COURSE OUTCOMES
CO 1	Describe and analyze the importance of data communications and the layered protocol Model
CO 2	Describe and analyze and evaluate a number of data link, network, and transport layer protocols and network devices.
CO 3	Have a basic knowledge of the use of cryptography and network security;
CO 4	Explain concepts and theories of networking and apply them to various situations, classifying networks, analyzing perform ascend implementing new technologies
CO 5	Describe the network security concept
CO6	Describe the Network Services and Protocols including Domain Name System, Dynamic Host Configuration Protocol Concept

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L4	1	1	-	2	-	-	-	1	1	-	-	2	1	1	-
CO2	L4	2	2	1	1	3	-	-	-	1	-	1	2	-	1	-
CO3	L3	-	1	3	2	-	2	2	3	-	-	-	3	-	1	-
CO4	L3	3	2	2	2	2	-	-	2	1	1	2	2	2	-	-
CO5	L2	1	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO6	L5	-	1	3	2	-	2	2	3	-	-	-	3	-	1	-

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

Text Books:

1. "Data Communication and Networking", Behrouz Forouzan, McGraw Hill Education.

Reference Books:

1. "Computer Networks", Andrew S Tanenbaum, Pearson Edition
2. "Data and Computer Communications " , W. Stallings, PHI/ Pearson Education

Computer Science & Engineering					
Code: CSC602	**Data Science**	**L**	**T**	**P**	**C**
		2	**1**	**0**	**3**

Course Objective:

The main objective of this course is to train the student to do theoretical with practical data science work, Career- wise, we expect our students to be able to develop into skilled data science researchers or software developers.

MODULE-I **8hr**

INTRODUCTION: -

Introduction to data science, Different sectors of using data science, Purpose and components of Python, Data Analytics processes, Exploratory data analytics, Quantitative technique and graphical technique, Data types for plotting.

MODULE-II **8hr**

STATISTICAL ANALYSIS: -

Introduction to statistics, statistical and non -statistical analysis, major categories of statistics, population and sample, Measure of central tendency and dispersion, Moments, Skewness and kurtosis, Correlation and regression, Theoretical distributions – Binomial, Poisson, Normal

MODULE-III **8hr**

INTRODUCTION TO MACHINE LEARNING: -

Machine learning, Types of learning, Properties of learning algorithms, Linear regression and regularization, model selection and evaluation, classification: SVM, kNN and decision tree, Ensemble methods: random forest, Naive Bayes and logistic regression, Clustering: k -means, feature engineering and selection, Dimensionality reduction: PCA

MODULE-IV **8hr**

PYTHON SETUP FOR MATHEMATICAL AND SCIENTIFIC COMPUTING: -

Anaconda installation process, data types with python, basic operators and setup, introduction to numpy, mathematical functions of numpy, introduction to scipy, scipy packages, data frame and data operations, data visualisation using matplotlib.

CO	COURSE OUTCOMES
CO 1	To enable students to show there data analytics skill
CO 2	To develop knowledge of fundamentals of data science
CO 3	To empower students with hands-on for data science
CO 4	To make students experience with theoretical data science and programming
CO5	Introduction to scipy, scipy packages, data frame and data operations, data visualization using matplotlib
CO6	Decision tree ,Ensemble methods: random forest ,Naïve Baye sand logistic regression ,Clustering

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO 5	PO6	PO 7	PO8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L1	-	3	2	-	-	-	-	-	1	-	3	3	1	-	-
CO2	L6	3	2	-	-	-	-	-	-	2	-	2	2	-	-	-
CO3	L2	-	2	3	-	3	-	2	-	-	-	3	-	-	1	-
CO4	L5	2	-	2	-	3	3	-	-	3	-2	2	2	-	-	-
CO5	L4	-	-	-	-	-	-	-	3	-	-	-	-	2	-	1
CO6	L4	-	-	-	-	-	-	-	-	-	-	-	2	-	1	1

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlatio

Text Books:

1. N.G.Das , Statistical Methods (combined edition Vol.I and Vol.II) – Mc Graw Hill
2. Roger D. Peng, Elizabeth Matusi, The Art of Data Science: A Guide for Anyone who work with data - Leanpub
3. AurelienGeron, Hands-On Machine Learning with Scikit – Learn &TensorFlow – O'reilly

Reference Books:

1. AndriyBurkov, The Hundred Page Machine Learning Book – Xpress Publishing
2. James, G., Witten, D., Hastie, T., Tibshirani, R. An introduction to statistical learning with applications in R. Springer.
3. Murphy, K. Machine Learning: A Probabilistic Perspective. - MIT Press

Computer Science & Engineering					
Code: CSC603	**Image Processing**	**L**	**T**	**P**	**C**
		2	**1**	**0**	**3**

OBJECTIVES OF THE COURSE

To familiarize students with image enhancement and restoration techniques, to explain different image compression techniques

COURSE DESCRIPTION:

MODULE-I: **8hr**

INTRODUCTION AND DIGITAL IMAGE FUNDAMENTALS

Introduction: Origin, Steps in Digital Image Processing, Components. Digital Image Fundamentals: Elements of Visual Perception, Image Sampling and Quantization, Some Basic Relationships between pixels, Color Models.

MODULE-II: **5hr**

IMAGE TRANSFORM

Introduction to the Fourier Transform, The Discrete Fourier Transform, Discrete Cosine Transform, Singular Value Decomposition and Principal Component Analysis.

MODULE-III: **5hr**

IMAGE ENHANCEMENT

Spatial Domain: Some Simple Intensity Transformations, Histogram processing, Basics of Spatial Filtering, Smoothing and Sharpening Spatial Filtering. Frequency Domain: Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters.

MODULE-V: **8hr**

WAVELETS AND IMAGE COMPRESSION

Wavelets: Background, Sub-band Coding, Multi-resolution Expansions. Compression: Fundamentals, Image Compression Models, Error Free compression- Variable Length Coding, Bit-Plane Coding, Lossless Predictive Coding, Lossy Compression, Lossy Predictive Coding, Transform Coding and Wavelet Coding.

CO	COURSE OUTCOMES
CO 1	To study the image fundamentals and image transforms necessary for image processing
CO 2	To study the image enhancement techniques.
CO 3	To study the image restoration procedures and segmentation tools.
CO 4	Students can able to apply Gaussian filters on the image for its enhancement
CO 5	To study the wave let tools and the image compression procedures
CO6	Smoothing and Sharpening frequency domain filters – Ideal, Butter worth and Gaussian filters.

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L1	3	-	2	-	-	-	-	-	-	1	-	-	-	1	-
CO2	L1	2	2	2	3	-	2	-	2	-	-	1	-	-	-	-
CO3	L1	2	-	3	2	-	-	3	-	2	-	-	-	2	1	2
CO4	L3	3	2	3	-	-	1	-	-	-	-	-	-	-	-	-
CO5	L1	3	2	3	2	-	-	-	-	-	-	1	-	-		-
CO6	L1	2	1	-	1	-	-	1	3	-	3	2	-	-	-	-

H-High(3), M- Moderate(2), L- Low(1), '-' for No

correlation TEXT BOOK:

1. Rafael C. Gonzales, Richard E. Woods, "Digital Image Processing", Third Edition, Pearson Education, 2010.

REFERENCES:

1. S. Jayaraman, S Essakirajan, "Digital Image Processing", Second Edition, Tata McGraw Hill, 2009
2. Khalid Sayood, "Introduction to Data Compression", Third Edition, Elsevier, 2006.
3. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, "Digital Image Processing Using MATLAB", Third Edition Tata Mc Graw Hill Pvt. Ltd., 2011.
4. https://cse19-iiith.vlabs.ac.in/index.html

Computer Science & Engineering					
Code: CSP605	**System Software**	**L**	**T**	**P**	**C**
		2	**1**	**0**	**3**

Objectives of the course

To introduce the student to key concepts in Phase transformations and enable an understanding of the steps involved in several important phase transformations.

Detailed Syllabus:

MODULE-I **10hr**

INTRODUCTION: System Software, Application Software, components of a programming system: Assembler, Loader, Linker, Macros, Compiler, Program Development Cycle, Evolution of Operating Systems, Functions of Operating System, Machine Structure: General Machine Structure , Approach to anew machine, Memory Registers, Data, Instructions, Evolution of Machine Language: Long Way, No looping, Address Modification, Looping, Introduction to Assembly LanguageProgram.

MODULE –II **8hr**

ASSEMBLERS: Review of Computer Architecture – Machine Instructions and Programs – Assemblers– Basic Assembler Functions – Assembler Features – Assembler Design Options. LOADERS AND LINKERS: Loaders and Linkers – Basic Loader Functions – Machine-Dependent Loader Features – Machine-Independent Loader Features– Loader Design Options-Dynamic Linking and Loading- Object files- Contents of an object file – designing an object format – Null object formats- Code sections- Relocation – Symbols and Relocation – Relocatable a.out-ELF.

MODULE-III **8hr**

MACROPROCESSORS AND EMULATORS: Microprocessors – Basic Macro Processor Functions – Machine- Independent Macro Processor Features – Macro Processor Design Options - Introduction to Virtual Machines (VM)

- Emulation - basic Interpretation – Threaded Interpretation – Interpreting a complex instruction set – binary translation.

MODULE-IV **8hr**

VIRTUAL MACHINES: Pascal P-Code VM – Object-Oriented VMs – Java VM Architecture – Common Language Infrastructure – Dynamic Class Loading. ADVANCED FEATURES: Instruction Set Issues – Profiling – Migration – Grids – Code optimizations- Garbage Collection - Examples of real-world implementations of system software.

CO	COURSE OUTCOMES
CO 1	Explain the organization of basic computer, its design and the design of control unit.
CO 2	Understand the organization of memory and memory management hardware.
CO 3	Distinguish between Operating Systems software and Application Systems software.
CO 4	Identify the primary functions of an Operating System.
CO 5	Classify Master attributes and assessment of quality, reliability and security of software.
CO 6	Instruction Set Issues – Profiling – Migration – Grids – Code optimizations- Garbage Collection

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L2	1	1	-	2	-	-	-	-	-	-	-	2	1	1	-
CO2	L2	2	2	1	1	3	-	-	-	-	-	1	2	-	1	-
CO3	L2	-	1	3	2	-	-	-	-	-	-	-	3	-	1	-
CO4	L3	3	2	2	2	2	-	-	-	-	-	2	2	2	-	-
CO5	L4	1	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO6	L5	3	2	2	2	2	-	-	-	-	-	2	2	2	-	-

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

TEXT BOOKS:

1. Leland L. Beck, "System Software", 3rd ed., PearsonEducation.
2. John R. Levine, "Linkers & Loaders", MorganKauffman.
3. James E Smith and Ravi Nair, "Virtual Machines",Elsevier.

REFERENCES:

1. Srimanta Pal, "Systems Programming " , Oxford UniversityPress.
2. John J.Donovan, " "Systems Programming", Tata McGraw-Hill.
3. Systems Programming by John J Donovan (McGraw-HillEducation)
4. Operating System and System Programming – Dhamdhere (McGraw-HillEducation)

Syllabus for B. Tech course in Computer Science & Engineering

Computer Science & Engineering					
Code: CSP606	**Distributed System**	**L**	**T**	**P**	**C**
		2	**1**	**0**	**3**

Course objective:

This course covers the basic understanding of distributed computing system. The course aims to provide an understanding of the principles on which the Internet and other distributed systems are based; their architecture, algorithms and how they meet the demands of contemporary distributed applications. The course covers the building blocks for a study of distributed systems, and addressing the characteristics and the challenges that must be addressed in their design: scalability, heterogeneity, securityandfailurehandlingbeingthemostsignificant.Distributedcomputingisafieldof computer science that studies distributed systems. A distributed system is a system whose components are located on different networked computers, which communicate and coordinate their actions by passing messages to one another. The components interact with one anotherrinordertoachieve a common goal. Three significant characteristics of distributed systems are: concurrency of components, lack of a global clock, and independent failure of components.

Detailed Syllabus:

MODULE-I **8hr**

Introduction to distributed computing system, evolution different models, gaining popularity, definition,issues in design, DCE, message passing –introduction, desirable features of a good message passing system, issues in IPC, synchronization, buffering, multigram messages, encoding and decoding of message data, process addressing, failure handling, group communication.

MODULE-II **8hr**

Introduction, model, transparency, implementation mechanism, stub generation, RPC messages, marshalling arguments and results, server management, parameter - passing semantics, call semantics, communication protocols for RPCs, client – server binding, exception handling, security, mini project using Java RMI.

MODULE-III **8hr**

General architecture of DSM systems, design and implementation issues of DSM systems, granularity, structure of shared memory space, consistency model, replacement strategy, thrashing, advantages of DSM, clock synchronization DFS and security- Desirable features of good DFS, file models, file accessing Models, file sharing semantics, file catching schemes, file replication, fault Tolerance, atomic transaction, potential attacks to computer system, cryptography, authentication, access control .Digital signatures, DCE security service.

MODULE-IV **8hr**

Operating Systems, Client-Server Model, Distributed Database Systems, Parallel Programming Languages and Algorithms. Distributed Network Architectures- Managing Distributed Systems. Design Considerations.

MODULE-V **8hr**

For development, implementation & evaluation of distributed information systems, workflow, software processes, transaction management, and data modeling, infrastructure e.g. middle-ware to glue heterogeneous, autonomous,

and partly mobile/distributed data systems, such as e.g. client/server-, CORBA-, and Internet- technologies. Methods for building distributed applications.

CO	COURSE OUTCOMES
CO 1	Demonstrate knowledge of the basic elements and concepts related to distributed system technologies.
CO 2	Demonstrate knowledge of the core architectural aspects of distributed systems
CO 3	Demonstrate knowledge of details the main underlying components of distributed systems (such as RPC, file systems);
CO 4	Use and apply important methods in distributed systems to support scalability and fault tolerance;
CO 5	Demonstrate experience in building large-scale distributed applications.
CO 6	Understand the concept of development, implementation & evaluation of distributed information systems, workflow, software processes, transaction management,

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L2	1	1	-	2	-	-	-	-	-	-	-	2	1	1	-
CO2	L2	2	2	1	1	3	-	-	-	-	-	1	2	-	1	-
CO3	L2	-	1	3	2	-	-	-	-	-	-	-	3	-	1	-
CO4	L3	3	2	2	2	2	-	-	-	-	-	2	2	2	-	-
CO5	L4	1	3	2	-	-	-	-	-	-	-	-	-	1	-	-
CO6	L5	3	2	2	2	2	-	-	-	-	-	2	2	2	-	-

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

Text Books:

1. Pradeep K. Sinha, "Distributed Operating Systems: Concepts Design", 2007
2. Crichlow Joel M, "An Introduction to Distributed and Parallel Computing", PHI, 1997
3. Black Uyless, "Data Communications and Distributed Networks", PHI, 5thEdition,1997

Computer Science & Engineering					
Code: CSP608	**Software Engineering**	**L**	**T**	**P**	**C**
		2	**1**	**0**	**3**

Course objectives –

1. To develop basic Knowledge in Software Engineering and its applications.
2. To understand software Engineering layered architecture and the process frame work.
3. To analyze software process models such as the waterfall, spiral, evolutionary models and agile method forsoftware development.
4. To design software requirements and specifications of documents.
5. To understand project planning, scheduling, cost estimation, risk management.

Course Description:

MODULE-I: **8hr**

INTRODUCTION TO SOFTWARE PROCESS

Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models – Introduction to Agility-Agile process-Extreme programming (XP) Process.

MODULE-II: **8hr**

REQUIREMENTS ANALYSIS AND SPECIFICATION

Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document – Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management Classical analysis: Structured system Analysis, Petri Nets- Data Dictionary.

MODULE-III: **8hr**

SOFTWARE DESIGN

Design process – Design Concepts-Design Model– Design Heuristic – Architectural Design - Architectural styles,

Architectural Design, Architectural Mapping using Data Flow- User Interface Design: Interface analysis, Interface Design –Component level Design: Designing Class based components, traditional Components.

MODULE-IV: **8hr**

TESTING AND MAINTENANCE

Software testing fundamentals-Internal and external views of Testing-white box testing - basis path testing- control structure testing-black box testing- Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing And Debugging –Software Implementation Techniques: Coding practices-Refactoring- Maintenance and Reengineering-BPR model-Reengineering process model-Reverse and Forward Engineering.

MODULE-V: **8hr**

PROJECT MANAGEMENT

Software Project Management: Estimation – LOC, FP Based Estimation, Make/Buy Decision COCOMO I & II Model – Project Scheduling – Scheduling, Earned Value Analysis Planning – Project Plan, Planning Process, RFP Risk Management – Identification, Projection - Risk Management-Risk Identification-RMMM Plan-CASE TOOLS

CO	COURSE OUTCOMES
CO 1	Identify the principles of large scale software systems, and the processes that are used to build them.
CO 2	Able to use tools and techniques for producing application software solutions from informal and semi-formal problem specifications.
CO 3	Develop and preciation of the cost, quality, and management issues involved in software Construction.
CO 4	Implementdesignandcommunicateideasaboutsoftwaresystemsolutionsatdifferentlevels.
CO 5	Establish the relation with other people in ateam, communicating computing ideas effectively in speech and in writing.
CO6	Learners will explore techniques for eliciting, analyzing, and managing software requirements throughout the software development lifecycle

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L1	1	1	-	2	-	-	-	-	-	-	-	2	-	-	-
CO2	L3	3	2	1	1	3	-	-	-	-	-	-	2	-	-	-
CO3	L6	3	1	3	2	-	2	2	-	-	-	-	3	-	-	-
CO4	L3	3	2	2	2	2	-	-	-	-	-	-	2	-	-	-
CO5	L6	1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO6	L5	-	3	2	1	1	3	-	-	-	-	-	-	2	-	-

H-High(3), M- Moderate(2), L- Low(1), '-' for No

correlation TEXT BOOKS:

1. Roger S. Pressman, ―Software Engineering – A Practitioner's Approach‖, Seventh Edition, Mc Graw-Hill International Edition, 2010.

2. Rajib Mall, ―Fundamentals of Software Engineering‖, Third Edition, PHI Learning PrivateLimited, 2009.

REFERENCE

1. Ian Sommerville, ―Software Engineering‖, 9th Edition, Pearson Education Asia, 2011.

2. Pankaj Jalote, ―Software Engineering, A Precise Approach‖, Wiley India, 2010.

3. Kelkar S.A., ―Software Engineering‖, Prentice Hall of India Pvt Ltd, 2007.

4. Stephen R.Schach, ―Software Engineering‖, Tata McGraw-Hill Publishing Company Limited,200

Computer Science & Engineering					
Code: CSO609	**Artificial Intelligence & Machine Learning**	**L**	**T**	**P**	**C**
		2	**1**	**0**	**3**

Course objectives -

The aim of Artificial Intelligence & Machine Learning course is to prepare students for career in computer science & engineering where knowledge of AI & ML techniques leading to the advancement of research and technology. Artificial Intelligence and Machine Learning are the terms of computer science. Machine Learning is the learning in which machine can learn by its own without being explicitly programmed. It is an application of AI that provide system the ability to automatically learn and improve from experience.

Course Detail -

MODULE-I: 8hr

Overview and Search Techniques: Introduction to AI, Problem Solving, State space search, Blind search: Depth first search, Breadth first Search, Informed search: Heuristic function, Hill climbing search, Best first search, A* & AO* Search, Constraint satisfaction problem; Game tree, Evaluation function, Mini-Max search, Alpha-beta pruning, Games of chance.

MODULE-II: 8hr

Knowledge Representation (KR): Introduction to KR, Knowledge agent, Predicate logic, Inference rule & theorem proving forward chaining, backward chaining, resolution;Propositionalknowledge,Booleancircuitagents;RuleBasedSystems,Forward reasoning: Conflict resolution, backward reasoning: Structured KR: Semantic Net - slots, inheritance, Conceptual Dependency.

MODULE-III: 8hr

Handling uncertainty and Learning: Source of uncertainty, Probabilistic inference ,Bayes' theorem, Limitation of naïve Bayesian system, Bayesian Belief Network (BBN); Machine learning, Basic principal, Utility of ML Well defined learning system, Challenges in ML, Application ofML.

MODULE-IV: 8hr

Learning and Classifier: Linear Regression (with one variable and multiple variables), Decision Trees and issue in decision tree, Clustering (K-means, Hierarchical, etc), Dimensionality reduction, Principal Component Analysis, Anomaly detection, Feasibility of learning, Reinforcement learning.

MODULE-V: 8hr

Artificial Neural Networks: Introduction, Artificial Perceptron's, Gradient Descent and The Delta Rule, Adaline, Multilayer Networks, Back-propagation Rule back-propagation Algorithm-Convergence; Evolutionary algorithm, Genetic Algorithms – An Illustrative Example, Hypothesis SpaceSearch, Swarm intelligence algorithm.

CO	COURSE OUTCOMES
CO 1	Demonstrate fundamental understanding of artificial intelligence (AI)and expert systems.
CO 2	Apply basic principles of AI in solutions that require problem solving, inference,perception,knowledge representation, and learning.
CO 3	Demonstrate proficiency in applying scientific method to models of machine learning.
CO 4	Discuss the basics of ANN and different optimizations techniques.
CO 5	Students can able to understand how artificial intelligence teaches computers to process data in a way that is inspired by the human brain
CO6	Students can apply the concept of Artificial neural network the areas like system identification control, process control etc

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L3	1	2		3	3	3	-	2	2	-	-	-	-	-	-
CO2	L3	3	3	3	-	2	2	-	-	-	-	-	3	3	-	2
CO3	L3	2	2	-	3	2	-	-	-	-	-	-	2	-	3	2
CO4	L1	1	3	2	-	3	-	-	-	-	-	-	3	2	-	3
CO5	L2	2	2	-	1	-	3	-	2	-	-	-	2	-	1	-
CO6	L3	1	3	3	-	2	2	-	-	-	-	-	3	3	-	2

H-High(3), M- Moderate(2), L- Low(1), '-' for No

correlation Text Book:

1. Artificial Intelligence by Elaine Rich and Kevin Knight, Tata MeGrawHill
2. Understanding Machine Learning. Shai Shalev-Shwartz and Shai Ben-David. Cambridge University Press.
3. Artificial Neural Network, B. Yegna narayana, PHI,2005

Reference Book:

1. Christopher M. Bishop. Pattern Recognition and Machine Learning(Springer)
2. IntroductiontoArtificialIntelligenceandExpertSystemsbyDanW.Patterson,Prentice Hall of India

Computer Science & Engineering					
Code: CSP604	**Soft Computing**	**L**	**T**	**P**	**C**
		2	**1**	**0**	**3**

Course objective:

This course will provide exposure to theory as well practical systems and software practical systems and software used in soft computing **.**

Detailed Syllabus

MODULE-I: **8hr**

INTRODUCTION TO SOFT COMPUTING: Soft computing: Soft computing concepts, soft computing versus hard computing, various types of soft computing techniques, applications of soft computing.

MODULE-II: **9hr**

ARTIFICIAL NEURAL NETWORKS: Neural Networks: History, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training, Algorithms-perceptions; Training rules, Delta, Back Propagation Algorithm, Multilayer PerceptronModel.

MODULE-III: **8hr**

SPECIAL LEARNING NETWORK: Competitive learning networks, Kohen Self-organizing networks, Hebbian learning, Hopfield Networks, Associative memories, The Boltzmann machine**,** Applications of Artificial Neural Networks.

MODULE-IV:

FUZZY LOGIC: Fuzzy Logic: Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation. Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations. Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations. Fuzzy Logic: Classical Logic, Multivalued Logics, Fuzzy Qualifiers, Linguistic Hedges, Introduction & features of membership functions.

MODULE-V:

FUZZY RULE BASED SYSTEM: Fuzzy rule base system: Fuzzy Propositions, implications and inferences, Fuzzy reasoning, Defuzzification techniques, Fuzzy logic controller design, Fuzzy decision making & Applications of fuzzy logic.

MODULE-VI:

GENETIC ALGORITHMS: Genetic Algorithms: An Overview of Genetic algorithm (GA), Evolution strategies (ES), Evolutionary programming (EP), Genetic programming (GP); GA operators: Encoding,Selection,Crossover, Mutation,schemaanalysis,analysisofselectionalgorithms;convergence;optimization,oftravelling salesman problem using genetic algorithm approach; Markov & other stochastic models. Other Soft Computing Techniques: Simulated annealing, Tabu search, Ant colony-based optimization (ACO), etc

CO	COURSE OUTCOMES
CO 1	Present the feasibility of applying as of computing methodology for specific problem.
CO 2	Identify and describe soft computing techniques and their roles in building intelligent machines.
CO 3	Apply neural network stop pattern classification and regression problems.
CO 4	Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.
CO 5	Apply genetic algorithms to combinatorial optimization problems.
CO6	Students will gain a comprehensive understanding of soft computing paradigms.

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L2	3	2		3	-	3	-	2	2	-	-	-	-	-	-
CO2	L1	2	3	3	-	-	2	-	-	-	-	-	3	3	-	2
CO3	L3	3	2	-	3	2	-	-	-	-	-	-	2	-	3	2
CO4	L4	3	3	2	-	3	-	-	-	-	-	-	3	2	-	3
CO5	L3	1	2	-	1	-	3	-	2	-	-	-	2	-	1	-
CO6	L5	3	3	2	-	3	-	-	-	-	-	-	3	2	-	3

H-High(3), M- Moderate(2), L- Low(1), '-' for No

correlation Text Book:

1. P. R. Beeley, Foundry Technology, Newnes-Buttterworths,2001.
2. P. D. Webster, Fundamentals of Foundry Technology, Portwillis press, Red hill,1980. SupplementaryReading:
1. P. C. Mukherjee, Fundamentals of Metal casting Technology, Oxford IBH,1980.
2.R. W. Hein, C. R. Loper and P. C. Rosenthal, Principles of Metal casting, Mc Graw Hill,1976.

Syllabus for B. Tech course in Computer Science & Engineering

Computer Science & Engineering					
Code: ITO601	**Information Retrieval**	**L**	**T**	**P**	**C**
		2	**1**	**0**	**3**

OBJECTIVES:

To provide an overview of Information Retrieval systems. Expose them to various retrieval models with emphasis on pros and cons of these models. Discuss mechanisms of web search along with the details of ranking algorithms. Introduce basic concepts of text categorization and recommender systems.

MODULE-I **8hr**

Introduction to Information Retrieval: The nature of unstructured and semi -structured text. Inverted index and Boolean queries. Text Indexing, Storage and Compression Text encoding: tokenization; stemming; stop words; phrases; index optimization. Index compression: lexicon compression and postings lists compression. Gap encoding, gamma codes, Zipf's Law. Index construction. Postings size estimation, dynamic indexing, positional indexes, n-gram indexes, real-world issues.

MODULE –II **8hr**

Information Retrieval Models: Boolean; vector space; TFIDF; Okapi; probabilistic; language modeling; latent semantic indexing. Vector space scoring. The cosine measure. Efficiency considerations. Document length normalization. Relevance feedback and query expansion. Rocchio algorithm.

MODULE –III **8hr**

Web Information Retrieval: Hypertext, web crawling, search engines, ranking, link analysis, PageRank, HITS. Retrieving Structured Documents: XML retrieval, semantic web.

Performance Evaluation of IR systems: Evaluating search engines. User happiness, precision, recall, F - measure. Creating test collections: kappa measure, interjudge agreement.

MODULE –IV **8hr**

Text Categorization and Filtering: Introduction to text classification. Naive Bayes mode ls. Spam filtering. Vector space classification using hyperplanes; centroids; k Nearest Neighbors. Support vector machine classifiers. Kernel functions. Boosting.

MODULE –V **8hr**

Advanced Topics: Summarization, Topic detection and tracking, Personalization, Question answering, Cross language information retrieval (CLIR). Recommender System.

CO	COURSE OUTCOMES
CO 1	The understanding of different Information retrieval models
CO 2	To know about evaluation methods of the information retrieval model
CO 3	Exposures of implementing retrieval models on text data
CO 4	To know about text categorization and its implementation
CO 5	To know the challenges associated with each topics on new domain of retrieval and classification
CO6	Proficiency in Retrieval Models and Algorithms

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO 5	PO6	PO 7	PO8	PO 9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L1	2	2		3	-	3	-	2	2	-	-	-	-	-	-
CO2	L2	1	3	3	-	-	2	-	-	-	-	-	3	3	-	2
CO3	L4	2	2	-	3	2	-	-	-	-	-	-	2	-	3	2
CO4	L5	1	3	2	-	3	-	-	-	-	-	-	3	2	-	3
CO5	L3	1	2	-	1	-	3	-	2	-	-	-	2	-	1	-
CO6	L6	2	2	-	3	2	-	-	-	-	-	-	2	-	3	2

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

TEXT BOOKS:

1. Manning, Raghavan and Schutze, "Introduction to Information Retrieval", Cambridge University Press, 2009.
2. Baeza-Yates and Ribeiro-Neto, "Modern Information Retrieval", Addison Wesley.

REFERENCES:

1. Charles L. A. Clarke, Gordon Cormack, and Stefan Büttcher, "Information Retrieval: Implementing and Evaluating Search Engines", MIT Press Cambridge, 2010.
2. Baeza-Yates / Ribeiro-Neto, "Modern Information Retrieval: The Concepts and Technology behind Search", Pearson Education India, 2010.

Syllabus for B. Tech course in Computer Science & Engineering

Computer Science & Engineering			
CSP607	**NATURAL LANGUAGE PROCESSING**	**3L:0T:0P**	**3 Credit**

OBJECTIVES:

This course provides an introduction to the field of natural language processing (NLP).Purpose is to make students learn how systems can understand and produce language, for applications such as information extraction, machine translation, automatic summarization, question-answering, and interactive dialogue systems. The course will cover linguistic (knowledge-based) and statistical approaches to language processing in the three major subfields of NLP: syntax (language structures), semantics (language meaning), and pragmatics/discourse (the interpretation of language in context).

MODULE –I **8hr**

Introduction to Natural Language Processing (NLP). Sound: Biology of Speech Processing; Place and Manner of Articulation; Word Boundary Detection; Argmax based computations; HMM and Speech Recognition.

MODULE –II **8hr**

Words and Word Forms: Morphology fundamentals; Morphological Diversity of Indian Languages; Morphology Paradigms; Finite State Machine Based Morphology; Automatic Morphology Learning; Shallow Parsing; Named Entities; Maximum Entropy Models; Random Fields.

MODULE –III **8hr**

Structures: Theories of Parsing, Parsing Algorithms; Robust and Scalable Parsing on Noisy Text as in Web documents; Hybrid of Rule Based and Probabilistic Parsing; Scope Ambiguity and Attachment Ambiguity resolution.

MODULE –IV **8hr**

Meaning: Lexical Knowledge Networks, Wordnet Theory; Indian Language Wordnets and Multilingual Dictionaries; Semantic Roles; Word Sense Disambiguation; WSD and Multilinguality; Metaphors; Co- references.

MODULE –V **8hr**

Web 2.0 Applications: Sentiment Analysis; Named Entity Recognition; Text Entailment; Robust and Scalable Machine Translation; Question Answering in Multilingual Setting; Cross Lingual InformationRetrieval (CLIR)

CO	COURSE OUTCOMES
CO 1	Approaches to syntax and semantics in NLP.
CO 2	Approaches to discourse, generation, dialogue and summarization with in NLP.
CO 3	Current methods for statistical approaches to machine translation.
CO 4	Machine learning techniques used in NLP, including hidden Markov models and probabilistic context-free grammars
CO 5	Clustering and unsupervised methods, log-linear and discriminative models, and the EM algorithm as applied with in NLP
CO6	Statistical and Machine Learning Models for NLP

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO 5	PO6	PO 7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L1	1	2	1	3	-	3	-	2	2	-	-	-	-	-	-
CO2	L5	3	3	3	-	-	2	-	-	-	-	-	3	3	-	2
CO3	L2	1	2	-	3	2	-	-	-	-	-	-	2	-	3	2
CO4	L4	2	3	2	-	3	-	-	-	-	-	-	3	2	-	3
CO5	L3	1	2	-	1	-	3	-	2	-	-	-	2	-	1	-
CO6	L6	1	2	-	3	2	-	-	-	-	-	-	2	-	3	2

H-High(1), M- Moderate(2), L- Low(3), '-' for No correlation

TEXT BOOKS:

1. Dan Jurafsky and James Martin, "Speech and Language Processing", 2nd Edition, Prentice Hall, 2008.
2. Andrew Radford, Martin Atkinson, David Britain, Harald Clahsen and Andrew Spencer, "Linguistics: An Introduction", Cambridge University Press, 2009.

REFERENCES:

1. Chris Manning and Hinrich Schütze, "Foundations of Statistical Natural Language Processing", MIT Press. Cambridge, 1999.
2. Allen James, "Natural Language Understanding", 2nd edition, Benjamin Cumming, 1995.
3. Eugene Charniack, "Statistical Language Learning", MIT Press, 1993.
4. Steven Bird, "Natural Language Processing with Python", 1st Edition, O'Reilly, 2009.
5. Jacob Perkins, "Python Text Processing with NLTK 2.0 Cookbook", Packt Publishing, 2010.

Computer Science & Engineering					
Code: ITO602	**Internet of Things**	**L**	**T**	**P**	**C**
		2	**1**	**0**	**3**

Course Objective:

Students will be explored to the interconnection and integration of the physical world and the cyber space.They are also able to design & develop IOT Devices.

Module I **8hr**

Introduction

Overview and Motivations, IPv6 Role, IOT Definitions, IOT Frameworks. .

Module II **8hr**

Prototyping Embedded Devices

Electronics, Embedded Computing Basics, Arduino, Raspberry Pi, Beagle Bone Black, Electric Imp, Other Notable Platforms

Module III **8hr**

IPv6 Technologies for the IOT

Overview and Motivations, Address Capabilitie s, IPv6 Protocol Overview, IPv6 Tunnelling, IPsec in IPv6, Header Compression Schemes, Quality of Service in IPv6,Migration Strategies to IPv

Module IV **8hr**

Evolving IOT Standards

Overview and Approaches, IETF IPv6 Routing Protocol for RPL Roll, Constrained Application Protocol (CoAP) , Representational State Transfer (REST) , ETSI M2M , Third -Generation Partnership Project Service

Requirements for Machine-Type Communications , CENELEC, IETF IPv6 Over Lowpower WPAN (6LoWPAN) , ZigBee IP (ZIP), IP in Smart Objects (IPSO)

Module V **8hr**

Prototyping Online Components

Getting Started with an API, Writing a New A PI, Real-Time Reactions, Other Protocols: MQTT, Extensible Messaging and Presence Protocol

Module VI **8hr**

IOT Application Examples

Overview, Smart Metering/Advanced Metering Infrastructure, e-Health/Body Area Networks, City Automation, Automotive Applications, Home Automation, Smart Cards, Tracking (Following and Monitoring Mobile Objects),Over-The-Air-Passive Surveillance/Ring of Steel, Control Application Examples, Myriad Other Applications.

CO	COURSE OUTCOMES
CO 1	Explain the concept of IoT
CO 2	Illustrate key technology, protocols and standard of IoT
CO 3	Analyse trade-off in interconnected wireless embedded device networks
CO 4	Understand application of IoT in automation of commercial and real world example
CO 5	Design a simple IoT System comprising sensors, edge devices and wireless network involving prototyping, programming and data analytics
CO 6	Students can apply the concept on real life applications of IOT

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L2	1	2	1	3	-	3	-	2	2	-	-	-	-	-	-
CO2	L3	2	3	3	-	-	2	-	-	-	-	-	3	3	-	2
CO3	L4	1	2	-	3	2	-	-	-	-	-	-	2	-	3	2
CO4	L2	3	3	2	-	3	-	-	-	-	-	-	3	2	-	3
CO5	L6	1	2	-	1	-	3	-	2	-	-	-	2	-	1	-
CO6	L3	1	2	2	2	2	-	-	-	-	-	-	-	-	-	-

H-High(1), M- Moderate(2), L- Low(3), '-' for No correlation

Textbooks:

1. Building the Internet of Things with IPv6 AND MIPv6 by DANIEL MINOLI Published by John Wiley & Sons, Inc., Hoboken, New Jersey.(UNIT-I, III, V, VI)
2. Designing the Internet of Things by Adrian McEwen and Hakim Cassimally Published by John Wiley & Sons (UNIT-II, IV)

References:

1. Getting Started with the Internet of Things by CunoPfister Published by O'Reilly Media, Inc.
2. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things" Key

Computer Science & Engineering					
Code: CS601P	**Computer Networks Lab**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

List of Experiments:

1. Study of Network Devices in detail and to connect the computers in Local Area Network.
2. Study of IP and to Configure Host IP, Subnet Mask and Default Gateway in a system in LAN (TCP/IP Configuration).
3. Study of different types of Network cables and to implement the cross -wired cable and straight through cable in a network.
4. Implementation of basic network command and Network configuration comm ands.
5. Performing an Initial Switch Configuration.
6. Performing an Initial Router Configuration.
7. Configuring and Examining Network Address Translation (NAT).
8. Configuring Ethernet and Serial Interfaces.
9. Configuring Routing Information Protocol (RIP).
10. Configuring a Cisco Router as a DHCP Server.

Computer Science & Engineering					
Code: CS602P	**Data Science Lab**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

List of Experiments:

1. Basic Python or R programming
   a. Program to add two numbers
   b. Maximum of two numbers
   c. Program for factorial of a number
   d. Program to check Armstrong number
2. Array Programming
   a. Program to find sum of array
   b. Program to reverse an array
   c. Program to find largest element of an array
3. List programming
   a. Program to swap two elements in a list
   b. Program to find sum of numbers in a list
   c. Program to find even numbers in a list
   d. Program to do cumulative sum of a list
4. Matrix program
   a. Program to add two matrices
   b. Program to multiply two matrices
   c. Program to find transpose of matrix
   d. Program to subtract matrices
5. Dictionary program
   a. Program to find sum of all items in a dictionary
   b. Program to merge two dictionary
   c. Program to remove all duplicate words in a sentence
6. Tuple program
   a. Program to find the size of tuple
   b. Program to find Maximum and minimum element in tuple
   c. Program to extract digits from a t uple list
   d. Program to remove tuple of K-length
7. Searching and sorting program
   a. Program for insertion sort
   b. Program Merge sort
   c. Program for Bubble sort
   d. Program for Quick sort
8. File handling program
   a. Program to read file one by one
   b. Program to remove lines starting with any prefix
   c. Program to merge two file to a third file
9. Use Data sets for analysis
   a. Use Iris Data set to perform PCA and do your analysis on different flowers with different sepal and petal length & width.
   b. Use Titanic Data set to find any analysis on deat h rate with gender and age
   c. Use House price data set to do house price prediction
10. Use Image/text data set for analysis
    a. Use Lungs image data for segmentation
    b. Use any image data set you want to go for feature extraction and dimensionality reduction.
    c. Document classification on any available dataset

Computer Science & Engineering					
Code: CS603P	**Image Processing Lab**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

List of Experiments

1. Distance and Connectivity
2. Image Arithmetic
3. Affine Transformation
4. Point Operations
5. Neighborhood Operations
6. Image Histogram
7. Fourier Transform
8. Color Image Processing
9. Morphological Operations
10. Image Segmentation
11. Image Processing Test Bench

Syllabus for B. Tech course in Computer Science & Engineering

Computer Science & Engineering					
Code: CS604P	**Soft Computing Lab**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

List of Experiments:

1. To perform Union, Intersection and Complement operations in Fuzzy Logic.
2. To implement De-Morgan's Law.
3. To plot various Membership Functions in Fuzzy Logic.
4. Implementation of Fuzzy Relations using Max -Min Composition method.
5. Implementation of Fuzzy Controller using FIS (Washing Machine).
6. To generate Activation Functions that are being used in Neural Networks.
7. To generate the output of ANDNOT function using McCulloch -Pitts Neural Network.
8. To generate the output of XOR function using McCulloch -Pitts Neural Network.
9. To classify two-dimensional input patterns inbipolar with given targets using Hebb Net.

RADHA GOVIND UNIVERSITY
RAMGARH, JHARKHAND

Department of Computer Science & Engineering

Under Faculty of Engineering and Technology

Choice Based Credit System Curriculum for
Bachelor of Technology

SEMESTER VII

(Effective from Academic Session 2020-21)

Branch: Computer Science & Engineering

Semester -VII

S.N.	Code	Course Title	Lecture	Tutorial	Practical	Credits
1	CSC701	Artificial Intelligence	3	0	0	3
2	PEC-III	**Professional Elective –III**	3	0	0	3
3	PEC-IV	**Professional Elective –IV**	3	0	0	3
4	OEC III	**Open Elective –III**	3	0	0	3
5	OEC IV	**Open Elective –IV**	3	0	0	3
6	CS701P	Artificial Intelligence Lab.	0	0	2	1
7	CS702D	Project-I	0	0	4	2
8	CS703I	Internship Assessment II	0	0	2	2
					Total credits	20

Code	**Professional Elective-III (Any one)**	**Code**	**Professional Elective- IV(Any one)**
CSP702	Machine Learning	ITP705	Data Mining and Data Warehousing.
CSP703	Multimedia and Applications	ITP706	Information Security.
CSP704	Human Computer Interaction	CSP707	Computer Vision

Code	**Open Elective-III (Any one)**	**Code**	**Open Elective-IV(Any one)**
ITO708	Software Engineering	ITO711	Information Security
CSO709	Values and Ethics in Profession.	CSO712	Cryptography
CSO710	*Data Mining	ITO713	Knowledge Domain Development

Computer Science & Engineering and Information Technology					
Code: CSC701	**Artificial Intelligence**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objective:

1. To impart knowledge about Artificial Intelligence.
2. TO give understanding of the main abstractions and reasoning for intelligent systems.
3. To enable the students to understand the basic principles of Artificial Intelligence in various applications.

MODULE 1: **8hr**

Introduction

Overview of AI, Problems of AI, AI techniques, Problem Solving, Problem Space and Search, Defining the problem as state space search, Problem characteristics; Tic,Tac,Toe Problem

AI languages

Basic knowledge of AI programming languages like Prolog and Lisp.

MODULE 2: **8hr**

Basic Search Techniques

Solving Problems by searching; Uniform search strategies; Breadth first search, depth first search, depth limited search, bidirectional search, Best First search, comparing search strategies in terms of complexity.

MODULE 3: **10hr**

Special Search Techniques

Heuristic Search, greedy best, first search, A* search; Hill climbing search, Simulated Annealing search; Genetic Algorithm; Constraint Satisfaction Problems; Adversarial search, Games, Optimal decisions and strategies in games, Minimax search, Alpha, beta pruning.

Symbolic Logic

Syntax and semantics for propositional logic, Syntax and semantics of FOPL, Properties of WFF, Clausal form, Unification, Resolution

MODULE 4: **10hr**

Reasoning Under Inconsistencies and Uncertainties:

Non-monotonic reasoning, Truth Maintenance System, Default Reasoning & closed world assumption, Predicate completion and circumscription, Fuzzy Logic.

Probabilistic Reasoning

Bayesian probabilistic inference, Representation of knowledge in uncertain domain, Semantics of Bayesian networks, Dempster, Shafer theory.

MODULE 5: **8hr**

Structured Knowledge

Associative networks, Conceptual graphs, Frames structures.

Expert Systems

Rule based systems, Non production systems: decision tree architectures, black board system architecture, and neural network architecture.

Learning

Types of learning, general learning model, learning by induction; generalization, specialization, example of inductive learner.

CO	COURSE OUTCOMES
CO 1	Discuss basic concepts of Artificial Intelligence, AI (Artificial Intelligence)principles, AI Task domains and application.
CO 2	Explain various searching techniques, constraint satisfaction problem, game playing techniques and apply these techniques in applications which involve perception, reasoning and learning.
CO 3	Explain various searching techniques, constraint satisfaction problem, game playing techniquesandapplythesetechniquesinapplicationswhichinvolveperception,reasoningand learning.
CO 4	Explain working of uncertainty management, decision making and learning methods.
CO 5	Applydifferentknowledgerepresentation,reasoning,andlearningtechniquestoreal- world problems.
CO 6	Formulate valid solutions for problem involving uncertain inputs or outcomes by using decision making techniques

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3
CO1	L2	3	-	-	-	-	3	-	2	2	-	-	-	-	-	-
CO2	L2	1	2	2	2	-	2	-	-	-	-	-	3	3	-	2
CO3	L2	2	2	2	2	2	-	-	-	-	-	-	2	-	3	2
CO4	L2	1	1	-	-	3	-	-	-	-	-	-	3	2	-	3
CO5	L3	3	2	2	2	-	3	-	2	-	-	-	2	-	1	-
CO6	L6	1	1	-	-	2	-	-	-	-	-	-	-	-	-	-

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

Text book:

1. Elaine Rich, Kevin Knight and Shivashankar B Nair, "Artificial Intelligence", Mc Graw Hill Publication, 2009.
2. Dan W. Patterson, "Introduction to Artificial Intelligence and Expert System", Pearson Publication, 2015.

References:

1. Saroj Kaushik, "Artificial Intelligence", Cengage Learning, 2011.

Computer Science & Engineering and Information Technology					
CSP702	**Machine Learning**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objective:

1. To understand the basic theory underlying machine learning.
2. To be able to formulate machine learning problems corresponding to different applications.
3. To understand a range of machine learning algorithms along with their strengths and weakness.
4. To be able to apply machine learning algorithms to solve problems of moderate complexity.

MODULE 1: **8hr**

What is Machine learning, Basic principal, Utility of ML Well defined learning system, designing learning system, Challenges in ML, Application of ML.

MODULE 2: **10hr**

Linear Regression (with one variable and multiple variables), Gradient Descent, Classification (Logistic Regression, Over fitting, Regularization, Support Vector Machines), Decision Trees and issue in decision tree, Bayesian Learning – Bayes Theorem, Concept Learning, Bayes Optimal Classifier, Naïve Bayes Classifier, Bayesian Belief Networks, EM Algorithm.

MODULE 3: **8hr**

Clustering (K-means, Hierarchical, etc.), Dimensionality reduction, Principal Component Analysis, Anomaly detection, Feasibility of learning, Reinforcement learning.

MODULE 4: **8hr**

Artificial Neural Networks, Artificial Perceptron's, Gradient Descent and The Delta Rule, Adaline, Multilayer Networks, Back-propagation Rule back-propagation Algorithm- Convergence.

MODULE 5: **8hr**

Evolutionary algorithm, Genetic Algorithms – An Illustrative Example, Hypothesis Space Search, Genetic Programming, Swarm intelligence algorithm.

CO	COURSE OUTCOMES
CO 1	Describe fundamental of machine learning, design and its application.
CO 2	Differentiate various learning approaches, and to interpret the concepts of different learning.
CO 3	Illustrate and apply clustering algorithms and identify its applicability in real life problems.
CO 4	Discuss basics of neural network and its different model.
CO 5	Describe different optimizations algorithm.
CO 6	To be able to formulate machine learning algorithms to solve problems of moderate complexity

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L2	3	2	3	1	2	-	-	-	-	-	-	-	1	-	-
CO2	L2	1	2	3	1		-	-	-	1	-	-	-	1	-	-
CO3	L4	3	3	2	2	1	-	-	-	-	-	-	-	3	-	-
CO4	L2	1	2	2	-	2	-	-	-	-	-	-	-	1	-	-
CO5	L2	3	2	3	1	2	-	-	-	-	-	-	-	1	-	-
CO6	L4	3	1	1	1	-	-	-	-	-	-	-	-	1	-	-

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

Text Book:

1. Understanding Machine Learning. Shai Shalev-Shwartz and Shai Ben-David. Cambridge University Press.

2. Tom Mitchell. Machine Learning (McGraw Hill)

3. Artificial Neural Network, B. Yegnanarayana, PHI, 2005

Reference Book:

1. Christopher M. Bishop. Pattern Recognition and Machine Learning (Springer)

Computer Science & Engineering and Information Technology					
CSP703	**MULTIMEDIA SYSTEMS AND APPLICATIONS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objective:
To introduce various aspects of multimedia components like Images, audio, sound and computer graphics. Provides hands on training in the use of Image Editing tools with software.

Syllabus:

MODULE 1: **8hr**

Introduction to Multimedia System: Architecture and components, Multimedia distributed processing model, Synchronization, Orchestration and Quality of Service (QOS) architecture.

MODULE 2: **10hr**
Audio and Speech: Data acquisition, Sampling and Quantization, Human Speech production mechanism, Digital model of speech production, Analysis and synthesis, Psycho-acoustics, low bit rate speech compression, MPEG audio compression.

MODULE 3: **10hr**
Images and Video: Image acquisition and representation, Composite video signal NTSC, PAL and SECAM video standards, Bilevel image compression standards: ITU (formerly CCITT) Group III and IV standards, JPEG image compression standards, MPEG video compression standards.

MODULE 4: **8hr**
Multimedia Communication: Fundamentals of data communication and networking, Bandwidth requirements of different media, Real time constraints: Audio latency, Video data rate, multimedia over LAN and WAN, Multimedia conferencing.

MODULE 5: **9hr**
Multimedia Information Systems: Operating system support for continuous media applications: limitations is usual OS, New OS support, Media stream protocol, file system support for continuous media, data models for multimedia and hypermedia information, content based retrieval of unstructured data.

CO	COURSE OUTCOMES
CO 1	Developed understanding of technical aspect of Multimedia Systems.
CO 2	Understand various file formats for audio, video and text media.
CO 3	Develop various Multimedia Systems applicable in real time.
CO 4	Design interactive multimedia software.
CO 5	Apply various networking protocols for multimedia applications.
CO 6	To evaluate multimedia application for its optimum performance.

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L6	3	3	2	3	-	-	-	-	1	1	2	3	1	-	-
CO2	L2	1	1	3	2	1	-	-	-	3	3	2	3	1	-	-
CO3	L6	3	2	3	2	1	-	-	-	1	3	1	2	1	--	-
CO4	L6	2	2	2	1		-	-	-	1	3	3	2	1	-	1
CO5	L3	3	1	2	1	1	-	-	-	1	1	3	2	-	-	1
CO6	L5	3	2	1	1	-	-	-	-	1	2	1	1	-	-	1

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

Text Books

1. K. Sayood, Introduction to Data Compression, Morgan-Kaufmann.
2. A. Puri and T. Chen, Multimedia Systems, Standards, and Networks, Marcel Dekker.
3. Iain E.G. Richardson, H.264 and MPEG-4 Video Compression, John Wiley.

Computer Science & Engineering and Information Technology					
ITP705	**Data Mining and Data Warehousing**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objective:

This course will introduce the concepts of data ware house and data mining , which gives a complete description about the principle , used architectures, applications, design and implementation of data mining and data ware housing concepts.

Syllabus

MODULE 1: **8hr**

Introduction:
Data warehousing-definitions and characteristics, Multi-dimensional data model, Warehouse schema. Data Marts: Data marts, types of data marts, loading a data mart, metadata, data model. Maintenance, nature of data, software components; external data, reference data, performance issues, monitoring requirements and security in a data mart.

MODULE 2: **8hr**

Online Analytical Processing: OLTP and OLAP systems, Data Modeling, LAP tools, State of the market, Arbor Essbase web, Micro strategy DSS web, Brio Technology, star schema for multi-dimensional view, snowflake schema, OLAP tools.

MODULE 3: **10hr**

Developing a Data Warehousing: Building of a Data Warehousing, Architectural strategies & organizational issues, design considerations, data content, distribution of data, Tools for Data Warehousing.

MODULE 4: **10hr**

Data Mining : Definitions; KDD (Knowledge Discovery database) versus Data Mining; DBMS versus Data Mining, Data Mining Techniques; Issues and challenges; Applications of Data Warehousing & Data mining in Government.
Association Rules: Apriori algorithms. Partition algorithm, Dynamic itemset counting algorithm, FP- tree growth algorithm, generalized association rule.

MODULE 5: **8hr**

Clustering Techniques: Clustering paradigm, Partition algorithms, CLARA, CLARANS, Hierarchical clustering, DBSCAN, BIRCH, CURE; Categorical Clustering, STIRR, ROCK, CACTUS.
Decision Trees : Tree construction principle, Best split, Splitting indices, Splitting criteria, Decision tree construction with presorting.

MODULE 6: **8hr**

Web Mining: Web content Mining; Web structure Mining; Web usage Mining; Text mining.

MODULE 7: **8hr**

Temporal and Spatial Data Mining: Basic concepts of temporal data mining, The GSP algorithm, SPADE, SPIRIT, WUM.

CO	COURSE OUTCOMES
CO 1	Establish the relation between data warehousing and datamining.
CO 2	Able to compare end multi-dimensional structure of data model.
CO 3	Abletoidentifytheneedforanalysisoflarge,complex, information-richdatasets.
CO 4	Identify the goals and primary tasks of the data mining process.
CO 5	Understand the iterative character of a data process and specify its basic steps.
CO6	Characterize and discriminate data summarization forms and determine data mining functionalities

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	L6	1	3	2	3	-	-	-	-	-	-	2	3	1	-	-
CO 2	L2	2	2	3	2	1	-	-	-	-	-	2	3	-	-	-
CO 3	L1	1	1	3	2	1	-	-	-	-	-	1	2	-	-	-
CO 4	L1	2	2	2	1	-	-	-	-	-	-	3	2	1	-	-
CO 5	L2	1	2	2	1	1	-	-	-	-	-	3	2	1	-	-
CO 6	L4	3	3	2	3	-	-	-	-	-	-	2	3	-	-	-

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

Books

1. Data Warehousing, Reema Thareja
2. Data mining - Concepts & Techniques, Jiawei Han, Micheline Kamber, Morgan Kaufmann ,2nd Ed.2006.
3. Oracle 8i Data Warehousing, Michale Corey, Michale Abbey, Tata McGraw Hill
4. Fundamentals of Database Systems, Navathe and Elmasry, Addison Wesley, 2000
5. Data Mining, Arun Pujari Orient Longman, 2003

Computer Science & Engineering and Information Technology					
ITP706	**INFORMATION SECURITY**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objective:
This courses focuses on the models, tools and techniques for enforcement of security with some emphasis on the use of cryptography .Students will learn security from multiple perspectives.

Detailed syllabus:

Module1: **8hr**
Computer Auditing- System Access control, Data Access Control, Security Administration, and System Design.

Module 2 **8hr**
Hardware Security Controls - The Total System Needs Securing, Levels of Hardware Controls, Operating System Controls, Access Controls, General-Purpose Operating Systems Security, Sources of Additional Information

Module 3 **10hr**
Software Controls - Software Security and Controls, Types of Software Intrusions, Configuration Management, Modularity and Encapsulation, Protecting Information, Selecting Security Software, Analysis of Software Products Database Security - Introduction to Databases, Security Requirements of Databases, Designing Database Security.

Module 4: **10hr**
Methods of Protection, Security of Multilevel Databases,The Future of Databases. Network and Telecommunication Security - Telecommunications and Networks, Security Considerations, Cases in Point, Special Communications, Security Considerations.

Module 5: **9hr**
Microcomputer Security - Microcomputer Problems and Solutions , The Microcomputer Environment , Security of Microcomputers, Internal Data Security, The Threats to Micros, Developing a Micro Security Plan, Establishing a Micro-to-Mainframe Link , Portable Microcomputer Security , Password Protection, Security of Special Micro Applications.

CO	COURSE OUTCOMES
CO 1	Recognize the errors and remedies in processes involving information technology
CO 2	Students can get the knowledge of risk and controls in IT operation in industry
CO 3	Determine IT security guidelines for various type of industries
CO 4	Evaluate assets a regarding, data integrity, system effectiveness and system efficiency.
CO 5	Understand software security auditing including database security audit, network security audit and micro-computer security audit.
CO 6	Students will learn to assess how information technology can be used to achieve a competitive advantage and excellence in service

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L2	3	2	-	3	-	2	-	2	-	-	1	-	1	-	-
CO2	L1	1	1	-	3	-	1	-	2	-	-		-	1	-	-
CO3	L3	2	2	-	3	-	2	-	3	-	-		-	-	-	-
CO4	L4	2	3	-	3	-	1	-	2	-	-	1	-	-	-	-
CO5	L2	3	2	-	3	-	1	-	3	-	-		-	-	-	2
CO6	L5	1	1	-	3	-	1	-	2	-	-	1	-	-	1	-

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

Textbook:

1. Deborah Russell, *Computer Security Basics*, O'Reilly & Associate, 1991.
2. Karen A. Forcht, *Computer Security Management*, Boyd & Fraser Publishing Co., 1994.
3. Donald A. Watne, Peter B.B. Turney, *Auditing EDP Systems*, 2nd Edition, PH 1990

Computer Science & Engineering and Information Technology			
Code: CSP707	**Computer Vision**	**L**	**T**
		3	**0**

Objectives:

Computer Vision focuses on development of algorithms and techniques to analyze and interpret the visible world around us. This requires understanding of the fundamental concepts related to multi- dimensional signal processing, feature extraction, pattern analysis visual geometric modeling, stochastic optimization etc. Knowledge of these concepts is necessary in this field, to explore and contribute to research and further developments in the field of computer vision. Applications range from biometrics, medical diagnosis, document processing, mining of visual content, to surveillance, advanced rendering etc.

Detail Syllabus:

MODULE-I **8hr**

Digital Image Formation and low-level processing: Overview and State-of-the-art, Fundamentals of Image Formation, Transformation: Orthogonal, Euclidean, Affine, Projective, etc.; Fourier Transform, Convolution and Filtering, Image Enhancement, Restoration, Histogram Processing.

MODULE-II **8hr**

Depth estimation and Multi-camera views: Perspective, Binocular Stereopsis: Camera and Epipolar Geometry; Homography, Rectification, DLT, RANSAC, 3-D reconstruction framework; Auto-calibration.

MODULE-III **9hr**

Feature Extraction: Edges - Canny, LOG, DOG; Line detectors (Hough Transform), Corners - Harris and Hessian Affine, Orientation Histogram, SIFT, SURF, HOG, GLOH, Scale-Space Analysis- Image Pyramids and Gaussian derivative filters, Gabor Filters and DWT.

MODULE-IV **9hr**

Image Segmentation: Region Growing, Edge Based approaches to segmentation, Graph-Cut, Mean- Shift, MRFs, Texture Segmentation; Object detection.

MODULE-V **8hr**

Pattern Analysis: Clustering: K-Means, K-Medoids, Mixture of Gaussians, Classification: Discriminant Function, Supervised, Un-supervised, Semi-supervised; Classifiers: Bayes, KNN, ANN models; Dimensionality Reduction: PCA, LDA, ICA; Non-parametric methods.

MODULE-VI **8hr**

Motion Analysis: Background Subtraction and Modeling, Optical Flow, KLT, Spatio-Temporal Analysis, Dynamic Stereo; Motion parameter estimation.

CO	COURSE OUTCOMES
CO 1	To apply mathematical modeling methods for low-,intermediate-and high-level image processing tasks.
CO 2	To design new algorithms to solve recent state of the art computer vision problems.
CO 3	To perform software experiments computer vision problems and compare their performance with the state of the art.
CO 4	To develop abroad knowledgebase coast easily relate to the existing literature.
CO 5	To gather a basic understanding about the geometric relationships between 2D images and the 3D world.
CO6	To build a complete system to solve a computer vision problem.

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	L6	3	2	-	-	-	-	3	-	-	-	-	-	-	-	-
CO3	L5	3	2	-	2	-	2	-	-	-	-	-	-	-	-	-
CO4	L6	3	2	-	-	2	-	-	-	-	-	-	-	-	-	-
CO5	L1	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-
CO6	L6	3	2	3					-	-	-	-	-	-	-	-

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

Textbok

1. Richard Szeliski, Computer Vision: Algorithms and Applications, Springer-Verlag London Limited 2011.
2. Richard Hartley and Andrew Zisserman, Multiple View Geometry in Computer Vision, 2nd Edition, Cambridge University Press, March 2004.

Reference book

1. Richard Hartley and Andrew Zisserman, Multiple View Geometry in Computer Vision, Second Edition, Cambridge University Press, March 2004.
2. Christopher M. Bishop; Pattern Recognition and Machine Learning, Springer, 2006
3. R.C. Gonzalez and R.E. Woods, Digital Image Processing, Addison- Wesley, 1992.
4. K. Fukunaga; Introduction to Statistical Pattern Recognition, Second Edition, Academic Press, Morgan Kaufmann, 1990.

Computer Science & Engineering and Information Technology					
CSO709	**Values and Ethics in Profession**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objective:
Students will understand the importance of values and Ethics in their Personal lives and professional careers and also students will learn the rights and responsibilities.

Module-1 **8hr**

Science,Technology and Engineering as Knowledge and as Social and Professional Activities, Effects of Technological Growth: Rapid Technological growth and depletion of resources. Reports of the Club of Rome. Limits of growth; sustainable development, Energy Crisis; Renewable Energy Resources.

Module-2 **8hr**

Environmental degradation and pollution. Eco-friendly Technologies. Environmental Regulations. Environmental Ethics, Appropriate Technology Movement of Schumacher: later developments

Module-3 **8hr**

Technology and developing nations. Problems of Technology transfer. Technology assessment, impact analysis. Human Operator in Engineering projects and industries. Problems of man machine interaction. Impact of assembly line and automation. Human centered Technology.

Module-4 **8hr**

Ethics of Profession

Engineering profession: Ethical issues in engineering practice. Conflicts between business demands and professional ideals. Social and ethical responsibilities of Technologists. Codes of professional ethics. Whistle blowing and beyond. Case studies.

Module-5 **8hr**

Profession and Human Values

Value Crisis in contemporary society, Nature of values: Value Spectrum of a ‘good’ life, Psychological values: Integrated personality; mental health, Societal values: The modern search for a ‘good’ society, justice, democracy, secularism, rule of law; values in Indian Constitution, Aesthetic values: Perception and enjoyment of beauty, simplicity, clarity - Moral and ethical values: Nature of moral judgments; canons of ethics; ethics of virtue; ethics of duty; ethics of responsibility.

CO	COURSE OUTCOMES
CO 1	Identify the effects of technological growth on the society and the limited natural resources.
CO 2	Identify the essence of sustainable development, and will be able to apply approaches to handle energy crisis and environment protection
CO 3	Analyse the impact of technology transfer and the problems of man machine interaction for human operator in engineering projects and industries.
CO 4	Apply industrial standards, code of ethics and role of professional ethics in engineering field.
CO 5	Illustrate the possible values crisis at different levels and the way out with the help of the constitution and moral, and ethical values.
CO6	Understand and associate the holistic perception of harmony at all levels of existence

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO 1	PO2	PO3	PO 4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO 2	PSO 3
CO1	L1	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	L1	1	2	3	-	-	-	-	3	-	-	-	-	-	-	-
CO3	L3	-1	2	3	-	2	-	2	-	-	-	-	-	-	-	-
CO4	L3	-	3	3	-	-	2	-	-	-	-	-	-	-	-	-
CO5	L2	-2	3	1	-	-	-	-	-	-	-	-	-	-	-	-
CO6	L1	-	3	2	3	2	3	1	1	-	-	-	-	-	-	-

Text Books:

1. Stephen H Unger, Controlling Technology: Ethics and the Responsible Engineers, John Wiley & Sons, New York 1994 (2nd Edition)
2. Deborah Johnson, Ethical Issues in Engineering, Prentice Hall, Englewood Cliffs, New Jersey 1991.
3. A N Tripathi, Human values in the Engineering Profession, Monograph published by IIM, Calcutta 1996.

Reference Books:

1. Mike Martin and Ronald Schinzinger, “Ethics in Engineering”, McGraw-Hill, New York, 2005.
2. Charles E Harris, Michael S Pritchard and Michael J Rabins, “Engineering Ethics Concepts and Cases”, Thompson Learning, 2000.
3. Govindarajan M, Natarajan S., Senthil Kumar V. S., “Engineering Ethics”, Prentice Hall of India, New Delhi 2004.
4. Charles D Fledderman, Engineering Ethics”, Prentice Hall, New Mexico, 1999.
5. Edmund G Seebauer and Robert L Barry, Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.
6. David Ermann and Michele S Shauf, “Computers, Ethics and Society”, Oxford University Press, 2003.

CO	COURSE OUTCOMES
CO 1	Ability to identify the minimum requirements for the development of application.
CO 2	Ability to develop, maintain, efficient, reliable and cost effective software solutions
CO 3	Ability to critically thinking and evaluate assumptions and arguments.
CO 4	Students can apply the knowledge, techniques and skills in the development of a software product.
CO 5	Students can decompose the given project in various phase of lifecycle
CO6	Students will be able to choose appropriate process model depending on the user requirements

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L1	3	1	1	1	-	-	2	-	-	-	-	-	1	-	_-
CO2	L6	2	-	2	1	-	-	2	-	-	-	-	-	1	2	-
CO3	L5	2	1	1	1	-	-	-	-	-	-	-	-	2	-	-
CO4	L4	1	-	1	1	--	-	-	-	-	-	-	-	-	-	-
CO5	L3	1	3	1	1	-	-	-	-	-	-	-	-	1	-	-
CO6	L3	1	1	1	1	-	-	1	-	-	-	-	-	1	-	-

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

TEXT BOOKS

- Software engineering A practitioner's Approach, Roger S Pressman, sixth edition McGraw Hill International Edition.
- Software Engineering, Ian Sommerville, seventh edition, Pearson education.

REFERENCE BOOKS:

- Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India, 2010.
- Software Engineering : A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
- Fundamentals of Software Engineering, Rajib Mall, PHI, 2005
- Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.
- Software Engineering1: Abstraction and modeling, Diner Bjorner, Springer International edition, 2006.
- Software Engineering2: Specification of systems and languages, Diner Bjorner, Springer International edition 2006.
- Software Engineering Foundations, Yingxu Wang, Auerbach Publications, 2008.
- Software Engineering Principles and Practice, Hans Van Vliet, 3rd edition, John Wiley &Sons Ltd.
- Software Engineering 3: Domains, Requirements, and Software Design, D. Bjorner, Springer International Edition.
- Introduction to Software Engineering, R. J. Leach, CRC Press.

Computer Science & Engineering and Information Technology					
CSO712	**CRYPTOGRAPHY**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Objective:
To make students learn different techniques along with hash functions, MAC, digital signatures and their use in various protocols for network security and system security.

Course Description:

MODULE 1: **5hr**

Conventional Encryption and Message Confidentiality: Conventional Encryption Principles, Conventional Encryption Algorithms, Location of Encryption Devices, Key Distribution

MODULE 2: **5hr**
Public key cryptography and Message Authentication: Approaches to Message Authentication, SHA-1, MD5, Public key cryptography Principles, RSA, Digital Signatures, Key Management

MODULE 3: **4hr**
Network Security Applications: Kerberos Motivation, Kerberos version 4, PGP Notation, PGP Operational Description

MODULE 4: **8hr**
IP Security: IP Security Overview, IP Security Architecture, Authentication Header
Web Security: Web Security Threats, Web Traffic Security Approaches, Overview of Secure Socket Layer and Transport Layer Security, Overview of Secure Electronic Transaction

MODULE 5: **8hr**
Intruders and Viruses: Intruders, Intrusion Techniques, Password Protection, Password selection Strategies, Intrusion Detection, Malicious Programs**,** Nature of viruses, Types of viruses, Macro viruses, Antivirus Approaches
Firewalls: Firewall characteristics, Types of Firewalls, Firewall configuration

CO	COURSE OUTCOMES
CO 1	Explain the basics of network security and compare various encryption techniques.
CO 2	Summarize the functionality of public key cryptography
CO 3	Apply various message authentication function sand secure algorithms
CO 4	Demonstrate different types of security systems and describe different levels of security and services.
CO 5	Describe the concepts used in early substitution and translation ciphers
CO6	Apply some cryptographic ciphers to simple data

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L2	3	1	1	1	1	-	2	-	-	-	-	-	1	3	3
CO2	L5	2	2	2	3	1	-	2	-	-	-	-	-	2	2	2
CO3	L3	2	1	1	-	1	-	-	-	-	-	-	-	2	1	1
CO4	L3	1	1	1	1	--	-	-	-	-	-	-	-	1	1	2
CO5	L2	1	3	1	1	-	-	-	-	-	-	-	-	1	2	2
CO6	L3	1	1	2	1	-	-	1	-	-	-	-	-	1	3	2

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

Suggested Text Books:

1. "Cryptography and Network Security Principles and Practices", Fourth Edition, William Stallings. Publisher: Prentice Hall
2. "Cryptography And Network Security", McGraw Hill, Behrouz A *Forouzan*

Computer Science & Engineering and Information Technology					
ITO713	**Knowledge Driven Development (KDD)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course objective:

Managing knowledge in a software project is a challenge. Waterfall methodology places emphasis on exhaustive documentation, which is difficult to be kept updated with the dynamics project delivery environment. Agile relies mostly on user stories and acceptance criteria for knowledge management which is flexible but may not be exhaustive.

KDD digitizes the knowledge currently contained in the project documents into a specified number of building blocks represented in inventory relationship format. For the implementation aspects, it follows Agile way of working. By digitizing knowledge, KDD brings in the next level of maturity in the project delivery that takes it closer to effective implementation of digital transformation programs using enablers such as Machine Learning, Artificial Intelligence, Data Analytics, and Cloud.

Course syllabus:

MODULE 1: Project delivery and supporting methodologies **4hr**

- IT Industry from technology and domain perspective
- Information technology – a knowledge-based industry
- IT project delivery – An introduction
- IT project delivery methodology landscape

MODULE 2: Project delivery pain areas and the way forward **4hr**

- IT project failures
- Project delivery pain areas
- Project knowledge

MODULE 3. Project knowledge model – context and definition **5hr**

- Traditional project knowledge management
- Project delivery activities and project knowledge
- Project knowledge model – Definition
- Project knowledge model – An example

MODULE 4: Extending project knowledge model to cover end to end project delivery – KDD **10hr**

- KDD focus area and core value
- End to end project delivery using quality gate
- Tracking project delivery quality through Key process indicators (KPI)
- Fitment for different types of Domains and Projects
- KDD Differentiator
- Contrasting KDD with Agile and Waterfall methodologies

MODULE 5: KDD Compliance with standards of project delivery **10hr**

- Quality assurance framework
- Project management framework
- Service management framework
- Enterprise architecture framework
- Test management framework
- Addressing contemporary concerns of project delivery
- Assisting Waterfall, Agile and DevOps
- Positioning of KDD in the digital era

MODULE 6. Global relevance of KDD **8hr**

- KDD and generic knowledge management framework
- Examples of generic knowledge management framework
- Generic knowledge management framework – its potential usage in skill development
- Towards another ontology framework

CO	COURSE OUTCOMES
CO 1	Understanding Knowledge Management
CO 2	Integration of Knowledge into Development Processes
CO 3	Enhanced Collaboration and Communication Skills
CO 4	Utilization of Knowledge Repositories and Tools
CO 5	Continuous Improvement Practices
CO6	Measuring the Impact of Knowledge Management

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO2	PO3	PO4	PO 5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO12	PSO1	PSO2	PSO3
CO1	L2	3	1	1	1	1	-	2	-	-	-	-	-	1	3	3
CO2	L4	2	2	2	3	1	-	2	-	-	-	-	-	2	2	2
CO3	L3	2	1	1	-	1	-	-	-	-	-	-	-	2	1	1
CO4	L4	1	1	1	1	--	-	-	-	-	-	-	-	1	1	2
CO5	L4	1	3	1	1	-	-	-	-	-	-	-	-	1	2	2
CO6	L6	1	1	2	1	-	-	1	-	-	-	-	-	1	3	2

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

Recommended text-book:

Knowledge Driven Development – Bridging Waterfall and Agile Methodologies, Published jointly by Cambridge University Press and IISc Press.

References:

1. Agile Manifesto: http://agilemanifesto.org/
2. Scrum guide: https://www.scrumalliance.org/learn-about-scrum/the-scrum-guide

Computer Science & Engineering			
CSO710	**Data Mining**	**L**	**T**
		3	**0**

Course Objective:
To fully understand standard data mining methods and techniques such as association rules, data clustering and classification. Learn new, advanced techniques for emerging applications.
.

Module – 1 **8hr**
Data warehousing and online analytical processing: Data warehousing: Basic concepts, Data warehouse modeling: Data cube and OLAP, Data warehouse design and usage, Data warehouse implementation, Data generation by attribute-oriented induction.

Module – 2 **10hr**
Introduction and Data Preprocessing :Why data mining, What is data mining, What kinds of data can be mined, What kinds of patterns can be mined, Which Technologies Are used, Which kinds of Applications are targeted, Major issues in data mining .Data Preprocessing: An overview, Data cleaning, Data integration, Data reduction, Data transformation and data discretization.

Module – 3 **8hr**
Classification: Basic Concepts: Basic Concepts, Decision tree induction, Bays Classification Methods, Rule-Based classification, Model evaluation and selection, Techniques to improve classification accuracy.

Module– 4 **10hr**
Mining Frequent Patterns, Associations, and Correlations: Basic Concepts and Methods: Basic Concepts, Frequent Itemset Mining Methods, Which Patterns Are Interesting?—Pattern Evaluation Methods, Pattern Mining in Multilevel, Multidimensional Space, Constraint- Based Frequent Pattern Mining.

Module – 5 **8hr**
Cluster Analysis: Basic concepts and methods: Cluster Analysis, Partitioning methods, Hierarchical Methods, Density-based methods, Grid-Based Methods, Evaluation of clustering.

CO	COURSE OUTCOMES
CO 1	Analyze different data models used in data warehouse
CO 2	Apply different preprocessing techniques for different attributes. .
CO 3	Determine frequent item set using association rules.
CO 4	Apply different classification techniques to classify the given data set.
CO 5	Analyze different clustering techniques
CO6	Implementing Data Mining Algorithms and Tools

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO 2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO1	PSO2	PSO3
CO1	L4	1	2	-	1	2	-	-	-	-	-	-	-	1	3	3
CO2	L3	2	2	2	1	1	-	-	-	-	-	-	-	2	2	2
CO3	L5	1	3	2	1	-	-	-	-	-	-	2	-	2	1	1
CO4	L3	1	2	2	2	1	-	-	1	-	-	-	-	1	1	2
CO5	L5	3	1	2	3	3	-	-	-	-	-	-	-	1	2	2
CO6	L5	3	1	-	-	1	-	-	-	-	-	-	-	1	3	2

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

Text Book:

1. Jiawei Han, Micheline Kamber, Jian Pei: Data Mining Concepts and Techniques, ELSEVIER (MK) 3rd edition 2012.

Reference Books:

1. Arun K Pujari: Data Mining Techniques 2nd Edition, Universities Press, 2009.
2. Jiawei Han and Micheline Kamber: Data Mining - Concepts and Techniques, 2nd Edition, Morgan Kaufmann Publisher, 2006.
3. Alex Berson and Stephen J. Smith: Data Warehousing, Data Mining, and OLAP Computing, Mc GrawHill Publisher, 1997.
4. Insight into Data Mining – Theory and Practice – K.P.Soman, Shyam Diwakar, V.Ajay, PHI, 2006.

Computer Science & Engineering			
CSP704	**Human Computer Interaction**	**L**	**T**
		3	**0**

Course Objective:
The aim of this course is to give students adequate understanding of the concepts of usability, user experience, and user centered design.

Module I: **5hr**
FOUNDATIONS OF HCI
The Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms.

Module II: 5hr
DESIGN & SOFTWARE PROCESS
Interactive Design basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process – software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules – principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.

Module III: **5hr**
MODELS AND THEORIES
Cognitive models –Socio-Organizational issues and stake holder requirements –Communication and collaboration models-Hypertext, Multimedia and WWW.

Module IV: **8hr**

MOBILE HCI
Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools.

Module V: **8hr**
WEB INTERFACE DESIGN
Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow. Case Studies.

COURSE OUTCOMES:

CO	COURSE OUTCOMES
CO 1	Explain the capabilities of both humans and computers from the viewpoint of human information processing
CO 2	Understand the design technologies for individuals and persons with Disabilities
CO 3	Analyze and Design real time application in mobile HCI and Web Interface
CO 4	Describe typical human–computer interaction (HCI) models and styles, as well as various historic HCI paradigms
CO 5	Design and implement user interfaces that effectively meet user needs and usability goals
CO6	Analyze user needs and requirements to inform the design of interactive systems.

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO 2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO1	PSO2	PSO3
CO1	L2	1	2	-	1	2	-	-	-	-	-	-	-	1	3	3
CO2	L2	2	2	2	1	1	-	-	-	-	-	-	-	2	2	2
CO3	L4	1	3	2	1	-	-	-	-	-	-	2	-	2	1	1
CO4	L2	1	2	2	2	1	-	-	1	-	-	-	-	1	1	2
CO5	L5	3	1	2	3	3	-	-	-	-	-	-	-	1	2	2
CO6	L4	3	1	-	-	1	-	-	-	-	-	-	-	1	3	2

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

TEXT BOOKS:

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, "Human Computer Interaction", 3rd Edition, Pearson Education, 2004 (UNIT I , II & III)
2. Brian Fling, "Mobile Design and Development", First Edition , O"Reilly Media Inc., 2009 (UNIT –IV)
3. Bill Scott and Theresa Neil, "Designing Web Interfaces", First Edition, O"Reilly, 2009.(UNIT-V)

Computer Science & Engineering			
TO711	**INFORMATION SECURITY**	**L**	**T**
		3	**0**

Course Objective:

The objectives of information security revolve around safeguarding sensitive information, ensuring the confidentiality, integrity, and availability of data, and protecting systems and networks from unauthorized access, misuse, or destruction.

Detailed syllabus:

Module1

Computer Auditing- System Access control, Data Access Control, Security Administration, and System Design.

Module 2

Hardware Security Controls - The Total System Needs Securing, Levels of Hardware Controls, Operating System Controls, Access Controls, General-Purpose Operating Systems Security, Sources of Additional Information

Module 3

Software Controls - Software Security and Controls, Types of Software Intrusions, Configuration Management , Modularity and Encapsulation, Protecting Information, Selecting Security Software, Analysis of Software Products Database Security - Introduction to Databases, Security Requirements of Databases, Designing Database Security, Methods of Protection,

Security of Multilevel Databases,The Future of Databases. Network and Telecommunication Security - Telecommunications and Networks, Security Considerations, Cases in Point, Special Communications, Security Considerations.

Module 4

Microcomputer Security - Microcomputer Problems and Solutions , The Microcomputer Environment , Security of Microcomputers, Internal Data Security, The Threats to Micros, Developing a Micro Security Plan, Establishing a Micro-to-Mainframe Link , Portable Microcomputer Security , Password Protection, Security of Special Micro Applications.

CO	COURSE OUTCOMES
CO 1	Recognize propensity of errors and remedies in processes involving information Technology
CO 2	Consummate knowledge of risk and controls in IT operation in industry
CO 3	Determine IT security guidelines for various type of industries
CO 4	Evaluate asset safeguarding, data integrity, system effectiveness and system efficiency.
CO 5	Understand software security auditing including database security audit, network security audit and micro-computer security audit.
CO6	Develop and implement a comprehensive information security plan for an organization, addressing aspects such as risk assessment, threat modeling,security policies, and incident response procedures.

Mapping of Course Outcomes onto Program Outcomes and Program Specific Outcomes

CO	BL	PO1	PO 2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO1	PSO2	PSO3
CO1	L4	1	2	-	1	2	-	-	-	-	-	-	-	1	3	3
CO2	L2	2	2	2	1	1	-	-	-	-	-	-	-	2	2	2
CO3	L3	1	3	2	1	-	-	-	-	-	-	2	-	2	1	1
CO4	L5	1	2	2	2	1	-	-	1	-	-	-	-	1	1	2
CO5	L2	3	1	2	3	3	-	-	-	-	-	-	-	1	2	2
CO6	L6	3	1	-	-	1	-	-	-	-	-	-	-	1	3	2

H-High(3), M- Moderate(2), L- Low(1), '-' for No correlation

BOOKS:

1. Deborah Russell, Computer Security Basics, O'Reilly & Associate, 1991.
2. Karen A. Forcht, Computer Security Management, Boyd & Fraser Publishing Co., 1994. Donald A. Watne, Peter B.B. Turney, Auditing EDP Systems, 2nd Edition, PH 1990

COMPUTER SCIENCE & ENGINEERING					
COURSE CODE: CSE 701P & IT 701P	**ARTIFICIAL INTELLIGENCE LAB**	L	T	P	C
		0	0	2	1

LIST OF EXPERIMENTS

EXP No.	EXPERIMENT NAME	COURSE OUTCOME
1	Write LISP Program to define a function for i. Converting Centigrade temperature to Fahrenheit ii. Finding maximum among three numbers iii. Finding factorial of a number iv. Finding n^{th} power of m (m^n) using recursive function	CO1s
2	Write PROLOG program i. To find maximum among three numbers ii. To find factorial of a number iii. To add/remove nth element in a list iv. To implement reverse of a list	CO1
3	Write a PROLOG Program about family relations and checking the relation between different family members by using facts and rules.	CO1
4	Write a PROLOG Program for Missionaries and Cannibal problem.	CO2
5	Write a PROLOG Program for Water Jug problem.	CO2
6	Write a LISP program to perform Breadth-first search	CO2
7	Write a LISP program to perform Depth-first search	CO2
8	Write a PROLOG Program for 8 puzzle problem.	CO2
9	Write a PROLOG Program for an expert course advisor system.	CO4
10	Write a program for TIC-TAC-TOE game using python.	CO3

RADHA GOVIND UNIVERSITY
RAMGARH, JHARKHAND

Department of Computer Science & Engineering
Under Faculty of Engineering and Technology

Choice Based Credit System Curriculum for
Bachelor of Technology

SEMESTER VIII

(Effective from Academic Session 2020-21)

Semester -VIII

Branch: Computer Science & Engineering

S.N.	Code	Course Title	L	T	P	Credits
1.	CS801D	Project-II			16	08
					Total Credit	08

NOTE- A Student can be allowed to do project outside after the permission of departmental Academic Committee. Those students doing project outside has present their project progress every month. Those students doing project outside can be permitted to present progress every fortnight though video conferencing. Students doing project in house has present their project progress every week