Estd. 1962
NAAC 'A' Grade
MHRD-NIRF- 28th Rank

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दुरध्वनी (ईपीएबीएक्स) २६०९००० (अभ्यास मंडळे विभाग– २६०९०९४)
फॅक्स : ००९१-०२३१-२६९१५३३ व २६९२३३३.e-mail:bos@unishivaji.ac.in

SU/BOS/Sci. & Tech/7400 **Date: 21/07/2018**

To,

The Principal/ Director,
All affiliated Engineering Colleges/ Institute,
Shivaji University, Kolhapur.

Subject : Regarding Guidelines, structure, of CBCS B. Tech. Program and syllabus of First Year B. Tech. Program under Faculty of Science and Technology.

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the University Authorities have accepted and granted approval to Guidelines, structure of CBCS B. Tech. Program and syllabus of First Year B. Tech. Program to following branches under Faculty of Science and Technology:

B. Tech. Programme (Branch)

1.	Civil Engineering & Technology
2.	Mechanical Engineering & Technology
3.	Production Engineering & Technology
4.	Automobile Engineering & Technology
5.	Electrical Engineering & Technology
6.	Chemcial Engineering & Technology
7.	Electronics Engineering & Technology
8.	Electronics and Telecommunication Engineering & Technology
9.	Biotechnology Engineering & Technology
10.	Information Technology Engineering & Technology
11.	Environmental Engineering & Technology
12.	Computer Science Engineering & Technology

The revised syllabi shall be implemented from the academic year 2018-19 (i.e. from July 2018) onwards. A soft copy containing CBCS Guidelines, structure, and syllabus of First Year B. Tech. is enclosed herewith. The syllabus is also made available on university website www.unishivaji.ac.in.

Further, it is hereby informed that the question papers on the pre-revised syllabi shall be set for the examination to be held in October/November 2018 and April/May 2019. These chances are available for repeater students, if any.

You are therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours faithfully,

Dy. Registrar

Encl-: as above.

Copy to-

1) I/c Dean, Faculty of Science & Technology
2) Director, Examination and Evaluation
3) The Chairman, respective BOS / Co-ordinating Committee

} For information

4) O.E. 4 Section
5) Appointment Section
6) Eligibility Section
7) Meeting Section

} For information & necessary action .

SHIVAJI UNIVERSITY, KOLHAPUR

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Accredided by NAAC 'A' Grade

Syllabus for

Bachelor of Technology

(B. Tech.) Program

(To be implemented from June, 2018 onwards)

SHIVAJI UNIVERSITY, KOLHAPUR

FIRST YEAR ENGINEERING AND TECHNOLOGY

Structure and Syllabus

(From the Academic Year 2018-2019)

(Course common to all branches except Architecture and Textile Engineering)

INSTRUCTIONS:

There are two groups in each semester:

1.Physics Group and

2.Chemistry Group

Allotment of groups to students:

a) Semester I: 50% students from each college will be admitted to Physics Group and remaining 50% will be admitted to Chemistry Group. The concerned College will decide the number and names of the students to be admitted in physics and chemistry groups and inform the same to the University.

b)Semester II: The students for Physics group in semester-I will be admitted to Chemistry Group in semester-II. The students for Chemistry Group in semester-I will be admitted to Physics Group in semester-II.

First Year Engineering and Technology – CBCS PATTERN (All Branches) (Sem I & II)

Sr. No		TEACHING SCHEME									EXAMINATION SCHEME							
		THEORY			TUTORIAL			PRACTICAL			THEORY					PRACTICAL (Term wok)		
		Credits	No. of Lecture	Hours	Credits	No. of Lecture	Hours	Credits	No. of Lecture	Hours	Hours	Mode	Marks	Total Marks	%Min	Hours	Max	%Min
SEMESTER - I																		
1	BSC-P-101 / BSC-C-101	3	3	3	-	-	-	1	2	2		CIE	30	100	40%	As per BOS Guidelines	25	40%
												ESE	70					
2	BSC-M-I-102	3	3	3	1	1	1	-	-	-		CIE	30	100	40%		25	40%
												ESE	70					
3	ESC-103	3	3	3	-	-	-	1	2	2		CIE	30	100	40%		25	40%
												ESE	70					
4	ESC-104	3	3	3	-	-	-	1	2	2		CIE	30	100	40%		25	40%
												ESE	70					
5	ESC-105	3	3	3	-	-	-	1	2	2		CIE	30	100	40%		25	40%
												ESE	70					
6	HM-I-106	1	1	1	-	-	-	1	2	2		-	-	-	-		25	40%
7	ESC-W-I-107	1	1	1	-	-	-	1	2	2		-	-	-	-		50	40%
	TOTAL	17	17	17	1	1	1	6	12	12				500			200	
SEMESTER –II																		
1	BSC-P-201 / BSC-C-201	3	3	3	-	-	-	1	2	2		CIE	30	100	40%	As per BOS Guidelines	25	40%
												ESE	70					
2	BSC-M-II-202	3	3	3	1	1	1	-	-	-		CIE	30	100	40%		25	40%
												ESE	70					
3	ESC-203	3	3	3	-	-	-	1	2	2		CIE	30	100	40%		25	40%
												ESE	70					
4	ESC-204	3	3	3	-	-	-	1	2	2		CIE	30	100	40%		25	40%
												ESE	70					
5	ESC-205	3	3	3	-	-	-	1	2	2		CIE	30	100	40%		25	40%
												ESE	70					
6	HM-II -206	1	1	1	-	-	-	1	2	2		-	-	-	-		25	40%
7	ESC-W-II-207	1	1	1	-	-	-	1	2	2		-	-	-	-		50	40%
	TOTAL	17	17	17	1	1	1	6	12	12				500			200	
	TOTAL	34	34	34	2	2	2	12	24	24				1000			400	

CIE – Continuous Internal Evaluation ESE – End Semester Examination

Candidate contact hours per week : 30 Hours(Minimum)
Total Marks for B.Tech I. Sem I & II :**1400**
Theory and Practical Lectures : 60 MinutesEach
Total Credits for B.Tech.-I (Semester I & II) :**48**
IntheoryexaminationtherewillbeapassingbasedonseparateheadofpassingforexaminationofCIEandESE
There shall be separate passing for theory and practical (term work)courses
Non-Credit Self Study Course : Compulsory Civic Courses(CCC) **For Sem I: CCC – I :** Democracy, Elections and Good Governance
Non-Credit Self Study Course : Skill Development Courses (SDC) For Sem II: SDC – I : Any one from following (i) to(v) i) Business Communication & Presentation ii) Event management iii) Personality Development, iv) Yoga & Physical Management v) Resume, Report & proposal writing

Note:
1.BSC : Basic Science Course arecompulsory.
2.HM : Humanities and Management arecompulsory.
3.ESC : Engineering Science Course **: ESC- P**for courses (subjects) are mandatory**Physics** group, while **ESC – C** courses (subjects) are mandatory for **Chemistry**group.
4.There will be two groups for Sem I & II Physics and Chemistry. The Candidate's those opting Physics group in Sem I shall appear for Chemistry group in Sem II andVice-versa.
5.ESC-W: Engineering Science Course-Workshop arecompulsory.

Course List

Semester – I

Physics Group			
Sl. No	**Code No.**	**Subject**	**Credits**
1.	BSC-P-101	Engineering Physics	4
2.	BSC-M-I-102	Engineering Mathematics-I	4
3.	ESC-P-103	Basic Electrical Engineering	4
4.	ESC-P-104	Basic Civil Engineering	4
5.	ESC-P-105	Engineering Graphics	4
6.	HM-I-106	Professional Communication-I	2
7.	ESC-W-I-107	Workshop Practice-I	2
		Total	24

Chemistry Group			
Sl. No	**Code No.**	**Subject**	**Credits**
1.	BSC-C-101	Engineering Chemistry	4
2.	BSC-M-I-102	Engineering Mathematics-I	4
3.	ESC-C-103	Fundamentals of Electronics and Computer Programming	4
4.	ESC-C-104	Applied Mechanics	4
5.	ESC-C-105	Basic Mechanical Engineering	4
6.	HM-I-106	Professional Communication-I	2
7.	ESC-W-I-107	Workshop Practice-I	2
		Total	24

Semester II

Chemistry Group			
Sl. No	**Code No.**	**Subject**	**Credits**
1.	BSC-C-201	Engineering Chemistry	4
2.	BSC-M-II-202	Engineering Mathematics-II	4
3.	ESC-C203	Fundamentals of Electronics and Computer Programming	4
4.	ESC-C204	Applied Mechanics	4
5.	ESC-C205	Basic Mechanical Engineering	4
6.	HM-II-206	Professional Communication-II	2
7.	ESC-W-II-207	Workshop Practice-II	2
		Total	24

Physics Group			
Sl. No	**Code No.**	**Subject**	**Credits**
1.	BSC-P-201	Engineering Physics	4
2.	BSC-M-II-202	Engineering Mathematics-II	4
3.	ESC-P-203	Basic Electrical Engineering	4
4.	ESC-P-204	Basic Civil Engineering	4
5.	ESC-P-205	Engineering Graphics	4
6.	HM-II -206	Professional Communication-II	2
7.	ESC-W-II-207	Workshop Practice-II	2
		Total	24

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester I and II
EngineeringPhysics

SECTION – I

Unit 1.Diffraction and Polarization of Light :(12 Marks)(7)

Diffraction : Diffraction- Concept and types (Fresnel and Fraunhofer diffraction), Diffraction grating – construction and theory, resolving power of planetransmission grating.

Polarization:

Introduction, double refraction, Huygens' theory (positive and negative crystals), Optical Activity, Specific Rotation, Laurent's half shade polarimeter.

Unit 2. Laser and FibreOptics:(12 Marks)(7)LASER :

Absorption, spontaneous emission, stimulated emission, pumping, population inversion, Ruby laser, characteristics of laser, Holography (construction and reconstruction)

Fibre Optics:

Total Internal Refection, structure of opticalfibre, acceptance angle, acceptance cone, numerical aperture and fractional refractive index change (noderivation), fibre optic communication system, advantages of optical fibres.

Unit 3. Sound: (11 Marks)(7)

Conditions for good acoustics, Reverberation, Reverberation time, Sabine's formula for reverberation time (no derivation), Absorption coefficient, Factors affecting architectural acoustics and their remedy.

SECTION – II

Unit 4.Crystal Physics: (12 Marks)(7)

Space Lattice, Basis and Crystal structure, Unit cell, Seven crystal system, number of atoms per unit cell, coordination number, atomic radius, packing fraction, relation between density and lattice constant, Miller indices - procedure, features and sketches for differentplanes, symmetry elements of cubic crystal,Bragg's law for X-ray diffraction.

Unit 5. Physics of Nano-materials: (12 Marks)(7)

Concept- Nanomaterial, Nanoscience and Nanotechnology, production techniques(Top down and bottom up), Ball milling and Colloidal technique for synthesis of nano particles, Types of Nanomaterial, Tools- Scanning Tunneling Microscope and Atomic Force Microscope, properties and applications of nano-materials.

Unit 6.QuantumMechanics (11 Marks)(7)

Wave-particle duality of light, dual nature of matter (De-Broglie's concept of matter waves) Wavelength of matter wave in terms of K.E. and P. D., Properties of matter waves, Heisenberg's uncertainty principle for position and momentum, Compton Effect (Statement, explanation and experimental verification).

List of Experiments;

Minimum 8 experiments should be performed from the following list.

01. Bi-prism experiment
02. Diffraction at Cylindrical obstacle.
03. Calculation of divergence of LASER beam.
04. Determination of wavelength of LASER using diffraction grating.
05 Wavelength of different spectral lines of mercury using grating.
06. Polarimeter.
07. Verification of inverse square law of intensity of light.
08. Resolving power of Telescope
09. Measurement of band gap energy.
10. Study of crystal structure.
11. Study of symmetry elements of cubic crystal.
12. Determination of 'd' (interplaner distance) using XRD pattern.
13. Study of Planes with the help of models related Miller Indices.
14. Determination of e/m of an electron
15. R. P. of grating

References :

1. R. K. Gaur & Gupta S. L, Engineering Physics -DhanapatRai Publication.
2. M. N. Avadhanulu& P. G. Kshirsagar - A Text Book of EngineeringPhysics -S. Chand Publication.
3. B. L. Theraja -Modern Physics - S. Chand & Company Ltd., Delhi.
4. Subramanyam&BrijLal, A Text Book of Optics –S. Chand & Company (P.) Ltd.
5. B. K. Pandey and S. Chaturvedi- EngineeringPhysics, Cengage Learning-2012
6. S. O. Pillai, Solid State Physics : Structure & Electron Related Properties,Eastern Ltd,, New Age International Ltd.
7. Charles Kittle, Introduction to Solid State Physics - Wiley India Pvt. Ltd.(8^{th}Edtion).
8. V. Rajendran – Engineering Physics- Mc. Graw Hills
9. Alan Giambattista and others- Fundamentals of physics, Tata Mc. Graw Hills
10. Vijay Kumari- Engineering Physics, Vikas Publications
11. ResnickHalliday, Physics Volume-I, Krane -John Wiley & Sons Pub.
12. ResnickHalliday, Physics Volume-II, Krane -John Wiley & Sons Pub.
13. Hitendra K. Malik, A. K. Singh – Engineering Physics - Tata Mc. Graw Hills Education Private Ltd.
14. A. Beiser – Concepts of Modern Physics - Tata Mc. Graw Hills
15. L. J. Schiff – Quantum Mechanics - Tata Mc. Graw Hills

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester -I

EngineeringMathematics-I

SECTION I

Unit 1: Matrices and Solution of Linear System Equations(8)(Weightage 15 Marks in Shivaji Uni Exam of 70 marks)

1. Rank of matrix: definition, normal form and echelon form
2. Consistency of linear system equations
3. System of linear homogeneous equations
4. System of linear Non-homogeneous equations

Unit 2: Eigen Values and Eigen vectors (7)

(Weightage 10 Marks in Shivaji Uni Exam of 70 marks)

1. Eigen Values
2. Properties of Eigen Values
3. Eigen vectors
3. Properties of Eigen vectors
4. Cayley-Hamilton's theorem (Without proof)

Unit 3: Complex Numbers (6)

(Weightage 10 Marks in Shivaji Uni Exam of 70 marks)

1. De Moivre's Theorem (Without proof)
2. Roots of complex numbers by using De Moivre's Theorem
3. Expansion of sinnθ and cosnθ in powers of sinθ and /or cosθ.
4. Circular functions of a complex variable - definitions

5Hyperbolic and Inverse Hyperbolic Functions- definitions .

SECTION II

Unit 4: Numerical Solution of linear simultaneous equations: (6)(Weightage 10 Marks in Shivaji Uni Exam of 70 marks)

1. Gauss elimination method
2. Gauss-Jordan method
3. Jacobi's iteration method
4. Gauss-Seidel iteration method

Unit 5: Expansion of Functions and Indeterminate forms: (7)(Weightage 10 Marks in Shivaji Uni Exam of 70 marks)

1. Maclaurin's theorem
2. Standard expansions
3. Taylor's theorem
4. Indeterminate forms and L' Hospital's rule

Unit 6: Partial Differentiation:(8)(Weightage 15 Marks in Shivaji Uni Exam of 70 marks)

1. Partial derivatives: Introduction
2. Total derivatives
3. Differentiation of implicit function
4. Euler's theorem on homogeneous function of two variables
5. Jacobian and its Properties .
6. Maxima and Minima of functions of two variables

General Instructions:

1. Batch wise tutorials are to be conducted. The number of students per batch should be as per the university pattern for practical batches.
2. Minimum number of assignments should be 8 covering all topics.

Recommended Books:

1. A text book of Applied Mathematics, Vol.I by P. N. Wartikar& J. N. Wartikar, Pune VidyarthiGrihaPrakashan, Pune.
2. Higher Engineering Mathematics by Dr. B. S. Grewal, Khanna Publishers, Delhi.

Reference Books:

1. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India Pvt. Ltd.
2. Advanced Engineering Mathematics by H. K. Dass, S. Chand, New Delhi.
3. A text book of Engineering Mathematics Volume I by Peter V. O'Neil and Santosh K.Sengar, Cengage Learning.
4. Mathematical methods of Science and Engineering by Kanti B. Datta, Cengage Learning.
5. Numerical methods by Dr. B. S. Grewal, Khanna Publishers, Delhi.
6. A text book of Engineering Mathematics by N. P. Bali, Iyengar, Laxmi Publications (P) Ltd.,NewDelhi.

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester -I and II

Basic Electrical Engineering

SECTION I

Unit1: Analysis of D.C. circuits: (8)

(Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

Concept of E.M.F, Potential Difference, Current, Resistance, Ohm's Law Kirchhoff's laws, mesh and node analysis

(Numerical on Mesh and Nodal Analysis of Two loops)

Unit 2:Magnetic circuits:(8)

(Weightage 11 Marks in Shivaji Uni Exam of 70 marks)

Concept of mmf, reluctance, magnetic flux, Magnetic Flux density, Magnetic field strength, BH curve, magnetic leakage, fringing, Comparison of Electric and Magnetic circuit, series magnetic circuits (Theoretical Concepts only).

Unit 3: Single phase AC Circuits: (8) (Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

Fundamentals of Alternating quantities, Faraday's Law, Types of Induced E.M.F ,Generation of sinusoidal voltage, concept of R.M.S. & Average value, form factor, Peak Factor, Pure Resistive, Inductive, Capacitive , R-L, R-C, R-L-C series circuits, powers, Significance of power factor.

(Numerical Treatment on Series R-L, R-C, R-L-C circuits)

SECTION II

Unit 4: Three phase A.C. Circuits (7) (Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

Advantages of 3 phase system, Generation of 3 phase AC supply, balanced 3 phase load, relation between line and phase quantities for star connected circuit and delta connected circuit.

Unit 5:Earthing and lamps: (7) (Weightage 11 Marks in Shivaji Uni Exam of 70 marks)

Necessity of Earthing, Earthing methods, Fuse (rewireble and HRC). MCB, Incandescent Lamp, Fluorescent tube, CFL, LED lamp, Mercury vapour lamp, single line diagram of electrical systems.

Unit 6: Single phase Transformer: **(8)** (Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

Construction, operating principle, Types, emf equation, Ratios of voltage and current, operation on no load and with load, power losses, efficiency, voltage regulation, applications.

(Numerical Treatment on E.M.F Equations &Transformer losses and Efficiency)

List of Experiments

Minimum 8 experiments should be performed from the following list.

1. Laboratory Sessions covering,General Introduction to Electrical Engineering laboratory, Experimental Set ups, Instruments etc.. Electrical Symbols.
2. Electric Shocks and precautions against shocks(Do's and Don'ts) .
3. Study of Ohm's Law.
4. Verification of Kirchhoff's Voltage Law and Kirchhoff's Current Law.
5. B-H curve of magnetic material.
6. Study of Faraday's law.
7. Determination of Reactance's for Series R-L- C Circuit.

8. Measurement of active and reactive power in balanced 3-phase circuit using Two-watt meter method.
9. Study of Basic methods of Earthing. Use of Fuse and Miniature Circuit breaker.
10. Study of different luminaries including Incandescent lamp, Mercury vapor lamps, fluorescent tube, CFL, and LED lamps.
11. Polarity and Ratio Test for single Phase Transformer.
12. Pre-determination of efficiency and regulation by Open Circuit and Short circuit tests on single phase transformer.
13. Determine the Efficiency of single Phase Transformer by Direct Loading Test

Reference books:

1. P.V.Prasad and S.Shivan Raju – Electrical Engineering concepts and Applications – Cengage learning.
2. B.L.Theraja – Electrical Technology vol.1. – S.Chand.
3. B.L.Theraja – Electrical Technology vol.2. – S.Chand.
4. NagrathI.J. and D.P.kothari – Basic Electrical Engineering(2001) – Tata McGraw Hill.
5. .BharatiDwivedi and AnurasgTripathi – Fundamentals of Electrical Engineering – Willey Precise

FIRST YEAR ENGINEERING AND TECHNOLOGY

Semester -I and II

Basic Civil Engineering

SECTION I

Unit 1: Relevance of Civil Engineering and Building Planning(7)

Introduction, branches of civil engineering, application of civil engineering inother alliedfields.Principles of planning, introduction to Bye-Laws regarding building line, height of building, open space requirements, F.S.I., setbacks, ventilation, sanitation as per municipal corporation area requirement.

Unit 2: Components of Building (7)

A) Sub-structure: Types of soil and rocks as foundation strata, concept of bearing capacity,types of foundations i.e. shallow and deep and their suitability. Shallow foundation such as wall foundation, isolated foundation, deep foundation such as pile foundation.

B) Super-structure: Elements of super-structures and their functions

Unit 3: Building Materials and Design (7)

Use and properties of the following materials--Concrete – ingredients and grades, plain and reinforced cement concreteand ready mixconcrete, bricks, steel, timber, roofingmaterials etc.

Introduction to types of loads, load bearing and framed structures.

SECTION II

Unit 4: Linear and Angular Measurements(7)

Principles of surveying, Classification of surveys, Chain Surveying, Introduction to metricchain and tapes, error in chaining, nominal scale and R.F., ranging, chaining and offsetting, index plan, location sketch and recording of field book, Chain and compass survey, Meridian, bearing and its types, system of bearing, Types of compass: prismatic and surveyor's compass. Calculation

Ofincluded angles, correction for local attraction.

Unit 5: Leveling (7)

Terms used in leveling, use of Dumpy level and Auto Level, temporary adjustments.Methodsof reduction of levels, types of leveling, Contours, characteristics of contours, use of contour maps.Introduction and use of EDM's with special reference to Total Station.Measurement of area by planimeter – mechanical and digital.

Unit 6: Introduction to Transportation, Environmental and Irrigation Engineering (7)

Components of rigid and flexible pavement, components of railway track (Broad Gauge)Components of water supply scheme (flow diagram), Necessity of Irrigation, Types of Dams (Earthen and Gravity Dam)

Term work:

Student can choose either Model A or Model B for performing practical

Model A

List of Experiments: Minimum 8 experiments should be performed from the following list-Practicalexercises given be carried out and drawing sheets be plotted wherever necessary.

1. Introduction to Measurement of Distances.
2. Plotting the outlines of building by chaining, ranging and offsetting.

3. Plotting of closed traverse by prismatic compass.
4. Reduction of levels by rise and fall method.
5. Finding out gradient of line by rise and fall method
6. Measurement of area by mechanical
7. Study of total station for various measurements.
8. Site visit to study various construction processes and principles of planning.
9. Drawing sheet showing various building elements.
10. Drawing sheet showing various sign conventions

Model B

List of Experiments: Minimum 8 experiments should be performed from the following list-Practicalexercises given be carried out and drawing sheets be plotted wherever necessary.

1. Introduction to Measurement of Distances.
2. Plotting the outlines of building by chaining, ranging and offsetting.
3. Plotting of closed traverse by surveyor's compass.
4. Reduction of levels by collimation plane method.
5. Finding out gradient of line by collimation plane method.
6. Measurement of area by digital planimeter
7. Study of total station for various measurements.
8. Site visit to study various construction processes and principles of planning.
9. Drawing sheet showing various building elements.
10. Drawing sheet showing various sign conventions

Reference Books:

1. Basic Civil Engineering by S. S. Bhavikatti, New Age International Publications.
2. Civil Engineering Materials - Technical Teacher's Training Institute, Chandigarh
3. Surveying by N. Basak, Tata Mc-Graw Hill Publication.
4. Basic Civil Engineeringby G. K. Hiraskar, DhanpatRai Publication.
5. Surveying Vol.I, Vol.II, Vol.III by B.C. Punmia, Laxmi Publication.
6. Irrigation Engineering by B. C. Punmia, DhanpatRai Publications

FIRST YEAR ENGINEERING AND TECHNOLOGY

Semester -I and II

EngineeringGraphics

SECTION I

Unit1: Fundamentals of Engineering Graphics& Engineering Curves (6)

A) Fundamentals of Engineering Graphics: Introduction to Drawing instruments and their uses. Layout of drawing sheets, different types of lines used in drawing practice, Dimensioning system as per BIS (Theoretical treatment only)

B) Engineering curves: Construction of regular polygons (up to hexagon). Construction of Ellipse – (Directrix-Focus & Arcs of circle Method) Parabola-(Directrix-Focus & Rectangle Method) , Hyperbola-(Directrix-Focus & Rectangular Method), Involutes, Archimedian spiral and Cycloid only. (10 marks)

Unit 2: Projections of lines & Planes (9)

A) Projections of lines: Introduction to First angle and third angle methods of projection.
Projections of points on regular reference planes. Projections of horizontal, frontal and Profile lines on regular and auxiliary reference planes. Projection of oblique lines it's True length and angle with reference planes by rotation and auxiliary plane method. Concept of grade and bearing of line.

B) Projections of planes: Projections on regular and on auxiliary reference planes. Types of planes (horizontal, frontal, oblique and Profile planes). Edge view and True shape of a Plane. Angles made by the plane with Principle reference planes. Projections of plane figures inclined to both the planes. (Circle and regular polygon) (15 marks)

Unit 3: Projections of solids (5)

Projections of Prisms, Pyramids, Cylinder and Cones inclined to both referenceplanes(Excluding frustum and sphere)(10 marks)

SECTION- II

Unit 4: Orthographic Projections (7)

Orthographic views: lines used, Selection of views, spacing of views, dimensioning and sections. Drawing required views (any two views) from given pictorial views (Conversion of pictorial view into orthographic view) including sectional orthographic view. (15 marks)

Unit 5: Isometric projections (6)

Isometric projections: Introduction to isometric, Isometric scale, Isometric projections and Isometric views / drawings. Circles in isometric view. Isometric views of simple solids and objects. (10 marks)

Unit 6: Development of plane and curved surfaces (7)

Development of plane and curved surfaces: of the solids, Prisms, Pyramids, Cylinders and Cones along with cutting planes (Solids in simple position only). (10 marks)

Note: The above syllabus is to be covered according to the first angle method of projection.
Self-Study: Geometrical constructions and free hand sketches**,** Missing Views

Term work:

The following six sheets are to be drawn based on the above topics. All these sheets should be drawn on half imperial (A3 size) drawing sheets only.

1. Engineering curves	01
2. Projections of lines and planes	01
3. Projections of solids	01
4. Orthographic projections	01
5. Isometric projections	01
6. Sections of solids and development of surfaces	01

Reference Books:

1. Engineering Drawingby N. D. Bhatt, Charotor Publication House, Bombay
2. Fundamentals of Engineering by W. J. Luzadder, Drawing, Prentice Hall of India.
3. Engineering Design and Visualization by Jon M.Duff,William A. Ross, CENGAGE Learning
4. Machine Drawing by N. D. Bhatt, Charotor Publication House, Bombay.
5. Graphic Science by French and Vierck, Mc-Graw Hill International.
6. Engineering Drawing and Graphics by K. Venugopal, New Age Publication
7. A text book of Engineering Drawing by R. K. Dhawan, S. Chand and Co.
8. Machine Drawing by K. L. Narayana, New Age Publication
9. Engineering Drawing by N. B. Shaha and B. C. Rana, Pearson Education.
10. Engineering Drawing and Graphics Using AutoCAD by T. Jeyapoovan, Vikas Publication.
11. Engineering Drawing by Prof. Amar Pathak, WIELY India Publication.

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester -I
Professional Communication-I

Unit 1: Understanding Communication **(3)**

1. Introduction, nature and importance
2. Process of communication
3. Basic types of communication- Verbal and Non- verbal
4. Barriers and filters of communication

Unit 2: Grammar and Vocabulary **(2)**

1. Forms of Tenses
2. LSRW skills
3. Developing vocabulary (synonyms, antonyms, confused words etc.)

Unit 3: Phonetics **(2)**

1. Understanding Phonetics and its alphabets
2. Transcription practices

Unit 4: Developing Oral Skills **(3)**

1. Importance and techniques of spoken language.
2. Techniques of formal speech, meetings, Elocution, Extempore etc.

Unit 5: Professional Correspondence **(4)**

1. Importance, language and style, formats (British & American)
2. Letter Writing – Simple letter (seeking permission regarding absence etc.),
3. Preparation of technical events information broacher and manuals.

Term Work: Minimum 8 should be performed from the following list.

1. Elocution
2. Vocabulary building
3. Phonetic Alphabets (Listen & repeat)
4. Pronunciation
5. Fluency Tips
6. Extempore
7. Teamwork- story making
8. Effective reading (newspaper articles)
9. Active listening (memorizing)
10. Letter writing
11. Situational conversation

Instructions:

1. Minimum 7 assignments should be covered.
2. Use of language lab is mandatory for both the semesters.

Reference Books:

1. Handbook for Technical Writingby David A. McMurrey, Joanne Buckley, Cengage.
2. A Course in Englishby J.D. O'Connor.
3. Better English Pronunciation by J.D. O'Connor.
4. Communication Skills Handbook: How to succeed in written and oral communication by Jane Summers, Brette Smith, Wiley India Pvt.Ltd.
5. Personal Development for Life and Work by Masters, Wallace, Cengage.
6. Soft Skills for Managers by Dr. T. KalyanaChakravarthi, Dr. T. LathaChakravarthi, Biztantra.
7. Soft Skills for every one by Jeff Butterfield, Cengage.
8. Behavioural Science by Dr.Abha Singh, Wiley India Pvt.Ltd.
9. An Introduction to Professional English and Soft Skills by Bikram K. Das, KalyaniSamantray, Cambridge University Press New Delhi.
10. Speaking Accurately, K.C. Nambiar, Cambridge University Press New Delhi.
11. Speaking Effectivelyby Jeremy Comfort, Pamela Rogerson, Cambridge University Press New Delhi.
12. Cambridge English for Job Hunting by ColmDownes, Cambridge University Press New Delhi.
13. Body Language by Allen Pease.
14. The Ace of Soft Skills by Gopalswami Ramesh, Mahadevan Ramesh, Pearson Publication, Delhi.
15. Decision Making Skills by Khanka S.S.
16. Business Ethics and Communication by C.S. TejpalSheth.
17. Write Right by Syed AbdurRaheem.

FIRST YEAR ENGINEERING AND TECHNOLOGY

Semester -I and II

Workshop Practice-I

Unit 1: Safety (3)

Concept of accidents, causes of accidents, safety precautions while working in shop, safetyequipments and their use.

Unit 2: Measuring Instruments (3)

Brief introduction to instruments like – Steel rule, Calipers, Vernier Caliper, Micrometer, DialGauge, Vernier height Gauge etc. Least counts, common errors and care while using them, Use ofmarkinggauge, 'V'block and surface plate.

Unit 3: Smithy (4)

Introduction to smithy operations like- bending, forming, upsetting, drawing. Smithy toolshammer,hot & cold chisel flatters, tongs, anvil etc.

Unit 4: Fitting (4)

Study of various tools like- files, drills, taps, dies. Fitting operations.

Term work:

The term work consists of assignment on safety, measuring instruments, Smithy and fitting.
Every student should perform,

1. Smithy
One job in smithy involving upsetting, Drawing, bending such as- Hook, peg, square headedbolt etc.

2. Fitting
One job Male/Female fitting with operations- Marking, cutting, drilling, tapping filing etc.

Reference Books:
1. A Course in Workshop Technology, Vol – I by B. S. Raghuvanshi, Dhanapat Rai and Sons.
2. Elements of Workshop Technology, Vol – I by HajaraChaudhari, Media Promoters.
3. Workshop Technology, Vol – I by Gupta and Kaushik, New Heights.
4. Workshop Technology, Vol – I by Chapman, The English Language Book Society.
5. Workshop Technology, Vol.-I by H.S. Bawa, TMH Publications, New Delhi.

FIRST YEAR ENGINEERING AND TECHNOLOGY

Semester -I and II

EngineeringChemistry

Unit 1: Water **(7)**

Introduction, impurities in natural water, water quality parameters total solids, acidity, alkalinity, chlorides, and dissolved oxygen (definition, causes, significance), hardness of water types of hardness, units of hardness, ill effects of hard water in steam generation in boilers (scale & sludge formation), numerical on hardness, treatment of hard water (ion exchange and reverse osmosis).

Unit 2: Instrumental methods of chemical analysis **(7)**

Introduction, advantages and disadvantages of instrumental methods-----

A)Spectrometry: Introduction, Laws of spectrometry (Lamberts and Beer-Lambert's law),Single beam spectrophotometer (schematic, working and applications).

B)Chromatography: Introduction, types, gas-liquid chromatography (GLC), basic principle, instrumentation and applications.

Unit 3: Advanced materials **(7)**

A)Polymers: Introduction, plastics, thermo softening and thermosetting plastics, industrially important plastics like phenol formaldehyde, urea formaldehyde and epoxy resins, Conducting polymers and Biopolymers(Introduction, examples and applications.)

B)Composite materials: Introduction, Composition, properties and uses of fiber reinforced plastics (FRP) and glass reinforced plastic (GRP).

SECTION II

Unit 4: Fuels(7)

Introduction, classification, calorific value, definition, units (calorie, kcal, joules, kilojoules), characteristics of good fuels, comparison between solid, liquid and gaseous fuels, types of calorific value (higher and lower), Bomb calorimeter and Boy's calorimeter. Numericalproblems on Bomb and Boy's calorimeter.

Unit.5: Corrosion: **(7)**

Introduction, causes, classification, atmospheric corrosion (oxidation corrosion), electrochemical corrosion (hydrogen evolution and oxygen absorption mechanism), factors affecting rate of corrosion. Prevention of corrosion by proper design and material selection,cathodic protection, Protective coatings-hot dipping (galvanizing and tinning,), electroplating.

Unit 6: Metallic materials & Green Chemistry **(7)**

A)Metallic materials: Introduction, Alloy- definition and classification, purposes of making alloys. Ferrous alloys: Plain carbon steels (mild, medium and high), stainless steels. Nonferrous alloys: Copper alloy (Brass), Nickel alloy (Nichrome), Aluminum alloy (Duralumin and Alnico).

B)Green Chemistry: Definition, Twelve principles of Green Chemistry.

Term work:

List of Experiments:

Minimum 8 experiments should be performed from the following list out of which two experiments should be demonstrative on instrumental methods.

1. Determination of acidity of water.
2. Determination of alkalinity of water.
3. Determination of chloride content of water by Mohr's method.

4. Determination of total hardness of water by EDTA method.
5. Determination of moisture, volatile and ash content in a given coal sample by proximate analysis.
6. Preparation of urea-formaldehyde resin.
7. Preparation of phenol-formaldehyde resin.
8. Determination of percentage of copper in brass.
9. Estimation of zinc in brass solution.
10. Determination of rate of corrosion of aluminium in acidic and basic medium.
11. Demonstration of pH meter.
12. Demonstration of photo-colorimeter / spectrophotometer.
13. Demonstration of paper chromatography.

Reference books:

1.Engineering Chemistry by Jain and Jain, DhanpatRai Publishing Company Ltd., New Delhi.
2.A Textbook of Engineering Chemistry by S. S. Dara and S. S. Umare, S. Chand & Company Ltd., New Delhi.
3.A Textbook of Engineering Chemistry by C. P. Murthy, C. V. Agarwal and A. Naidu, BS Publications, Hyderabad.
4.Chatwal and Anand, Instrumental Methods of Chemical Analysis, Himalaya Publishing House, New Delhi.
5.Engineering Chemistry by Dr. A. K. Pahari and Dr. B. S. Chauhan, Laxmi Publications (P) Ltd, New Delhi.
6.A text Book of Engineering Chemistry by ShashiChawla, DhanpatRai& Co. (Pvt.) Ltd, Delhi.
7.Engineering Chemistry by Wiley India.
8.Engineering Chemistry by RenuBapna and Renu Gupta, MacMillan Publishers (India) Ltd, Delhi.

FIRST YEAR ENGINEERING AND TECHNOLOGY
Semester -I and II

Fundamentals of Electronics and Computer

Unit 1: Semiconductor Devices and Applications (7)

(Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

Semiconductor Diode, Half wave, Full wave, Bridge rectifier, Voltage Regulator Using Zener Diode,BJT: characteristics, CE configuration, CE as an amplifier. Load Line, Operating Point, Leakage Currents, Saturation and Cut off Mode of Operations.

Unit 2: Digital Electronics (7)

(Weightage 11 Marks in Shivaji Uni Exam of 70 marks)

Logic Gates, Boolean algebra, Comparison of Specifications of Logic Families, Combinational Logic, Half Adder, Full Adder, Multiplexer, De-Multiplexer.

Unit 3: Applications (7)

(Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

A) Transducers: for Displacement (LVDT), Temperature (RTD), Pressure (Strain Gauge), Speed (Shaft Encoder), Range, Specifications and Limitations.

B) Appliances: Operation of Appliances: Digital Thermometer, Weighing Machine, Washing Machine, Microwave Oven and Tachometer.

SECTION II

Unit 4: Computer Basics and Hardware (5)

(Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

A) Generations & Classification of Computers.

B) Computer System Architecture– CPU, Input Unit, Output Unit, Storage Unit.

C) Applications of Computers.

Unit 5: Data Representation and Computer Software (8)

(Weightage 11 Marks in Shivaji Uni Exam of 70 marks)

A) Data Representation In Computer: Types Of Number System – Binary, Octal, Decimal, Hexadecimal & Their Conversions, Coding Schemes – ASCII, Unicode.

B) Computer Software:

A) Operating System: Types Of Operating System, Functions, Unix/Linux Commands: Listing, Changing, Copying, And Moving Files & Directories (ls, cd, cat, mkdir, rmdir)

B) System Software: Assembler, Interpreter, Compiler.

C) Application Software's: Word Processor, Spreadsheets, Presentation andtheir Applications.

Unit 6: Computer Programming and Networks (8)

(Weightage 12 Marks in Shivaji Uni Exam of 70 marks)

A) Computer Programming: Program Development Cycle, Algorithm, Flowchart, Programming Control Structures – Sequence, Selection, and Repetition.

B) Introduction to Computer Networks: Definition Of Computer Network, Need, Standards: OSI, TCP/IP, Types of Networks: LAN, WAN, MAN, Network Topologies.

Term work: FUNDAMENTAL OF ELECTRONICS

List of Experiments: Minimum 4 experiments should be performed from the following list.

1. Testing of Electronic components- resistors, capacitors, inductor, diode, transistor, LED and Switches using multi-meter &C.R.O.
2. V-I Characteristics of PN junction diode and Zener diode.
3. Study of Half and Full wave rectifiers and their comparison.
4. Study of Frequency response of CE amplifier.
5. Study of truth tables of logic Gates: OR, AND, NOT, NAND, NOR, EXOR.
6. Study of MUX/DEMUX.
7. Measurement of Displacement using LVDT/strain Gauge.
8. Measurement of Temperature using any transducer.

Self-Learning Activities: Different types of Communication systems & Communication Media.

Term work: FUNDAMENTAL OF COMPUTER

List of Experiments: Minimum 4 experiments should be performed from the following list.

1. Study of computer system – Internal Components & peripherals.
2. Use of Unix/Linux commands & create a file using any editor in Linux.
3. Create a document using any word processor (In Linux (open office) /Windows (Microsoft office).
4. Use any spreadsheet application to manipulate numbers, formulae and graphs (In Linux/Windows).
5. Use any power point presentation application and create a professional power point presentation using text, image, animation etc. (In Linux/Windows).
6. An assignment based on use of Internet and Web for searching and downloading Technical information.
7. Study of Tablet and Android Operating System Features and applications.

Text Books:

1. A Text Book of Applied Electronics by R S Sedha, S. Chand
2. Basic Electronics Engineering by Vijay Baru, RajendraKaduskar, S T Gaikwad (Wiley/ DREAMTECH)
3. Digital Principles & Applications by Albert Malvino, Donald Leach, TMGH Publication.
4. Principle of Electronics by V.K. Mehata, S. Chand
5. Electronic Instrumentation by H. S. Kalasi, Tata McGraw Hills Publication

Reference Books:

1) Electronics Devices and Circuit Theory by Robert L. Boylestad and Louis Nashelsky (Pearson Education Publication)
2) Fundamental of Digital Circuits by A. Anand Kumar (PHI- Publication)
3) Fundamental of Electronics Engineering by R.Prasad(CENGAGE- Learning)
4) Introduction to Information Technology, ITL Education Solutions LTD. Pearson Education
5) Fundamentals of Computers by V. Rajaram, PHI Publications.
6) UNIX concepts and applications by Sunitabha Das, TMGH.
7) Computer FundamentalsArchetucture and Organization by B.Ram New Age International Publishers.

FIRST YEAR ENGINEERING AND TECHNOLOGY

Semester -I and II

Applied Mechanics

Unit 1: Fundamentals of Statics (7)

Basic Concepts and Fundamental Laws, Force, Moment and Couple, System of Forces, Resultant, Resolution and Composition of Forces, Varignon's Theorem, Law of Moments.

Unit 2: Equilibrium (7)

Lami s' Theorem, Free Body Diagram, Equilibrium of Forces, Equilibrium conditions, Surface friction for bodies on horizontal and inclined planes.

Beams: Types of Loads, Types of supports, Analysisof Simple beams, Virtual work method for support reactions.

Unit 3: Centroid and Moment of Inertia (7)

Centroid and Center of Gravity, Moment of Inertia of Standard shapes from first principle, Parallel and perpendicular axis theorem, Moment of Inertia of plain and composite figures, Radius of Gyration.

SECTION II

Unit 4: Kinetics of Linear (8)

Introduction to Kinematics of Linear motion (no numerical on kinematics), Kinetics of linear motion, Newton's Laws, D'Alembert's Principle, Work- Energy Principle, Impulse Momentum Principal

Unit 5: Kinetics of Circular Motion (8)

Introduction to Kinematics of Circular motion (no numerical on kinematics), Rotation with constant and variable angular acceleration, centripetal and centrifugal force, condition of skidding and overturning.

Unit 6: Impact and Collision (5)

Impact, Types of Impact, Law of conservation of Momentum, Coefficient of Restitution,Numerical on Direct central Impact.

Term work:

Student can choose either Model 1 or Model 2 for performing practical

Model 1	Model 2
A) Experiments:	
1. Law of polygon of forces	**1.** Law of polygon of forces
2. Jib crane	**2.** Jib crane
3. Bell crank lever	**3.** Bell crank lever
4. Support Reactions of Beam	**4.** Support Reactions of Beam
5.Fleture's Trolley	**5.** Centrifugal force
B) Graphics Statics: (To be solved on A3 sheet)	
1. To find Resultant - 3 problems	1. To find Resultant - 3 problems
2.To find support reactions - 3 problems	**2.**To find support reactions - 3 problems
C) Home Assignments	
At least one assignment on each unit with minimum 5 numericals	At least one assignment on each unit with minimum 5 numericals

Reference Books:

1.Engineering Mechanics by S. S. Bhavikattis, New Age International Pvt. Ltd.
2.Engineering Mechanics by R. K. Bansal and Sanjay Bansal.
3.Vector Mechanics for Engineers Vol.I and II by F. P. Beer and E. R. Johnston, Tata Mc-Graw Hill Publication.
4.Engineering Mechanics by Manoj K Harbola, Cengage Learning
5.Engineering Mechanics by K. I. Kumar, Tata Mc-Graw Hill Publication
6.Engineering Mechanics by S. B. Junnerkar.
7.Engineering Mechanics by Irving H. Shames, Prentice Hall of India, New Delhi.
8.Applied Mechanics by S. N. Saluja, Satya Prakashan, New Delhi.
9.Engineering Mechanics by Statics and Dynamics by Ferdinand Singer, Harper and Row Publications
10.Engineering Mechanics by R. S. Khurmi, S. Chand Publications
11.Fundamentals of Engineering Mechanics by S. Rajasekaran, G. Sankarasubramanian,VikasPublishing House
12) "Applied Mechanics- Dynamics &Statics " by I.B.Prasad, Khanna Publisher, Delhi

FIRST YEAR ENGINEERING AND TECHNOLOGY

Semester -I and II

Basic Mechanical Engineering

Unit1:Thermodynamics(7)

Thermodynamic State, Process, Cycle, Thermodynamic System, Heat, work, Internal Energy,First Law of Thermodynamics, Application of First Law to steady Flow processes,Limitations of First Law (Numerical Treatment) Statements of Second Law of Thermodynamics.(12 marks)

Unit 2: Introduction to I C Engine (7)

Carnot Engine, Construction and Working of C.I. and S.I., Two stroke, Four Stroke Cycles,Air standard cycles- Carnot Cycle, Joule Cycle, Otto Cycle, Air Standard efficiency (DescriptiveTreatment only) (12 marks)

Unit 3: Introduction to Refrigeration and Air Conditioning (6)

Carnot refrigerator, Refrigerant types and properties, Vapour compression and vapourabsorption system, solar refrigeration, Window Air Conditioning, Psychometric properties ofmoistair, Applications of refrigeration and air conditioning (Descriptive Treatment only).(11 marks)

Unit4:EnergySources and power plants (7)

Renewable and nonrenewable, Solar-flat plate collector, concentric collector–Parabolic andcylindrical, Photovoltaic cell, Wind, Hydropower plant, Steam Power plant,Bio-gas, Bio-Diesel (Descriptive Treatment only). (12 marks)

Unit 5: Mechanical Power Transmission and Energy conversion devices(7)

Type of Belt and belt drives, chain drive, Types of gears and gear Trains, (Numerical Treatment on belt drive), Construction, workingand applications of centrifugal Pump, Reciprocating compressor and Peloton wheel Turbine.(12 marks)

Unit 6: Manufacturing Processes (6)

Introduction to manufacturing processes - Casting Process, Steps involved in castingprocesses, and their applications, Metal removing processes (Lathe, milling & drilling operations) Metal JoiningProcesses – Arc welding, soldering and brazing and their applications.(11 marks)

Term Work:

List of experiments: Minimum 8 experiments should be performed from the following list--

1. Demonstration of I.C. engine
2. Demonstration of Two stroke and four stroke engine
3. Demonstration of vapor compression refrigeration system and window airconditioner.
4. Demonstration of Solar water heating system.
5. Demonstration of Steam or Hydroelectric Power Plant
6. Demonstration of Diesel power plant
7. Demonstration of types of Gears and gear trains.
8. Demonstration of pumps and compressor.
9. Demonstration of hydraulic turbine
10. Demonstration of metal joining processes.
11. Demonstration of metal removal processes
12. Industrial visit based on syllabus.

Reference Books:

1. Solar Energy by Dr.S.P. Sukathame,Tata Mc-Graw Hill Publication
2. Non-Conventional Sources of Energy by G.D. Rai, Khanna Publication
3.Engineering Thermodynamics by R.Joel, The English Language Book Society.
4.Engineering Thermodynamics by Achultan, Prentice Hall of India.
5.Thermal Engineering by R.K. Rajput, Laxmi Publication, Delhi.
6.Elements of Heat Engine Vol.I,II,III by Patel and Karamchandani, Acharya Book Depot.
7.Power Plant Engineering by Arora and Domkunwar, Dhanpat Rai and Sons.
8. Manufacturing Technology Volume I and II by P. N. Rao, Tata Mc-Graw Hill Publication
9. Elements of Workshop Technology, Vol.I and II by HajaraChoudhari, Media Promoters
10. Basic Mechanical Engineering by Basant Agrawal & C. M. Agrwal, Wiley India Pvt. Ltd.
11.Energy Technology by S. Rao and Dr.B.B. Parulekar, Khanna Publication.

FIRST YEAR ENGINEERING AND TECHNOLOGY

Semester -II

EngineeringMathematics-II

SECTION-I

Unit 1: Ordinary Differential Equations of First Order and First Degree (7)
(Weightage 10 Marks in Shivaji Uni Exam of 70 marks)
1. Linear differential equations
2. Reducible to Linear differential equations
3. Exact differential equations
4. Reducible to Exact differential equations

Unit 2: Applications of Ordinary Differential Equations of First Order and First Degree (6)
(Weightage 10 Marks in Shivaji Uni Exam of 70 marks)
1.Applications to Orthogonal trajectories (Cartesian and Polar equations)
2. Applications to Simple Electrical Circuits
3. Newton's law of cooling

Unit 3: Numerical Solution of Ordinary Differential Equations of First Orderand First Degree(Weightage 15 Marks in Shivaji Uni Exam of 70 marks)**(8)**
1. Taylor's series method
2. Euler's method
3. Modified Euler's method
4. Runge-Kutta fourth order formula

SECTION-II

Unit 4:Numerical Solutions Of Algebraic and Transcendental Equations (6)(Weightage 10 Marks in Shivaji Uni Exam of 70 marks)
1. Bisection Method
2. Secant Method
3. Newton Raphson Method

Unit 5: Special Functions (7)
(Weightage 10 Marks in Shivaji Uni Exam of 70 marks) 1. Gamma function and its properties
2. Beta function and its properties
3. Error function and its properties

Unit 6: Multiple Integration and its applications: (8)
(Weightage 15 Marks in Shivaji Uni Exam of 70 marks)
1. Double Integrals and evaluation
2. Change of order of integration
3. Change into Polar Coordinates
4. Area enclosed by plane curves
5. Mass of a plane lamina

General Instructions:
1. Batch wise tutorials are to be conducted. The number of students per batch should be asperthe Universitypattern for practical batches.

2. Minimum number of assignments should be 8 covering all topics.

Recommended Books:

1. A text book of Applied Mathematics, Vol.-I by P. N. Wartikar& J. N. Wartikar, PuneVidyarthiGrihaPrakashan, Pune.
2. A text book of Applied Mathematics, Vol.-II by P. N. Wartikar& J. N. Wartikar, PuneVidyarthiGrihaPrakashan, Pune.
3. Dr. B. S. Grewal - Higher Engineering Mathematics by Dr. B. S. Grewal, Khanna Publishers,Delhi.

Reference Books:

1. Higher Engineering Mathematics by B.V.Ramana, Tata McGraw-Hill Publications, NewDelhi
2. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India Pvt. Ltd.
3. Advanced Engineering Mathematics by H. K. Dass.
4. Mathematical methods of Science and Engineering by Kanti B. Datta, Cengage Learning.
5. A textbook of Engineering Mathematics Volume I by Peter V. O'Neil and Santosh K. Sengar, Cengage Learning.
6. A textbook of Engineering Mathematics by N. P. Bali, Iyengar, Laxmi Publications (P) Ltd.,New Delhi.

FIRST YEAR ENGINEERING AND TECHNOLOGY

Semester -I and II

Workshop Practice-II

Unit 1: Welding (4)

Types of welding – gas welding, arc welding, resistance welding, Welding equipment's,welding of various metals, electrode classification and coding, welding joints.

Unit 2: Carpentry (4)

Introduction, Classifications of wood, common varieties of Indian timber, carpentry toolslike- Marking tools, cutting tools, planes, striking tools, holding tools. Carpentry operations- marking,sawing,chiseling, grooving etc. carpentry joints.

Unit 3: Sheet metal work (4)

Specifications of metal sheets, working tools, sheet metal operations like-cutting, bending,folding, punching, reverting and joining by brazing and soldering.

Unit 4: Air pollution: (2)

Air pollution due to automobiles, causes, PUC testing.

Term work:

The term work consists of assignment on Welding, Carpentry, Sheet metal work, Airpollution.
Every student should perform---

1. Welding: One job on Arc welding- Lap / Butt Joint etc. (For individual student)
OR
Table, Shoe stand, Bag stand etc. (For 4-6 students)

2. Carpentry :One composite job involving dovetail joint, T joint, cross halving joint, pen stand etc.(Forindividual student)
OR
Table, Teapot, Stool etc. (For 4-6 students)

3. Sheet metal Work:
One job on commercial items such as Dust bin, funnel, tray etc.

Reference Books:

1. A Course in Workshop Technology, Vol – I by B. S. Raghuvanshi, Dhanapat Rai and Sons.
2. Elements of Workshop Technology, Vol – I by HajaraChaudhari, Media Promoters.
3. Workshop Technology, Vol – I by Gupta and Kaushik, New Heights.
4. Workshop Technology, Vol – I by Chapman, The English Language Book Society.
5. Workshop technology, Vol.-I by H.S. Bawa, TMH Publications, New Delhi.
6. I.C. Engines by Mathur& Sharma, Dhanpat Rai Publications, New Delhi.

FIRST YEAR ENGINEERING AND TECHNOLOGY

Semester -II

Professional Communication-II

Unit 1: Developing Writing Skills(3)

1. Importance of technical writing
2. Report Writing:

a) Techniques of Report Writing
b) Methods of data collection
c) Types of Report Writing- Survey, Inspection and Investigation

Unit 2: Behavioral Skills(5)

1. Understanding Self (SWOT analysis)
2. Attitude Building/ Developing Positive attitude
3. Decision Making Skills
4. Leadership Skills
5. Stress Management
6. Time Management
7. Team Work

Unit 3: Presentation Skills(2)

1. Importance & techniques
2. Presenting yourself professionally

Unit 4: Career skills (4)

1. Corporate Manners and Etiquettes
2. Planning and Managing Career
3. Job Application and Resume
4. Interview: Techniques& skills
5. Group Discussion
6. Debate

Term Work: Any 8 out of the following should be conducted

1. Group Discussion (lab session/class room activity)
2. Mock Interview
3. Report writing (lab session/class room activity)
4. Paragraph writing on current technical writing
5. Presentation on current affairs
6. Developing Professional Telephonic skills
7. Exercise of Application writing and Resume writing
8. Practice of Case Study
9. Team building activities
10. Report writing (3 types)
11. Introduction and use of modern communication techniques
12. Computer aided presentation of a project report (PPT)

Instructions:

1. Minimum 7 assignments should be covered.
2. Use of language lab is mandatory for both the semesters.

Reference Books:

1. Handbook for Technical Writingby David A. McMurrey, Joanne Buckley, Cengage.
2. A Course in Englishby J.D. O'Connor.
3. Better English Pronunciation by J.D. O'Connor.
4. Communication Skills Handbook: How to succeed in written and oral communication byJane Summers, Brette Smith, Wiley India Pvt.Ltd.
5. Personal Development for Life and Work by Masters, Wallace, Cengage.
6. Soft Skills for Managers by Dr. T. KalyanaChakravarthi, Dr. T. LathaChakravarthi,Biztantra.
7. Soft Skills for every one by Jeff Butterfield, Cengage.
8. Behavioural Science by Dr.Abha Singh, Wiley India Pvt.Ltd.
9. An Introduction to Professional English and Soft Skills by Bikram K. Das, KalyaniSamantray, Cambridge University Press New Delhi.
10. Speaking Accurately, K.C. Nambiar, Cambridge University Press New Delhi.
11. Speaking Effectivelyby Jeremy Comfort, Pamela Rogerson, Cambridge University PressNew Delhi.
12. Cambridge English for Job Hunting by ColmDownes, Cambridge University Press NewDelhi.
13. Body Language by Allen Pease.
14. The Ace of Soft Skills by Gopalswami Ramesh, Mahadevan Ramesh, PearsonPublication, Delhi.
15. Decision Making Skills by Khanka S.S.
16. Business Ethics and Communication by C.S. TejpalSheth.
17. Write Right by Syed AbdurRaheem.

SHIVAJIUNIVERSITY KOLHAPUR

REVISED SYLLABUS AND STRUCTURE

SECOND YEAR (B. Tech) CBCS

Computer Science and Engineering

To be introduced from the academic year 2019-20

(i.e. from June 2019) onwards

(Subject to the modifications will be made from time to time)

SECOND YEAR COMPUTER SCIENCE AND ENGINEERING - CBCS PATTERN

SEMESTER - III

Sr. No.	Course Subject / Title	TEACHING SCHEME									EXAMINATION SCHEME											
		THEORY			TUTORIAL			PRACTICAL			THEORY					PRACTICAL			TERMWORK		
		Credits	N0. Of Lectures	Hours	Credits	No. of Hours	Hours	Credits	No. of Hours	Hours	Hours	mode	marks	Total Marks	MIN.	Hours	MAX	MIN.	Hours	MAX	MIN.
1	BSC - CS301 Applied Mathematics	3	3	3	1	1	1					CIE	30	100	40	AS PER BOS GUIDELINES			AS PER BOS GUIDELINES	25	10
												ESE	70								
2	PCC-CS302 DiscreteMathematics &Structures	3	3	3	1	1	1					CIE	30	100	40					25	10
												ESE	70								
3	PCC- CS303 Data Structures	3	3	3								CIE	30	100	40						
												ESE	70								
4	PCC- CS304 Computer Networks - I	3	3	3				1	2	2		CIE	30	100	40		50	20		25	10
												ESE	70								
5	PCC- CS305 Microprocessors	3	3	3				1	2	2		CIE	30	100	40					25	10
												ESE	70								
6	PCC- CS306 C programming	3	3	3				2	4	4							50	20		50	20
7	HM- CS307 Soft Skills							1	2	2							25	10		25	10
	Total (SEM –III)	***18***	***18***	***18***	***2***	***2***	***2***	***5***	***10***	***10***				***500***			***125***			***175***	

SECOD YEAR COMPUTER SCIENCE AND ENGINEERING - CBCS PATTERN																						
SEMESTER - IV																						
		TEACHING SCHEME									EXAMINATION SCHEME											
Sr. No.	Course Subject / Title	THEORY			TUTORIAL			PRACTICAL			THEORY					PRACTICAL			TERMWORK		
		Credits	N0. Of Lectures	Hours	Credits	No. of Hours	Hours	Credits	No. of Hours	Hours	Hours	mode	marks	Total Marks	MIN.	Hours	MAX	MIN.	Hours	MAX	MIN.
1	PCC-CS401 Automata Theory	3	3	3								CIE	30	100	40	AS PER BOS GUIDELINES			AS PER BOS GUIDELINES		
												ESE	70								
2	PCC- CS402 Computer Networks - II	3	3	3				1	2	2		CIE	30	100	40		50	20		25	10
												ESE	70								
3	PCC- CS403 Computer Organization and Architecture	3	3	3								CIE	30	100	40						
												ESE	70								
4	PCC- CS404 Operating Systems - I	3	3	3				1	2	2		CIE	30	100	40					25	10
												ESE	70								
5	PCC- CS405 Software Engineering	3	3	3								CIE	30	100	40						
												ESE	70								
6	PCC- CS406 Object Oriented Programming	2	2	2				2	4	4							50	20		50	20
7	PW- CS407 Mini Project							1	2	2							50	20		50	20
8	MC-CS408 Environmental Studies	2	2	2	1	1	1					CIE ESE	30 70	100	40						
	Total (SEM –IV)	***19***	***19***	***19***	***1***	***1***	***1***	***5***	***10***	***10***				***600***			***150***			***150***	
	Total	**37**	**37**	**37**	**3**	**3**	**3**	**10**	**20**	**20**				**1100**			**275**			**325**	

CIE- Continuous Internal Evaluation

ESE – End Semester Examination

• Candidate contact hours per week : 30 Hours(Minimum)	• Total Marks for S.E. Sem III & IV : **800 + 900 =1700**
• Theory and Practical Lectures : 60 MinutesEach	• Total Credits for S.E. Sem III & IV : **50 (SEM-III: 25 + SEM -IV:25)**
• In theory examination there will be a passing based on separate head of passing for examination of CIE andESE.	
• There shall be separate passing for theory and practical (term work)courses.	

Note:

1. **BSC-CS**: Basic Science Course – Computer Science and Engineering arecompulsory.
2. **ESC-CS:** Engineering Science Course - Computer Science and Engineering arecompulsory.
3. **PCC-CS:** Professional Core Course – Computer Science and Engineering arecompulsory.
4. **HM-CS:** Humanities and Management- Computer Science and Engineering arecompulsory.
5. **PW-CS:** Project Work-– Computer Science and Engineering arecompulsory.
6. **MC-CS:** Mandatory Course -Environmental Studies which is compulsory for theory 70 marks and project work 30 marks.

S. Y. B. Tech (Computer Science and Engineering) Sem – III

1. Applied Mathematics(BSC-CS301)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs/Week	**Theory :** ESE 70Marks CIE 30Marks
Tutorial : 1 Hrs/Week	**Term work:** 25 marks
Practical: ---	**Practical :---**
Credits:- 4	

Prerequisite: Basic probability theory , Statistics

Course Objectives:

1. To develop mathematical skills and enhance thinking power ofstudents.
2. To give the knowledge to the students of fuzzy set theory, numerical methods probability and statistics with an emphasis on the application of solvingengineering problems
3. To prepare students to formulate a mathematical model using engineering skills& interpret the solution in realworld.

Course Outcomes:

Upon successful completion of this course, the student will be able to:

1. Describe the statistical data numerically by using Lines of regression and Curve fittings.
2. Solve basic problems in probability theory, including problems involvingthe binomial, Poisson, and normaldistributions.
3. Calculate numericalIntegration.
4. Define fuzzy sets using linguistic words and represent these sets by membership functions, convexity, Normality, support,etc.
5. Solve examples on the principle in performing fuzzy number arithmeticoperations such as Addition, Multiplication & fuzzyequation.
6. Solve assignment problems by using different techniques of operationresearch.

Unit No.	Contents	No.of Lectures
1.	**Correlation, Regression & CurveFitting:** Introduction, Karl Pearson's Coefficient of Correlation.,Lines of regression of bivariate data., Fitting of Curves by method of Least-squares, FittingofStraight lines. Fitting of exponential curves. Fitting of second degree Parabolic curves.	06
2.	**ProbabilityDistribution:** Random variables,Discrete Probability distribution,Continuousprobability distribution,BinomialDistribution,PoissonDistribution,Normal Distribution.	06

3.	**NumericalIntegration:** Newton Cotes formulae.TrapezoidalRule,Simpson's 1/3rd rule.Simpson's 3/8th rule, Weddle's Rule.	06
4.	**Introduction to Fuzzysets:** Crisp set and Fuzzy set, Basic concepts of fuzzy sets, Basic operationsonfuzzy sets,Properties of fuzzy sets	06
5.	**Fuzzy Arithmetic:** Fuzzy numbers,Fuzzy cardinality, Arithmetic Operationson Fuzzy numbers,Solutions of Fuzzy equations of type A + X = B&A.X	06
6.	**Assignment Problem:** Definition, Balanced and Unbalancedassignment problem, Hungarian Method., Balanced assignmentproblems.,Unbalanced assignment problems. Traveling salesmen problem.	09

TEXTBOOKS:

1. Advance Engineering Mathematics by Erwin Kreyszig (WileyIndia).
2. Mathematical Methods of Science and Engineering, by Kanti B. Datta(Cengage Learning)
3. Advanced Engineering Mathematics, 3e, by Jack Goldberg (OxfordUniversity Press).
4. Engineering Mathematics by V. Sundaram (VikasPublication).
5. Higher Engineering Mathematics, by B. S. Grewal (Khanna PublicationDelhi).
6. Higher Engineering Mathematics, by B. V. Ramana (TataMcGraw-Hill).
7. Advanced Engineering Mathematics, by H. K. Das (S. ChandPublication).
8. Fuzzy Sets and Fuzzy Logic: Theory and Applications, by George J. Klir andBo Yuan (Prentice Hall of India Private Limited).
9. Applied Mathematics by Navneet D. Sangle (CengagePublication)

General Instructions:

1. For the term work of 25 marks, batch wise tutorials are to beconducted.
2. Number of assignments should be at least six (All units should becovered).

S. Y. B. Tech (Computer Science and Engineering) Sem – III

2. Discrete Mathematics & Structures (PCC-CS302)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs/Week	**Theory :** ESE 70Marks CIE 30Marks
Tutorial : 1 Hrs/Week	**Term work:** 25 marks
Practical: ---	**Practical :---**
Credits:- 4	

Prerequisite: Basic Mathematics

Course Objectives:

1. To expose the students to the mathematical logic related to computer sciencefareas.
2. To enhance the problem solving skills in the areas of theoretical computerscience.
3. To use mathematical concepts in the development of computerapplications.

Course Outcomes:

Upon successful completion of this course, the student will be able to –

1. Apply logic concepts in designing aprogram.
2. Illustrate basic set concepts & apply operations onset.
3. Minimize the BooleanFunction.
4. Apply basic concepts of probability to solve real worldproblem.
5. Represent data structures using graph concepts.
6. Design abstract machine, detectdeadlocks.

Unit No.	Contents	No. of Lectures
1	**Mathematical Logic:** Statements & Notations, Connectives, Statement Formulas & truth table, Well formed formulas, Tautologies , Equivalence of formulas, Duality law, Tautological Implications, Functionally complete set of connectives, Other connectives, Normal Forms, Theory of Inference for statement calculus.	10
2	**Set Theory:** Basic concepts of set theory, Operations on Sets, Ordered pairs & n-tuples, Cartesian product	04
3	**Relations & Functions:** Relations. Properties of binary relations. Matrix & Graph Representation of Relation., Partition & covering of Set, Equivalence Relations. , Composition of Binary Relation., POSET&Hasse Diagram, Functions, Types of Functions, Composition of functions..	06

4	**AlgebraicSystems:** Algebraic Systems: Examples & general Properties, Semi groups & Monoids, Groups: Definitions & Examples, Subgroup & Homomorphism.	06
5	**Lattice andBooleanAlgebra:** Lattice as partially ordered sets, Lattice as Algebraic Systems., Special Lattices., Boolean Algebra: Definitions & examples, Boolean Functions., Representation & Minimization of Boolean Functions.	08
6	**GraphTheory:** Basic concepts of graph theory., Paths, Reachability & Connectedness, Matrix, Representations of Graphs., Storage Representation & Manipulations of Graphs. PERT & Related technologies.	05

Text Books:

1. "DiscreteMathematicalStructureswithApplicationtoComputerScience"byJ.P.Tremblay& R. Manohar (MGH International)

Reference Books:

1. Discrete Mathematics –SemyourLipschutz, Marc Lipson (MGH), Schaum's outlines.
2. Discrete Mathematics and its Applications – Kenneth H. Rosen (AT&T Bell Labs) (mhhe.com/rosen)
3. Discrete Mathematical Structures – Bernard Kolman, Robert Busby, S. C. Ross and Nadeemur-Rehman (PearsonEducation)

TERM WORK :

4. It should consist of minimum 10 to 12 assignments based on topics of syllabus & Exercise problems mentioned in text books out of which 4 to 5 implementations of above assignments must be using 'C' programming language.

S. Y. B. Tech (Computer Science and Engineering) Sem – III

3. Data Structures (PCC-CS303)

TEACHING SCHEME	EXAMINATION SCHEME
Theory :3 Hrs. / Week.	**Theory :** ESE 70Marks CIE 30Marks
Tutorial : ---	**Term work: ---**
Practical : ---	**Practical :---**
Credit:-3	

Prerequisite: C programming

Course Objectives:

1. To make the students familiar with basic datastructures.
2. To provide students with foundation in computer programming/problem.
3. To teach the students to select appropriate data structures in computerapplications.
4. To provide the students with the details of implementation of various datastructures.

Course Outcomes:

Upon successful completion of this course, the student will be able to –

1. Identify the appropriate data structure for specific application.
2. Design and analyze programming problemstatements.
3. Chose appropriate sorting and searchingalgorithms.
4. Outline the solution to the given software problem with appropriate datastructure.

Unit No.	Contents	No.of Lectures
1	**Basic of DataStructures** Data structure- Definition, Types of data structures, DataStructureOperations, Algorithms: Complexity, Time and Space complexity.	03
2	**Searching and SortingTechniques** Linear search, Binary search, Hashing – Definition, hash functions, Collision, Bubble sort, Selection sort, Insertion sort, Merge sort, Quick sort, Radix sort, Complexity and analysis.	07
3	**Stacks andQueues** Stack: Definition, operations, Array representation of stack, applications Queue: Definition, operations, Array representation of queue,applications,Circular queue, Priority queue, Deque.	07

4	**LinkedLists** Definition, representation, operations, implementation and applications ofsingly, doubly and circular linked lists. Linked representation of stack and Queue.	06
5	**Trees** Terminology, representation, binary tree, traversal methods, binary search tree, AVL search tree, B tree, B+ tree, Heaps- Operations and their applications, Heap sort.	06
6	**Graphs:** Basic concept of graph theory, storage representation, graph traversal techniques- BFS and DFS, Graph representation using sparse matrix.	06

TEXT BOOKS:

1. Schaum's Outlines Data Structures – Seymour Lipschutz (MGH)

REFERENCE BOOKS:

2. Data Structure using C- A. M. Tanenbaum, Y. Langsam, M. J. Augenstein(PHI)
3. Data Structures- A Pseudo code Approach with C – Richard F. Gilberg and Behrouz A. Forouzon 2nd Edition

S. Y. B. Tech (Computer Science and Engineering) Sem – III

4. Computer Networks – I (PCC-CS304)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs. / Week	**Theory :** ESE 70Marks CIE 30Marks
Tutorial : ---	**Term work:** 25
Practical: 2 Hrs. /Week	**Practical :**50
Credit:- 4	

Course Objectives: To perceive fundamental concepts of Computer Networks

1. To understand layered architecture and basic networkingprotocols
2. To illustrate the TCP/IP protocol internal details

Course Outcomes:

Upon successful completion of this course, the student will be able to –

1. Demonstrate concepts of ComputerNetworks.
2. Explain OSI and TCP/IP layeredarchitecture
3. Implement network and data linklayer.
4. Demonstrate TCP protocol indetail.
5. To analyze the protocol structure using network analyzingtools.
6. apply the principals of socket programming in thenetworks.

Unit No.	Contents	No. of Lectures
1	**Introduction to Computer Network:** Overview of OSI layer Model and TCP/IP protocol model, Addressing, Underlying technologies for LANs, WANs, and Switched WANs.	05
2	**Data Link Layer** Design issues for Data Link Layers, Framing methods, Error control: detection and correction, Flow control, Elementary Data Link protocols, Sliding window Protocols, Go back n, Selective repeat.	06
3	**Medium Access Control Sub layer:** Static and Dynamic channel allocation, Multiple Access protocols ALHOA, CSMA, Collision Free Protocols, Ethernet: IEEE 802.3, IEEE 802.4, IEEE 802.5 standards, Wireless LANS 802.11 standards	06
4	**Network Layer:** IPv4 Addresses: Classful Addressing Other Issues, Sub-netting and Super netting, Class less Addressing, Delivery, Forwarding and routing; Routing methods: Shortest path, Link state, Distance vector routing and broadcast routing,	06

Congestion control algorithms: Principles, Congestion prevention policies, congestion control in datagram subnet, Load Shedding, Jitter Control.

5	**Internet Protocol:** IPDatagramformat,Fragmentationandreassemblymodels,ARP,RARP,ICMP, IGMP	08
6	**TransportLayer:** The Transport service primitives, UDP:ProcesstoProcesscommunication,UserDatagramFormat,Operationand uses of UDP. TCP: TCP Services and Features, TCP segment format, TCP Connections, Flow and error control in TCP, TCP Timers; Berkeley Sockets: Socket Addresses, Elementary Socket system calls byte ordering and address conversion routines, connectionless iterative server, connection oriented concurrent server, TCP and UDP Client serverPrograms.	08

TEXT BOOKS:

1. TCP/IP protocol suit 4th Ed. – Behrouz A. Forouzen (Tata Mag.Hill)
2. Computer Networks – Andrew S. Tanenbaum(PHI)
3. Unix Network Programming – W. Richard Stevens (PHI)

REFERENCEBOOKS*:*

1. TCP/IP Illustrated, The Protocols, Vol. I – W. Richard Stevens, G. Gabrani (PearsonEducation.)
2. Internetworking with TCP/IP, Vol. I Principles, Protocols, and Architectures – D. E. Comer (PearsonEd.)
3. Internetworking with TCP/IP, Vol. III, Client-Server Programming and Application (2nd Ed.) –D. E. Comer, David L. Stevens (Pearson Ed.)

TERM WORK

1. Study and demo of LAN, WAN and various connecting devices andcomponents
   - List out component and devices required for a std. LAN,WAN
2. Study, design and configuration of IEEE 802.3 Ethernet and IEEE 802.11Wireless
   - LANs (ReferringRFCs)
3. Study of following connectivity test tools with all its options–
4. ifconfig, arp, route,traceroute
5. nmap, netstat,finger
6. Implementing Framingmethods
7. Implementing Elementary data link protocol (Stop & waitprotocol)
8. Implementation of Error detection (CRC)code
9. Implementation of Error detection codes (Hamming)
10. Programs to understand IP addressing, classful & classlessaddressing
11. Implementation of sliding windowprotocol.

12. Implement shortest path routingalgorithm.

13. Programs for connection oriented (TCP) client-server using socketprogramming
14. Programs for connection less (UDP) client-server using socketprogramming
15. Study of network protocol analyzer (Ethereal or Wire-Shark) and understanding packet formats for UDP, TCP, ARP, ICMPprotocols.

INTRUCTIONS FOR PRACTICAL EXAMINATIONS AND TERMWORK:

Term Work: It should consist of 10-12 experiments based on the syllabus and should be implemented by using Socket Programming. The study experiments should consist of some practical work and observations.

S. Y. B. Tech (Computer Science and Engineering) Sem – III

5. Microprocessors (PCC-CS305)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 03 Hrs / Week	**Theory :** ESE 70Marks CIE 30Marks
Tutorial : ---	**Term work :** 25 marks
Practical :02 Hrs / Week	**Practical :---**
Credits:- 4	

Prerequisite: Fundamental of Electronics and Basic Computer

Course Objectives:

1. To learn the Architecture and Basic Programmingmodel.
2. To give the hands onexperienceof Assembly language programming for 8085 and 8086 Microprocessors
3. Differentiate between Microprocessors and Microcontrollers
4. To differentiate the microprocessorfamily.

Course Outcomes:

Upon successful completion of this course, the student will be able to –

1. Describe the Architecture of 8085 microprocessors andmicrocontroller
2. Classify the 8086 Assembly Instructions set and use in Assembly languagePrograms
3. Explain Programming model's of 8086 microprocessors
4. Classify the 8086 Assembly Instructions set and use in Assembly languagePrograms
5. Understand the higher processor architecture
6. Understand the need for otherMicroprocessors

Unit No.	Contents	No. of Lectures
1	Architecture of 8085 Classification of Instructions, Instruction set of 8085 Introduction to 8051 Micro controllers	06
2	The Microprocessor and its Architecture: a) Internal Microprocessor Architecture b) Real Mode Addressing Addressing Mode: a) data Addressing Mode b) Program Memory Addressing Mode c) Stack memory Addressing mode..	06
3	Data movement Instruction , PUSH and POP , Load Effective Address String Data Transfer Arithmetic Instruction:	06

	a) Addition b) Subtraction c)Comparison d) Multiplication e) Division BCD & ASCII Arithmetic, AssemblerDetails.	
4	Logic & Program ControlInstruction: a) Basic LogicInstruction Shift & Rotate, Jump Group and Procedures Machine Control & Miscellaneous Instructions Basic Interrupt Processing, HardwareInterrupts	06
5	80386Microprocessor: Introduction to 80386 Microprocessor, The Memory System Special 80386 Registers80386 Memory Management , Virtual 8086 Mode Introduction to Protected Mode memory Addressing,Memory Paging Mechanism	09
6	PentiumProMicroprocessor Introduction to Pentium Pro Microprocessor, Internal Structure of the Pentium Pro, The Memory System Multiple Core technology.	06

TEXT BOOKS:

1. The INTEL Microprocessors; Architecture, Programming and Interfacing By Barry B Brey (8th Edition)
2. Microprocessors and Microcontrollers- N.Senthi Kumar, M, Saravanam and SJeevananthan (Oxford UniversityPress)

REFERENCE BOOKS:

7. Microprocessors Architecture, Programming and Application with 8085 by Ramesh Gaonkar 2 The Microcomputer Systems: the 8086.8088 Family By Yu Chenn A. Gibson (PHI Ltd)

List of Laboratory Experiments:

1. To convert different number from decimal to binary, octal to hexadecimal & vice versa &alsostudy of logic gates.
2. Perform hands on experiment using 8085kit.
3. Storing and displaying the content stored at different registers and memorylocation
4. Implementation of 8085 programs involving data transfer and arithmetic instructionset.
5. Implementation of 8085 programs involving logical and bit manipulation instructionset.
6. Implementation of 8086 programs involving branch instruction and machine control instructionset.
7. Implementation of DOS debugsutility.
8. Use of assembler directive and find the count and the sum of even, odd numbers from the givenarray.
9. Implementation of string data transfer instructions and use of Db directive for declaration of 2-Darray
10. Implementation of Dos interrupts to read char from keyboard and display on thescreen.
11. Implementation of basic logic instruction, shift and rotate instruction and BCD and ACSII arithmetic instructions.
12. To study memory management unit of 80386 processor which include address calculation, descriptor and pagingmechanisms.

S. Y. B. Tech (Computer Science and Engineering) Sem – III

6. C Programming (PCC-CS306)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs / Week	**Theory :**---
Tutorial : ---	**Term work:** 50 marks
Practical: 4 Hrs. / Week	**Practical :** 50marks
Credits:- 5	

Prerequisite: Digital Electronics ,Computer Fundamentals

Course Objectives:

1. To learn concepts of arrays and pointers inC
2. To learn file handling in C
3. To learn memory management inC
4. To learn structures inC

Course Outcomes:

Upon successful completion of this course, the student will be able to –

1. Articulate the principles of procedure oriented problem solving andprogramming.
2. Explain programming fundamentals including statements, control flow andrecursion
3. Able to formulate problems and implement algorithmsinC . .
4. Analyze and use data structures to solve the complexproblemstatements. .
5. Demonstrate file operations using file handling concepts through developingapplications.

Unit No.	Contents	No.of Lectures
1	**Introduction toC:** The Form of a C Program, The Library and Linking, Separate Compilation,Compilinga C Program, C's Memory Map; Expressions – The Basic Data Types, Modifying the Basic Types, Identifies Names, Variables, The Four C Scopes, Type Qualifiers-const, volatile, Storage Class Specifiers; Statements - Selection Statements, Iteration Statements, Jump Statements, Expression Statements, BlockStatements.	6
2	**Console I/O & Basics of ArrayandStrings.** Console I/O: Reading and Writing Characters, Reading and Writing Strings, Formatted Console I/O, printf(), scanf(), Suppressing Input. Arrays and Strings- Two-Dimensional Arrays, Arrays of Strings, Multidimensional Arrays, Array Initialization, Variable-Length Arrays.	6
3	**Functions:** The General Form of a Function, Understanding the Scope of a Function, Parameter passing, Passing arrays to functions, Function Arguments, argc and argv-Arguments to main(),The return Statement, What Does main( ) Return?,	6

Recursion, Function Prototypes, Declaring Variable Length Parameter Lists, The inline Keyword.

4	**Pointers:** What Are Pointers?, Pointer Variables, The Pointer 0perators, Pointer Expressions, Pointers and Arrays, Arrays of Pointers, Multiple Indirection, Initializing Pointers, Pointers to Functions and structures, C's Dynamic Allocation Functions, restrict-Qualified Pointers, Problems withPointers.	6
5	**Structures, Unions, Enumerations, andtypedef :** Structures, Arrays of Structures, Passing Structures to Functions, Structure Pointers, Arrays and Structures Within Structures, Unions, Bit-Fields, Enumerations, Using sizeof to Ensure Portability, typedef .	6
6	**File I/O :** FileI/O,StandardCvs.UnixFileI/O,StreamsandFiles,FileSystemBasics,fread() and fwrite(), fseek() and Random-Access I/O, fprintf( ) and fscanf(), The Standard Streams.	6

Instructions for Practical Examinations:

It should consist of minimum 10-12 experiments based on the syllabus and concepts mention below. Students of different batches should implement different programs. Student should perform all experiments using GCC under Linux environment.

TEXT BOOKS:

1. C the Complete Reference by Herbert Schild (Tata McGraw Hill) 4thEdition.
2. The C Programming Language- Brian W. Kernighan, Dennis Ritchie 2ndEdition.

REFERENCE BOOKS:

1. Programming in ANSI C by E.Balaguruswamy.(TataMcGraw Hill)4thEdition.
2. Let Us C By Yashavant P. Kanetkar, 5thEdition.

List of Experiments

1. BranchingStatements
2. Looping
3. Arrays
4. Functions
5. StorageClass.
6. Structures.
7. Implementation ofSTACK.
8. Implementation ofQUEUE.
9. Implementation of LINKEDLIST.
10. Copy Contents of one file to anotherfile.
11. Implementation ofGRAPH.
12. Implementation ofTREE.

S. Y. B. Tech (Computer Science and Engineering) Sem – III

7. SOFT SKILLS (HM-CS307)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : ---	**Theory :---**
Tutorial : ---	**Term work:** 25 Marks
Practical: 2 Hrs. / Week	**Practical :** 25Marks
Credits:- 1	

Prerequisite: English language

Course Objectives:

1. To make the engineering students aware of the importance, the role and the content of soft skills through instruction, knowledge acquisition, demonstration andpractice.
2. To develop and nurture the soft skills of the students through individual andgroup activities.
3. To expose students to right attitudinal and behavioral aspects and to build the same throughactivities
4. To encourage the all round development of students by focusing on softskills.

Course Outcomes:

Upon successful completion of this course, the student will be able to –

1. Effectively communicate through verbal/oral communication and improve thelistening skills
2. Actively participate in group discussion / meetings / interviews and prepare &deliver presentations.
3. Function effectively in multi-disciplinary and heterogeneous teams through the knowledge ofteam work, Inter-personal relationships, conflict management and leadershipquality.

Contents

Unit No	
1	**Understanding Communication Skills:** Verbal Communication - Effective Communication - Active listening – Articulation Paraphrasing – Feedback Non- Verbal Communication- Body Language of self and others
2	**Behavioral Skills /Self Development:** SWOT Analysis, Confidence improvement, values, positive attitude, positive thinking and self esteem.
3	**Leadership and Team Building** Culture and Leadership- Salient Features of Corporate Culture, Leadership Styles,Leadership Trends,Team Building- Team Development Stages, Types of Teams, Attributes of a successful team – Barriers involved
4	**Developing Writing skills** E-mail writing, report writing, resumes writing, practice.

Stress and Time Management

5 Stress in Today's Time- Identify the Stress Source, Signs of Stress, Ways to Cope with Stress.Healthier Ways to Combat Stress, Steps to be taken in the Organizations: Open communication, Time Management, Working towards Your Goals, Smart Work, Prioritize yourTasks

Professional Skill

6 Ethics, Etiquette and Mannerism-All types of Etiquette (at Meetings, Etiquette at Dining. Involuntary Awkward Actions, Public Relations Office(PRO)'s Etiquettes) Technology Etiquette: Phone Etiquette, Email Etiquette, Social Media Etiquette, Video Conferencing Etiquette, InterviewEtiquette.
Dressing Etiquettes: for Interview, offices and social functions.
Ethical Values: Importance of Work Ethics, Problems in the Absence of Work Ethics.

TERM WORK:

1. The instructor shows videos to enhance skills supporting career aspects and discussion about same videos. Multiple set of observations based on videos can be prepared by students.
2. Multiple set of activity based assignments can be prepared to allow multiple skills exposurefor example a group task encouraging discussions, team building,value sharing, leadership and role play all at the same time. Every student must be given adequate opportunity to participate actively in each activity.
3. Each student will write one report based on visit / project / business proposaletc.
4. Faculty may arrange one or more sessions from following: Yoga and Meditation. Stress management, relaxation exercises, and fitness exercises. Time management and personal planningsessions.
5. The student must prepare the journal in the form of report elaborating the activities performed in the lab. Continuous assessment of laboratory work is to be done based on overall performance and lab assignments performance of student. Each lab assignment assessment will assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each lab assignment assessment include- timely completion, performance, punctuality, neatness, enthusiasm, participation and contribution in various activities-SWOT analysis, presentations, team activity, event management, group discussion, Group exercises and interpersonal skills and similar otheractivities/assignments.

TEXT BOOKS:

1. Developing Communication Skills by Krishna Mohan and MeeraBanerji;MacMillan India Ltd., Delhi
2. Gajendra Singh Chauhan, Sangeeta Sharma: Soft Skills – An Integrated Approach to Maximize Personality, WILEY INDIA, ISBN:13:9788126556397
3. Essentials of Effective Communication, Ludlow and Panthon; Prentice Hall ofIndia.

REFERENCE BOOKS:

1. Indrajit Bhattacharya, ―An Approach to Communication Skills‖, Delhi, Dhanpat Rai,2008.
2. Seven Spiritual Laws of Success - DeepakChopra
3.Simon Sweeney, ―English for Business Communication‖, Cambridge University Press, ISBN13:978-0521754507.

S. Y. B. Tech (Computer Science and Engineering) Sem – IV

1. Automata Theory(PCC-CS-401)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs/Week	**Theory :** ESE 70Marks CIE 30Marks
Tutorial : ---	**Term work:** ---
Practical: ---	**Practical :---**
Credits:- 3	

Prerequisite: Basic Mathematical Concepts, Sets, graphs. **Course Objectives:**

1. To introduce students to the mathematical foundations of computation, the theory offormal languages andgrammars
2. To strengthen the students' ability to understand and conduct mathematical proofsfor computations
3. To make the students understand the use of automata theory in Compliers & SystemProgramming.
4. To analyze and design finite automata, pushdown automata, grammars & Turingmachines

Course Outcomes:

Upon successful completion of this course, the student will be able to –

1. Understand basic concepts of Regular Language and Regular Expressions
2. Select appropriate abstract machine to recognize a given formallanguage.
3. Generate complex languages by applying Union, Intersection, Complement, Concatenationand Kleene * operations on simplelanguages.
4. Apply parsing concepts for syntaxanalysis.
5. Be familiar with thinking analytically and intuitively for problem solving situations in relatedareas of theory in computerscience.

Unit No	Contents	No. of Lectures
1	**Regular Languages and Finite Automata** Proofs,RecursiveDefinitions,Regularexpressionsandregularlanguages,Finite Automata,unions,intersection&complementsofregularlanguages,Applications of FA	7
2	**Nondeterminism and Kleene's Theorem** Nondeterministic finite automata, NFA with null transition, Equivalence of FA's, Kleene's Theorem (Part I & Part II), Minimal Finite Automata	6
3	**Context free Grammars** Definition, Union, Concatenation and Kleene *'s of CFLs, Derivation trees and ambiguity, Simplified forms and normal forms	5

4	**Parsing andPushdownAutomata** Definition of Pushdown Automata, Deterministic PDA, Equivalence of CFG's& PDA's, Top down parsing, bottom up parsing.	6
5	**Context free languages** CFL's and non CFL's**,** Pumping Lemma, intersections and complementsof CFLs	5
6	**Turing Machines** Definition,TMaslanguageacceptors,combiningTuringMachines**,**Computing partial function with a TM, Multi-tape TMs, and Universal TM	7

Text Books:

1. Introduction to Languages & the Theory of Computations – John C. Martin (Tata MGHEdition)
2. Discrete Mathematical Structures with applications to Computer Science – J .P. Trembley & R. Manohar (MGH)

Reference Books:

1. Introduction to Automata Theory, Languages and computation – John E. Hopcraft,Raje
2. Motwani, Jeffrey D. Ullman (PearsonEdition)
3. Introduction to theory of Computations – Michael Sipser (ThomsonBooks/Cole)
4. Theory of Computation –VivekKulkarni

S. Y. B. Tech (Computer Science and Engineering) Sem – IV

2. Computer Networks-II (PCC-CS-402)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs/Week	**Theory :** ESE 70Marks CIE 30Marks
Tutorial : ---	**Term work:** 25 marks
Practical: 2 Hrs/Week	**Practical :** 50Marks
Credits:- 4	

Prerequisite: Computer Network-I.

Course Objectives:

1. To understand the Client server model & socketinterface
2. To perceive IPv6 addressing and protocol
3. To explain and learn basic internet technologyprotocols
4. Simulate protocols using softwaretools.

Course Outcomes:

Upon successful completion of this course, the student will be able to –

1. program the client server model usingsockets
2. understand and apply next generation protocol and addressingmodel
3. elaborate the fundamentals of Domain NameSystems
4. apply the concepts of Remote login and FTP in networkapplications
5. learn fundamentals of web, HTTP and e-mail communication protocols.
6. understand multimedia streaming and relevant protocols.

Unit No	Contents	No. of Lectures
1	**Client server model & socket interface:** The Socket Interface, The Client Server model andSoftwaredesign, Concurrent processinginclient-serversoftware,AlgorithmsandissuesinClient-Serverdesign, Multiprotocol Servers, Multiservice Servers, Concurrency in clients, Unix Internet Super server (inetd).	6
2	**Next Generation IPv6 and ICMPv6:** IPV6 addresses, packet format, ICMPV6, Transaction from IPV4 to IPV6	5
3	**BOOTP, DHCP and Domain name system:** Name Space, Domain Name Space, Distribution of name space, and DNS in internet, Resolution, DNS massages, Types of records, Compression examples, and encapsulation. BOOTP, DHCP	6

4	**Remote Login: TELNET and File TransferFTP,TFTP:** Concept, NVT, Embedding, Options & options/sub-option negotiation, controlling the server, Out-of-band signaling, Escape charter, Mode of operation, user interface. **FTP:** Connections, Communication, Command processing, File transfer, User interface, Anonymous FTP, TFTP.	6
5	**Web Applications Service Protocols:** HTTP: Architecture, Web Documents, HTTP Transaction, RequestandResponse, HTTP Headers and Examples, Persistent Vs Non- Persistent HTTP, Proxy servers. **Electronic Mail:** Architecture, User agent, addresses, Delayed delivery, SMTP commands and responses, Mail transfer phases, MIME, POP3	7
6	**Multimedia In Internet:** Streaming stored audio/video, Streaming live audio/video, Realtimeinteractive audio/video, Real Time Transport Protocol (RTP), Real Time Transport Control Protocol (RTCP), Voice Over IP (VoIP), Session Initiation Protocol (SIP)	6

Text Books:

1. TCP/IP Protocol Suite by Behrouz A. Forouzan McGraw-Hill Publication, 4thEdition.
2. Computer Networks by Andrew STanenbaum.

Reference Books:

1. Data Communications and Networking by Behrouz AForouzan
2. Internetworking with TCP/IP by Douglas Comer
3. Computer Networking: A Top-Down Approach by Jim Kurose

Term work:

It should consist of minimum 8 - 10 experiments based on the following guidelines

1. Client program using UDP to connect to well known services (echo, time of the day serviceetc.).
2. Implementing concurrent TCP multiserviceclient/server.
3. Implementing Iterative UDP client/server.
4. Study of following DNS Tools with all its options. nslookup, dig, host,whois.
5. Implement trivial file transfer protocol (TFTP).
6. Configuration of basic services for FTP, HTTP, Telnet etc. on LinuxPlatform
7. Write program to send a mail using SMTP commands and receive a mail using POP3commands.
8. Capturing & Analyzing operation of various application layer protocols using network protocol analyzer. (Wireshark andtcpdump)
9. Study of various streaming multimedia protocols in Internet (Using various audio/video streaming services on theInternet)

S. Y. B. Tech (Computer Science and Engineering) Sem – IV

3. Computer Organization and Architecture (PCC-CS-403)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs/Week	**Theory :** ESE 70Marks CIE 30Marks
Tutorial : ---	**Term work:** ---
Practical: ---	**Practical :---**
Credits:- 3	

Prerequisite: Basic Computer and Microprocessor

Course Objectives:

1. To provide a high-level overview of Computerorganization.
2. To discuss the basic of I/O addressing andaccess.
3. To make the students aware of overall design and architecture of computer and itsorganization.
4. To analyze performance issues in processor and memory design of a digitalcomputer.

Course Outcomes:

Upon successful completion of this course, the student will be able to –

1. recapitulate the history of computer system and the basic concepts of computer architectureand organization.
2. understand the concept of I/Oorganization.
3. apply the different algorithms to perform arithmeticoperations.
4. articulate the design issues in the development ofprocessor.
5. conceptualize instruction levelparallelism.
6. understand the concept of memorytechniques.

Unit No	Contents	No.of Lectures
1	**Computer Evolution andPerformance** Evolution of computer – Mechanical Era: Babbage's Difference Engine, Electronic Era: First generation, IAS Computers, Instruction Set and Instruction Execution, Second generation, Input-Output Operation, Programming Language, Third generationand VLSI Era – IC Circuits, Performance Consideration and Measures, Speed up Techniques, Difference between RICS and CISC.	5
2	**Input and OutputOrganization** Accessing I/O devices, Direct Memory Access (DMA), Buses: SynchronousBusand Asynchronous Bus, Interface Circuits, Standard IO Interface.	6
3	**Arithmetic** Addition and Subtraction of Signed Numbers, Design of fast Adders,Multiplication of Positive numbers , Signed Operand Multiplication, Fast Multiplication, Integer Division, Floating Point Number Operations: IEEE 754 Floating Point Format, Arithmetic Operations	8
4	**The Processing Unit** Some fundamental Concepts, Execution of complete Instruction,Multiplebus	6

	organization, Hardwired control, Micro programmed Control **Pipelining**	
5	Basic Concepts: Role of Cache Memory, Pipeline Performance. DataHazards:Operand Forwarding, Handling Data Hazards in Software and Side Effects and Instruction Hazards: Unconditional Branches and Conditional Branches and Branch Prediction	5
	Computer Memory System	
6	Some Basic Concepts, Types of Memories :ROM and RAM, SemiconductorRAMmemory, Cache Memories: Mapping functions, Replacement Algorithms, Example of Mapping Techniques	6

Text Books:

1. Computer Architecture and Organization-John P Hayes (MGH) 3rd Edition
2. Computer Organization – Carl Hamacher, ZvonkoVranesic and SafwatZaky . Publisher: Tata McGraw Hill. 5th Edition.

Reference Books:

4. Computer Systems Organization & Architecture – John D. Carpinelli (PearsonEducation)
5. http://cse.stanford.edu/class/sophomore-college/projects-00/risc/risccisc/(RISC vs.CISC)
6. http://www.cpu-world.com/sspec/

S. Y. B. Tech (Computer Science and Engineering) Sem – IV

4. Operating System I (PCC-CS-404)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs/Week	**Theory :** ESE 70Marks CIE 30Marks
Tutorial : ---	**Term work:** 25 marks
Practical: 2 Hrs/Week	**Practical :---**
Credits:- 4	

Prerequisite: Computer Network-I.

Course Objectives:

1. To make the students understand basic concepts of operatingsystem
2. To expose the students to various functions of the Operating system and theirusage
3. To give hands on exposure to Linux commands and systemcalls.

Unit No.	Contents	No.of Lectures
1	**Overview of OS** Abstract view of an operating system,Fundamental principles of OS operations, OS interaction with the computer and user programs, Efficiency ,system performance and user service,Batch Processing System, Multiprogramming System, The Time Sharing System, The Real Time Operating System, Distributed operating system, Operation of OS, Operating system with monolithic structure,Virtual machine operating system, Kernel based operating system, Microkernel based operatingsystem	6
2	**Processes, Threads and Synchronization** Processes andprograms,Implementing processes, Threads, Process synchronization, Race condition, Critical Section, Synchronization approaches, Classic process synchronization problems, Semaphores, Monitors	6
3	**Process Scheduling** Scheduling terminology and concepts,Nonpreemptive scheduling policies, Preemptive scheduling policies, Long, Medium and short term scheduling	6
4	**Deadlock** What is deadlock, Deadlock in resourceallocation,Handling Deadlocks : Deadlock Detection and Resolution, Deadlock prevention, Deadlock avoidance	6
5	**Memory Management** Managing the memory hierarchy, Static and Dynamic Memory Allocation, Heap Management, Contiguous Memory Allocation and Non Contiguous Allocation, Segmentation and Segmentation with paging, Virtual memory basics, Demand paging, Page replacementpolicies	6

6	**File systems and I/O systems** Overview of file processing, Filesandfile operations, Fundamental file organizations and access methods, Layers of the Input Output control system, Overview of I/O system	6

Text Books:

1. Operating Systems –A Concept Based approach –Dhananjay M Dhamdhere (TMGH).3rd edition.
2. Operating System Concepts –Abraham Silberschatz, Peter B. Galvin &Grege Gagne(Wiley)

Reference Books:

1. UNIX Concepts and Applications –Sumitabha Das(TMGH).
2. Operating System: Concepts and Design –Milan Milenkovic (TMGH)
3. Operating System with case studies in Unix, Netware and Windows NT –Achyut S. Godbole (TMGH).

Term work:

The tutorials should be conducted on the following guidelines.

1. Six assignments should be based on theoretical / analytical concepts, preferably from the exercises of the books covering all topics of thesyllabus.
2. Four assignments should on usage of Unix / Linux commands and system calls concerned with General purpose utilities, file system, handling ordinary files, basic file attributes, the Shell, the Process and Filters using regular expressions as mentioned in the reference book at serial no.1.
3. Installation of any two operating system usingVmware.

These assignments should be practically conducted during the tutorial sessions.

S. Y. B. Tech (Computer Science and Engineering) Sem – IV

5. Software Engineering (PCC-CS-405)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs/Week	**Theory :** ESE 70Marks CIE 30Marks
Tutorial : ---	**Term work: ---**
Practical: ---	**Practical :---**
Credits:- 3	

Course Objectives:

1. To expose the students to basic concepts & principles of softwareengineering.
2. To make the student aware of the importance of SDLC in their project developmentwork.
3. To expose the students to software testing techniques and software qualitymanagement.

Course Outcomes:

1. Comprehend systematic methodologies of SDLC(Software Development LifeCycle)
2. Discriminate competing and feasible system requirements indicating correct real world problem scope and prepare stepwise system conceptual model using stakeholder analysis and requirementvalidation.
3. Prepare SRS document for aproject
4. Apply software design and developmenttechniques
5. Develop a quality software project through effective team-building, planning, scheduling and risk
6. Understand testing methods at each phase ofSDLC

Unit No.	Contents	No.of Lectures
1	**The software Problem** Cost, Schedule & Quality, Scale and Change, Software Processes: Process & Project, Component Software Processes, Software Development process Models, Project Management Process.	6
2	**Software Requirements Analysis & specification** Value of Good SRS, Requirement Process, Requirements Specification, Other Approaches for Analysis ,Validation	5
3	**Software Planning & Scheduling** Responsibilities of Software Project Manager, Project Planning, Project Scheduling, Project Staffing, People CMM, Risk Management	6
4	**Design** Design Concepts, Function Oriented Design, Object Oriented Design, Detail Design,Verification,Metrics	6

5	**Coding & Testing** Coding & Code Review,Testing, UnitTesting,Black Box ,Testing,White Box Testing, Program Analysis Tools,Integration Testing, System Testing	7
6	**Software Reliability &Quality Management** Reliability,SoftwareQuality,Software Quality Management System, ISO 9000, SEI capability Maturity Model, Six Sigma, Agile Software Development & Extreme Programming, Agile Project Management	6

Text Books:

1. Software Engineering: A precise Approach – Pankaj Jalote (Wiley India) (Unit1,2,4).
2. Fundamentals of Software Engineering – Rajib Mall (3rd Edition)(PHI) (Unit 5,6).
3. Software Engineering by Jan Sommerville (9th Edition) Pearson (Unit 6, 7 &6.8).
4. Software Engineering Principles & Practices by RohitKhuranaITLESL (2nd Edition) Vikas Publishing House Pvt. Ltd. (Unit3).

Reference Books:

1. Software Engineering – Concepts & Practices –Ugrasen Suman (CenageLearning)
2. Software Engineering Fundamentals –Behforooz& Hudson (Oxford: Indian Edition1st)

S. Y. B. Tech (Computer Science and Engineering) Sem – IV

6. Object Oriented Programming (PCC-CS406)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 2 Hrs/Week	**Theory :**---
Tutorial : ---	**Term work:** 50 marks
Practical: 4 Hrs/Week	**Practical :** 50marks
Credits:- 4	

Pre- requisites: Basics Of C Programming Language

Course Objectives:

1. To learn advanced features of the C++ programming language as a continuation of the previouscourse.
2. To learn the characteristics of an object-oriented programming language: data abstractionand information hiding, inheritance, and dynamic binding of the messages to themethods.
3. To learn the basic principles of object-oriented design and software engineering in terms of software reuse and managingcomplexity.
4. To enhance problem solving and programming skills in C++ with extensive programming projects.
5. To become familiar with the LINUX software developmentenvironment.

Course Outcomes:

After the completion of this course, a successful student will be able to do the following:

1) Use the characteristics of an object-oriented programming language in aprogram.
2) Use the basic object-oriented design principles in computer problemsolving.
3) Use the basic principles of software engineering in managing complex softwareproject.
4) Program with advanced features of the C++ programming language.
5) Develop programs in the LINUX programming environment.

Unit No.	Contents	No. of Lectures
1	**Basics of Object Oriented Programming** The Origins of C++,Features of Object Oriented Programming, relations of Classes & Structures, Classes & Objects, Encapsulation, Data Abstraction, Inheritance, Inline Function, Constructor &Destructor ,function overloading & Operator overloading, Static class member, Static Member Function, Scope resolution Operator, Access members Data member & member Function, Defining member functions, Passing Object to Functions, Nested classes, local classes, Friend functions, Friend class	5
2	**Pointers , Arrays, Dynamic allocation Operator** Arrays Of Object, Pointers to Object, THIS pointer, type checking C++ Pointers, Pointers to Derived types, Pointers to Class members Dynamic Allocation Pointers :-New & Delete Operator	3
3	**Functions & Operator Overloading** Functions Overloading, Operator Overloading, Types Of Constructors, Destructors, Operator Overloading Using Friend Function, Unary & Binary Operator Overloading(Arithmetic, Comparison Operator Overloading),Assignment Operator Overloading(=,+=)	4
4	**Inheritance & Virtual Function** Inheritance, Single Inheritance, Types of Derivations, Passing parameters to base ,Multiple Inheritance, Multilevel Inheritance, Hybrid Inheritance ,Hierarchical Inheritance , Virtual function, Calling a Virtual function through a base class reference, Virtual functions are hierarchical, Pure virtual functions, Abstract classes, Early and late binding.	5
5	**Templates & Exception handling** Function Template ,Class Template, Generic Classes ,Generic Functions, Applying Generic Functions Type Name, export keyword Power of Templates Standard Template Library (STL):-STL Container, STL Algorithm, STL iterator. Exception handling :-Exception handling fundamentals, Catching, Throwing ,& Handling Exception, Exception handling options,	5

6	**I/O System Basics,FileI/0** Streams ,File Pointers & Redirections Streams, C++ stream, C++ Predefined stream classes, Formatted I/O, C++ file I/O, manipulators, fstream and the File classes, File operations, namespaces, std namespaces	4

TERM WORK:

- It should consist of minimum 10-12 experiments based on the syllabusand concepts mention below. Students of different batches should implement different programs based on thefollowing guidelines
- Student should perform the Practicals on Linuxplatform

List of Experiments

1. Classes &objects
2. Constructors &destructors
3. Friend function and Friendclass
4. Inline Function, Static data members & memberfunctions,
5. Array, Array of Objects, Pointer to Object, THIS pointer, Dynamic allocation operators (New & Delete)
6. Function overloading, Operator overloading (unary/binary/arithmetic/comparison)
7. Inheritance (multilevel, multiple, hybrid, Hierarchical)
8. Virtual function and Virtual class, early and latebinding
9. Generic function &classes
10. STL
11. ExceptionHandling
12. Filehandling

TEXT BOOKS:

1. The Complete Reference C++ by Herbert Schild(Tata McGraw Hill) 4th Edition andonwards.
2. Object oriented Programming in C++ by Rajesh K.Shukla(Wiley) IndiaEdition

REFERENCE BOOKS:

1 Object-Oriented Programming with C++ by E. Balaguruswamy. (Tata McGraw-Hill) 6th Edition and onwards
2. Object oriented Programming with C++- by SouravSahay (Oxford) 2nd edition

S. Y. B. Tech (Computer Science and Engineering) Sem – IV

7. Mini Project (PW-CS407)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : ---	**Theory :**---
Tutorial : ---	**Term work:** 50 marks
Practical: 2 Hrs/Week	**Practical :** 50marks
Credits:- 3	

Pre-requisites: Knowledge of software engineering and C/C++

Course Objectives:

1. To expose the students to solve the real worldproblems.
2. To utilize the techniques. Skills and modern Engineering tools for building theproject.
3. To follow the methods and tasks as per SDOLCApproach

Course Outcomes:

1. Define the problemstatement.
2. Organize, Plan and prepare the detailed projectactivities.
3. Construct Flowchart, System Architecture based on the projectdescription
4. Implement the solution for theirproblem.

Platform: - C, C++

Course Contents/Description:-

The Mini Project should be undertaken preferably by a group of 3-4 students who will jointly work together and implement the project. The Mini Project topic should be based on the any one subject concepts that students have studied for their Academic Year. The group will select the project with the approval of the guide and submit the name of the project with a synopsis of the proposed work not more than 02 to 03 pages. In the Synopsis they have to state Flowchart, Usage of the logic, algorithm, functions and suitable data structure for implementing the solution. They have to implement project using C, C++languages.

S. Y. B.Tech (Computer Science and Engineering) Sem – IV

8. ENVIRONMENTAL STUDIES(PCC-CS408)

	TEACHING SCHEME	EXAMINATION SCHEME
	Theory : 2 Hrs/Week	**Term work:**
	Tutorial : 1 Hr/week	**Theory** 100
	Practical:	**Practical :**
	Credits:- 3	

SHIVAJI UNIVERSITY, KOLHAPUR

REVISED SYLLABUS AND STRUCTURE

THIRD YEAR (C.B.C.S.) BACHELOR OF TECHNOLOGY

IN

Computer Science and Engineering

To be introduced from the academic year 2020-21

(w. e. f. June 2020) onwards

	THIRD YEAR COMPUTER SCIENCE AND ENGINEERING - CBCS PATTERN																
	SEMESTER - V																
		TEACHING SCHEME							EXAMINATION SCHEME								
Sr. No.	Course Subject / Title	THEORY			TUTORIAL		PRACTICAL		THEORY				ORAL / PRACTICAL		TERMWORK	
		Credits	N0. Of Lectures	Hours	Credits	No. of Hours	Credits	No. of Hours	mode	marks	Total Marks	MIN.	MAX	MIN.	MAX	MIN.
1	**PCC-CS501** Information Security	3	3	3			1	2	CIE ESE	30 70	100	40			50	20
2	**PCC- CS502** System Programming	3	3	3			1	2	CIE ESE	30 70	100	40	25	10	50	20
3	**PCC- CS503** Object-Oriented Modeling & Design	3	3	3					CIE ESE	30 70	100	40				
4	**PCC- CS504** Computer Algorithms	4	4	4	1	1			CIE ESE	30 70	100	40			25	10
5	**OEC- CS505** Computer Graphics & Multimedia **OEC-CS506** Internet of Things	3	3	3					CIE ESE	30 70	100	40				
6	**PCC- CS507** Java Programming	3	3	3			2	4					50	20	50	20
7	**HM- CS508** Business English				1	2							25	10	25	10
	Total (SEM –V)	***19***	***19***	***19***	***2***	***3***	***4***	***8***			***500***		***100***		***200***	

	THIRD YEAR COMPUTER SCIENCE AND ENGINEERING - CBCS PATTERN																
	SEMESTER - VI																
		TEACHING SCHEME							EXAMINATION SCHEME								
Sr. No.	Course Subject / Title	THEORY			TUTORIAL		PRACTICAL		THEORY				ORAL / PRACTICAL		TERMWORK		
		Credits	N0. Of Lectures	No. of Hours	Credits	No. of Hours	Credits	No. of Hours	mode	marks	Total Marks	MIN.	MAX	MIN.	MAX	MIN.	
1	**PCC-CS601** Compiler Construction	3	3	3			1	2	CIE ESE	30 70	100	40			25	10	
2	**PCC- CS602** Operating System-II	4	4	4			1	2	CIE ESE	30 70	100	40			25	10	
3	**PCC- CS603** Database Engineering	4	4	4			1	2	CIE ESE	30 70	100	40	50	20	25	10	
4	**PCC- CS604** Machine Learning	3	3	3	1	1			CIE ESE	30 70	100	40			25	10	
5	**OEC- CS605** E-Commerce & Digital Marketing **OEC - CS606** ii) Cyber Security	3	3	3					CIE ESE	30 70	100	40					
6	**PCC- CS607** C# Programming	2	2	2			1	2					50	20	25	10	
7	**PW- CS608** Domain Specific Mini Project						1	2					50	20	25	10	
	Total (SEM –VI)	***19***	***19***	***19***	***1***	***1***	***5***	***10***			***500***		***150***		***150***		
	Total (SEM - V+ SEM - VI)	**38**	**38**	**38**	**3**	**4**	**9**	**18**			**1000**		**250**		**350**		

CIE- Continuous Internal Evaluation

ESE – End Semester Examination

• Candidate contact hours per week : 30 Hours (Minimum)	• Total Marks for T.Y. Sem V & VI : 8**00 + 800 =1600**
• Theory and Practical Lectures : 60 Minutes Each	• Total Credits for T.Y. Sem V & VI : **50 (SEM-V: 25 + SEM -VI: 25)**
• In theory examination there will be a passing based on separate head of passing for examination of CIE and ESE.	
• There shall be separate passing for theory and practical (term work) courses.	

Note:

1. **PCC-CS:** Professional Core Course – Computer Science and Engineering are compulsory.
2. **HM-CS:** Humanities and Management- Computer Science and Engineering are compulsory.
3. **PW-CS:** Domain Specific Mini Project -– Computer Science and Engineering are compulsory.
4. **#OEC-CS: Open Elective Course** – To be offered to Inter departmental students.

   # - 60% of the students from other branches to be chosen on merit.
   - 40% of the students may be from same branch based on merit.
   - Number of students to be allowed should be 72(Max.) for the branch with intake of 60 students.
   - The above ratio should be followed in proportionate to the sanctioned intake.

OPEN ELECTIVE COURSE-I

Sr. No.	**Name of the Subject**	**Name of the concern Branch**
1	i) Computer Graphics & Multimedia ii) Internet of Things	Computer Science and Engineering

OPEN ELECTIVE COURSE-II

Sr. No.	Name of the Subject	**Name of the concern Branch**
1	i) E-Commerce & Digital Marketing ii) Cyber Security	Computer Science and Engineering

T. Y. B. Tech (Computer Science and Engineering) Sem – V

1. Information Security (PCC - CS501)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs./Week	**Theory :** ESE 70 Marks CIE 30 Marks
Tutorial : -------	**Term work :** 50 Marks
Practical: 2 Hrs./Week	**Practical : ------**

Pre-requisites: Computer Network, Modular Arithmetic &Number Theory, C / C++.

Course Objectives

1. To introduce the principles of Crypto-Systems.
2. To expose students to various security services and mechanisms used.
3. To make the students aware of the security features of PGP, S/MIME, Digital Signatures, IPSec& SSL.
4. To make the students understand the system level security issues concerning threats, intruders and use of firewalls and trusted systems.
5. To make students to explore non-cryptographic and software vulnerabilities.

Course Outcomes

Upon successful completion of this course, the students will be able to :

1. Understand principles of Crypto-systems.
2. Compare and analyze various security services and mechanisms.
3. Apply and use the features of PGP, S/MIME, DSA, IPSec, SSL in their profession.
4. Take precautions of their personal computing system from possible threats and attacks.
5. Explore newer vulnerabilities and provide the solutions to them.

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1.	**Classical Encryption Techniques and DES:** The OSI Security Architecture, Symmetric Cipher Models: Substitution Techniques, Transposition Techniques, Block Cipher Principles, The Data Encryption Standard.	6
2.	**Public-Key Cryptosystems, Key Management and Authentication :** Principles of Public-Key Cryptosystems, The RSA Algorithm, Key Management, Diffie-Hellman Key Exchange, Authentication requirements, Authentication functions, MAC and Hash functions and their requirements.	7
3.	**Digital Signatures and Authentication Applications**: Digital Signature, Digital Signature Standard, Authentication applications - Kerberos, X.509 Authentication service.	5
4.	**Electronic mail and IP security**: Email Security - PGP, S/MIME, IP Security-IP Security Architecture, Authentication Header and Encapsulating Security Payload.	5
5.	**Web and System Security**: Secure Socket Layer and Transport Layer Security, Secure Electronic Transaction, Intruders, Intruder Detection, Password Management, Firewall Design Principles, Trusted Systems.	6
6.	**Non-Cryptographic Protocol Vulnerabilities**: DoS and DDoS, Session Hijacking and Spoofing, Pharming attacks. Software Vulnerabilities - Phishing, Buffer Overflow, Format String attacks, SQL Injection.	7

Term Work

- Minimum of 10 Experiments to be performed from the list given below.
- Practical should include the implementation and use of the following mechanisms/Algorithms/Tools /Techniques
- Implementation can be in C/C++ Programming Language

Experiment List

1. GCD Using Euclidean algorithm/Computing Multiplicative inverses/ Prime number and modular arithmetic operations.
2. Substitution/Transposition/ Product Cipher and their Analysis
3. Single round of DES algorithm/Double DES/ Triple DES and its analysis
4. RSA Algorithm to provide Confidentiality and Authentication services or any other Public-Key Algorithm.
5. Diffie–Hellman or any other key exchange Algorithm.

6. Implementation and use of any authentication functions / algorithm.
7. Generation and use of Digital Signature for real world situation.
8. Usage of PGP security package and S/MIME features.
9. Experimenting with SSL/TLS/E-Commerce Applications and identifying their Vulnerabilities.
10. Demo and usage of network traffic analysis tools.
11. Experimentation on identifying non-cryptographic Protocol Vulnerabilities and remedies thereon.
12. Experimenting on identifying software Vulnerabilities using various tools/techniques and their analysis.
13. Any other4 Implementation/Demo/Experimentation based on the topics of syllabus.

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Cryptography and Network Security	William Stallings	Pearson Edition	(Unit I to V)
2	Network Security and Cryptography	Bernard Menezes	Cengage Learning	Unit -VI

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Cryptography and network security	Atul Kahate	TMGH
2	Cryptography and Network Security	B. A. Forouzan	TMGH
3	Network Security Know it All	Joshi et. al	Morgan Kaufmann Publisher

T. Y. B. Tech (Computer Science and Engineering) Sem –V

2. System Programming (PCC - CS502)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs./Week	**Theory :** ESE 70 Marks CIE 30 Marks
Tutorial : -----	**Term work:** 50 Marks
Practical: 2 Hrs./Week	**Oral :** 25 Marks

Pre-requisites: Basics of OS and Basics Microprocessor.

Course Objectives

1. To expose the students to the fundamentals of languages and processing
2. To make students to learn design of grammars, assemblers and compilers
3. To provide hands on experience to the students on simulation of linkers, loaders and software tools for UIs

Course Outcomes

1. Student will be able to identify the role of system programs and application programs.
2. Student will be able to understand the basics of system programs like editors, compiler, assembler, linker, loader, interpreter and debugger.
3. Students able to describe the various concepts of assemblers and macro - processors.
4. Students able to understand the various phases of compiler and compare its working with assembler.
5. Students understand how linker and loader create an executable program from an object module created by assembler and compiler.
6. Students will be able to create graphical user interfaces for basic programs and learn about terminal input/output through the termios libraries.

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1.	**Language Processors**: Introduction, Language processing activities, Fundamentals of language processing, Fundamentals of language, Specification, Language Processing Development Tools: LEX and YAC	**7**
2.	**Assemblers:** Elements of assembly language programming, A simple assembly scheme, pass structure of assemblers, Design of a two pass assemble	**5**
3.	**Macros and Macro Processors:** Macro definition and call, Macro expansion, Nested macro calls, Advanced macro facilities, Design of macro pre-processor: Design Overview, Data structure of Macro pre-processor with and Example	**7**

4	**Compilers and Interpreters:** Aspects of compilation, Memory allocation: Static and Dynamic memory allocation, Memory Allocation in block Structure language. Compilation of expressions, Code optimization: Local and Global optimization and Optimization technique, Interpreters	**7**
5.	**Linkers:** Introduction, Relocation and linking concepts, Self- relocating programs, linking for overlays, Loaders	**5**
6.	**Software tools:** Introduction, Software tools for program development, Editors, Debug Monitors, Programming Environments, and User Interface	**5**

Term Work

Minimum of 5 experiments on LEX and 5 case-studies each on Assembler, Complier, Macro Preprocessor, Linker and Loaders

Oral Exam

Orals can be conducted over the syllabus contents and Term Work assignments.

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1.	**System Programming and operating systems**	**D. M. Dhamdhere**	**2ndEdition (TMGH)**	**All Units**
2.	**Lex &Yacc Publisher:**	**Doug Brown, John Levine, Tony Mason**	**2nd Edition O'Reilly Media**	**For Practical**

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T. Y. B. Tech (Computer Science and Engineering) Sem – V

3. Object Oriented Modeling and Design (PCC - CS503)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs./Week	**Theory :** ESE 70 Marks CIE 30 Marks
Tutorial : -----	**Term work : -----**
Practical : -----	**Oral : -----**

Pre-requisites: Software Engineering & Object Oriented Concepts.

Course Objectives

1. To Understand the Object Based View of the System
2. To design Problems using Object Oriented Analysis and Design Techniques
3. To Understand UML notations and compare with OMT
4. To inculcate necessary skills to handle complexities in Software Design

Course Outcomes

1. Ability to analyze and model software systems
2. Ability to construct OO view of the system
3. Ability to design a Software System using OMT design techniques.
4. Ability to design a Software System using UML design techniques.

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1.	**Introduction: Ability to analyze and model software systems** Object oriented themes, modeling as a design technique. **Object Modeling:** Object, classes, Link & association, advanced link & Association concepts, generalization & Inheritance, grouping constructs, aggregation, abstract classes, generalization as extension & restriction, multiple inheritance, metadata, candidate key & constraints.	**8**

2.	**Dynamic & Functional Modeling:** **Dynamic modeling**: Events & states, operations, nested state diagrams, concurrency, advanced dynamic modeling concepts &simple dynamic model, relation of object dynamic models. **Functional Modeling**: functional model, data flow diagrams, specifying operations, constriction, a simple functional model, relation of functional to object & dynamic model.	**7**
3.	**Design Methodology:** OMT methodology, Impact of an object-oriented approach, analysis, system design with examples, combining models, design algorithms, design optimization, implementation of controls, design association & physical packaging.	**3**
4.	**Introducing the UML:** An overview of the UML, Conceptual Model of UML, Architecture of UML Structure modeling Using UML**:** Classes, Relationship, Diagrams, Class Diagrams**.**	**7**
5.	**Behavioral Modeling:** Interactions, Use Cases, Use Case Diagram, Interaction diagrams, Activity diagrams, Events & Signals, State Machines, Process & Threads, Time & Space, State chart diagrams.	**5**
6.	**Architectural Modeling:** Components, Deployment, Collaboration, Patterns & frameworks, component diagrams, Deployment diagrams.	**6**

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Object-orientated Modeling & Design: (Unit 1 to 3)	James Rambaugh, Michael Blaha, William Premerlani, Frederick Eddy, William Lorensen	PHI	Unit 1 to 3
2	The Unified Modeling Language User Guide	Grady Booch, James Rambaugh, Lvar Jacobson	Addison Wesley	Unit 4 to 6

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Object oriented analysis & design using UML	H. Srimathi, H. Sriram, A. Krishnamoorthy	SCITECH PUBLICATION 2nd Edition
2	Object Oriented analysis& Design	Andrew High	TMG
3	Practical Object Oriented Design with UML	Mark Priestley	McGraw-Hill Education
4	Threat first Object oriented analysis & design	Breet Mclaughline, Garry Police & Devide West	OREILLY

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T. Y. B. Tech (Computer Science and Engineering) Sem – V

4. Computer Algorithms (PCC - CS504)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 4 Hrs/Week	**Theory :** ESE 70 Marks CIE 30 Marks
Tutorial : 1Hr/Week	**Term work :** 25 Marks
Practical : -----	**Oral : -----**

Pre-requisites: Data Structures, Discrete Mathematics, Engineering Mathematics, Programming Concepts.

Course Objectives

1. To introduce algorithm design methods / techniques with analysis
2. To devise algorithm for given problem statement
3. To introduce complex computational problems
4. Introducing parallel algorithms

Course Outcomes

Upon Completion of this course, students will be able to:

1. Understand and demonstrate algorithm design methods with analysis
2. Devise algorithm for given problem statement and analyze its space and time complexity by using recurrence relation
3. Categorize the problem to determine polynomial and non-polynomial based on its nature
4. Understand and demonstrate basic concepts of parallel algorithms

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1.	**Unit 1 : Divide and Conquer:** What is algorithm, Algorithm Specification, Recurrence relations, Performance Analysis, Randomized Algorithms. Divide and Conquer**:** The general method, Binary search, Finding the maximum and minimum, Merge sort, Quick sort, DC Selection Algorithm, analysis of Divide and Conquer algorithms.	10
2.	**The Greedy Method:** The general method, Knapsack problem, Job sequencing with deadlines, minimum-cost spanning trees – Prim's and Kruskal's Algorithms, Optimal storage on tapes, Optimal merge Patterns, Single source shortest paths.	7
3.	**Dynamic Programming:** The general method, Multistage graphs, All pair shortest paths, 0/1 knapsack, Reliability design, Traveling Sales person problem.	7
	Basic Traversal and Search Techniques and Backtracking: Techniques for Binary Trees, Game Tree; Techniques for Graphs – Breadth First Search & Traversal, Depth First Search	13

4.	& Traversal, AND/OR graphs; Connected components and Spanning Trees; Bi-connected components and depth first search. Backtracking - The general method, 8-queen problem, sum of subsets, Knapsack Problem, Hamiltonian Cycle, and Graph Coloring.	
5.	**NP Hard and NP Complete Problems:** Basic Concepts, Introduction to NP Hard Graph Problems.	4
6.	**Introduction to Parallel Algorithm:** Computational Model and Fundamental Techniques and Algorithms – PRAM, MESH and HYPERCUBE.	7

Term Work

It should consist of minimum 10-12 assignments based on following guidelines

- A batch of students will be assigned different algorithms and expected to analyze the algorithms in terms of time and space complexity
- Solve different exercise problems in text book mentioned in syllabus
- Student need to perform at least 6 programs from the syllabus. Perform Priori Analysis and Posteriori Measurement on the same.

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Fundamentals of Computer Algorithms	Ellis Horowitz, Satraj Sahani, Saguthevar Rajasejaran	Universities Press, Second Edition	**All Units**

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Fundamentals of Algorithmics	Gilles Brassard, Paul Bratley	Pearson Education
2	Mastering Algorithms with C	Kyle Loudon	SPD O'Reilly
3	Computer Algorithms- Introduction to Design and Analysis	Sara Baase, Allen Van Gelder	Pearson Education

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T. Y. B. Tech (Computer Science and Engineering) Sem – V

5. Open Elective Course - I (OEC - CS505)

Computer Graphics and Multimedia (OEC - CS505)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs./Week	**Theory :** ESE 70 Marks CIE 30 Marks
Tutorial : -----	**Term work : -----**
Practical : -----	**Practical : -----**

Course Objectives

1. To provide knowledge to the students about basics of computer graphics and different display devices.
2. To expose students to the various 2D & 3D transformation & projection techniques.
3. To provide knowledge to the students about basics of Illumination models, surface rendering methods.
4. To make the students aware of multimedia system &Multimedia Authoring, Compression techniques.

Course Outcomes

Upon successful completion of this course, the student will be able to -

1. Express basic ideas of computer graphics and different display devices.
2. Understand & apply various transformation, projection and rendering techniques on graphical objects.
3. Identify & apply the intensity of light on graphical objects using different illumination models.
4. Understand multimedia system & use of Multimedia Authoring & Compression techniques on graphical objects.

Unit No.	Unit Name and Contents	No. of Lectures
1	**Basic of Computer Graphics** Basic of Computer Graphics, Applications of computer graphics, Display devices: Random and Raster scan systems, Input devices, Scan Conversion techniques: RLE, Frame Buffer, Graphics software and standards.	5
2	**Transformations –** Basic 2D & 3D transformations - Translation, Scaling, Rotation, Reflection, Shearing, Multiple Transformations, Rotation about an axis parallel to a coordinate axis, Rotation about an arbitrary axis in space, Affine and Perspective Geometry, Orthographic projections and Axonometric projections.	8
3	**Illumination models and surface rendering methods** Light sources, Basic illumination models, Displaying light intensities, Polygon Rendering methods, Ray tracing methods, Radiosity lighting.	5

4	**Introduction to Multimedia** Multimedia: Historical perspective, multimedia data and multimedia systems, a multimedia system today, Analog and Digital Signals, Analog-to-Digital Conversion, Media Representation and Media Formats - Digital Images, Digital Video, Digital Audio.	**6**
5	**Multimedia Authoring & Compression** Examples of Multimedia, Requirements for Multimedia Authoring Tools, Intramedia Processing, Intermedia Processing, Media Compression - The Need for Graphics Compression, Graphics compression in relation to other media compression, Mesh compression using connectivity encoding.	**7**
6	**Computer Animation** Introduction: Types, Key frame animation, Procedural animation, Construction of an animation sequence, Motion control methods, VFX, SFX, Introduction to Morphing, Wrapping techniques, Defining virtual & Augmented reality.	**5**

Text Books:

1. Procedural elements for Computer Graphics - David F. Rogers (MGH International) (For Units 1)
2. Mathematical elements for Computer Graphics - David F. Rogers, J. Alan Adams (MGH Int.) (Unit 2)
3. Computer Graphics C Version second edition –Donald D. Hearn, M. Pauline Baker (Pearson) (Unit 3)
4. Multimedia systems: Algorithms, Standards & Industry Practice-Parag Havaldar & Gerard Medioni, Cengage Learning (Unit 4, 5)
5. Computer Graphics- Rajesh Maurya (WILEY India) (Unit 6)
6. Virtual & Augmented reality - Paul Mealy (Kindle Edition) (Unit 6)

Some assignments on following topics can be given and its evaluation should be considered for CIE

1. Introduction to computer graphics, OPEN GL, GLUT, GLU
2. Design 2D & 3D objects by using graphics primitives
3. Apply the different transformation techniques on 2D & 3D graphical objects
4. Create graphics design using any software(Picasa, Autodesk Maya, Sketch Up, Solid works)
5. Perform rendering using Blender or Lux Core Render Software
6. Create 2D & 3D animated object using Synfig or Blender Software.

T. Y. B. Tech (Computer Science and Engineering) Sem – V

5. Open Elective Course - I (OEC - CS506)

Internet of Things (OEC - CS506)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs./Week	**Theory :** ESE 70 Marks CIE 30 Marks
Tutorial : -----	**Term work : -----**
Practical : -----	**Practical : -----**

Pre-requisites: Fundamentals of Computer Network and Internet, basics of C / C++ programming language.

Course Objectives

1. To learn Internet of Things Technology
2. To know the basics of RFID, Sensor technologies.
3. To know the basics of IoT systems like Raspberry Pi, Arduino, and Banana Pi.
4. To aware students about wireless communication technologies and IoT applications.
5.

Course Outcome

1. Students will understand basic concepts of IoT
2. students will be able to learn and implement RFID technology in various applications.
3. Students will be able to write programs for basic applications
4. Student will understand and implement different communication technologies in IoT systems.

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1.	**Introduction:** IoT, Objects / Things, IoT definitions, IoT frame work, Identification technologies, Internet in IoTs.	4
2.	**Fundamental of IoT mechanisms:** Identification of IoT objects and services, Traffic characteristics, scalability and inter-operability, security and privacy, Communication capabilities, Mobility support and device power, Sensor technology, RFID technology and satellite technology.	6
3.	**Radio Frequency Identification Technology**: RFID, IoT objects and services, principles of RFID, Components of an RFID system, RFID reader, Tags, middleware, Sensor nodes, connecting nodes, networking nodes.	6
4.	**IoT systems:** Hardware and Software: Introduction to Raspberry Pi, Familiar with Raspberry Pi hardware, study of I/O ports, Programming with Raspberry Pi: Study of operating system, simple programs in C / C++, Introduction with Python programming.	8

5.	**Communication Technologies:** WPAN Technologies: Introduction to IEEE 802.15.4 standard, Bluetooth, Zigbee, IEEE 802.15.6; WBANS, NFC, IEEE 802.11 WLAN, Cellular and mobile technologies.	6
6.	**IoT Application Examples:** Smart Metering, advanced metering infrastructure, e-health / Body Area Network, City Automation (Smart City), Automotive Application, Environmental Applications, Home Automation, Control Applications.	6

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	The Internet of Things - Connecting objects to the web	Hakima Chaouchi	Wiley Publications
2	Building the Internet of Things	Daniel Minoli	Wiley Publications
3	Raspberi Pi Beginner's Guide	Gareth Halfacree	Raspberi Press
4	Introduction to Wireless Telecommunications systems and Networks	Gary J. Mulett.	Cengage Learning (India Edition).

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Raspberry Pi for Dummies	Sean McManus, Mike Cook	A Wiley Brand
2	Architecting the Internet of Things	Bernd Scholz, Reiter	Springer

T. Y. B. Tech (Computer Science and Engineering) Sem – V

6. Java Programming (PCC - CS507)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs./Week	**Theory : ------**
Tutorial : -----	**Term work :** 50 Marks
Practical : 4 Hrs./Week	**Oral :** 50 Marks

Pre-requisites: C++ and html.

Course Objectives

1. To introduce the concept of object-oriented programming using java.
2. To learn how to implement reliable and secure application using exception handling and package concept.
3. Have the ability to write program to perform file operations.
4. To understand how to design components with java Swing API and present mechanism of multithreading.
5. To familiarize database connectivity through JDBC and learn the collection framework.
6. To explore the concept of networking and web programming using java servlet and jsp.

Course Outcomes

1. Students will be able to articulate the principle of object-oriented problem solving & programming**.**
2. Students will be able to illustrate code reusability, security and abstraction using inheritance, package and interface.
3. Students will be able to develop reliable and user-friendly applications using exception handling and file handling.
4. Students will be able to create desktop apps using SWING and event handling and also illustrate multithreading concepts.
5. Students will be able to use JDBC & collection framework.
6. Students will be able to apply network programming concept & develop web applications using servlet and jsp.

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1.	**Fundamental Programming in Java:** The Java Buzzwords, The Java Programming Environment- JVM, JIT Compiler, Byte Code Concept, Hotspot, A Simple Java Program, Source File Declaration Rules, Comments, Data Types, Variables, Operators, Strings, Input and Output, Control Flow, Big Numbers, Arrays-Jagged Array. **Objects and Classes:** Object-Oriented Programming Concepts, Declaring Classes, Declaring Member Variables, Defining Methods, Constructor, Passing Information to a Method or a Constructor, Creating and using objects, Controlling Access to Class Members, Static Fields and Methods, this keyword, Object Cloning, Class Design Hints,	5
2.	**Inheritance, Interface and Packaging**: Inheritance: Definition, Super classes, and Subclasses, Overriding and Hiding Methods, Polymorphism, Inheritance Hierarchies, Super keyword, Final Classes and Methods, Abstract Classes and Methods, casting, Design Hints for Inheritance, Nested classes & Inner Classes, finalization and garbage collection. Interfaces**:** Defining an Interface, Implementing an Interface, Using an Interface as a Type, Evolving Interfaces, and Default Methods. Packages**:** Class importing, Creating a Package, Naming a Package, Using Package Members, Managing Source and Class Files. Developing and deploying (executable) Jar File.	7
3.	**Exception and I/O Streams:** **Exception:** Definition, Dealing with Errors, The Classification of Exceptions, Declaring Checked Exceptions, Throw an Exception, Creating Exception Classes, Catching Exceptions, Catching Multiple Exceptions, Re-throwing and Chaining Exceptions, finally clause, Advantages of Exceptions, Tips for Using Exceptions. **I/O Streams:** Byte Stream – Input Stream, Output Stream, Data Input Stream, Data Output Stream, File Input Stream, File Output Stream, Character Streams, Buffered Stream, Scanner, ,Random File Access File.	4
4.	**Graphical User Interfaces using Swing and Multithreading** Introduction to the Swing, Swing features, Swing Top Level Containers-Creating a Frame, Positioning a Frame, Displaying Information in a Panel, The Model-View-Controller Design Pattern, The JComponent Class. **Layout Management:** Introduction to Layout Management, APIs for Border Layout, Flow Layout, Grid Layout	6

	Event Handling: Basics of Event Handling, The AWT Event Hierarchy, Semantic and Low- Level Events in the AWT, Low-Level Event Types **User Interface Components:** Text Input, Choice Components, Menus, Dialog Boxes Setting the Look and Feel of UI, Introduction to JApplet **Multithreading:** Processes and Threads, Runnable Interface and Thread Class , Thread Objects, Defining and Starting a Thread, Pausing Execution with Sleep, Interrupts, Thread States, Thread Properties, Joins, Synchronization	
5.	**Collection and Database Programming** Collections: Collection Interfaces, Concrete Collections- List, Queue, Set, Map, the Collections Framework **Database Programming**: The Design of JDBC, The Structured Query Language, JDBC Installation, Basic JDBC Programming Concepts, Query Execution, Scrollable and Updatable Result Sets, Metadata, Row Sets, Transactions	**7**
6.	**Networking and Web:** **Networking**: Overview of Networking, Networking Basics, Working with URLs, Creating a URL, Parsing a URL, Reading Directly from a URL, Connecting to a URL, Reading from and Writing to a URL Connection, Sockets, Reading from and Writing to a Socket, Writing the Server Side of a Socket, Datagram, Writing a Datagram Client and Server. **Servlet and JSP:** Introduction to Servlet, The servlet Lifecycle, Retrieving Information and Sending Information, Database Connectivity using servlet, Introduction to JSP, Writing Scriplets, The jsp Lifecycle, Retrieving Information and Sending Information, Database Connectivity using jsp	**7**

Term Work

1. 25 marks for performance in practical and experiments as part of continuous evaluation
2. 25 marks for Two Practical Tests and oral (Each of 25 Marks) to be conducted during the semester.

Practical List

- Minimum 15 experiments should be conducted based on above topics and covering following list. At least two experiments should be conducted on each unit in the syllabus.

1. Create a class called Employee that includes three pieces of information as instance variables- first name, a last name and a monthly salary. Your class should have a constructor that initializes the three instance variables. Provide a set and a get method for each instance variable. If the monthly salary is not positive, set it to 0.0. Write a test application named EmployeeTest that demonstrates class

Employee's capabilities. Create two Employee objects and display each object's yearly salary. Then give each Employee a 10% raise and display each Employee's yearly salary again.

2. Create class SavingsAccount. Use a static variable annualInterestRate to store the annual interest rate for all account holders. Each object of the class contains a private instance variable savingsBalance indicating the amount the saver currently has on deposit. Provide method calculateMonthlyInterest to calculate the monthly interest by multiplying the savingsBalance by annualInterestRate divided by 12this interest should be added to savingsBalance. Provide a static method modifyInterestRate that sets the annualInterestRate to a new value

   Write a program to test class SavingsAccount. Instantiate two savingsAccount objects, saver1 and saver2, with balances of Rs 2000.00 and Rs 3000.00, respectively. Set annualInterestRate to 4%, then calculate the monthly interest and print the new balances for both savers. Then set the annualInterestRate to 5%, calculate the next month's interest and print the new balances for both savers.

3. Create Vehicle Interface with name, maxPassanger, and maxSpeed variables. Create LandVehicle and SeaVehicleInteface from Vehicle interface. LandVehicle has numWheels variable and drive method. SeaVehicle has displacement variable and launch method. Create Car class from LandVehicle, HoverCraft from LandVehicle and SeaVehicle interface. Also create Ship from SeaVehicle. Provide additional methods in HoverCraft as enterLand and enterSea. Similarly provide other methods for class Car and Ship. Demonstrate all classes in a application.

4. Create abstract class Shape which has instance variables side, area and perimeter
   And methods calculateArea(), calculatePerimeter() as abstract methods and display() as concrete method. Write subclasses which extend Shape class like Triangle, Rectangle, Circle, Cube and Squere and override abstract methods and display methods in subclass take instance variable if needed as per the formula. And use parameterized constructor to initialize instance variables using "this" reference variable

   Write Test class and Create a reference variable of Shape which will hold the objects of all the sub classes and calculate respective area, perimeter and display the results.

5. Create the interface stack which has variable size, abstract methods push (), pop (), display (), overflow () and underflow (). We need to implement 3 subclasses IntegerStack, StringStack and DoubleStack respectively by implementing interface. All the methods in interface are declared for string. And in subclass for integerStack convert string to integer. Same thing to all other. Create one test class and check for the working of all the classes.

6. Develop a mathematical package for Statistical operations like Mean, Median, Average, Standard deviation. Create a sub package in the math package -convert. In "convert" package provide classes

to convert decimal to octal, binary, hex and vice-versa. Develop application program to use this package, and build executable jar file of it.

7. Develop application which can handle any 5 combination of predefined compile time and runtime exceptions using multiple catch blocks. Use throws and finally keywords as well.
8. Develop a BankAccount class which should contain all methods of Bank i.e. balanceEnquery(), withdraw(), transfer() and deposit(). You should create at least two objects of BankAccount using array and do all operations mentioned above. Also generate user defined exception LowBalanceException, NegetiveNumberException and PasswordMismatchException whenever required. To transfer amount from one account to another use two BankAccount objects.
9. Take file name as input to your program through command line, if file exists the open and display contents of the file. After displaying contents of file ask user – 1.do you want to add the data at the end of file or 2.replace specified text in file by other text. Based on user's response, then accept data from user and append it to file. If file in not existing then create a fresh new-file and store user data into it. Also. User should type exit on new line to stop the program. Do this program using Character stream classes.
10. Take Student information such as name, age, weight, height, city, phone from user and store it in the file using DataOutputStream and FileOutputStream and Retrive data using DataInputStream and FileInputStream and display the result. Use Serialization concept and Bytestream classes.
11. Develop a Swing GUI based standard calculator program. Use event handling, Layout of swing package.
12. Create Stop Watch with Swing GUI and Multithreading. Provide Facility for Lap Counting.
13. Write a program to read a text file one line at a time. Read each line as a String and place that String object into a LinkedList. Print all of the lines in the LinkedList in reverse order.
14. Fill a HashMap with key-value pairs. Print the results to show ordering by hash code. Extract the pairs, sort by key, and place the result into a LinkedHashMap. Show that the insertion order is maintained.
15. Write a GUI based program to create a student registration and Login. Store Registration data in Database and take Login information from Database.
16. Create GUI Based chat application using TCP or UDP.
17. Design a student registration form which contains all the registration details and after registration display success page which should display all the entered details. And also design login form , home page and logout form using servlet.
18. Write a program to store the above form information in database. And while login check with database. Display all student names in home page. Give one search field and button to search for

particular student record and display all his information as search result using servlet and jsp using MVC.

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Core Java- Volume I Fundamentals	Cay Horstmann and Gary Cornell	Pearson, Eight edition	Unit 1 to Unit 4
2	Core Java- Volume II Advanced Features	Cay Horstmann and Gary Cornell	Pearson, Eight edition	Unit 5 and Unit 6
3	Java Servlet Programming	Jason Hunter	O'Reilly Publication, 2nd Edition	Unit 6
4	Core-Servlet and Java Server Pages Volume – 1	Marty Hall, Larry Brown	Pearson Education	Unit 6

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	JAVA-The Complete Reference	Herbert Schildt	McGraw Hill, Oracle Press	Ninth edition
2	Head First Java	Eric Freeman Elisabeth Robson Bert Bates Kathy Sierra	O'Reilly Publication	3rd edition
3	Head First Servlets and JSP	Bryan Basham, Kathy Sierra, Bert Bates	O'Reilly Publication	2nd Edition

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T. Y. B. Tech. (Computer Science and Engineering) Sem – V

7. Business English (HM - CS508)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : -----	**Theory : -----**
Tutorial : 2 Hrs./Week	**Term work :** 25 Marks
Practical: -----	**Oral :** 25 Marks

Pre-requisites:

1) Knowledge of functional grammar and vocabulary in English
2) Knowledge of the importance of business English in their career path
3) Knowledge of linguistic competence and understand intricacies involved in technical communication

Course Objectives

1. Develop basic skills to deal with people in business situations
2. Increase their knowledge of key business concepts worldwide
3. Write and read basic business reports, letters, e-mails etc
4. Expand vocabulary related to general business situations
5. Develop confidence to deal with people and basic issues in the business world

Course Outcomes

1. Learn to communicate with others in practical, business oriented situations
2. Learn to express themselves in English with greater fluency, accuracy and confidence
3. Learn to handle themselves in English in a variety of business contexts, from negotiating, to using the telephone, to making presentations, to socialising
4. Enhance the skills of listening, speaking, pronunciation skills, as well as business vocabulary
5. Acquire the communicative competencies crucial for appropriate workplace behavior

UNIT NO.	UNIT NAME & DETAILS
1.	**Getting acquainted with professional culture:** • First day at work • Induction program • Company hierarchy • Behavior pruning
2.	**Vocabulary building and Reading comprehension:** • Reading techniques and comprehension skills • Synonyms and antonyms • One-word substitution • Prefixes and Suffixes • Idioms and phrases • Homonyms and homographs • Irregular verbs like (write, wrote, written) • Situational vocabulary
3.	**Effective vocal Communication:** • Effective Meetings • Video Conferencing • Effective Telephonic Communication • Breaking Bad news
4.	**Effective written Communication:** • Business letters • Resume Writing • E-mail writing • Report writing • Minutes of meeting • Memo writing
5.	**Public speaking and Presentation Skills:** • Preparing and conducting presentation • Body language • Overcoming stage fear • Best practices • Interviewing and being interviewed
6.	**Miscellaneous:** • Group Discussion • Handling Complains • Negotiation Skills • Business Etiquettes

Term Work

- Individual Performance or Presentation to be Evaluated Continuously
- Group Activity Performance to be Evaluated in the Batch
- Assignments or Write up (Minimum 10)

Assignment List

1. Case study of organizational hierarchy
2. Match the following on antonyms & synonyms
3. Irregular verb list (like choose, chose, chosen)
4. Word building by using prefixes suffixes (eg. ir-regular, im-possible)
5. Minutes of Meeting – writing
6. Report writing (any report)
7. Comprehension/paragraph writing
8. Business letter / resume writing / email writing
9. PPT presentation on any non-technical topic. PPT handout should be attached
10. Do's & Dont's of group discussion & Business etiquettes

Textbooks / Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1.	Technical Communication	Ashraf Rizvi	Tata McGraw Hill, 2005	1, 2, 3, 4, 6
2	Effective Business Communication	M. V Rodriques	Concept Publishing Company Pvt. Ltd. 2013	1, 2, 3, 4, 6
3	English for Technical Communication	K. R. Laxminarayan	SCITECH 2nd Edition 2014	2, 4, 3
4.	Technical English	Dr. M. Hemamalini	Wiley, 2014	2, 3, 4, 5
5	Business English	T. Thomson	Heinle & Heinle 2004	1, 3, 5, 6
5	Business Communication; The Real World and Your Career	Senguin J	South-Western 1999	1, 3, 4, 6

T. Y. B. Tech (Computer Science and Engineering) Sem – VI

1. Compiler Construction (PCC - CS601)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs./Week	**Theory :** ESE 70 Marks CIE 30 Marks
Tutorial : -----	**Term work :** 25 Marks
Practical : 2 Hrs./Week	**Oral : -----**

Pre-requisites: C, System Programming, Data structures

Course Objectives

1. To introduce the fundamentals of compilers and their phases.
2. To design and implement phases of a compiler.
3. To expose the students to various tools like LEX and YACC.

Course Outcomes

1. Recall the compiler phases and compiler construction tools like LEX and YACC.
2. To design and implement Lexical Analyser for a simple language.
3. To design and implement Syntax analyser for a simple expression.
4. To apply Syntax directed translations and Syntax Directed definitions to generate intermediate code.
5. To identify appropriate code optimizing transformation for the given code.
6. To explain concept of code generation.

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1.	**Introduction:** Compilers, Phases of a compiler, Compiler construction tools, cousins of the compiler.	**5**
2.	**Lexical Analysis:** Role of a Lexical analyzer, input buffering, specification and recognition of tokens, finite automata implications, designing a lexical analyzer generator.	**6**
3.	**Syntax Analysis**: Role of Parser, Writing grammars for context free environments, Top-down parsing, Recursive descent and predictive parsers (LL), Bottom-Up parsing, Operator precedence parsing, LR, SLR and LALR parsers	**7**
4.	**Syntax Directed Translation and Intermediate Code Generation**: Syntax directed definitions, construction of syntax tree, S-attributed definitions, L-attributed definitions, Intermediate languages, assignment statements, back patching.	**7**

5.	**Code Optimization**: Principle sources of optimization, optimization of Basic Blocks, loops in flow graphs, Peephole optimization	**5**
6.	**UNIT 6- Code Generation**: Issues in design of a code generator and target machine, Run time storage management, Basic blocks and flow graphs, Next use information and simple code generator, Issues of register allocation, code generation from Dags.	**6**

Term Work

Minimum of 10 to 12 experiments should be carried out based on the following experiments based on following list.

Practical List

Minimum of 10 to 12 experiments should be carried out based on the following experiments.

1. Design of preprocessor for C program.
2. Design a complete lexical analyzer for C language.
3. Program to create a symbol table generator.
4. Design a syntax analyzer for simple expression in c language using top down parsing.
5. Program to create a syntax tree for simple expression in c language using recursive descent parsing.
6. To implement intermediate code generator for Boolean expression in three address code format.
7. Implement intermediate code generator for the conditional statements in three address code format.
8. Implement any one bottom up parsing [LR, SLR, LALR, Operator precedence] technique.
9. To implement a program for code generator from labeled tree.

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1.	Compilers - Principles, Techniques and Tools	A. V. Aho, R .Shethi and J. D. Ullman	Pearson Education	ALL Units

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1.	Compiler construction	D.M. Dhamdare	Mc-Millan	-
2.	LEX & YACC	Dong Brown, John Levine, Tony Mason	O'Reilly 2nd Edition	Refer for Practical's

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2. Operating System -II (PCC - CS602)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 4 Hrs./Week	**Theory :** ESE 70 Marks CIE 30 Marks
Tutorial : -----	**Term work:** 25 marks
Practical: 2 Hrs./Week	**Practical : -----**

Pre-requisites: Data Structures, Concepts of Process, deadlock and System calls.

Course Objectives

1. Fundamental architecture of UNIX operating system kernel.
2. Detail algorithms of buffer cache management.
3. Internal File system organizations and related algorithms in UNIX.
4. System calls for UNIX file system.
5. Process structure, creation and management in UNIX.
6. Architecture and algorithms of process scheduling and memory management.
7. I/O subsystem architecture and algorithms.

Course Outcomes

Upon Completion of this course, students will be able to:

1. To understand UNIX kernel, its architectural components like file subsystem, process control subsystem, memory management.
2. To understand a concrete way (UNIX i-nodes) of organizing a file system on a physical storage medium.
3. To maintain UNIX directories, files, manage processes, manipulate data with proper use of pipes and file redirection, UNIX filters.
4. To implement and handle various UNIX system calls.
5. To explain the principles of paging, virtual memory (VM) and describe the data structures and components (both hardware and software) that are necessary to implement it.
6. To perform shell programming involving decision control, looping and control flow statements on UNIX based machines.

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1.	**Introduction and buffer cache:** **General Overview of the System** - History, System Structure, User Perspective, Operating System Services, Assumptions About Hardware, Architecture of the UNIX OS, Introduction to System Concepts, Kernel Data Structure, System Administration. **Buffer Cache: -** Buffer Headers, Structure of the Buffer Pool, Scenarios for Retrieval of a Buffer, Reading and Writing Disk Blocks, Advantages and Disadvantages of Buffer Cache.	**10**
2.	**Internal Representation of Files:** I-nodes, Structure of the Regular File, Directories, Conversion of a Pathname to I-node, Super Block, I-node Assignment to a New File, Allocation of Disk Blocks, Other File Types.	**8**
3.	**System Calls for File System:** Open, Read, Write, File and Record Locking, Adjusting the Position of FILE I/O-LSEEK, Close, File Creation, Creation of Special Files, Change Directory and Change Root, Change Owner and Change Mode, Stat and FStat, Pipes, Dup, Mounting and Un-mounting File Systems, Link, Unlink, File System Abstractions, File System Maintenance.	**6**
4.	**The Structure of Processes:** Process States and Transitions, Layout of System Memory, The Context of a Process, Saving Context of a Process, Manipulation of the Process Address Space**.**	**8**
5.	**Process Control and Scheduling:** Process Control: - Process Creation, Signals, Process Termination, Awaiting Process Termination, Invoking Other Programs, The User ID of a Process, The Shell, System Boot and the Init Process. Process Scheduling: - Process Scheduling, System Calls for Time, Clock.	**8**
6.	**Memory management and I/O Subsystem:** Swapping, Demand Paging, A Hybrid System with Demand Paging and Swapping. Driver Interfaces, Disk Drivers, Terminal Drivers, Streams.	**8**

Term Work

- It should consist of minimum 10-12 experiments based on the above topics and covering the following list of assignments. (Reference book – Linux System Programming by Robert Love may be referred for the assignments listed below.)

1. Demonstration of how the Linux Kernel implements and Manages files.
2. Implement User Buffer I/O using ‘C’ program.
3. Study & Implement file management using low level file access system calls.

4. Implementation of various operations on Files (Create, Open, Read, Write, Append, Fstat, Dup etc.,)
5. Implementation of various system call (OPEN, READ, WRITE) by reader & writer process.
6. Study & Implementation of pipe () system call.
7. Demonstration of UNIX Process Management – from process creation to process termination.
8. Study & Implementation of signal () system call.
9. Study and demonstration of different Memory Management Techniques.
10. Study and Implement Time, Sleep and Clock Management.
11. Client - Server communication using IPC mechanism: Unnamed pipe, Named pipe.
12. Implementation of Shell Scripts.
13. Implementation of system call for UNIX/Linux.
14. Study of boot loader like "Grub"
15. Study of compilation of Linux kernel.

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	The design of Unix Operating System	Maurice J. Bach	PHI	**All Units**

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Linux System Programming	Robert Love	SPD, O' REILLY
2	Unix concepts & administration	Sumitabha Das	Tata McGrow Hill, 3rd Edition

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3. Database Engineering (PCC - CS603)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 4 Hrs./Week	**Theory :** ESE 70 Marks CIE 30 Marks
Tutorial : -----	**Term work :** 25 marks
Practical: 2 Hrs./Week	**Practical :** 50 Marks

Pre-requisites: Set Theory, Operating System, Data Structures**.**

Course Objectives

1. To understand fundamental concepts and algorithms of Database Systems.
2. To gain familiarity with SQL and DBMS.
3. To learn database design techniques.

Course Outcomes

1. Understand fundamentals of database management systems.
2. Represent logical design of database using E-R Diagram.
3. Analyze & construct good database design.
4. Apply SQL queries to design & manage the database.
5. Understand transactions, concurrency control and apply to database system.
6. Understand failures in database and appropriate recovery techniques.

UNIT NO.	UNIT Name and Contents	NO. OF LECTURES
1.	**INTRODUCTION TO DATABASES [Text Book 1]** Database System Applications, Purpose of Database Systems, View of Data, Database Languages, Database Users & Administrators, Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations.	**8**
2.	**E-R MODEL AND DATABASE DESIGN** **[E-R Model: Text Book 1] [Normalization: Text Book 2]** E-R Model: The Entity-Relationship Model, Mapping Constraints, Keys, Entity-Relationship Diagrams, Reduction to Relational Schemas, Extended ER features-Specialization, Generalization, Aggregation. Normalization: Data Redundancies & Update Anomalies, Functional Dependencies. Canonical Cover, The Process of Normalization, First Normal Form, Second Normal Form, Third	**10**

	Normal Form, Boyce-Codd Normal Form, Fourth Normal Form, Fifth Normal Form.	
3.	**STRUCTURED QUERY LANGUAGE (SQL) [Text Book 1]** Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Aggregate Functions, Nested sub Queries, Modification of Databases, Join expression, Views.	**8**
4.	**DATA STORAGE & INDEXING [Text Book 1]** Physical storage media, File Organization, Organization of records in File, Data Dictionary Storage, Database Buffer, Basic Concepts indexing & hashing, Ordered Indices, B+ Tree Index files, Multiple-Key Access, Static Hashing, Dynamic Hashing.	**8**
5.	**TRANSACTION MANAGEMENT [Text Book 1]** Transaction Concept, A Simple Transaction Model, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Lock-Based Protocols, Timestamp-Based Protocols, Validation-Based Protocols.	**9**
6.	**RECOVERY SYSTEM [Text Book 1]** Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Failure with Loss of Nonvolatile Storage, Remote Backup Systems.	**5**

Term Work

Minimum 12 -14 Experiments based on the following topics.

1. Draw an E-R Diagram of any organization.
2. Reduce above mentioned E-R Diagram into tables.
3. Normalize any database from first normal form to Boyce-Codd Normal Form (BCNF).
4. Write a program of Database connectivity with any object oriented language.
5. Use DDL Queries to create, alter (add, modify, rename, drop) & drop Tables.
6. Use DML Queries to insert, delete, update & display records of the tables.
7. Create table with integrity constraints like primary key, check, not null and unique.
8. Create table with referential integrity constraints with foreign key, on delete cascade and on delete set null.
9. Display the results of set operations like union, intersections & set difference.
10. Display the results of Join Operations like cross join, self join, inner join, natural join, left outer join, right outer join and full outer join.
11. Display the records using Aggregate functions like min, max, avg, sum & count. Also use group by, having clauses.
12. Display the results using String operations.

13. Create & Update views for any created table.
14. Write java program to implement dense and sparse indexing
15. Write java program to implement B+ tree indexing.
16. Write java program to implement static hashing.
17. Study of NoSql.

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Database System Concepts	A. Silberschatz, H.F. Korth, S. Sudarshan	6th Edition, McGraw Hill Education.	**1,3,4,5,6**
2	Database Systems - A practical approach to Design, Implementation and Management	Thomos Connolly, Carolyn Begg	3rd Edition, Pearson Education	**2**

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Database Systems – Design, Implementation and Management	Rob & Coronel	5th Edition Thomson Course Technology	**3**
2	Fundamentals of Database Systems	Ramez Elmasri, Shamkant B. Navathe	4th Edition, Pearson Education	**2**

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4. Machine Learning (PCC - CS604)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs./Week	**Theory :** ESE 70 Marks CIE 30 Marks
Tutorial :1 Hrs./Week	**Term work :** 25 marks
Practical : -----	**Practical : -----**

Pre-requisites: Linear Algebra, Statistics, Probability Theory.

Course Objectives

1. To understand Machine Learning Aspects.
2. To understand primitives in learning process by Computer.
3. To understand nature of problems solved with Machine Learning.

Course Outcomes

On completion of the course, student will be able to

1. Explain Machine Learning concepts.
2. Analyze the Machine Learning model.
3. Design solution using Machine Learning techniques.
4. To tackle real world problems in domain of data mining, information retrieval, computer vision, linguistics and bioinformatics, etc.

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1.	**Introduction to Machine Learning:** Introduction to Probability and Statistics, **Machine Learning:** Definition, Terminology, Types of learning, Machine Learning Problem categories, Machine learning architecture, process, Lifecycle, Performance measures, tools and framework, data visualization.	06
2.	**Regression:** **Simple regression** – hypothesis, cost function, parameter learning with gradient descent, learning rate, Gradient Descent for linear regression, examples, simple regression in matrix form. **Multivariate Linear Regression** – Multiple features, hypothesis functions, Gradient Descent for multiple variables, Feature scaling, polynomial regression	06
3.	**Classification- logistic regression & Naïve Bayes :** **Logistic Regression** – Definition, Hypothesis representation, decision boundary, cost function, Gradient Descent for Logistic Regression. Multiclass Classification, **Regularization** - Over fitting &Under fitting, cost function, Regularized Linear Regression, Regularized Logistic Regression, Conditional probability and Naïve Bayes Classifier. Instance-based classifier – K- Nearest Neighbor Classifier, Bayesian Network, Hidden Markov Model.	07
4.	**Classification- Decision trees and Support Vector Machine:** **Decision trees:** definition, terminology, the need, advantages, and limitations. Constructing and understanding Decision trees, common problems with Decision trees, Decision tree algorithms, random forest, examples. **Support Vector Machine:** What is SVM, Kernel Trick, Cost Function, Decision Trees vs. Support Vector Machine.	06
5.	**Unsupervised learning :** Clustering, K Means clustering, Hierarchical clustering, Association Rule mining.	04
6.	**Neural Network & Recommendation System:** **Neural Networks-** Neuron representation and model, Hypothesis for neuron, cost function, solution of a problem using single neuron. Gradient descent for a neuron. Neural network, Multiclass classification with neural network. Learning in neural network-back propagation algorithm **Recommendation System:** Popularity based recommender engines, Content based recommendation engines, Classification based recommendation engine, Collaborative filtering.	07

Term Work

- It should consist of minimum 10-12 assignments based on the above topics.

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Machine Learning with Python- an approach to applied ML	Abhishek Vijayvargia	BPB Publications	**All Units**
2	Practical Machine Learning	Sunila Gollapudi	Packt Publishing Ltd	**1,2**
3	Machine Learning	Tom M. Mitchell	McGraw Hill Education; First Edition	**1,2,3,4,5**

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Machine Learning for dummies	John Paul Muller	Willey Publication	
2	Introduction to Machine Learning	EthemAlpaydin	PHI 2nd Edition-2013	**1,2**
3	http://neuralnetworksanddeeplearning.com/			**6**

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5. Open Elective Course - II (OEC- CS605)

E- Commerce & Digital Marketing (OEC - CS605)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs./Week	**Theory :** ESE 70 Marks CIE 30 Marks
Tutorial : -----	**Term work : -----**
Practical : -----	**Practical : -----**

Course Objectives:

1. To get the knowledge about business advantages of the e-commerce and digital marketing and its importance

2. To develop a digital marketing plan and to make SWOT analysis

3. To get introduced with various digital channels, business tools in social networking

4. To understand the optimization of a Web site and SEO optimization

Course Outcomes:

1. Students will be able to identify the importance of the e-commerce and digital marketing for business success
2. Students will be able to create a digital marketing plan, starting from the SWOT analysis and defining a target group
3. Students will be able to identifying digital channels, business tools used in social networking
4. Students will be able to demonstrate the optimization of web site using business tools.

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1.	**Introduction to E-commerce, frameworks & architectures** **Introduction:** The term "E-Commerce", Business models related to E-Commerce, Technical and economic challenges **Frameworks and architectures:** Actors and stakeholders, Fundamental sales process, Technological elements	(4)
2.	**B2C business, B2B business** **B2C Business:** The process model and its variants, The pricing challenge, The fulfillment challenge, The payment challenge, B2C-business and CRM, B2C software systems **B2B business:** The process model and its variants, B2B software systems	(5)

3.	**Introduction to Digital Marketing** How digital technologies transformed marketing?, Definitions- digital marketing and multichannel marketing- Paid, owned and earned media, the growing range of digital marketing platform, digital marketing strategy-key features of digital marketing strategy, applications of digital marketing, benefits of digital marketing, alternative digital business models, difference between e-commerce and e-business, challenges in developing and managing digital marketing strategy	**(6)**
4.	**Online marketplace analysis & macro environment** **Introduction:** situation analysis for digital marketing, the digital marketing environment, understanding customer journeys, online consumer behavior and implications for marketing, business models for e-commerce **Online macro environment**: Technological forces, economic forces, political forces, Legal forces, social forces and cultural forces	**(8)**
5.	**Digital Marketing Strategy and relationship marketing** **Digital Marketing strategy development**: how to structure digital marketing strategy, strategy implementation **Relationship marketing using digital platforms**: Introduction, the challenge of customer engagement, customer lifecycle management	**(6)**
6.	**Marketing Communications** Marketing Communications using digital media channels: Introduction, search engine marketing, online public relations, e-mail marketing and mobile text messaging, social media and viral marketing, offline promotion techniques. **Case study:** How the ministry of food processing took to social media or world food India 2017.	**(7)**

Text Books:

1. Introduction to E-commerce: Combining Business & Information Technology 1st Edition, (2016) Martin Kutz. & bookboon.com
2. Digital Marketing: Strategy, Implementation and Practice, 6th Edition by Dave Chaffey, Fiona Ellis-Chadwik, Pearson Education.

Reference Books:

1. The Beginner's Guide to Digital Marketing (2015). Digital Marketer.
   Pulizzi, J.(2014) Epic Content Marketing, McGraw Hill Education.
2. "Electronic Commerce", Jeffrey F Rayport and Bharat Bhasker, Tata McGraw Hill.

It should consist of assignments on following topics within group of 4-5 students & its evaluation will be considered for CIE

1. Define a target group (working in groups)
2. Creating web sites, MS Expression (working in groups)
3. Writing the SEO content (working in groups)
4. Google AdWords (working in groups)
5. CRM strategy (working in groups)

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5. Open Elective Course - II (OEC - CS606)

Cyber Security (OEC - CS606)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs./Week	**Theory :** ESE 70 Marks CIE 30 Marks
Tutorial : -----	**Term work : -----**
Practical : -----	**Practical : -----**

Prerequisite: Fundamental knowledge of Data Communication, Networking and Information Security.

Course Objectives:

1. To gain knowledge about securing both clean and corrupted systems, protect personal data, and secure computer networks
2. To examine secure software development practice
3. To understand key terms and concepts in I.T. ACT
4. To incorporate approaches for incident analysis and response

Course Outcomes:

On completion of the course, student will be able to

1. Explain the cyber security concepts.
2. Describe the cyber security vulnerabilities and prevention techniques.
3. Explain the different rules and regulations under I.T. ACT.
4. Explain the concepts of digital forensics & incident management

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1.	**Computer and Network Security** Introduction to Computer Security - Introduction, How Seriously Should You Take Threats to Network Security?, Identifying Types of Threats, Basic Security Terminology, Concepts and Approaches, Online Security Resources Networks and the Internet : Introduction, Network Basics, How the Internet Works, Basic Network Utilities , Advanced Network Communications Topics	06
2.	**Cyber Frauds, DoS, Viruses:** Cyber Stalking, Fraud, and Abuse: Introduction, How Internet Fraud Works, Identity Theft, Cyber Stalking, Protecting Yourself	06

	Against Cyber Crime. Denial of Service Attacks: Introduction, DoS, Illustrating an Attack, Malware: Introduction, Viruses, Trojan Horses, The Buffer-Overflow Attack. The Sassier Virus/Buffer Overflow, Spyware, Other Forms of Malware, Detecting and Eliminating Viruses and Spyware	
3.	**Techniques Used by Hackers :** Introduction, Basic Terminology, The Reconnaissance Phase, Actual Attacks, Malware Creation, Penetration Testing	**06**
4.	**Computer Security Technology:** Introduction, Virus Scanners, Firewalls, Antispyware, IDS, Digital Certificates, SSL/TLS, Virtual Private Networks, Wi-Fi Security	**06**
5.	**I.T. ACT:** Introduction, Cyber Security Regulations, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards. The INDIAN Cyberspace, I.T. Act	**06**
6.	**Introduction to Forensics:** Introduction, General Guidelines, Finding Evidence on the PC, Finding Evidence in System Logs , Getting Back Deleted Files, Operating System Utilities, Operating System Utilities, Mobile Forensics: Cell Phone Concepts	**06**

Text Books:

1. Computer Security Fundamentals - Chuck Easttom, Pearson, third edition.

Reference Books:

1. Jason Luttgens, Matthew Pepe, Kevin Mandia, Incident Response & Computer Forensics, McGraw-Hill Osborne Media, 3 rd edition , 2014.
2. Keith J. Jones, Richard Bejtlich, Curtis W. Rose, Real Digital Forensics: Computer Security and Incident Response, Paperback – Import, 2005.
3. John Sammons, the Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics Paperback, February 24, 2012.
4. Hacking Exposed: Network Security Secrets & Solutions, Stuart McClure, Joel Scambray and George.Kurtz, McGraw-Hill, 2005.
5. Ethical Hacking, Thomas Mathew, OSB Publisher, 2003.
7. Dave Shackleford, Virtualization Security: Protecting Virtualized Environments, John Wiley & Sons, 2012.
8. BRAGG, Network Security: The Complete Reference, McGraw Hill Professional, 2012

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6. C# Programming (PCC - CS607)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 2 Hrs./Week	**Theory : -----**
Tutorial : -----	**Term work :** 25 marks
Practical : 2 Hrs./Week	**Practical :** 50 marks

***Pre-requisites*:** C++, Java, HTML

Course Objectives

1. Understand code solutions and compile C# projects within the .NET framework
2. Demonstrate knowledge of object-oriented concepts using C#.NET application
3. Create and manipulate GUI components in C# and interact with database using ADO.NET in window based application
4. Create network based and multithreaded applications using C#
5. Creating ASP.Net applications using standard .net controls
6. Maintain session and controls related information for users in multi-user web applications

Course Outcomes

1. Students will be able to develop correct, well-documented programs using the C# programming language.
2. Students will be able to learn to develop object-oriented programs using C# classes and objects
3. Students will be able to learn to use Windows Forms and WPF to create GUI-based programs
4. Students will be able to build networking and multithreading based programs using C#
5. Students will be able to design web applications using ASP.NET using ASP.NET controls in web applications.
6. Students will be able to debug and deploy ASP.NET web applications and create database driven ASP.NET web applications.

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1.	**.Net architecture and C# Basics:** **.Net Architecture:** The Relationship of C# to .NET, The Common Language Runtime, A Closer Look at Intermediate Language, Assemblies, .NET Framework Classes, Namespaces, **C# basics**: Predefined data types, The Main () Method, More on Compiling C# Files, Console I/O, Using Comments# Programming Guidelines, Dynamic variables, DLL creation & calling.	**3**

2.	**Object oriented programming in C# :** Classes and Structs, Class Members, Anonymous Types, Structs, Partial Classes, Static Classes, The Object Class, Extension Methods, **Inheritance**: Types of Inheritance, Implementation Inheritance, Modifiers, Interfaces	**4**
3.	**Arrays, Operators and casts and strings:** **Arrays**: Simple Arrays, Multidimensional Arrays, Jagged Arrays, Array Class, Array and Collection Interfaces, Enumerations **Operators and casts:** Operators, Type Safety, Comparing Objects for Equality, Operator Overloading, User-Defined Casts, **String:** System. String, Building Strings, String Builder Members, Format Strings, Regular Expressions.	**4**
4.	**Windows Form & Database with ADO.NET:** Introduction to GUI application & components –add data control programmatically, Link data to control, process all control, track the visible forms, Find all MDI child forms, Save configuration setting for form, Force list box to scroll items, Restrict text box, Use of auto complete combo-box ,Sort a list view, Database with ADO.NET-Overview of Ado.NET, Data components in Visual Studio .NET.	**5**
5.	**Threading and Networking:** **Threading:** Overview, Asynchronous Delegates, the Thread Class and Thread Pools, Threading Issues, Synchronization, and Timers. **Networking:** Networking-Obtain information about Local network, Detect changes in network, Download data over HTTP or FTP, Download a File & Process using Stream, Respond to HTTP request from your application.	**4**
6.	**Introduction to ASP.NET 4.5** ONE ASP.NET: Introducing One ASP.NET, Simplifying a Complex Ecosystem, How Do You Benefit? **ASP.NET web form structure:** Application Location Options, The ASP.NET Page Structure Options, ASP.NET 4.5 Page Directives, ASP.NET Page Events, Dealing with Post backs, Cross-Page Posting ,ASP.NET Application Folders, Compilation, Build Providers, Global.aspx	**4**

Term Work

1. It should consist of 10 to 12 experiments based on the above syllabus covering following list of assignments
2. 50% of the experiment should be console based & 40 % experiment should be windows form application. and 10% should be web-based application

Practical List:

1. Language Introduction (Includes console-based application, creation of DLL, running a program without IDE) calling a method from another program.
2. OOPS concepts in C#-Class, Implementation Inheritance, Extension methods (Use any application).
3. Develop DLL file and use it in application program. (Use Any application)
4. Implementation of Interface Inheritance (Use Any Application).
5. Implementation of Multidimensional & Jagged array (Use Any application).
6. Use of properties in any application.
7. Implementation of Operator overloading (Any application).
8. String manipulation using String & String builder(Any application)
9. Develop program to use Regex. Matches method and Regular Expression pattern matching.
10. Design a Windows Form based application for different controls.(Any application)
11. Design a Windows Form based MDI application with different controls.(Any application)
12. Design a Windows Form based application for field validation.(Any application)
13. Design a any Windows Form based application with Database connectivity with all field validation.(Any application)
14. Develop a Win1dows Form application that performs SELECT, INSERT, UPDAE & DELETE queries and also displays the List of Books available in a Library System by fetching the details from a database. The C# application must also contain the filter capability.
15. Implement console-based networking application to obtain information of network & detect changes in network.
16. Design a Windows form application to download file & process it using stream.
17. Simple ASP.NET web application deployment in IIS server
18. Design simple login and registration page using client-side validation controls in ASP.NET
19. Do the server-side validation by using database connectivity for above problem and display all the records of database when successfully logged in using ASP.NET.

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Professional C# 2012 & .Net 4.5	Christian Nagel, Bill, Evjen, Jay Glynn, Morgan Skinner, Karli Watson	Wrox Publication	1 to 2 and unit 3 (threading)
2	A Programmer's Guide to ADO.Net in C#	Mahaesh Chand	Apress Publication	Unit 3 Windows app and ADO.NET
3	Visual C# 2010 Recipes- A Problem-Solution Approach	Allen Jones, Adam Freeman, Matthew MacDonald, Rakesh Rajan	Apress Publication	Unit 3 Windows app and ADO.Net and Unit 4 networking
4	Professional ASP.NET 4.5 in C# and VB	John Wiley & Sons Inc.	WROX publication	Unit 4 ASP part and Unit 5 and 6

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	ASP.NET 4.5-Black book	Kogent	Dreamtech Publication

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7. Domain Specific Mini-project (PW - CS608)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : -----	**Theory : -----**
Tutorial : -----	**Term work :** 25 marks
Practical : 2 Hrs./Week	**Practical :** 50 marks

Pre-requisites:

1. Software Engineering Concepts
2. Object Oriented Concepts

Course Objectives

1. To expose the students to use engineering approach to solve domain specific real time problem.
2. To use the appropriate and newer technologies while developing the project.
3. To learn the skills of team building and team work.

Course Outcomes

Upon successful completion of this course, the student will be able to –

1. Identify specific problem statement from a selected domain.
2. Analyze the problem and prepare SRS and design document.
3. Write code and carry out testing.
4. Write a report covering details of the project and give presentation on a project.

Contents

The students should form group of 4 to 5 students and every group is supposed to choose a specific domain (preferably from Smart India Hackathon problem statement) to do the mini project. Further the group should identify the relevant problem in the selected domain and propose the solution, which can be implemented as a mini-project using suitable technology. The mini-project work should be evaluated by a team of teachers appointed by the department. The evaluation and marking should include Continuous Internal Evaluation (CIE) and Semester End Examination (SEE) during which the group should give presentation and demonstration of their work done. Care should be taken to avoid out-sourcing of the work.

SHIVAJI UNIVERSITY KOLHAPUR

REVISED SYLLABUS AND STRUCTURE

FINAL YEAR (FINAL YEAR B. Tech) BACHELOR OF TECHNOLOGY

IN

Computer Science and Engineering

To be introduced from the academic year 2021-22

(w.e.f. June 2021) onwards

	FINAL YEAR COMPUTER SCIENCE AND ENGINEERING - CBCS PATTERN																
	SEMESTER - VII																
		TEACHING SCHEME							EXAMINATION SCHEME								
Sr. No.	Course Subject / Title	THEORY			TUTORIAL		PRACTICAL		THEORY				ORAL / PRACTICAL		TERMWORK	
		Credits	N0. Of Lectures	Hours	Credits	No. of Hours	Credits	No. of Hours	mode	marks	Total Marks	MIN.	MAX	MIN.	MAX	MIN.
1	PCC-CS701 Advanced Computer Architecture	4	4	4	1	1			CIE ESE	30 70	100	40			25	10
2	PCC- CS702 Cloud Computing	3	3	3			1	2	CIE ESE	30 70	100	40			25	10
3	PCC- CS703 Advanced Database Systems	3	3	3			1	2	CIE ESE	30 70	100	40	50	20	25	10
4	PCE- CS704 Elective-I	3	3	3	1	1			CIE ESE	30 70	100	40			25	10
5	PCC- CS705 Web Technologies	3	3	3			2	4					50	20	50	20
6	PW- CS706 Project – I						2	4					50	20	50	20
7	SI-CS707 Internship						1								50	20
	Total (SEM –VII)	***16***	***16***	***16***	***2***	***2***	***7***	***12***			***400***		***150***		***250***	

	FINAL YEAR COMPUTER SCIENCE AND ENGINEERING - CBCS PATTERN																	
	SEMESTER - VIII																	
		TEACHING SCHEME							EXAMINATION SCHEME									
Sr. No.	Course Subject / Title	THEORY			TUTORIAL		PRACTICAL		THEORY				ORAL / PRACTICAL		TERMWORK			
		Credits	N0. Of Lectures	No. of Hours	Credits	No. of Hours	Credits	No. of Hours	mode	marks	Total Marks	MIN.	MAX	MIN.	MAX	MIN.		
1	PCC- CS801 Big Data Analytics	4	4	4			1	2	CIE ESE	30 70	100	40	50	20	25	10		
2	PCC- CS802 Deep Learning	3	3	3	1	1			CIE ESE	30 70	100	40			25	10		
3	PCE- CS803 Elective-II	3	3	3	1	1			CIE ESE	30 70	100	40			25	10		
4	PCE- CS804 Elective-III	3	3	3	1	1			CIE ESE	30 70	100	40			25	10		
5	PCC- CS805 Mobile Application Development	3	3	3			2	4					50	20	50	20		
6	PW- CS806 Project – II						2	4					50	20	50	20		
7	HM-CS807 Professional Skills				1	1									50	20		
	Total (SEM –VIII)	***16***	***16***	***16***	***4***	***4***	***5***	***10***			***400***		***150***		***250***			
	Total	**32**	**32**	**32**	**6**	**6**	**12**	**22**			**800**		**300**		**500**			

CIE- Continuous Internal Evaluation

ESE – End Semester Examination

• Candidate contact hours per week : 30 Hours (Minimum)	• Total Marks for Final Yr. Sem VII & VIII : **800 + 800 =1600**
• Theory and Practical Lectures : 60 Minutes Each	• Total Credits for Final Yr. Sem VII & VIII: **50 (SEM-VII: 25 + SEM -VIII: 25)**
• In theory examination there will be a passing based on separate head of passing for examination of CIE and ESE.	
• There shall be separate passing for theory and practical (term work) courses.	

Note:

1. **PCC-CS:** Professional Core Course – Computer Science and Engineering are compulsory.
2. **PCE-CS:**ProfessionalCoreElective–ComputerScienceandEngineeringarecompulsory
3. **HM-CS:** Humanities and Management- Computer Science and Engineering are compulsory.
4. **PW-CS:** Domain Specific Mini Project -– Computer Science and Engineering are compulsory.
5. **SI-CS:** Internship-Computer Science and Engineering are compulsory.

Professional Core Elective – I

1. Artificial Intelligence
2. Software Testing & Quality Assurance
3. Image Processing

Professional Core Elective – II

1. Project Management
2. Natural Language Processing
3. Ad-Hoc Wireless Sensor Networks

Professional Core Elective – III

1. High Performance Computing
2. Blockchain Technologies
3. Human computer Interaction

Final Year B. Tech (Computer Science and Engineering)

Semester-VII

1. Advanced Computer Architecture (PCC-CS701)

TEACHING SCHEME	EXAMINATION SCHEME
Theory :4 Hrs./Week	**Theory :** ESE 70 Marks CIE 30 Marks
Tutorial :1 Hrs./Week	**Term work: 25 Marks**
Practical :- NA	**Practical :NA**

Pre-requisites: Digital systems and microprocessors, computer organization and architectures.

Course Objectives

1. To make students know about the Parallelism concepts in Programming
2. To give the students an elaborate idea about the different memory systems and buses.
3. To introduce the advanced processor architectures to the students.
4. To make the students know about the importance of multiprocessor and multi- computers.
5. To study about data flow computer architectures

Course Outcomes

Upon successful completion of this course, the students will be able to:

1. Demonstrate concepts of parallelism in hardware/software.
2. Discuss memory organization and mapping techniques.
3. Describe architectural features of advanced processors.
4. Interpret performance of different pipelined processors.
5. Explain data flow in arithmetic algorithms.
6. Development of software to solve computationally intensive problems.

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1.	**The Concept of Computer Architecture and Fundamentals of Quantitative Design and Analysis:** a) Parallel Processing Mechanisms b) Parallel Computer Structures: Pipeline Computers c) Array Processors d) Multiprocessor Systems e) Architectural classification Schemes: Multiplicity of Instruction-Data Streams f) Trends in power and energy in Integrated Circuits g) Trends in Cost h) Dependability	7
2.	**Principles of Pipeline:** a) Principles of linear pipeline b) Classification of Pipelined Processors c) Interleaved memory organization d) Hazard detection and resolution e) Basic compiler Techniques for Exposing ILP	6
3.	**Memory Hierarchy Design :** a) Introduction b) Ten Advanced optimizations of cache performance	5
4.	**Data Level Parallelism in Vector, SIMD and GPU Architecture:** a) Vector Processing requirement: Characteristics of vector processing b) Multiple vector Task dispatching c) Pipelined vector processing methods d) Associative Array Processing: Associative Memory Organization e) Associative processors (PEPE and STARAN) f) Data Level Parallel in Vector :Introduction g) Vector Architecture	7
5.	**Data Level Parallelism in SIMD and GPU Architecture:** a) SIMD ARRAY PROCESSORS: SIMD Computer organization b) Masking and Data Routing Mechanism c) SIMD Instruction set extension for Multimedia d) Graphics Processing Units : Programming the GPU e) NVIDA GPU Computational structures f) NVIDA GPU Instruction set Architecture g) Conditional Branching in GPU h) NVIDA GPU Memory Structure	7

6.	**Multiprocessor Architecture :** a) Introduction b) Multiprocessor Architecture: Issus and Approach c) Challenges of parallel processing d) Centralized shared memory Architecture: Multiprocessors Cache coherence e) Basic schemes for enforcing coherence f) Snooping Coherence Protocols g) Distributed shared memory and directory based coherence h) Directory Based cache coherence protocol :The basics	7

Term Work

- It should consist of minimum 8-10 assignments with emphasis on solving exercise problems

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Computer architecture and Parallel Processing	Kai Hwang and Faye A Briggs	Tata McGraw-Hill	Unit No 01: a) 1.2.2 b) 1.3.1 c)1.3.2 d)1.3.3 e) 1.4.1 Unit No:02 : a)3.1.1 b)3.1.2 c)3.1.4 d)3.3.4 Unit No:04 : a) 3.41 b)3.4.2 c)3.4.3 d)5.4 e)5.4.2 Unit No:05 a)5.1.1 b)5.1.2
2	Computer Architecture: A Quantitative Approach	John L. Hennessy and Davd A. Patterson	Morgan Kaufmann	Unit No 01: f)1.5 g)1.6 h) 1.7 Unit No 02 : f) 3.2 Unit No 03: a)2.1 b)2.2 Unit No:04 : f)4.1 g)4.2 Unit No:05 : c) 4.3 d)4.4 e)4.4 f)4.4 Unit No:06 : Chapter 5

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Advanced computer Architecture	DezsoSima, Terence Fountain & Peter Kacsuk	Pearson Education
2	Parallel Programming Techniques & Applications using Networked Workstations &Parallel Computers	Barry Wilkinson & Michael Allen	Pearson Education
3	Advanced Computer Architecture	Kai Hwang & NareshJotwani	McGraw Hill Publications

Final Year B. Tech (Computer Science and Engineering) Sem- VII

2. Cloud Computing (PCC – CS702)

TEACHING SCHEME	EXAMINATION SCHEME
Theory :3 Hrs./Week	**Theory :** ESE 70 Marks CIE 30 Marks
Tutorial : NA	**Term work: 25 Marks**
Practical : 2 Hrs./Week	**Practical :NA**

Pre-requisites: Operating Systems, Fundamentals of Computer Networks.

Course Objectives

1. To become familiar with Cloud Computing and its ecosystem.
2. To learn basics of virtualization and its importance.
3. To evaluate in-depth analysis of Cloud Computing capabilities.
4. To give technical overview of Cloud Programming and Services.
5. To understand security issues in cloud computing.

Course Outcomes

Upon successful completion of this course, the students will be able to:

1. Describe the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing.
2. Explain the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc.
3. Collaboratively research on the state of the art (and open problems)in cloud computing.
4. Identify problems, and explain, analyze, and evaluate various cloud computing solutions.
5. Choose the appropriate technologies, algorithms, and approaches for the related issues.
6. Display new ideas and innovations in cloud computing.

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1.	**Overview of computing paradigm:** Recent trends in Computing - Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing. Evolution of cloud computing - Business driver for adopting cloud computing. **Introduction to Cloud Computing:** Cloud Computing - Introduction to Cloud Computing, History of Cloud Computing, Cloud service providers. Properties, Characteristics&	5

		Disadvantages - Pros and Cons of Cloud Computing, Benefits of Cloud Computing, Cloud computing vs. Cluster computing vs. Grid computing. Role of Open Standards.	
	2.	**Cloud Computing Architecture:** Cloud computing stack - Comparison with traditional computing architecture (client/server), Services provided at various levels, How Cloud Computing Works, Role of Networks in Cloud computing, protocols used, Role of Web services. Service Models (XaaS) - Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS). Deployment Models, Public cloud, Privatecloud, Hybrid cloud, Community cloud	6
	3.	**Virtualization:** Introduction and benefits, Implementation Levels of Virtualization, Virtualization at the OS Level, Virtualization Structure, Virtualization Mechanism, Open-Source Virtualization Technology, XenVirtualization Architecture, Binary Translation with Full Virtualization, Paravirtualization, Virtualization of CPU, Memory and I/O Devices	6
	4.	**Infrastructure as a Service (IaaS):** Introduction to IaaS - IaaS definition, Introduction to virtualization, Different approaches to virtualization, Hypervisors, Machine Image, Virtual Machine (VM). Resource Virtualization - Server, Storage, Network. Virtual Machine(resource) provisioning and manageability, storage as a service, Data storage incloud computing (storage as a service). Renting, EC2 Compute Unit, Platform and Storage, pricing, customers. **Platform as a Service (PaaS):** Introduction to PaaS - What is PaaS, Service Oriented Architecture (SOA). Cloud Platform and Management - computation, storage **Software as a Service (SaaS):** Introduction to SaaS, Web services, Web 2.0, Web OS, Case Study on SaaS	6
	5.	**Service Management in Cloud Computing:** Service Level Agreements (SLAs), Billing& Accounting, Comparing Scaling Hardware: Traditional vs. Cloud, Economics of scaling: Benefitting enormously, Managing Data - Looking at Data, Scalability & Cloud Services, Database & Data Stores in Cloud, Large Scale Data Processing **Cloud Security:** Infrastructure Security - Network level security, Host level security, Application-level security. Data security and Storage - Data privacy and security Issues, Jurisdictional issues raised by Data location: Identity & Access Management, Access Control, Trust, Reputation, Risk, Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations	7
	6.	**Case study on Open Source and Commercial Clouds –** Amazon EC2, Google Compute Engine, Microsoft Azure, Cloud foundry, OpenStack	5

Term Work

- Minimum of 10 Experiments to be performed from the list given below.

Experiment List

1. Working and Implementation of Infrastructure as a service.
2. Working and Implementation of Software as a service.
3. Working and Implementation of Platform as a services.
4. Practical Implementation of Storage as a Service.
5. Installing a private cloud.
6. Installing OS on a Virtual Machine Monitor.
7. Offline migration of virtual OS.
8. Live migration of virtual OS.
9. Study and implementation of infrastructure as Service using Open Stack.
10. Assignment to install and configure Google App Engine.
11. Hands on virtualization using Xen Server.
12. Hands on containerisation using Docker.
13. Deployment and Configuration options in Amazon (AWS).
14. Deployment and Configuration options in Google Cloud.
15. Deployment and Configuration options in Microsoft Azure.
16. Building a 'HelloWorld' app for the cloud.
17. Deploying the 'HelloWorld' app for the cloud.
18. Case study on Amazon EC2 to learn about Amazon EC2,Amazon Elastic Compute Cloud is a central part of Amazon.com's cloud computing platform, Amazon Web Services. How EC2 allows users torrent virtual computers on which to run their own computer applications.

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Cloud Computing for Dummies	Judith Hurwitz, R. Bloor, M.Kanfman, F.Halper	WileyIndia Edition	Unit - I, II, IV, V
2	Cloud Computing Black Book	Jayaswal, Kallakurchi, Houde, Shah	DreamtechPress	Unit-III
3	Cloud Security	Ronald Krutz and Russell Dean Vines	Wiley-India	Unit-V
4	Enterprise Cloud Computing	GautamShroff	Cambridge	Unit -VI

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Google Apps	Scott Granneman	Pearson
2	Cloud Security & Privacy	Tim Mather, S.Kumaraswammy, S.Latif	SPD, O'REILLY
3	Cloud Computing: A Practical Approach	Anthony T.Velte, et.al	McGraw Hill
4	Cloud Computing: Principles and Paradigms	Rajkumar Buyya, James Broberg, Andrzej Goscinski	Wiley India
5	Cloud Computing for Dummies	Judith Hurwitz, Marcia Kaufman, Fern Halper, Robin Bloor	Wiley Publication
6	Cloud Computing Bible	Barrie Sosinsky	Wiley India
7	Cloud Computing	Michael Miller	Que Publishing

Final Year B. Tech (Computer Science and Engineering) Sem- VII

3. Advanced Database Systems (PCC- CS703)

TEACHING SCHEME	EXAMINATION SCHEME
Theory :3 Hrs./Week (3 Credits)	**Theory :** ESE 70 Marks CIE 30 Marks
Tutorial :NA	**Term work: 25 Marks**
Practical :2 Hrs. /Week (1 Credit)	**POE :50 Marks**

Pre-requisites: Database Engineering, SQL Basics.

Course Objectives

1. To learn Basics of design of databases.
2. To acquire knowledge on parallel and distributed databases and its applications.
3. To study the usage and applications of SQL and NOSQL databases.
4. To Understand and perform common database administration tasks, such as database monitoring, performance tuning, data transfer, and security.
5. To understand the usage of advanced data mining techniques.

Course Outcomes

Upon successful completion of this course, the students will be able to:

1. Understand and identify issues arising from parallel and distributed processing of data.
2. Select appropriate database and construct solution to real world problems of storing large data.
3. Compare and Contrast NoSQL databases with each other and Relational Database Systems.
4. Make use of SQL cursors, triggers, stored procedures, and procedural SQL to write complex SQL scripts.
5. Learn database administration tasks and security measures.

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1.	**Section - I** **Unit I: Parallel and Distributed Databases** Parallel Systems, Parallel Database Architectures, Parallel Databases -- I/O Parallelism, Design of Parallel Systems, Distributed Systems, Distributed Database Concepts, Distributed Data Storage, Distributed Transactions, Commit Protocols, Distributed Query Processing, Case Studies-Distributed Databases in Oracle.	6
2.	**Unit II: Advanced SQL** SQL Functions, Oracle Sequences, Synonyms, Updatable Views, Procedural SQL, Triggers, Stored Procedures, PL/SQL Processing with Cursors, Embedded SQL, Dynamic SQL. Case study-Postgrey SQL.	4
3.	**Unit III: NoSQL Database Management** **NOSQL: Definition and Introduction**, Features and Types of NOSQL databases, Sorted Ordered Column-Oriented Stores, Key/Value Stores, Document Databases, Graph Databases. **NOSQL: Getting Initial Hands-On Experience**, Storing and Accessing Data, Storing Data in and Accessing Data from MongoDB, Querying MongoDB**, Interfacing and Interacting with NOSQL**, Case Study-CouchDB, CouchDB vs. MongoDB,Compass / Atlas GUI Tools for MongoDB.	8
4.	**Section - II** **Unit IV: Database Administration and Security** The Need for and Role of a Database in an Organization, The Evolution of the Database Administration Function, The Database Environment's Human Component, Security, Database Administration Tools: The Data Dictionary, CASE Tools, developinga Data Administration Strategy, The DBA at Work: Using Oracle for Database Administration.	7
5.	**Unit V: Business Intelligence and Data Warehouses** The Need for Data Analysis, Business Intelligence, Business Intelligence Architecture, Decision Support Data, The Data Warehouse, Online Analytical Processing, Star Schemas, SQL Extensions for OLAP, Materialized Views, Case Study- FireBase-Google.	7
6.	**Unit VI: Introduction to Data Mining** Introduction, Basic Data Mining Tasks, Data Mining Versus Knowledge Discovery in Databases, The Development of Data Mining, Data Mining Issues, Data Mining Metrics, Social Implications of Data Mining, Data Mining from a Database Perspective, The Future.	4

Term Work

Minimum10- 12 experiments to be performed from below mentioned experiment list.

Experiment List

1. Installation of Oracle / MySQL and practicing DDL & DML commands.
   Execute basic utilities used to interact with Oracle DBMS / MySQL.
2. Design and implement the Fragmentation schema & the Replication schema for the social networking websites / online e-shopping / e-learning websites.
3. Implementation of 2 Phase Commit protocol for distributed databases.
4. Execute partitioning queries on parallel databases.
5. Implementation of Oracle Synonyms and Sequence.
6. Demonstrate SQL Functions, Procedures, Cursors, and triggers using PL/SQL, Views.
7. Installation of MongoDB and Apache Cassandra.
8. Exploring MongoDB, and Apache Cassandra basics, Identify the schema design and data modeling techniques in MongoDB.
9. Accessing MongoDB and Apache Cassandra from some of thepopular high-level programming languages. Perform Create, Retrieve, Update and Delete or CRUD operations in MongoDB.
10. Install CouchDB on Windows.
11. Create and delete CouchDB database. Run CouchDB query with Mongo.
12. Case study of Oracle Database Administration and Security.
    Study of database administrator's responsibilities like –
    i) Installing and upgrading the database server and/or application tools.
    ii) Creating user’s profiles and ensuring system security by careful allocation of user permissions.
    iii) Monitoring technical support for both database systems and related applications.
13. Study of CASE concept and tools.
14. Demonstrate all OLAP operations and cube operator in OLAP.
15. Consider a case study of any Big Data system of your choice and design the distributed database architecture and analyze the probable solutions available in the market.

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Database System Concepts	Silberschatz, Korth, Sudarshan	MGH, 6th Edition (International edition) 2010	Unit 1
2	Database Systems, Design,Implementation and Management	Coronel-Morris- Rob	Cengage Learning, Ninth Edition	Unit No.2, 4, 5
3	Professional NoSQL	Shashank Tiwari	John Wiley & Sons, Inc. 2011	Unit No.3
4	Data Mining	Margaret H. Dunham	Pearson Education	Unit No. 6

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Database Management System	Raghu Ramkrishnan, Johannes Gehrke,	MGH, [4e], 2015
2	Fundamentals of Database Systems	R. Elmasri S. B. Navathe,	Addison Wesley, 2015
3	NoSQL Distilled: A brief guide to merging world of Polyglot persistence,	Pramod J. Sadalage and Marin Fowler	Addison Wesley, 2012.
4	Business Intelligence - Data Mining and optimization for Decision Making- -	Carlo Vercellis	A John Wiley and Sons, Ltd., Publication
5	Advanced Database Management System	Rini Chakrabarti -Shilbhadra Dasgupta	Wiley-India Pvt Ltd.
6	Database Systems: A Practical Approach to Design, Implementation and Management,	Thomas Connolly, Carolyn Begg	6th Edition,2012.

Final Year B. Tech (Computer Science and Engineering) Sem- VII

4. Artificial Intelligence (PCE– CS704) Elective-I

TEACHING SCHEME	EXAMINATION SCHEME
Theory : 3 Hrs./Week (3 Credits)	**Theory :** ESE 70 Marks CIE 30 Marks
Tutorial :1 Hr. /Week (1 Credit)	**Term work: 25 Marks**
Practical :	**Practical : –**

Pre-requisites: Basic Programming in Python.

Course Objectives

1. To impart artificial intelligence principles, techniques, and its history.
2. To assess the applicability, strengths, and weaknesses of the basic knowledge representation, problem solving, and learning methods in solving engineering problems.
3. To develop intelligent systems by assembling solutions to concrete computational problems.

Course Outcomes

Upon successful completion of this course, the students will be able to:

1. Evaluate Artificial Intelligence (AI) methods and describe their foundations.
2. Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation and learning.
3. Demonstrate knowledge of reasoning and knowledge representation for solving real world problems.
4. Analyze and illustrate how search algorithms play vital role in problem solving.
5. Illustrate the construction of learning and expert system.
6. Discuss current scope and limitations of AI and societal implications.

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1.	**Artificial Intelligence and Its Issues:** Definitions - Importance of AI, Evolution of AI - Applications of AI, Classification of AI systems with respect to environment, Knowledge Inferring systems and Planning, Uncertainty and towards Learning Systems.	5
2.	**Overview to Problem Solving&Heuristic Search:** Problem solving by Search, Problem space - State space, Blind Search - Types, Performance measurement. Types, Game playing mini-max algorithm, Alpha-Beta Pruning	6
3.	**Probabilistic Reasoning & Markov Decision process:** Probability, conditional probability, Bayes Rule, Bayesian Networks- representation, construction and inference, temporal model, hidden Markov model. MDP formulation, utility theory, utility functions, value iteration, policy iteration and partially observable MDPs.	7
4.	**Learning Systems & Expert Systems:** Forms of Learning Types - Supervised, Unsupervised, Reinforcement Learning, LearningDecision Trees. Expert Systems - Stages in the development of an Expert System - Probability based ExpertSystems - Expert System Tools - Difficulties in Developing Expert Systems - Applications ofExpert Systems.	7
5.	**Reinforcement Learning:** Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference learning, active reinforcement learning- Q learning.	5
6.	**AI with Python:** Study of important inbuilt libraries of Python like NumPy, SciPy, matplotlib, nltk, SimpleAI. Installing Python. Setting up PATH. Running Python. Study of real time applications of AI with Python, Case Studies: AI Platforms-Azure ML, Google AI, Swift AI, Tensorflow.	6

Term Work

- Minimum 8 tutorials to be performed from the list given below.
- Practical should include the implementation and use of the above mechanisms/Algorithms/Tools /Techniques.
- Implementation can be in Python Programming Language.

Tutorial List

1. Write a program to conduct uninformed and informed search.
2. Write a program to conduct game search.
3. Write a program to construct a Bayesian network from given data.
4. Write a program to infer from the Bayesian network.
5. Write a program to run value and policy iteration in a grid world.
6. Write a program to do reinforcement learning in a grid world.
7. Develop small AI based Mini Project like:
    i) Predicting user's next location
    ii) Detecting YouTube comment spam
    iii) Identifying the genre of a song
    iv) Shock front classification
8. Case Study on any one real time AI application.

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Artificial Intelligence - A Modern Approach	Russell, S. and Norvig, P.	3rd edition, Prentice Hall.2015
2	Artificial Intelligence: Foundations of Computational Agents	Poole, D. and Mackworth, A.	Cambridge University Press.2010

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Artificial Intelligence, 3rd edition	Ric, E., Knight, K and Shankar, B.	Tata McGraw Hill.2009
2	Artificial Intelligence - Structures and Strategies for Complex Problem Solving	Luger, G.F.	6th edition, Pearson.2008
3	Knowledge Representation and Reasoning	Brachman, R. and Levesque, H.	Morgan Kaufmann. 2004
4	Artificial Intelligence with Python: A Comprehensive Guide to Building Intelligent Apps for Python Beginners and Developers	Prateek Joshi	Packt publication January 2017 Edition
5	Reinforcement Learning: An Introduction	Sutton R.S. and Barto, A.G.	MIT Press. 1998
6	Artificial Intelligence and Intelligent Systems	Padhy, N.P.	Oxford University Press. 2009

Final Year B. Tech (Computer Science and Engineering) Sem–VII

5. Software Testing and Quality Assurance (PCE- CS704) Elective-I

TEACHING SCHEME	EXAMINATION SCHEME
Theory :3 Hrs./Week	**Theory :** ESE 70 Marks CIE 30 Marks
Tutorial : 1 Hrs/Week	**Term work: 25 Marks**
Practical : --	**Practical : –**

Pre-requisites: Software Engineering, SDLC and STLC.

Course Objectives

1. To understand software testing and quality assurance as a fundamental component of software life cycle
2. To understand the fundamentals of software verification
3. To efficiently perform Testing & QA activities using modern software tools
4. To understand and compare testing web applications and desktop applications

Course Outcomes

Upon successful completion of this course, the students will be able to:

1. Understand fundamental component of software life cycle
2. Apply and use the modern software testing tools
3. Compare and analyze the web and desktop application testing
4. Explore newer software project assessment methods

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1.	**Introduction :** Some Software Failures, Testing Process, Some Terminologies, Limitations of Testing, The V Shaped software life cycle model	4
2.	**Software Verification:** Verification Methods, SRS document verification, SDD document verification, Source code reviews, User documentation verification, Software project audit **Creating test cases from SRS and Use cases:** Use Case Diagram and Use Cases, Generation of test cases from use cases, Guidelines for generating validity checks,	8

	strategies for data validity, Database testing	
3.	**Regression Testing:** What is regression testing?, Regression Test cases selection, Reducing the number of test cases, Risk analysis, Code coverage prioritization techniques Object oriented testing: What is Object orientation?, What is object oriented testing?, Path testing, State based testing, Class testing	7
4.	**Software Testing Tools:** Selecting and Installing Software Testing tools, Automation and Testing Tools, Load Runner, Win runner and Rational Testing Tools, Silk test, Java Testing Tools,	6
5.	**Testing Process :** Seven Step Testing Process – I: Overview of the Software Testing Process, Organizing of Testing, Developing the Test Plan, Verification Testing, Validation Testing.	5
6.	**Testing Web applications** What is web testing? functional testing, UI testing, Usability testing, configurations and compatibility testing, security testing, performance testing, database testing, post deployment testing, web metrics. **Automated Test data generation:** Automated Test Data generation, Approaches to test data generation, Test data generation tools	6

Term Work

- Minimum of 10 Tutorials to be done from the list given below.
- It should include the demonstration and use of the Tools /Techniques

Guidelines for tutorials:

It should consist of 8-10 assignments based on the following topics:

1. Software Testing Process, its need and limitations

2. Verification at different phases of SDLC for particular case study (SRS document verification, SDD document verification, Source code reviews, User documentation verification, Software project audit etc.)

3. Creating test cases from SRS and Use cases for particular case study

4. Generation of validity checks for particular case study

5. Regression testing with Test cases selection / Regression testing with reducing the number of test cases / Regression testing with code coverage prioritization techniques

6. Generation of test cases using Path testing/ State based testing/Class testing for particular case Study

7. Measurement in Software Engineering

8. Software Metrics: Object oriented Metrics used in testing

9. Calculation of Software Quality attributes using different prediction models

10. Measurement of Internal / External Product Attributes

11. Generation of test cases in different key areas of Web application testing

12. Automated test data generation

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Software testing:	Yogesh Singh,	Cambridge University Press, First Edition	Unit-I,II,III,VI
2	Effective Methods for Software Testing (Chapter 4, 6, 7, 8, 9, 10)	William E. Perry,	Third edition, Wiley India, 2009	Unit –IV,V
3	Software Testing – Principles and Practices (Chapter 12)	Naresh Chauhan,	Oxford University Press, 2010	Unit –IV

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Foundations of Software testing:	Aditya P. Mathur,	Pearson, Second Edition
2	Software Testing:	Ron Patton,	Pearson (SAMS), Second Edition
3	Software Quality, Mordechai	Ben Menachem, Garry S. Marliss,	BS Publications

Final Year B. Tech (Computer Science and Engineering) Sem- VII

6. Image Processing (PCE – CS704) Elective-I

TEACHING SCHEME	EXAMINATION SCHEME
Theory :3 Hrs./Week	**Theory :** ESE 70 Marks CIE 30 Marks
Tutorial : 1 Hrs./Week	**Term work: 25 Marks**
Practical :	**Practical : –**

Pre-requisites:

Course Objectives

1. To learn the fundamental concepts of Digital Image Processing
2. To study basic image processing operations.
3. To cover the basic analytical methods which are widely used in image processing.

Course Outcomes

Upon successful completion of this course, the students will be able to:

1. Describe the basic issues and the scope of image processing, and the roles of image processing and systems in a variety of applications.
2. Explore different techniques in image acquisition and color transformation
3. Understand how digital images are represented
4. Evaluate the mathematical principles of digital image enhancement
5. Explore and apply the concepts of Edge detection, segmentation and object recognition

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1.	**Introduction** Concept of Digital Image Processing, Steps in Image Processing, Components of Image Processing System, Applications areas, Image representation, Grey scale and color images.	6
2.	**Image Enhancement and Processing :** Basic Grey level transformation, Histogram Processing techniques, Color Fundaments, color models, Pseudo color image processing.	7
3.	**Image Restoring and Reconstruction:** Noise models, Noise Reduction, Inverse filtering, MMSE filtering.	5
4.	**Image Compression :** Fundamental of Redundancies, Basic Compression Methods, Huffman coding, Arithmetic coding, LZW coding, JPEG	5

	compression, Standard.	
5.	**Image Segmentation:** Detection of Discontinuities, Point, Line and Edge detection, Thresholding, Region based Segmentation.	6
6.	**Image Processing Applications:** Biometric Pattern Recognition, Face Recognition. Preprocessing of Signature Patterns, Lung Disease Identification.	7

Term Work

- It should consist of minimum 8 – 10 assignments based on the above topics.

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Digital Image Processing	R.C.Gonzalez and R.E.Woods	Pearson Edition	1 to 6

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Digital Image Processing	A.K.Jain	PHL
2	Image processing, Analysis and Machine vision	M.Sonka, V.Hlavac, and R.Boyle	Thomson Asia pvt. Ltd

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7. WEB TECHNOLOGIES (PCC- CS705)

TEACHING SCHEME	EXAMINATION SCHEME
Theory :3 Hrs./Week	**Theory :** NA
Tutorial :NA	**Term work: 50 Marks**
Practical : 4 Hrs./Week	**POE : 50 Marks**

Pre-requisites: Object oriented Programming, Basics of HTML and CSS.

Course Objectives

1. Introduce students with front end web designing.
2. Motivate the students to develop web applications using PHP.
3. To introduce emerging Web technology concepts and tools.
4. To learn database access technologies and state management techniques.
5. To expose students to XAMPP web services.

Course Outcomes

Upon successful completion of this course, the students will be able to:

1. Apply knowledge of client side scripting.
2. Develop web application using PHP.
3. Design web application using MVC and Angular JS.
4. Demonstrate use of server side technologies.
5. Explore newer tools for web development.

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1.	**Front End Web Designing HTML and CSS:** HTML Design Patterns: HTML Structure, XHTML, DOCTYPE, Header Elements, Conditional Style Sheet, Structural Block Elements, Terminal Block Elements, Multipurpose Block Elements, Inline Elements, Class and ID Attributes, HTML Whitespaces CSS Selector and Inheritance: Type, Class and ID Selector, Position and Group Selectors, Attribute Selectors, Pseudo-element Selectors, Pseudo-class Selectors, Subclass Selector, Inheritance, Visual Inheritance, and Bootstrap	6

	2.	**Javascript Basics:** Introduction to javascript, Basic program of javascript, variables, functions, conditions, loops and repetition, Function, Arrays – DOM, Built-in Objects, Regular Expression, Exceptions, Event handling In Javascript, Validating HTML form data using javascript, Validation- AJAX - JQuery	7
	3.	**Angular Node JS:** Angular - Web Application architecture, MVC and MVVM design pattern, Angular architecture, Angular building blocks, Forms implementation, Filters, Services, Consuming REST Web Services, Modules: Built-in and custom, Directives: Built-in and custom, Routing and Navigation, Animations, Testing Angular application. Node, NodeJsarchitecture ,Modules: Built-in and custom, Event loop, Asynchronous application , Events, Listeners, Timers, and Callbacks in Node.js. Testing node application. Introduction to Mongo DB- Accessing MongoDB from Node.js.	5
	4.	**PHP basic:** PHP Basics: Embedding PHP code in Your Web Pages, Commenting Your Code, Outputting Data to the Browser, PHP supported Data Types, Identifiers, Variables, Constants, Expressions, String Interpolation, and Control Structures Functions: Invoking a Function, Creating a Function, Function Libraries Array: What is Array?, Creating an array, outputting an Array, Merging, slicing, splicing and Dissecting Arrays, Other useful Array, Functions.	5
	5.	**PHP session management (state management):** Session Handlers: What Is Session Handling, Configuration Directives, Working with Sessions, Practical Session-Handling Examples, Creating Custom Session Handlers, PHP cookies, Uploading Files with PHP	6
	6.	**PHP Database and small app using Laravel and Code to generate:** Installation Prerequisites, Using the MySqli Extension, Interacting with the Database, Executing Database Transactions.	7

Term Work

- Minimum of 15 Experiments to be performed from the list given below.
- 25 marks for performance in practical and experiments as part of continuous evaluation
- 25 marks for Practical Test and oral to be conducted.

Experiment List

1. Create html pages for website like login, registration and about us pages.
2. Apply and design the created HTML pages using CSS
3. Write a program demonstrating javascript functions and different validations.
4. Write a program to read and write HTML contents with JQuery.

5. Create a simple Testing Angular application.
6. Write a program demonstrating NodeJs application.
7. Write a program to handle the error in NodeJs..
8. Write a study experiment for Installing Apache and PHP on Linux, Configuring PHP at Build Time on Linux. Or Installation of XAMPP.
9. Hello world Program-Embedded HTML with PHP.
10. Program based on PHP variables, Expression, arrays, control structure.
11. Experiment Based on OOP and Advance OOP PHP
12. Form validation using PHP using regular expressions
13. Upload various types of file from client side to server with validation
14. Write a program to create and handle a session, cookie in PHP
15. Insert user entered data in form to MySQL database using PHP
16. Update user's data stored in MySQL database using PHP
17. Write a program to manage session in PHP having login facility in any web application
18. Write a program to show stored cookies, update, retrieve and delete from browser.

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Pro HTML5 and CSS3 Design Patterns	Michael Bowers, DionysiosSynodinos and Victor Sumner	Apress edition	(Unit I & II)
2	Beginning PHP and MySQL: From Novice to Professional	W. Jason Gilmore	Fourth Edition	Unit IV to VI
3	MEAN Web Development	Amos Q. Haviv	PACKT PUBLISHING LTD	Unit III

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Pro HTML5 and CSS3 Design Patterns	Michael Bowers, DionysiosSynodinos and Victor Sumner	Apress edition
2	Web Development withNode and Express	Ethan Brown	Published by O'Reilly Media
3	http://www.php.net	**Open Source**	online

Final Year B. Tech (Computer Science and Engineering) Sem– VII

8. Project-I (PW- CS706)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : NA	**Theory :** NA
Tutorial : NA	**Term work: 50 Marks**
Practical : 4 Hrs./Week	**Demo & OE: 50 Marks**

Pre-requisites: Software Engineering, Mini Project.

Course Objectives

1. Identify the area of project work

2. Recognize the need and ability to engage in lifelong learning

3. Function effectively on teams and to communicate effectively

4. Able to prepare the technical report

Course Outcomes

Upon successful completion of this course, the students will be able to:

1. Explain the need of a software project for the society

2. Identify requirement analysis like functional and technical requirements for the project

3. Come up with design documents for the project consisting of Architecture, Dataflow diagram,

Class Diagram, Algorithmic descriptions of various modules, collaboration diagram, ER Diagrams,

Database Design Documents, Sequence Diagram, Use Case Diagram

4. Able to demonstrate analysis and design.

5. Prepare the technical report consisting of Requirement specification, Analysis and Design of Project

Contents

The project work is to be carried out in two semesters of Final Year Computer Science and Engineering.

The project should be undertaken preferably by group of 4-5 students who will jointly work and implement the project in the two semesters.

In Semester VII, the group will select a project with the approval of the Guide (staff member) and submit the Name of the project with a synopsis of the proposed work of not more than 02 to 08 pages before second week of August in the academic year. The group is expected to complete detailed system design, analysis, data flow design, procurement of hardware and/or software, implementation of a few modules of the proposed work at the end of semester –VIII as a part of the term work submission in the form of a joint report.

The term work assessment will be done jointly by teachers appointed by Head of the Institution.

The oral examination will be conducted by an internal and external examiner

Note:

1. Project work should be continually evaluated based on the contributions of the group members, originality of the work, innovations brought in, research and developmental efforts, depth and applicability, etc.
2. Two mid-term evaluations should be done, which includes presentations and demos of the work done.
3. **Care should be taken to avoid copying and outsourcing of the project work.**

Final Year B. Tech (Computer Science and Engineering) Sem- VII

9. Internship (SI-CS707)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : NA	**Practical:1 Credit**
Tutorial :NA	**Term work: 50 Marks**
Practical : Minimum4 Weeks duration	**Mode of Evaluation : –**Internship Report, Presentation and Project Review.

Pre-requisites: Completion of minimum of Six semesters**,** Knowledge of Basic Programming Languages, Database Software.

Course Objectives

The course is designed to expose the students to industry environment and to take up on-site assignment as trainees or interns.

Course Outcomes

At the end of this internship the student should be able to:
1. Have an exposure to industrial practices and to work in teams
2. Communicate effectively
3. Understand the impact of engineering solutions in a global, economic, environmental, and societal context
4. Develop the ability to engage in research and to involve in life-long learning
5. Comprehend contemporary issues
6. Engage in establishing his/her digital footprint

Duration: Minimum 4 Weeks
Details:
Four weeks of work at industry site.
Supervised by an expert at the industry.

Term Work

1. Mode of Evaluation: Internship Report, Presentation and Project Review.
2. Collect the Internship Completion Letter given by authorized industry.
3. Assess the work based on progress report (signed by industry expert).

Final Year B. Tech (Computer Science and Engineering)

Semester- VIII

1. Big Data Analytics (PCC - CS801)

TEACHING SCHEME	EXAMINATION SCHEME
Theory :4 Hrs./Week	**Theory :** ESE 70 Marks CIE 30 Marks
Tutorial :	**Term work : 25 Marks**
Practical : 2 Hrs./Week	**POE : 50 Marks**

Pre-requisites: Operating Systems, Hadoop, Java, Networking, Machine Learning and Databases.

Course Objectives

1. Analyze several key technologies used in manipulating, storing, and analyzing big data.
2. Acquire clear understanding of R & Hadoop.
3. Acquire clear understanding of Integrating R & Hadoop and Acquire clear understanding of Hadoop Streaming and its importance.
4. Manage Big Data and analyze Big Data.
5. Apply tools and techniques to analyze Big Data.

Course Outcomes

Upon successful completion of this course, the students will be able to:

1. Analyze several key technologies used in manipulating, storing, and analyzing big data.
2. Acquire clear understanding of R & Hadoop.
3. Acquire clear understanding of Integrating R & Hadoop and Acquire clear understanding of Hadoop Streaming and its importance.
4. Manage Big Data and analyze Big Data.
5. Apply tools and techniques to analyze Big Data.

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1.	**INTRODUCTION TO BIG DATA :** Big Data and its Importance – Four V's of Big Data – Drivers for Big Data –Introduction to Big Data Analytics – Big Data Analytics applications, Architecture Components, Massively Parallel Processing (MPP) Platforms, Unstructured Data Analytics and Reporting, Big Data and Single View of Customer/Product, Data Privacy Protection, Real-Time Adaptive Analytics and Decision Engines.	8
2.	**INTRODUCTION TO R &HADOOP :** Getting Ready to Use R and Hadoop, Installing R, Installing R Studio, Understanding the features of R language, Installing Hadoop, Understanding Hadoop features, Learning the HDFS and MapReduce architecture, Writing Hadoop MapReduce Programs, Introducing Hadoop MapReduce, Understanding the Hadoop MapReduce fundamentals, Writing a Hadoop MapReduce example, Learning the different ways to write Hadoop MapReduce in R, Hadoop Ecosystem, Hadoop YARN, Hbase, Hive, Pig and Pig latin, Sqoop, ZooKeeper, Flume, Oozie.	8
3.	**INTEGRATION OF R & HADOOP :** Integrating R and Hadoop, Introducing RHIPE, Understanding the architecture of RHIPE, Understanding RHIPE samples, Understanding the RHIPE function reference, Introducing RHadoop, Understanding the architecture of RHadoop, Understanding RHadoop examples, Understanding the RHadoop function reference. HADOOP STREAMING WITH R Using Hadoop Streaming with R - Introduction, Understanding the basics of Hadoop Streaming, Understanding how to run Hadoop streaming with R, Understanding a MapReduce application, Exploring the Hadoop Streaming R package.	8
4.	**DATA ANALYTICS WITH R AND HADOOP :** Understanding the data analytics project life cycle – Introduction, Identifying the problem, Designing data requirement, Preprocessing data, Performing analytics over data, Visualizing data, Understanding data analytics problems, Exploring web pages categorization Case Studies: Computing the frequency of stock market change, Predicting the sale price of blue book for bulldozers.	8

5.	**SPARK FOR BIG DATA ANALYTICS :** The advent of Spark, Limitations of Hadoop, Overcoming the limitations of Hadoop, Theoretical concepts in Spark: Resilient distributed datasets, Directed acyclic graphs, SparkContext, Spark DataFrames, Actions and transformations, Spark deployment options, Spark APIs, Core components in Spark: Spark Core, Spark SQL, Spark Streaming, GraphX, MLlib, The architecture of Spark	8
6.	**UNDERSTANDING BIG DATA ANALYSIS WITH MACHINE LEARNING :** Introduction to machine learning, Types of machine-learning algorithms, Supervised machine learning algorithms, Unsupervised machine learning algorithm, Recommendation algorithms, Steps to generate recommendations in R, Generating recommendations with R and Hadoop.	8

Term Work

- Minimum of 10-12 Experiments to be performed from the list given below.

Experiment List

1. Installation of Hadoop.
2. Building Hadoop MapReduce application for counting frequency of word/phrase in simple text file.
3. Study and demonstration of Hadoop YARN Administration command and User commands.
4. Configure Hive demonstrate following
    - Write and execute a Hive query
    - Define Hive External table
    - Define Partitioned Hive Table
5. Demonstrate following on Hive
    - Load data into Hive table from HDFS
    - Update row in Hive table
    - Delete row from a Hive Table
6. Working with operators in Pig - FOREACH, ASSERT, FILTER, GROUP, ORDERBY, DISTINCT, JOIN, LIMIT, SAMPLE, SPLIT,FLATTEN.
7. Write and execute a Pig script

- Load data into a Pig relation without a schema
- Load data into a Pig relation with a schema
- Load data from a Hive table into a Pig relation

8. Installation of R studio and demonstration of following
    - R basic Syntax.
    - Exploring basic R Data Types.
    - Drawing Pie chart, Bar Chart, Histogram, etc.
    - R array and Vector.
9. Working with R with data sets- create, read, write and R Tables- create, read, write.
10. Manipulating and processing data in R - merging datasets, sorting data, putting data into shape, managing data using matrices managing data using data frames.
11. Study of RHIPE (R and Hadoop Integrated Programming Environment)
    - Installing Hadoop.
    - Installing R.
    - Installing protocol buffers.
    - Setting up environment variables.
    - Installing rJava.
    - Installing RHIPE.
12. Identifying the frequency of all the words that are present in the provided input text files using RHIPE Environment.
13. Installation and configuration of Apache Spark on Local Machine.
14. Write an application to Read multiple text files into single RDD using Spark.
15. Implementation of Linear regression with R and Hadoop.
16. Case studies should consist of but not limited to following: Big Data Analytics in Healthcare, Big Data Analytics In Immunology: A Knowledge-Based Approach, Big Data Analytics Embedded Smart City Architecture For Performance Enhancement Through Real-Time Data Processing And Decision-Making.
17. Case Study How Data Science Helped in development COVID-19 Vaccine.

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Big Data Analytics: Disruptive Technologies for Changing the Game	Arvind Sathi	IBM Corporation, 2012	Unit - I
2	Big Data Analytics with R and Hadoop	Vignesh Prajapati	Packt Publishing 2013	Unit - II, III, IV, VI
3	Practical Big Data Analytics	Nataraj Dasgupta	Packt Publishing 2018	Unit - V

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1.	Big Data (Black Book)	DT Editorial Services	Dreamtech Press
2.	Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business	Michael Minelli, Michehe Chambers	AmbigaDhiraj, Wiely CIO Series, 2013.
3.	Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics	Bill Franks	Wiley and SAS Business Series, 2012
4.	Hadoop: The Definitive Guide	Tom White	O'reilly, 2012
5.	Big Data Analytics	Seema Acharya, Subhasini Chellappan	Wiley, 2015
6.	Big Data Analytics with Hadoop 3	Sridhar Alla	Packt Publishing, 2018
7.	Big Data Analytics: Methods and Applications	Jovan Pehcevski	Arcler Press

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2. Deep Learning (PCC - CS802)

TEACHING SCHEME	EXAMINATION SCHEME
Theory :3 Hrs./Week	**Theory :** ESE 70 Marks CIE 30 Marks
Tutorial :1 Hrs./Week	**Term work: 25 Marks**
Practical : NA	**Practical : NA**

Pre-requisites: Machine Learning**.**

Course Objectives

1. Understand the basic concepts of deep learning networks
2. Introduce different models of deep learning to work with various types of inputs.
3. Learn effects of different parameters and hyper-parameters on deep learning model output.

Course Outcomes

Upon successful completion of this course, the students will be able to:

1. Describe basic concepts of artificial intelligence and deep learning.
2. Develop different deep learning models for given tasks.
3. Devise the correct parameters and hyper-parameters of developed model for getting improved results.

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1.	**Neural Network and Deep Learning** Introduction to AI, ML and Deep Learning, A brief history, Need of Deep Learning, Basics of neural network, Data representation for neural network, Gradient based optimization, anatomy of neural network.	7
2.	**Introduction to Tensorflow, Keras and hyperparameters** **Tensorflow:** Introduction, Downloading and installation of Tensorflow, The computation graph, Modelling cyclic dependencies, Building and running visualization, Computing graph and distribution, Simple math operation and distribution, Tensors, Rank of tensors, Tensor math, Numpy and tensors, Tensorflow example, **Keras:** Introduction, Models, Layers, Pre-	7

	processing, Deep Learning case studies, **Hyperparameters:** Learning rate, No of iterations, hidden layers, hidden units, choice of activation function, momentum, mini batch size, Overfitting and underfitting, regularization	
3.	**Convolutional Neural Networks** The convolutional operation, The max pooling operation, Training a convnet from scratch on a small dataset, Using pre-trained convnet, Visualizing what convnet learn	6
4.	**Sequence Models** One hot encoding, Using word embeddings, A recurrent layer in Keras, Understanding the LSTM and GRU layers, Example of LSTM in Keras, Advanced use of Recurrent Neural Network	6
5.	**Advanced Deep Learning Best Practices** Going beyond the sequential model: The Keras functional API, Inspecting and monitoring deeplearning models using Keras callbacks and Tensor Board, Getting the most out of your models	5
6.	**Generative Deep Learning** Text generation with LSTM, Deep Dream, Neural Style Transfer, Generating images with variational auto encoders, Introduction to generative adversarial network.	5

Term Work

- Minimum of 10 Tutorials to be performed from the list given below.
- Practical should include the implementation and use of the following mechanisms/Algorithms/Tools /Techniques

Tutorial List

1. Installing of Anaconda or Miniconda and working with Tensorflow and Keras
2. Introduction and working with Google Colab for using GPUs and TPUs for large projects
3. Developing simple perceptron (single layer neural network)
4. Developing simple multilayer neural network for different tasks
5. Designing and developing basic CNN for given task
6. Using transfer learning in CNN
7. Designing and developing simple RNN for given task
8. Designing and developing RNN with LSTM for given task
9. Designing and developing RNN with GRU for given task
10. Designing and developing model for Text generation using LSTM
11. Designing and developing model for Neural style transfer
12. Designing and developing model for generating images

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Deep Learning with Python	Francois Chollet	

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Deep Learning	by Ian Good fellow, Yoshua Bengio, Aaron Courville	MIT Press Book

Final Year B. Tech (Computer Science and Engineering) Sem- VIII

3. PROJECT MANAGEMENT (PCE- CS803) Elective-II

TEACHING SCHEME	EXAMINATION SCHEME
Theory :3 Hrs./Week	**Theory :** ESE 70 Marks CIE 30 Marks
Tutorial :1 Hrs./Week	**Term work: 25 Marks**
Practical :	**Practical : –**

Pre-requisites: Software Engineering Concept, Operations Management

Course Objectives

1. Provide students with a basic understanding of project management principles and practices.
2. Demonstrate competency in the creation and management of a project plan
3. Understanding impact of Scope, Time and Cost management.
4. Understanding the software quality metrics and quality assurance.
5. Develop strategies to calculate risk factors involved in IT projects
6. Understand the Agile development practices and driving forces for taking an Agile approach to software development.

Course Outcomes

Upon successful completion of this course, the students will be able to:

1. Understand project characteristics and various stages of a project.
2. Understand the conceptual clarity about project organization and feasibility analyses
3. Analyze the learning and understand techniques for Project planning, project risk, scheduling and Execution
4. Resolve IT related crises using project management
5. Manage the phases and infrastructure of IT projects
6. Describe fundamental concepts of agile methodology and agile development practices

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1.	**Introduction to Project Management:** Project and Project Management (PM), Role of project Manager, System view of PM, Organization, Stakeholders, Project phases and lifecycle, Context of IT projects, process groups, mapping groups to Knowledge areas	5
2.	**Project Integration Management:** Strategic planning and project selection, Developing a Project Management Plan, Directing and Managing Project Work, Monitoring and Controlling Project Work, Performing Integrated Change Control, Closing Projects or Phases	5
3.	**Project Scope, Time and Cost management:** Planning Scope Management, Collecting Requirements, Defining Scope, Creating the Work Breakdown Structure, Validating Scope, Controlling Scope Planning Schedule Management, Defining Activities, Sequencing and Estimating Activity, Resources & Duration, Developing & Controlling Schedule Basic Principles of Cost Management, Planning Cost Management, Estimating Costs, Determining the Budget, Controlling Costs	9
4.	**Quality and Human Resource Management:** Importance, Planning Quality Management, Performing Quality Assurance, Controlling Quality, Tools and Techniques for Quality Control, **Human Resource management:** Importance, keys to managing people, human resource planning, acquiring, developing and managing project team.	6
5.	**Risk management:** Importance, risk management planning, sources of risk, risk identification, qualitative and quantitative risk analysis, risk response planning, risk monitoring and control.	5
6.	**Agile Project Management:** The Genesis of Agile, Introduction and background, Agile Manifesto and Principles, Overview of Scrum, Extreme Programming, Feature Driven development, Lean Software Development, Agile project management, Design and development practices in Agile projects	4

Term Work

- It should consist of minimum 8 – 10 assignments based on the above topics.

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Information Technology Project Management	Kathy Schwalbe	Cengage Learning 7E	(Unit I to V)
2	Software Project Management	Bob Huges, Mike Cotterell, Rajib Mall	McGraw Hill Edu	Unit -VI

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Effective Project Management	Robert K.Wysocki	Wiley India 7 Edition
2	Project Management Core Textbook	Mantel Jr., Meredith, Shafer, Sutton, Gopalan	Wiley India Edition
3	IT Project Management	Joseph Phillips 3E	McGraw Hill Edu.

Final Year B. Tech (Computer Science and Engineering) Sem –VIII

4. Natural Language Processing (PCE- CS803) Elective-II

TEACHING SCHEME	EXAMINATION SCHEME
Theory :3 Hrs./Week	**Theory :** ESE 70 Marks CIE 30 Marks
Tutorial :1 Hrs./Week	**Term work: - 25 Marks**
Practical : NA	**Practical : – NA**

Course Objectives

1. To introduces the fundamental concepts and techniques of natural language processing (NLP).
2. To gain an in-depth understanding of the computational properties of natural languages and the commonly used algorithms for processing linguistic information.
3. To examines NLP models and algorithms using both the traditional symbolic and the more recent statistical approaches.

Course Outcomes

Upon successful completion of this course, the students will be able to:

1. Acquire the knowledge of fundamental mathematical models and algorithms in the fields of NLP
2. Apply these mathematical models and algorithms in application in software design and implementation for NLP.
3. Apply deep learning models to solve machine translation and conversation problems.
4. Apply deep structured semantic models on information retrieval and natural language applications.

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1.	**Introduction** Introduction to various levels of natural language processing, Ambiguities and computational challenges in processing various natural languages. Introduction to Real life applications of NLP such as spell and grammar checkers, information extraction, question answering, and machine translation.	6

2.	**Language Models** : The role of language models. Simple N-gram models. Estimating parameters and smoothing. Evaluating language models	6
3.	**Part Of Speech Tagging and Sequence Labeling**: Stochastic POS tagging, HMM, Transformation based tagging (TBL), Handling of unknown words, named entities, multi word expressions.	6
4.	**Syntactic parsing**: Constituency, Context-Free Grammars, Some Grammar Rules for English, Treebanks, Grammar Equivalence and Normal Form, Lexicalized Grammars.	6
5.	**Semantic Analysis**: Lexical semantics and word-sense disambiguation. Compositional semantics. Semantic Role Labeling and Semantic Parsing.	6
6.	**APPLICATIONSOFNLP:** NLInterfaces,TextSummarization,SentimentAnalysis,MachineTranslation,Questionanswering, Recent Trends in NLP	6

Term Work

- It should consist of minimum 8-10 assignments with emphasis on solving exercise problems.

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Speech and Language Processing	Daniel Jurafsky and James H Martin	2E, Pearson Education, 2009

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	**Natural language Understanding**	James A..	**2e, Pearson Education,1994**
2	Natural language processing: a Paninian perspective,	Bharati A., Sangat R., Chaitanya V..	**PHI, 2000**

Final Year B. Tech (Computer Science and Engineering) Sem- VIII

5. Ad-Hoc Wireless Sensor Networks (PCE- CS803) Elective-II

TEACHING SCHEME	EXAMINATION SCHEME
Theory :3 Hrs./Week	**Theory :** ESE 70 Marks CIE 30 Marks
Tutorial :1 Hrs./Week	**Term work: 25 Marks**
Practical :	**Practical : NA**

Pre-requisites: Computer Network, Information Security, Modular Arithmetic & Number Theory, C / C++.

Course Objectives

1) To introduce cellular and Ad Hoc wireless networks

2) To introduce routing protocols in Ad Hoc wireless networks

3) To introduce Transport layer and security protocols for ad hoc wireless networks

4) To introduce sensor networks and its routing algorithms

5) To introduce sensor networks infrastructure and sensor tasking

Course Outcomes

On completion of the course, student will be able to-

1) Describe issues and design goals in Ad Hoc wireless networks

2) Explain and classify various routing protocols in Ad Hoc wireless networks

3) Describe design issues and classify transport layer protocols and security protocols in Ad Hoc wireless Networks

4) Describe challenges and routing protocols in sensor networks

5) Explain sensor networks infrastructure management and sensor tasking and control techniques

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1.	**Introduction** Cellular and Ad Hoc wireless networks, Applications, Issues in Ad Hoc wireless networks, MAC Protocols for ad hoc wireless networks – Introduction, Issues in designing MAC protocol, Design goals of MAC protocol, Classification of	**6**

	MAC protocols, Contention based protocols.	
2.	**Routing protocols for ad hoc wireless networks** Introduction, Issues in designing a routing protocol for ad hoc wireless networks, Classification of routing protocols, Table driven, on-demand Hybrid routing protocols, Issues in designing a multicast routing protocol, Operation of multicast routing protocols, An architecture reference model for multicast routing protocols, Classification of multicast routing protocols.	**7**
3.	**Transport layer and security protocols for ad hoc wireless networks** Introduction, Design issues and goals, Classification of transport layer solutions, TCP over ad hoc wireless Networks, Security in ad hoc wireless networks, Network security requirements, Issues and challenges in security provisioning, Network security attacks, Key management, Secure routing.	**6**
4.	**Introduction to Sensor Networks** Unique Constraints and Challenges, Advantages of Sensor Networks, Sensor Network Applications, Medium Access Control, The S-MAC Protocol, IEEE 802.15.Standard and ZigBee: General Issues.	**6**
5.	**Routing Protocol for Sensor Network** Geographic, Energy-Aware Routing , Unicast Geographic Routing , Routing on a Curve , Energy-Minimizing Broadcast , Energy-Aware Routing to a Region , Attribute-Based Routing , Directed Diffusion , Rumor Routing , Geographic Hash Tables	**6**
6.	**Sensor Network Infrastructure Establishment** Topology Control , Clustering , Time Synchronization , Clocks and Communication Delays, Interval Methods, Reference Broadcasts, Localization and Localization Services, Ranging Techniques , Range-Based Localization Algorithms, Other Localization Algorithms, Location Services.	**7**

Term Work

Term work includes combination of written assignments, getting acquainted with wireless simulation tools and performing experiments from Virtual Lab portal of IIT, Bombay.
1) One assignment from each unit (Total 6 written assignments)

2) Faculty should demonstrate any open source wireless network simulator tool (ns-2, ns-3, GNS3, etc.) with installation, configuration and demonstration of some scenarios of WSNs.

3) Virtual Lab :- Performing 4 Assignments from Wireless Sensor Network Remote Triggered Lab (Wireless Remote Sensing, Experimentation, Monitoring and Administration Lab) from IIT Bombay

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Ad Hoc wireless Networks– Architecture and Protocols	C.S.R.Murthy& B.S. Manoj	Pearson Education	(Unit I to III)
2	Wireless sensor networks	Feng Zhao and LeonidesGuibas	Elsevier publication - 2004	(Unit –IV to VI)

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Ad Hoc Wireless Networks- A communication Theoretic perspective	O.K.Tonguz & G.Ferrari,	Wiley India
2	Ad Hoc Networking	Charles E. Perkins	Pearson Education
3	Ad Hoc Mobile Wireless Networks – Protocols and Systems	C. K. Toh	Pearson Education
4	Wireless Communications and Networks	William Stallings	Pearson Education – 2004
5	Introduction to Wireless and Mobile Systems, 2nd Edition,	Dharma Prakash Agrawal & Qing-An Zeng	CENGAGE Learning

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6. High Performance Computing (PCE- CS804) Elective-III

TEACHING SCHEME	EXAMINATION SCHEME
Theory :3 Hrs./Week **Tutorial :** 1 Hrs./Week	**Theory :** ESE 70 Marks CIE 30 Marks
Term Work: 25 Marks	**Practical:** -

Pre-requisites: 1. Computer Organization 2. Computer Algorithms

Course Objectives

1. To introduce the current trends in computer architecture and programming model.
2. To understand Parallel Hardware and Parallel Software.
3. To learn Distributed-Memory Programming with MPI.
4. To learn Shared-Memory Programming with Pthreads.
5. To learn Shared-Memory Programming with OpenMP.
6. To solve basic parallel problems.

Course Outcomes

Upon successful completion of this course, the students will be able to:

1. To introduce the current trends in computer architecture and programming model.
2. To explain Parallel Hardware and Parallel Software.
3. To apply and use Distributed-Memory Programming with MPI.
4. To apply and use Shared-Memory Programming with Pthreads.
5. To apply and use Shared-Memory Programming with OpenMP.
6. Program parallel architectures.

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1.	**Introduction** Need of Ever-Increasing Performance, Building Parallel Systems, Need to Write Parallel Programs, Concurrent, Parallel, Distributed, Typographical Conventions, Cluster Computing - architecture, Classifications, Grid Computing - Architecture, Applications	**6**
2.	**Parallel Hardware and Parallel Software** Modifications to the von Neumann Model, Parallel Software, Input and Output, Performance, Parallel Program Design, Writing and Running Parallel Programs	**5**
3.	**Distributed-Memory Programming with MPI** Compilation and execution, MPI programs, SPMD programs, The Trapezoidal Rule in MPI, Dealing with I/O, Tree-structured communication, MPI Reduce, Collective vs. point-to-point communications, MPI Allreduce, Broadcast, Data distributions, MPI Derived Datatypes, Performance Evaluation of MPI Programs	**6**
4.	**Shared-Memory Programming with Pthreads** Processes, Threads, and Pthreads, Hello World, Matrix-Vector Multiplication, Critical Sections, Busy-Waiting, Mutexes, Producer-Consumer Synchronization and Semaphores, Barriers and Condition Variables	**6**
5.	**Shared-Memory Programming with OpenMP** Compiling and running OpenMP programs, The program, The Trapezoidal Rule, Scope of Variables, The Reduction Clause, The parallel forDirective, More About Loops in OpenMP: Sorting, Scheduling Loops	**6**
6.	**Parallel Program Development** Two *n*-Body Solvers, Recursive depth-first search, Nonrecursive depth-first search, Data structures for the serial implementations, Performance of the serial implementations, Parallelizing tree search, A static parallelization of tree search using Pthreads, A dynamic parallelization of tree search using Pthreads, Evaluating the pthreads tree-search programs	**7**

Term Work

- Term Work should consist of 10 assignments based on the following list. At least one assignment must be from each unit.

1. Write a short note on significance of parallel programming to enrich the computational performance.
2. Enumerate the fundamental prerequisites of parallel programming.
3. Explain the modified architecture of von Neumann model.
4. Describe parallel program design with running process.
5. Explain the Trapezoidal rule in MPI.
6. How the evaluation for performance of MPI is done?
7. What is Pthread? Write a note on Pthread creation, finish. Explain Pthread API.
8. Explain: a) Mutexes b) barriers c) busy waiting
9. Explain the following terms with respect to OpenMp
    a. The trapezoidal rule
    b. Scope of the variable
10. Explain various loops in OpenMp with example.
11. Write short note on two n-body solvers.
12. Write dawn Difference between Recursive depth - first search and Non Recursive depth - first search

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	An Introduction to Parallel Programming	Peter S. Pacheco	Elsevier, 2011	1 to 6
2	Introduction to Grid Computing	Bart Jacob, Michael Brown, Kentaro Fukui, NiharTrivedi	International Business Machines Corporation 2005.	Grid Computing Unit 1
3	High Performance Cluster Computing: Architectures and Systems, Volume 1	R. Buyya	Pearson Education, 2008	Cluster Computing Unit 1

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Parallel computing theory and practice	Michel J. Quinn	TMH
2	Computer Architecture & Parallel Processing	Kai Hwang & Briggs	McGraw Hill
3	Parallel and Distributed Systems	Arun Kulkarni, Napur Prasad Giri	Wiley Publications, 2nd Edition

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7. Block chain Technology (PCE- CS804) Elective-III

TEACHING SCHEME	EXAMINATION SCHEME
Theory :3 Hrs./Week	**Theory :** ESE 70 Marks CIE 30 Marks
Tutorial : 1 hr/Week	**Term work: 25 Marks**
Practical :	**Practical :**

Pre-requisites: Expertise In Programming, Basic Knowledge Of Computer Security, Cryptography, Networking, Concurrent Or Parallel Programming

Course Objectives

1) Understand how blockchain systems (mainly Bitcoin and Ethereum) work
2) To securely interact with bitcoin and ethereum
3) Design, build, and deploy smart contracts and distributed applications
4) Integrate ideas from blockchain technology into their own projects

Course Outcomes

Upon successful completion of this course, the students will be able to:

1. Explain design principles of Bitcoin and Ethereum.
2. Explain Nakamoto consensus.
3. Explain the Simplified Payment Verification protocol.
4. List and describe differences between proof-of-work and proof-of-stake consensus.
5. Interact with a blockchain system by sending and reading transactions.
6. Design, build, and deploy a distributed application.

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1.	**Introduction** Distributed Database, Two General Problem, Byzantine General problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete. Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero Knowledge Proof.	6
2.	**Blockchain** Introduction, Advantage over conventional distributed database, Blockchain Network, MiningMechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee,Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Privateand Public blockchain	7
3.	**Distributed Consensus**: Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, SybilAttack, Energy utilization and alternate.	6
4.	**Cryptocurrency**: History, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum -Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin	8
5.	**Cryptocurrency Regulation**: Stakeholders, Roots of Bit coin, Legal Aspects-Crypto currency Exchange, Black Market andGlobal Economy.	8
6.	**Cryptocurrency Applications:** Internet of Things, Medical Record Management System, Domain Name Serviceand future of Blockchain	5

Term Work

Tutorials: Naive Blockchain construction, Memory Hard algorithm – Hashcash implementation, Direct Acyclic Graph, Play with Go-ethereum, Smart Contract Construction,Toy application using Blockchain, Mining puzzles

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
1	Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction	Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder,	Princeton University Press (July 19, 2016).	

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	'Blockchain Technology: Cryptocurrency and Applications	S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan	Oxford University Press, 2019.
2	Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming	Josh Thompson	Create Space Independent Publishing Platform, 201

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8. Human Computer Interaction (PCE- CS804) Elective-III

TEACHING SCHEME	EXAMINATION SCHEME
Theory :3 Hrs./Week	**Theory :** ESE 70 Marks CIE 30 Marks
Tutorial :1 Hrs./Week	**Term work: 25 Marks**
Practical : --	**Practical : --**

Pre-requisites: Web Technologies, Software Engineering, Basic knowledge of designing tools and languages like HTML, Java etc.

Course Objectives

1. To learn Human Computer Interaction study.
2. To learn human computer interface design
3. To learn Screen designing techniques
4. To learn Windows based UI interfaces
5. To learn Design and Development of Mobile Applications.

Course Outcomes

Upon successful completion of this course, the students will be able to:

1. Explain principles of User Interface
2. Demonstrates HCI design process
3. Demonstrate screen designing techniques
4. Apply windows based UI interfaces
6. Design and Develop Mobile Applications

Unit No.	Unit Name and Details	No. of Lectures
1	**Importance of user Interface** Definition, Importance of good design - Benefits of good design. A brief history of Screen design, The graphical user interface popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user - Interface popularity, characteristics- Principles of user interface.	6

2	**Understanding Clients and Business Functions** Human interaction with computers Importance of human characteristics Human consideration Human Interaction speeds Understanding business Functions.	6
3	***I*nterface and Screen Design** Screen and Web Page Meaning and Purpose Organizing Elements Clearly and Meaningfully Ordering of Data and Content, Navigation and Flow Visually Pleasing Composition, Focus and Emphasis Presenting Information Simply and Meaningfully Technological Considerations in Interface Design – Graphical Systems and Web Systems	8
4	**Windows** Windows Characteristics Components of Windows Window Presentation Styles Types of Windows Organizing Windows Functions The Web and the Browser	6
5	**Mobile Applications and Information Architecture** Mobile application medium types – SMS, Mobile Websites, Mobile Web Widgets, Mobile Web Applications, Native Applications, Games, Mobile Application Media Matrix, Application Context, Utility Context, Locale Context, Informative Applications, Productivity Application Context, Immersive Full-Screen Applications, Application Context Matrix Information Architecture Introduction, Mobile Information Architecture.	6
6	**Mobile Design and Communication** Elements of Mobile Design, Mobile Design Tools, Designing for the Right Device, Designing for Different Screen Sizes. Mobile Web Development – Web Standards, Designing for Multiple Mobile Browsers, Device Plans, Mark-up, CSS, JavaScript	4

Term Work

Term Work should consist of 8-10 assignments based on topics of syllabus.
Students should Design two Interactive UI, one for Desktop Application and One for Mobile Application, using any of the software tool like HTML, CSS, java etc.

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition	Units Covered
01	The essential guide to user interface design	Wilbert O Galitz	2nd Edition; Wiley DreamTech, 2002.	1,2,3,4
02	Mobile Design and Development	Brian Fling	O'Reilly,	5,6

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
01	Human - Computer Interaction	Alan Dix	3rd Edition; Pearson Education, 2003
02	Designing the user interface	Ben Shneidermann	3rd Edition; Pearson Education, 2009.
03	Interaction Design	Prece, Rogers and Sharps	3rd Edition; Wiley DreamTech, 2011.
04	User Interface Design	SorenLauesen	Pearson Education, 2005
05	Human -Computer Interaction	D. R. Olsen	1st Edition; Cengage Learning, 2009

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9. Mobile application development (PCC- CS805)

TEACHING SCHEME	EXAMINATION SCHEME
Theory :3 Hrs./Week	**Theory :**
Tutorial :	**Term work: 50 Marks**
Practical : 4 Hrs./Week	**POE : 50 Marks**

Pre-requisites: Java and XML.

Course Objectives

1. To describe android architecture and the tools for developing android applications.
2. To create an android application.
3. To design the user interfaces used in android applications
4. To deploy android application on app market.

Course Outcomes

Upon successful completion of this course, the students will be able to:

1. To Install and configure Android application development tools.
2. To Design and develop user Interfaces for the Android platform.
3. To Design and develop database based android application.
4. To Apply Java programming concepts to Android app development

UNIT NO.	UNIT NAME & DETAILS	NO. OF LECTURES
1.	**Android Overview:** Overview of Android, History, Android Versions, Android OS stack: Linux kernel, Native Libraries/DVM, Application Framework, Applications, Activity, Activity lifecycle, Fragments, Activity Back Stack, Process and Threads. **Android Development Environment** Introduction to Android SDK, Android Emulator, Creating a Project, Project Directory Structure, DDMS, Logging in Android (Logcat), Android Manifest File, Permissions.	8
2.	**Intents and Layouts:** XML, Android View Hierarchies, Linear Layouts, Relative Layout, Table Layout, Frame Layout Sliding, Using Padding and Margins with Layouts. What Is Intent? Android Intent Messaging via Intent Objects, Types of Intents, Using Intents with Activities, Sending Intents (Telephony, SMS), Broadcast Receivers	4
3.	**Input Controls, Input Events, Dialogs:** Buttons, Text Fields, Checkboxes, Radio Buttons, Toggle Buttons, Spinners, Event Listeners, Event Handlers, Touch Mode, Handling Focus, Dialogs: Alerts, Popups, Toasts	4
4.	**Menus, Notification and ActionBar:** Menus, Options menu, Context menu, Popup menu, Handling menu click events, creating a Notification, Notification actions, Notification priority, Managing Notifications, Removing notifications.	4
5.	**Android Database and App Market:** Installing SQLite plugin, DbHelper, The Database Schema and Its Creation, Four Major Operations, Cursors, Example, publish app to the Android Market.	4
6.	**Using Common Android APIs**: Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs.	4

Term Work

- Minimum of 15 Experiments to be performed from the list given below.
- 25 marks for performance in practical and experiments as part of continuous evaluation
- 25 marks for Practical Test and oral to be conducted.

Experiment List

01. Installation of Android SDK, emulator.
02. Creating simple project and study of android project structure and installing apk on mobile device/tablet, configuring mobile device/tablet in Android Studio with developer option and running app directly on mobile device/tablet.
03. Write a program to use of different layouts.
04. Write a program to study Intents for switching between activities.
05. Write a program to use of Intents for SMS and Telephony.
06. Write a program to study and demonstrate Broadcast Receiver.
07. Program to demonstrate Buttons, Text Fields, Checkboxes, Radio Buttons, and Toggle Buttons with their events handler.
08. Program to demonstrate Spinners, Touch Mode, Alerts, Popups, and Toasts with their events handler.
09. Program to demonstrate Touch Mode, Menus with their events handler.
10. Program to demonstrate notification with their action.
11. Develop a native calculator application.
12. Implement an application that writes data to the SD card.
13. Write a mobile application that creates alarm clock.
14. Implement an application that implements Multi-threading
15. Write a program to study and use of SQLite database.
16. Study of publishing app to the Android Market.

Text Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Beginning Android application development by	Wei-Mag Lee	

2	Learning Android by Marko Gargenta Publisher	W. Jason Gilmore	O'Reilly Media
3	Android Apps for Absolute Beginners	Wallace Jackson	SECOND EDITION
4	T1., "Android Wireless Application Development"	Lauren Darcey and Shane Conder	Pearson Education,2nd ed.

Reference Books

Sr. No.	Title	Author(s) Name	Publication & Edition
1	Application Development	Reto Meier	Wiley India
2	Android in Action	W.FrankAbleson, RobiSen, Chris King, C. Enrique Ortiz	Third Edition
3	The Android Developer's Cook book "Building Applications with the Android SDK"	James Steele	
4	Beginning Android	Mark L Murphy	Wiley India Pvt Ltd
5	Android Application Development All in one for Dummies	Barry Burd	Edition: I

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10. Project-II (PW- CS806)

TEACHING SCHEME	EXAMINATION SCHEME
Theory : NA	**Theory** : NA
Tutorial : NA	**Term work: 50 Marks**
Practical : 4 Hrs./Week	**Demo & OE : 50 Marks**

Pre-requisites: Project - I.

Course Objectives

1. Students should learn to design and develop usable User Interface
2. Students should learn to analyze and apply emerging technologies in development of a project
3. Students should learn to test the modules in Project
4. Students should learn to demonstrate working of project

Course Outcomes

Upon successful completion of this course, the students will be able to:

1. Design and develop usable User Interface
2. Analyze and apply emerging technologies in development of a project
3. Test the modules in Project
4. Demonstrate working of project

Contents

The group will continue to work on the project selected during the semester VII and submit the completed

Project work to the department at the end of semester VIII as mentioned below.

1. The workable project.
2. The project report in the bound journal complete in all respect with the following : -
    i. Problem specifications
    ii. System definition – requirement analysis.
    iii. System design – dataflow diagrams, database design
    iv. System implementation – algorithm, code documentation
    v. Test results and test report.
    vi. In case of object oriented approach – appropriate process be followed.

CIE will be jointly assessed by a panel of teachers appointed by head of the Institution. SEE examination will

be conducted by internal and external examiners

Note:

1. Project work should be continually evaluated based on the contributions of the group members, originality of the work, innovations brought in, research and developmental efforts, depth and applicability, etc.
2. Two mid-term evaluations should be done, which includes presentations and demos of the work done.
3. **Care should be taken to avoid copying and outsourcing of the project work**

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11. Professional Skills (HM-CS807)

TEACHING SCHEME	EXAMINATION SCHEME
Theory :NA	**Theory :**NA
Tutorial :1 Hr. /Week (1 Credit)	**Term work: 50 Marks**
Practical :NA	**Mode of Evaluation: Based on Term Work Activities.**

Pre-requisites: Effective English Communication, Report Writing Skills, Technical Skills.

Course Objectives

1. To increase one's knowledge and awareness of emotional competency and emotional intelligence at place of study/work.
2. To develop interpersonal skills and adopt good leadership behavior for empowerment of self and others.
3. To set appropriate goals, manage stress and time effectively.

Course Outcomes

At the end of the program learners will be able to:
1. Recognize own strengths and opportunities.
2. Apply the life skills to different situations.
3. Speak fluently in academic and social contexts.
4. Develop Critical thinking and innovative skills.

Syllabus

I. E-Learning Course

Students are supposed to complete e-learning course from any online platforms like MOOCS/NPTEL/Swayam/Coursera/Udemy etc. related to Project work or advanced technologies.
Duration of the Course should be minimum 4 weeks.
At the end of course students are advised to attend the exam and get the certificate for the same.

II. Professional Skills: Career Skills

1. Resume Skills
2. Interview Skills / Online Interview

3. Group Discussion Skills
4. Exploring Career Opportunities

III. Professional Skills: Team Skills

1. Presentation Skills
2. Trust and Collaboration
3. Brainstorming
4. Social and Cultural Etiquettes
5. Internal Communication
6. Social Media Profile Building

IV. Leadership and Management Skills

1. Leadership Skills
2. Managerial Skills
3. Time Management
4. Entrepreneurial Skills
5. Innovative Leadership and Design Thinking
6. Ethics and Integrity

V. Introduction to Critical Life skills

Leadership, teamwork, dealing with ambiguity, managing stress, motivating people, creativity, result orientation; Understanding Life Skills: Movie based learning, Self-awareness- identity, body awareness, stress management; building self-confidence; Importance of listening skills, Difference between listening and hearing, Types of listening.

Term Work

1. Students are expected to learn new application areas, enhance technical skills, and build their profile by completing E-Learning Course.
2. Prepare their resume in an appropriate template without grammatical and other errors and using proper syntax.
3. Participate in a simulated interview.
4. Actively participate in group discussions towards gainful employment.
5. Capture a self - interview simulation video regarding the job role concerned.
6. Enlist the common errors generally made by candidates in an interview.
7. Perform appropriately and effectively in group discussions.
8. Explore sources (online/offline) of career opportunities.
9. Identify career opportunities in consideration of their own potential and aspirations.
10. Use the necessary components required to prepare for a career in an identified occupation (As a case study).

Based on above activities respective guide should assess the performance of the students out of 50 marks.

Learning Resources

Text Books

1. Lewis Lansford and Peter Astley. Oxford English for Careers: Engineering 1: Student's Book. 2013. USA: Oxford University Press.
2. Jaimie Scanlon. Q: Skills for Success 1 Listening & Speaking. 2015. [Second Revised Edition]. Oxford: Oxford University Press.

Reference Books:

1. Sanjay Kumar and Puspalata. Communication Skills. 2015. [Second Edition] Print. New Delhi: Oxford University Press.
2. John Seely. Oxford Guide to Effective Writing and Speaking. 2013. [Third Edition].New Delhi: Oxford University Press.
3. Meenakshi Raman. Communication Skills. 2011. [Second Edition]. New Delhi: Oxford University Press.
4. Terry O‟Brien. Effective Speaking Skills. 2011. New Delhi: Rupa Publishers.
5. BarunMitra. Effective Technical Communication: AGuide for Scientists and Engineers. 2015. New Delhi: Oxford University Press.
6. English vocabulary in use – Alan Mc‘carthy and O‘dell
7. APAART: Speak Well 1 (English Language and Communication)
8. APAART: Speak Well 2 (Soft Skills)
9. Business Communication – Dr.Saroj Hiremath

Web References:

1 Train your mind to perform under pressure- Simon sinek
https://curiosity.com/videos/simon-sinek-on-training-your-mind-to-perform-underpressure-capture-your-flag/
2 Brilliant way one CEO rallied his team in the middle of layoffs
https://www.inc.com/video/simon-sinek-explains-why-you-should-put-people-beforenumbers.html
3 Will Smith's Top Ten rules for success
https://www.youtube.com/watch?v=bBsT9omTeh0

Online Resources:

1 https://www.coursera.org/learn/learning-how-to-learn
2 https://www.coursera.org/specializations/effective-business-communication