R-16

CURRICULUM ESSENTIALS

Handbook on Outcome Based Education

COMPUTER SCIENCE AND ENGINEERING

NARULA INSTITUTE OF TECHNOLOGY

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Institute Vision

To make the Institute excellent in technological education and research by imparting equitable, inclusive, ethical, flexible and multidisciplinary knowledge to budding technologists to serve the society.

Institute Mission

- To establish continuously improving academic ambience in the Institute in order to prepare the students with beyond curriculum knowledge, creativity, innovation, problem solving abilities, teamwork, communication skills etc. for their holistic development.
- To collaborate with Institutes of higher education, Professional Societies, R&D and Industrial organisations for continuous improvement of academic, research environment in the Institute and to build a strong Industry-Institute interface.
- To promote and nurture entrepreneurial and innovative quality of the students providing proper education, training and supportive facilities so that future entrepreneurs emerge with flying colors.
- To strengthen quality and knowledge-base of faculty through faculty development programmes for continuous upgradation to remain in tune with dynamically changing technology.
- To become a responsible contributor in the socio-economic development of the society through excellence in education and research.

Institute Quality Policy

- Adoption of appropriate standards and practices for good governance, to bring in transparency of all operations and thereby improve credibility at all levels.
- Industry-ready professionals to be developed through interactive teaching learning process involving state of the art class rooms, laboratories, libraries, corporate exposure and innovative project work.
- Higher studies/research for faculty & staff to be encouraged for up gradation of knowledge through participation in Quality Improvement Programs, Seminars, Workshops, Webinars etc.
- Laboratory facilities would be upgraded in emerging areas to promote R&D activities including participation in Govt. and Industry funded projects.
- Industrial consultancy to be carried out in an effective manner for developing sense of accomplishment.
- Interaction with Professional Societies would be encouraged for the professional growth and development of the students, faculties and staff for mutual benefit.
- NBA Accreditation for all AICTE approved programs to be obtained at the earliest and maintained on a long-term basis.
- The innovative and entrepreneurial skills of the students to be nurtured through Innovation & Incubation centre, finally culminating in start-ups.

Department Vision

To develop responsible citizens who would 'think global and act local' and become the change agents of society to meet the challenges of future.

Department Mission

The mission of the Computer Science and Engineering Department is to build and sustain a high quality and broad area-based teaching and research program in computer science, to prepare students for successful professional careers both in industry, academics and as entrepreneurs, and to provide service to the nation as a good human being.

Program Educational Objectives (PEOs)

B. Tech in Computer Science and Engineering

PEO1. Graduates are prepared to be employed in IT industries and be engaged in learning, understanding, and applying new ideas.

PEO2. Graduates are prepared to take up Masters / Research programs.

PEO3. Graduates are prepared to be responsible computing professionals in their own area of interest.

PEO4. Graduates are prepared to be good entrepreneurs and responsible social representatives.

Program outcomes (POs)

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. ***Communication:*** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project rith and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

B. Tech in Computer Science and Engineering

PEO5. The ability to understand, illustrate, discuss, explain the fundamental design and working principle of any existing or new computing model or concept related to the field of computer science and engineering and analyze the utility of the model or concept in respect of its capability of addressing and solving the relevant issues or problems.

PEO6. The ability to identify and formulate a problem within the scope of computer science and engineering domain for proposing software application-based or research-based solution models with adequate justification by applying the relevant domain knowledge.

PEO7. The ability to ideate, design, implements and analyse a solution proposal with proper documentation demonstrating adequate software engineering management skill along with the necessary technical skill for driving propensity towards technological innovation boosted with research and entrepreneurial aptitude for producing globally competent engineering professionals capable of making meaningful contributions in the field of computer science and engineering.

Curriculum Structure

Department: Computer Science and Engineering

1st Semester						
Course Code	**Course Title**	**Total Number of contact hours**				**Credits**
		Lecture(L)	**Tutorial(T)**	**Practical(P)**	**Total Hours**	
THEORY						
M 101	Mathematics –I	3	1	0	4	4
CH 101/ PH 101	Chemistry (Gr. A) / Physics - I(Gr. B)	3	1	0	4	4
EE 101/ EC 101	Basic Electrical Engineering (Gr. A) / Basic Electronics Engineering (Gr. B)	3	1	0	4	4
HU 101	Communicative English	2	0	2	2	2
ME 101	Engineering Mechanics	3	1	0	4	4
PRACTICAL						
HU191	Lang. Lab. and Seminar Presentation	0	0	2	2	1
CH 191/ PH191	Chemistry Lab (Gr. A) / Physics -I Lab(Gr. B)	0	0	3	3	2
EE 191/ EC 191	Basic Electrical Engineering Lab (Gr. A) /Basic Electronics Engineering Lab(Gr. B)	0	0	3	3	2
ME 191/ ME 192	Engg Drawing & Graphics(Gr A)/ Workshop Practice (Gr-B)	0	0	3	3	2
XC181	Extra Curricular Activity (NSS/ NCC)	0	0	2	2	1

2nd Semester						
Course Code	Course Title	Total Number of contact hours				Credits
		Lecture(L)	Tutorial(T)	Practical(P)	Total Hours	
THEORY						
M 201	Mathematics –II	3	1	0	4	4
CH 201/ PH 201	Chemistry (Gr. B) / Physics - I(Gr. A)	3	1	0	4	4
EE 201/ EC 201	Basic Electrical Engineering (Gr. B) / Basic Electronics Engineering (Gr. A)	3	1	0	4	4
CS 201	Computer Fundamentals & Principle of Computer Programming	3	1	0	4	4
ME 201	Engineering Thermodynamics & Fluid Mechanics	3	1	0	4	4
PRACTICAL						
CS291	Computer Fundamentals & Principle of Computer Programming Lab	0	0	3	3	2
CH 291/ PH291	Chemistry Lab (Gr. B) / Physics -I Lab(Gr. A)	0	0	3	3	2
EE 291/ EC 291	Basic Electrical Engineering Lab (Gr. B) /Basic Electronics Engineering Lab(Gr. A)	0	0	3	3	2
ME 291/ ME 292	Engg Drawing & Graphics(Gr B)/ Workshop Practice (Gr-A)	0	0	3	3	2
MC 281	Soft Skill Development	0	0	2	2	0

3rd Semester						
Course Code	**Course Title**	**Total Number of contact hours**				**Credits**
		Lecture(L)	**Tutorial(T)**	**Practical(P)**	**Total Hours**	
THEORY						
M(CSE)301	Mathematics-III	3	1	0	4	4
PH301	Physics-II	3	0	0	3	3
EE(CSE) 301	Circuit Theory and Network	3	0	0	3	3
CS301	Data Structures	3	0	0	3	3
CS302	Digital Electronics and Computer Organization	3	0	3	3	3
PRACTICAL						
PH391	Physics-II Lab	0	0	3	3	2
EE(CSE)391	Circuit Theory and Network Lab	0	0	3	3	2
CS391	Data Structures Lab	0	0	3	3	2
CS392	Digital Electronics and Computer Organization Lab	0	0	3	3	2
HU381	Technical Report writing and Language Practice Lab	0	0	2	2	1

4th Semester						
Course Code	**Course Title**	**Total Number of contact hours**				**Credits**
		Lecture(L)	**Tutorial (T)**	**Practical (P)**	**Total Hours**	
THEORY						
M(CSE)401	Numerical Methods and Statistics	3	0	0	3	3
HU401	Environmental science	2	0	0	2	2
CS401	Computer Architecture	3	0	0	3	3
CS402	Design and Analysis of Algorithms	3	0	0	3	3
CS 403	Formal Language And Automata Theory	3	0	0	3	3
PRACTICAL						
M(CSE)491	Numerical Methods and Statistics Lab	3	0	0	3	2
CS491	Computer Architecture Lab	0	0	3	3	2
CS492	Algorithms Lab	0	0	3	3	2
CS493	Programming with C++ Lab	1	0	2	3	2
MC 481	Technical Communication & Soft Skills	0	0	3	3	2 units

5th Semester						
Course Code	**Course Title**	**Total Number of contact hours**				**Credits**
		Lecture(L)	**Tutorial (T)**	**Practical (P)**	**Total Hours**	
THEORY						
CS501	Computer Graphics	3	0	0	3	3
CS502	Operating System	3	0	0	3	3
HU 503	Economics for Engineers	2	0	0	2	2
CS503	Data Base Management System	3	0	0	3	3
CS(IT)504/ CS(IT)504/ CS(IT)504C	Object Oriented Programming using Java/ Multimedia Technology/Communication Engineering	3	0	0	3	3
CS505A/ CS505B/ CS505C	Operations Research/ Computational Geometry/ Digital Signal Processing	3	0	0	3	3
PRACTICAL						
CS591	Computer Graphics Lab	0	0	3	3	2
CS592	Operating System Lab	0	0	3	3	2
CS 593	Data Base Management System Lab	0	0	3	3	2
CS(IT)594A/ CS(IT)594B/C S(ECE)594C	Object Oriented Programming Lab/ Multimedia Technology Lab/ Communication Engineering Lab	0	0	3	3	2
MC581	General Aptitude /Foreign Language	0	0	3	3	2 unit

6th Semester						
Course Code	Course Title	Total Number of contact hours				Credits
		Lecture(L)	Tutorial (T)	Practical (P)	Total Hours	
THEORY						
CS601	Computer Network	3	0	0	3	3
CS602	Microprocessor and Microcontroller	3	0	0	3	3
CS603	Software Engineering	3	0	0	3	3
CS604A/ CS604B/ CS604C	Compiler Design/ Robotics/ Simulation and modeling	3	0	0	3	3
IT(CSE)605A/ IT(CSE)605B/ IT(CSE)605C/ IT(CSE)605D	Pattern Recognition/ Distributed Operating System/ Distributed Database/ Computer Vision	3	0	0	3	3
IT(CSE)606A/ IT(CSE)606B/ IT(CSE)606C/	Data Warehousing and Data Mining/ Digital Image Processing/ E-commerce and ERP	3	0	0	3	3
PRACTICAL						
CS691	Computer Network Lab	0	0	3	3	2
CS692	Microprocessor and Microcontroller Lab	0	0	3	3	2
CS693	Software Engineering Lab	0	0	3	3	2
CS682	Mini Project	0	0	3	3	2
CS681	Group Discussion and Seminar	0	0	3	3	2

7th Semester						
Course Code	**Course Title**	**Total Number of contact hours**				**Credits**
		Lecture(L)	**Tutorial (T)**	**Practical (P)**	**Total Hours**	
THEORY						
CS701	Artificial Intelligence	3	0	0	3	3
HU702	Values & Ethics in Profession	2	0	0	2	2
CS702A/CS702B/CS702C	Soft Computing/ Natural Language Processing / Web technology	3	0	0	3	3
CS703A/CS703B/CS703C	Cloud Computing/ Data Analytics/ Sensor Network and IOT	3	0	0	3	3
CS704A/ CS704B/ CS704C	Distributed Algorithms/ Bio-informatics/ Cryptography and Network Security	3	0	0	3	3
PRACTICAL						
CS791	Artificial Intelligence Lab	0	0	3	3	2
CS792A/ CS792B/ CS792C	Soft Computing Lab/ Natural Language Processing Lab/ Web Technology Lab	0	0	3	3	2
CS795	Project-1	0	0	3	3	2
CS781	Industrial Training	0	0	0	0	2
MC781	Technical Skill Development	0	0	3	3	2 unit

8th Semester						
Course Code	**Course Title**	**Total Number of contact hours**				**Credits**
		Lecture(L)	**Tutorial (T)**	**Practical (P)**	**Total Hours**	
THEORY						
HU804	Principles of Management	2	0	0	2	2
CS801A/ CS801B/ CS801C/ CS801D	Mobile Computing/ Human computer Interaction/ Cyber Law and Security Policy/ VLSI Design	3	0	0	3	3
CS802A/ CS802B/ CS802C/ CS802D	Parallel Computing/ Machine Learning/ Real Time Operating System and Embedded System/ Advanced Computer Architecture	3	0	0	3	3
PRACTICAL						
CS891	Design lab	0	0	3	3	2
CS892	Project 2	0	0	12	9	6
CS893	Seminar Presentation	0	0	3	3	2
CS881	Grand Viva	0	0	0	0	4

Course Name: Mathematics –I
Course Code: M101
Contact: 3:1:0
Total Contact Hours: 48
Credits: 4

Course Outcomes (COs):

After completion of the course students would be able to

CO1	Understand and recall the properties and formula related to matrix algebra, differential calculus, integral calculus and vector algebra.
CO2	Determine the solutions of the problems related to matrix algebra, differential calculus, multivariable calculus, vector calculus and infinite series.
CO3	Apply the appropriate mathematical tools of matrix algebra, differential calculus, Integral Calculus, multivariable calculus, vector calculus and infinite series for the solutions of the related problems.
CO4	Analyze different engineering problems linked with matrix algebra, differential calculus, Integral Calculus, multivariable calculus, vector calculus,
CO5	Apply different engineering problems linked with matrix algebra, differential calculus, Integral Calculus, multivariable calculus, vector calculus.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
M101.1	3	3	2	-								2
M101.2	3	3	3	3								2
M101.3	3	3	3	3								2
M101.4	3	3	3	3								2
M101.5	3	3	3	3								2

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
M101.1	2	2	2
M101.2	2	2	2
M101.3	2	2	2
M101.4	2	2	2
M101.5	2	2	2

Course Name: Physics
Course Code: PH101
Contact: 3:1:0
Total Contact Hours: 48
Credits: 4

Course Outcomes (COs):

After completion of the course students would be able to

PH101.1	Describe various types of mechanical resonance and its electrical equivalence
PH101.2	Explain basic principles of Laser, Optical fibers and Polarization of light
PH101.3	Apply superposition principle to explain interference and diffraction
PH101.4	Analyze different crystallographic structures according to their co-ordination number and packing factors
PH101.5	Determine and justify the need of a quantum mechanics as remedy to overcome limitations imposed by classical physics

CO-PO

Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PH101.1	3	3	2	2								
PH101.2	3	3	2	2								
PH101.3	3	3	2	2								
PH101.4	3	3	2	2								
PH101.5	3	3	2	2								

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
PH101.1	2	2	2
PH101.2	2	2	2
PH101.3	2	2	2
PH101.4	2	2	2
PH101.5	2	2	2

Course Name: Basic Electronics Engineering
Course Code: EC101
Contact: 3:1:0
Total Contact Hours: 40
Credits: 4

Course Outcomes (COs):

After completion of the course students would be able to

CO1	Study PN junction diode, ideal diode, diode models and its circuitanalysis,
CO2	Learn how operational amplifiers are modeled and analyzed, and to design Op-Amp circuits to perform operations such as integration, differentiation on electronic signals
CO3	Study the concepts of both positive and negative feedback in electroniccircuits
CO4	Develop the capability to analyze and design simple circuits containing non-linear elements such as transistors using the concepts of load lines, operating points and incremental analysis.
CO5	Learn how the primitives of Boolean algebra are used to describe theprocessing of binary signals.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
EC101.1	2	3	3	3								
EC101.2	3		3									
EC101.3	3		3	3								
EC101.4	2	3	3									
EC101.5	3	3	2	3								

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
EC101.1	2	2	2
EC101.2	2	3	2
EC101.3	2	2	2
EC101.4	3	2	2
EC101.5	2	2	2

Course Name: Communicative English
Course Code: HU101
Contact: 2:0:0
Total Contact Hours: 26
Credits: 2

Course Outcomes (COs):

After completion of the course students would be able to

CO1	Understand about and use the modalities and nuances of communication in a workplace context.
CO2	Understand about communicating across cultures and societies.
CO3	Understand and know about and apply the basic formats, templates of business and official communication.
CO4	Understand and know about and employ formal communication modes in meetings and reports.
CO5	Understand and know about and use objective and culturally neutral language in interpersonal and business communication.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
HU101.1							2		3	3		3
HU101.2							2		3	3		3
HU101.3							2		3	3		3
HU101.4							2		3	3		3
HU101.5							2		3	3		3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
HU101.1	2	2	2
HU101.2	2	2	2
HU101.3	2	2	2
HU101.4	2	2	2
HU101.5	2	2	2

Course Name: Engineering Mechanics
Course Code: ME 101
Contact: 3:1:0
Total Contact Hours: 48
Credits: 4

Course Outcomes (COs):

After completion of the course students would be able to

CO1	Construct free body diagram and calculate the reactions necessary to ensure static equilibrium.
CO2	Study the effect of friction in static and dynamic conditions.
CO3	Understand the different surface properties, property of masses and material properties.
CO4	Analyze and solve different problems of kinematics and kinetics.
CO5	Analyze and study the fundamentals of electrical Power systems and Control Systems

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
ME101.1	2	2	2	2	3							
ME101.2	3	3	3	3	2							
ME101.3	3	3	3	2	2							
ME101.4	2	2	3	2	2							
ME101.5	2	3	2	2	2							

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
ME101.1	2	2	2
ME101.2	2	2	2
ME101.3	2	2	2
ME101.4	2	2	2
ME101.5	2	2	2

Course Name: Language Lab and Seminar Presentation
Course Code: HU191
Contact: 0:0:2
Total Contact Hours: 26
Credits: 1

Course Outcomes (COs):

After completion of the course students would be able to

CO1	Able to understand advanced skills of Technical Communication in English through Language Laboratory.
CO2	Able to apply listening, speaking, reading and writing skills in societal and professional life.
CO3	Able to demonstrate the skills necessary to be a competent Interpersonal communicator.
CO4	Able to analyze communication behaviors.
CO5	Able to adapt to multifarious socio-economical and professional arenas with the help ofeffective communication and interpersonal skills.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
HU191.1							2		3	3		2
HU191.2							2		3	3		2
HU191.3							2		3	3		2
HU191.4							2		3	3		2
HU191.5							2		3	3		2

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
HU191.1	2	2	2
HU191.2	2	2	2
HU191.3	2	2	2
HU191.4	2	2	2
HU191.5	2	2	2

Course Name: Physics I Lab

Course Code: PH 191
Contact Hours: 0:0:3
Credit: 2

Course Outcomes (COs):

After completion of the course students would be able to

CO1	Demonstrate experiments allied to their theoretical concepts
CO2	Conduct experiments using LASER, Optical fiber, Torsional pendulum, Spectrometer
CO3	Analyze and participate as an individual and as a member or leader in groups in laboratory sessions actively.
CO4	Analyze experimental data from graphical representations, and to communicate effectively them in Laboratory reports including innovative experiments.
CO5	Design solutions for real life challenges.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PH191.1	2	3	2	3	3							
PH191.2	2	3	2	3	3							
PH191.3	2	3	2	3	3							
PH191.4	2	3	2	3	3							
PH191.5	2	3	2	3	3							

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
PH191.1	2	2	2
PH191.2	2	2	2
PH191.3	2	2	2
PH191.4	2	2	2
PH191.5	2	2	2

Course Name: Basic Electronics Engineering Lab
Course Code: EC 191
Contact Hours: 0:0:3
Total Contact Hours: 36
Credit: 2

Course Outcomes (COs):

After completion of the course students would be able to

CO1	Knowledge of Electronic components such as Resistors, Capacitors, Diodes, Transistors measuring equipment like DC power supply, Multimeter, CRO, Signal generator, DC power supply.
CO2	Analyze the characteristics of Junction Diode, Zener Diode, BJT & FET anddifferent types of Rectifier Circuits.
CO3	Determination of input-offset voltage, input bias current and Slew rate, Common-mode Rejection ratio, Bandwidth and Off-set null of OPAMPs.
CO4	Able to know the application of Diode, BJT &OPAMP.
CO5	Familiarization and basic knowledge of Integrated Circuits

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
EC191.1	3	3	3	3	3							
EC191.2	3	3	3	3	3							
EC191.3	3	3	3	3	3							
EC191.4	3	3	3	3	3							
EC191.5	3	3	3	3	3							

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
EC191.1	2	2	2
EC191.2	2	2	2
EC191.3	2		2
EC191.4	2	2	2
EC191.5	2	2	2

Course Name: Engineering Drawing & Graphics
Course Code: ME 191
Contact Hours: 0:0:3
Total Contact Hours: 36
Credit: 2

Course Outcomes (COs):

After completion of the course students would be able to

CO1	Understand Engineering Graphics and visual aspects of design.
CO2	Understand and apply common drafting tools with the knowledge of drafting standards.
CO3	Apply computer aided drafting techniques to represent line, surface or solid models in different Engineering viewpoints.
CO4	Create part models; carry out assembly operation and show working procedure of a designed project work using animation.
CO5	Apply common drafting tools with the knowledge of drafting standards and create project work using animation.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
ME191.1	3	3	3	3	3							
ME191.1	3	3	3	3	3							
ME191.1	3	3	3	3	3							
ME191.1	3	3	3	3	3							
ME191.1	3	3	3	3	3							

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
ME191.1	2	2	2
ME191.1	2	2	2
ME191.1	2	2	2
ME191.1	2	2	2
ME191.1	2	2	2

Course Name: Extra Curricular Activity
Course Code: XC 181
Contact: 0:0:2
Total Contact Hours: 36
Credits: 1

Course Outcomes (COs):

After completion of the course students would be able to

CO1	To increase student awareness about the weaker and unprivileged sections of society
CO2	To expose students to environmental issues and ecological concerns
CO3	To make students self aware about their participatory role in sustaining society and the environment
CO4	Apply and produce small devices of their interest in project or research purpose.
CO5	Apply safety measures with simple components with their own hands.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
XC181.1						3	3	3	3			
XC181.2						3	3	3	3			
XC181.3						3	3	3	3			
XC181.4						3	3	3	3			
XC181.5						3	3	3	3			

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
XC181.1	2	2	2
XC181.2	2	2	2
XC181.3	2	2	2
XC181.4	2	2	2
XC181.5	2	2	2

Course Name: Mathematics- II
Course Code: M 201
Contact: 3:1:0
Total Contact Hours: 48
Credits: 4

Course Outcomes (COs):

After completion of the course students would be able to

CO1	Determine and recall the properties and formula related to Ordinary differential equations, Basic Graph Theory and Laplace transform.
CO2	Determine the solutions of the problems related to Ordinary differential equations, Basic Graph Theory and Laplace transform.
CO3	Apply appropriate mathematical tools of Ordinary differential equations, Basic Graph Theory and Laplace transform.
CO4	Analyze engineering problems on Ordinary differential equations, Basic Graph Theory and Laplace transform.
CO5	Apply engineering solutions by using Ordinary differential equations, Basic Graph Theory and Laplace transform.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
M201.1	3	3	2	-								2
M201.2	3	3	3	3								2
M201.3	3	3	3	3								2
M201.4	3	3	3	3								2
M201.5	3	3	3	3								2

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
M201.1	2	2	2
M201.2	2	2	2
M201.3	2	2	2
M201.4	2	2	2
M201.5	2	2	2

Course Name: Chemistry
Course Code: CH 201
Contact: 3:1:0
Total Contact Hours: 40
Credits: 4

Course Outcomes (COs):

After completion of the course students would be able to

CO1	Describe and apply fundamental concepts of the chemical thermodynamics to engineering applications
CO2	Ability to analyze & design different energy storage devices
CO3	Determine, analyze and interpret the structure of organic molecules using different spectroscopic techniques
CO4	Apply the knowledge of fuel, composites, polymers and organic reactions to different industries.
CO5	Evaluate theoretical and practical aspects relating to the transfer of the production of chemical products from laboratories to the industrial scale, in accordance with environmental considerations.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CH201.1	3	2	2	2		3	3					
CH201.2	3	3	3	3		3	3					
CH201.3	3	3	2	2		3	3					
CH201.4	3	2	3	2		3	3					
CH201.5	3	3	3	3		3	3					

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CH201.1	2	2	2
CH201.2	2	2	2
CH201.3	2	2	2
CH201.4	2	2	2
CH201.5	2	2	2

Course Name: Physics
Course Code: PH 201
Contact: 3:1:0
Total Contact Hours: 40
Credits: 4

Course Outcomes (COs):

After completion of the course students would be able to

CO1	Describe various types of mechanical resonance and its electrical equivalence
CO2	Explain basic principles of Laser, Optical fibers and Polarization of light
CO3	Apply superposition principle to explain interference and diffraction
CO4	Analyze different crystallographic structures according to their co-ordination number and packing factors
CO5	Determine and justify the need of a quantum mechanics as remedy to overcome limitations imposed by classical physics

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PH201.1	3	3	2	2								
PH201.2	3	3	2	2								
PH201.3	3	3	2	2								
PH201.4	3	3	2	2								
PH201.5	3	3	2	2								

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
PH201.1	2	2	2
PH201.2	2	2	2
PH201.3	2	2	2
PH201.4	2	2	2
PH201.5	2	2	2

Course Name: Basic Electrical Engineering (Gr-B)
Course Code: EE 201
Contact: 3:1:0
Total Contact Hours: 48
Credits: 4

Course Outcomes (COs):

After completion of the course students would be able to

CO1	Understand and analyze basic electric circuits
CO2	Determine and study the working principles of electrical machines.
CO3	Understand the components of low voltage electrical installations
CO4	Design the fundamentals of electrical Power systems and Control Systems
CO5	Analyze and study the fundamentals of electrical Power systems and Control Systems

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
EE201.1	3	3	3	3								
EE201.2	3	3	3	3								
EE201.3	3	3	3	3								
EE201.4	3	3	3	3								
EE201.5	3	3	3	3								

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
EE201.1	2	2	2
EE201.2	2	2	2
EE201.3	2	2	2
EE201.4	2	2	2
EE201.5	2	2	2

Course Name: Basic Electronics Engineering (Gr. A)
Course Code: EC201
Contact: 3:1:0
Total Contact Hours: 40
Credits: 4

Course Outcomes (COs):

After completion of the course students would be able to

CO1	Study PN junction diode, ideal diode, diode models and its circuitanalysis, application of
CO2	Learn how operational amplifiers are modeled and analyzed, and to design Op-Amp circuits to perform operations such as integration, differentiation on electronic signals
CO3	Study the concepts of both positive and negative feedback in electroniccircuits
CO4	Develop the capability to analyze and design simple circuits containing non-linear elements such as transistors using the concepts of load lines, operating points and incremental analysis.
CO5	Learn how the primitives of Boolean algebra are used to describe the processing of binary signals.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
EC201.1	2	3	3	3								
EC201.2	3		3									
EC201.3	3		3	3								
EC201.4	2	3	3									
EC201.5	3	3	2	3								

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
EC201.1	2	2	2
EC201.2	2	2	2
EC201.3	2	2	2
EC201.4	2	2	2
EC201.5	2	2	2

Course Name: Computer Fundamentals & Principle of Computer Programming
Course Code: CS201
Contact: 3:1:0
Total Contact Hours: 40
Credits: 4

Course Outcomes (COs):

After completion of the course students would be able to

CO1	Understand the fundamental concept of Computer and mathematical knowledge and apply them in designing and analyzing solution to engineering problem.
CO2	Understand the basic concept of C programming and use of data types/operators/input/output function for developing and implementing complete program leading to solution of mathematical and engineering problem.
CO3	Use conditional branching, iteration, recursion and formulate algorithms and programs in solving
CO4	Understand the concept of arrays, pointers, file and dynamic memory allocation and apply it for problem solving and also create new data types using structure, union and enum.
CO5	Understand how to decompose a problem into functions and assemble into a complete program by means of modular programming possibly as a team.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS201.1	3	3	3	2	2							
CS201.2	3	2	2	2	2							
CS201.3	3	3	3	2	2							
CS201.4	3	3	3	2	2							
CS201.5	3	3	3	2	2							

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS201.1	3	3	3
CS201.2	3	3	3
CS201.3	3	3	3
CS201.4	3	3	3
CS201.5	3	3	3

Course Name: Engineering Thermodynamics and Fluid Mechanics
Course Code: ME201
Contact: 3:1:0
Total Contact Hours: 48
Credits: 4

Course Outcomes (COs):

After completion of the course students would be able to

CO1	Know about thermodynamic equilibrium, heat & work transfer, First law and its application.
CO2	Understand the basic concepts of Heat Engine, Entropy from Second law of thermodynamics
CO3	Know the thermodynamic characteristics of a pure substance and its application in power cycles (Simple Rankine cycles, Air Standard cycles)
CO4	Knowledge of basic principles of fluid mechanics.
CO5	Ability to analyze fluid flow problems with the application of the momentum and energy equations.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
ME201.1	3	3	3	3								
ME201.2	3	3	3	3								
ME201.3	3	3	3	3								
ME201.4	3	3	3	3								
ME201.5	3	3	3	3								

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
ME201.1	2	2	2
ME201.2	2	2	2
ME201.3	2	2	2
ME201.4	2	2	2
ME201.5	2	2	2

Course Name: Programming for Problem Solving Lab
Course Code: CS 291
Contact: 0:0:3
Credits: 1.5

Course Outcomes (COs):

After completion of the course students would be able to

CO1	Understand and propose appropriate command or function in running system or developing program for engineering and mathematical problems depending on the platform used even in changed environment leading to their lifelong learning.
CO2	Identify and propose appropriate data type, arithmetic operators, input/output functions and also conditional statements in designing effective programs to solve complex engineering problem using modern tools.
CO3	Design and develop effective programs for engineering and mathematical problems using iterative statements as well as recursive functions using modular programming approach possibly as a team maintaining proper ethics of collaboration.
CO4	Explain and organize data in arrays, strings and structures and manipulate them through programs and also define pointers of different types and use them in defining self-referential structures and also to construct and use files for reading and writing to and from leading to solution of engineering and mathematical problem.
CO5	Prepare laboratory reports on interpretation of experimental results and analyze it for validating the same maintaining proper ethics of collaboration.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS291.1	3	3	3	3	3							
CS291.2	3	3	2	3	3							
CS291.3	3	3	3	3	3							
CS291.4	3	3	3	3	3							
CS291.5	3	3	3	3	3							

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS291.1	3	3	3
CS291.2	3	3	3
CS291.3	3	3	3
CS291.4	3	3	3
CS291.5	3	3	3

Course Name: Chemistry Lab (Gr. A)
Course Code: CH 291
Contact: 0:0:3
Total Contact Hours: 36
Credits: 2

Course Outcomes (COs):

After completion of the course students would be able to

CO1	Understand different types of instruments for estimation of small quantities chemicals used in industries, scientific and technical fields.
CO2	Analyze and determine the composition of liquid and solid samples working as an individual and also as a team member.
CO3	Analyze different water quality parameters considering public health and environment.
CO4	Synthesize drug and polymer materials considering public health and environmental safety.
CO5	Design innovative experiments applying the fundamental theory of chemistry.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CH291.1	2	3	3	3	3	2	3					
CH291.2	2	3	3	3	3	2	3					
CH291.3	2	3	3	3	3	2	3					
CH291.4	2	3	3	3	3	2	3					
CH291.5	2	3	3	3	3	2	3					

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CH291.1	2	2	2
CH291.2	2	2	2
CH291.3	2	2	2
CH291.4	2	2	2
CH291.5	2	2	2

Course Name: Physics I Lab
Course Code: PH 291
Contact Hours: 0:0:3
Credit: 2

Course Outcomes (COs):

After completion of the course students would be able to

CO1	Demonstrate experiments allied to their theoretical concepts
CO2	Conduct experiments using LASER, Optical fiber, Torsional pendulum, Spectrometer
CO3	Analyze and participate as an individual and as a member or leader in groups in laboratory sessions actively.
CO4	Analyze experimental data from graphical representations, and to communicate effectively them in Laboratory reports including innovative experiments.
CO5	Design solutions for real life challenges.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PH291.1	2	3	3	2	3							
PH291.2	2	3	3	2	3							
PH291.3	2	3	3	2	3							
PH291.4	2	3	3	2	3							
PH291.5	2	3	3	2	3							

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
PH291.1	2	2	2
PH291.2	2	2	2
PH291.3	2	2	2
PH291.4	2	2	2
PH291.5	2	2	2

Course Name: Basic Electrical Engineering Lab
Course Code: EE 291
Contact Hours: 0:0:3
Credit: 2

Course Outcomes (COs):

After completion of the course students would be able to

CO1	Identify and use common electrical components
CO2	To develop electrical networks by physical connection of various components and analyze the circuit behaviour.
CO3	Apply and analyze the basic characteristics of transformers and electrical machines.
CO4	Illustrate the venin's, Norton's, superposition and maximum power transfer theorem.
CO5	Create resonance condition in R-L-C series and parallel circuit and learn how to draw phasor diagram for the circuit

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
EE291.1	2	2	3	3	3							
EE291.2	3	2	2	3	3							
EE291.3	2	3	2	3	2							
EE291.4	2	2	2	3	2							
EE291.5	2	3	2	3	3							

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
EE291.1	3		2
EE291.2	3		
EE291.3	3	2	3
EE291.4	3	2	3
EE291.5	3		

Course Name: Basic Electronics Engineering Lab
Course Code: EC 291
Contact Hours: 0:0:3
Total Contact Hours: 36
Credit: 2

Course Outcomes (COs):

After completion of the course students would be able to

CO1	Knowledge of Electronic components such as Resistors, Capacitors, Diodes, Transistors measuring equipment like DC power supply, Multimeter, CRO, Signal generator, DC power supply.
CO2	Analyze the characteristics of Junction Diode, Zener Diode, BJT & FET and different types of Rectifier Circuits.
CO3	Determination of input-offset voltage, input bias current and Slew rate, Common-mode Rejection ratio, Bandwidth and Off-set null of OPAMPs.
CO4	Able to know the application of Diode, BJT &OPAMP.
CO5	Familiarization and basic knowledge of Integrated Circuits

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
EC291.1	3		3	2	3							
EC291.2	3	3	3		3							
EC291.3	3	3		2	3							
EC291.4	3		3		3							
EC291.5	3	3		1	3							

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
EC291.1	2	2	2
EC291.2	2		2
EC291.3		2	2
EC291.4	2		
EC291.5	2	2	2

Course Name: Engineering Drawing & Graphics
Course Code: ME 291
Total Contact Hours: 36
Credit: 2

Course Outcomes (COs):

After completion of the course students would be able to

CO1	Learn basics of drafting and use of drafting tools which develops the fundamental skills of industrial drawings.
CO2	Know about engineering scales, dimensioning and various geometric curves necessary to understand design of machine elements.
CO3	Understand projection of line, surface and solids to create the knowledge base oforthographic and isometric view of structures and machine parts.
CO4	Become familiar with computer aided drafting useful to share the design model to different section of industries
CO5	Become familiar with computer aided drafting useful to share the design model to different section of for research & development.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
ME291.1	3	3	3	3	3							
ME291.2	3	3	3	3	3							
ME291.3	3	3	3	3	3							
ME291.4	3	3	3	3	3							
ME291.5	3	3	3	3	3							

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
ME291.1	2	2	2
ME291.2	2	2	2
ME291.3	2	2	2
ME291.4	2	2	2
ME291.5	2	2	2

Course Name: Workshop Practice
Course Code: ME 292
Total Contact Hours: 36
Credit: 2

Course Outcomes (COs):

After completion of the course students would be able to

CO1	Identify and operate various hand tools related to variety of manufacturing
CO2	Apply safely fabricate simple components with their own hands.
CO3	Apply practical knowledge of the dimensional accuracies and tolerances applicable for different manufacturing processes.
CO4	Apply and produce small devices of their interest in project or research purpose.
CO5	Apply safety measures with simple components with their own hands.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
ME291.1	3	3	3	3	3							
ME291.2	3	3	3	3	3							
ME291.3	3	3	3	3	3							
ME291.4	3	3	3	3	3							
ME291.5	3	3	3	3	3							

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
ME291.1	2	2	2
ME291.2	2	2	2
ME291.3	2	2	2
ME291.4	2	2	2
ME291.5	2	2	2

Course Name: Mathematics-III
Course Code: M(CSE)301
Contact: 3:1:0
Total Contact Hours: 36
Credits: 4

Course Outcome(s):
After completion of the course students will be able to

CO1	Understand the fundamental concepts of Set Theory to Explain or Illustrate and Identify problems where students can Apply the concept appropriately to Solve them.
CO2	Understand the fundamental concepts of Mathematical Logic and Proof Techniques so that they can Prove theorems using Proof Techniques and Mathematical Logic Frameworks to justify a claim.
CO3	Explain or Illustrate the fundamental Theory of Numbers and Identify problems where students can Use the concept appropriately to Solve them.
CO4	Explain or Illustrate the fundamental principles of Algebraic Structures and Identify problems where students can Apply the concept appropriately to Solve them.
CO5	Develop ideas to Propose solutions to the problems of Graph Theory and Identify problems where students can Apply the concept appropriately and Analyze the effectiveness as well as limitations of solutions making the students aware of its utilitarian importance for further explorations leading towards lifelong learning.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
M(CSE)301.1	3	3	2									
M(CSE)301.2	3	3	2	2								
M(CSE)301.3	3	3	2									
M(CSE)301.4	3	3	2									
M(CSE)301.5	3	3	2	3								

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
M(CSE)301.1	2	2	2
M(CSE)301.2	2	2	2
M(CSE)301.3	2	2	2
M(CSE)301.4	2	2	2
M(CSE)301.5	2	2	2

Course Name: Physics-II
Course Code: PH 301
Contact: 3:0:0
Total Contact Hours: 33
Credits: 3

Course Outcomes (COs):

After completion of the course students would be able to

CO1	Understand basic postulates of Quantum Mechanics.
CO2	Understand the basic postulates of Quantum Mechanics.
CO3	Understand the macro state for thermodynamic system, thermodynamic probability and phase space.
CO4	Understand Guass's law, Faraday's law and Ampere's critical law.
CO5	Understand the properties of Nano material.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PH301.1	3	2	3	3								
PH301.2	3	3	2	2								
PH301.3	3	2	3	3								
PH301.4	3	2	2	2								
PH301.5	3	2	2	2								

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
PH301.1	3	2	2
PH301.2	2	3	2
PH301.3	3	2	2
PH301.4	2	2	2
PH301.5	3	3	3

Course Name: Circuit Theory and Network
Course Code: EE(CSE) 301
Contact: 3:0:0
Total Contact Hours: 33
Credits: 3

Course Outcomes (COs):

After completion of the course students would be able to

CO1	Understand various kinds of sources and their symbols, identify and use Kirchhoff's Laws and Networks theorem for simple circuit analyses.
CO2	Understand the concept of DC & AC transient analysis.
CO3	Understand expressions and perform calculations relating to the Transient response, Laplace transform, Two port network and Graph theory
CO4	Understand initial & final value theorem and its applications both time & s domain.
CO5	Will solve circuits using node, branch, cutest & tie set and tree the properties of Nano material.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
EE(CSE)301.1	3	2	2	2								
EE(CSE)301.2	3	2	3	2								
EE(CSE)301.3	3	2	2	2								
EE(CSE)301.4	3	2	2	2								
EE(CSE)301.5	3	2	2	2								

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
EE(CSE)301.1	2	2	2
EE(CSE)301.2	3	3	2
EE(CSE)301.3	2	3	2
EE(CSE)301.4	2	3	2
EE(CSE)301.5	2	3	2

Course Name: Data Structures
Course Code: CS 301
Contact: 3:0:0
Total Contact Hours: 33
Credits: 36

Course Outcomes (COs):

After attending the course students should be able to

CO1	Understand the concept of data structure and create new data structure to propose efficient solution by writing appropriate algorithm and program for engineering and mathematical problem after analyzing the efficiency of the same.
CO2	Identify and differentiate different types of data structures and implement the appropriate data structure after analyzing complex engineering problem leading to their lifelong
CO3	Understand and implement stack, queue and dequeue by selecting appropriate methods and use it for solving real life and engineering problem choosing appropriate modern
CO4	Understand and implement different non-linear data structures by selecting appropriate methods and apply it for solving complex engineering problem and also argue and judge maintaining the professional ethics to validate the same.
CO5	Understand different factors of sorting and searching algorithm and select the appropriate algorithm for solving complex engineering problem and also implement and analyze the algorithm.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS301.1	3	3	3	3	2							
CS301.2	3	3	3	3								3
CS301.3	3	3	3	3								
CS301.4	3	3	3	3	2			2				
CS301.5	3	3	3	3	2							

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS301.1	3	3	3
CS301.2	3	3	3
CS301.3	3	3	2
CS301.4	3	3	3
CS301.5	3	2	3

Course Name: Digital Electronics and Computer Organization
Course Code: CS302
Contact Hours/Week: 3
Credit: 3:0:0
Total Contact Hours: 36L

Course Outcomes (COs):

After attending the course students should be able to

CO1	Understand the basic gate operations and laws Boolean algebra.
CO2	Understand basic mechanism of digital computer and digital logic behind different arithmetic and control unit operations.
CO3	Design combinational circuits and combinational functions for larger more complex circuits.
CO4	Perform different operations with sequential circuits.
CO5	Understand fundamental concepts and techniques used in Logic families and PLDs.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS302.1	3	3	3	2	3							2
CS302.2	3	3	3	2	3							2
CS302.3	3	3	3	2	3							2
CS302.4	3	3	3	2	3							2
CS302.5	3	3	3	2	3							2

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS302.1	3	3	3
CS302.2	3	3	3
CS302.3	3	3	3
CS302.4	3	3	3
CS302.5	3	3	3

Course Name: Circuit Theory and Network Lab
Course Code: EE(CSE)391
Contact Hours/Week: 3P
Credit: 2

Course Outcomes (COs):

After attending the course students should be able to

CO1	Evaluate lecture material with circuit simulation software and laboratory benchexperiments
CO2	Analyze the response of Step, Ramp, Impulse and Sinusoidal signals
CO3	Solve the Laplace Transform and Inverse Laplace Transform.
CO4	Perform different operations with sequential circuits.
CO5	Conduct experimental investigation and gain knowledge of Two-port networks

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
EE(CSE)391.1	3	2	2	3	3							
EE(CSE)391.2	3	2	3	3	3							
EE(CSE)391.3	3	2	2	2	3							
EE(CSE)391.4	3	2	2	2	3							
EE(CSE)391.5	2	2	2	2	3							

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
EE(CSE)391.1	2	2	2
EE(CSE)391.2	3	3	2
EE(CSE)391.3	2	3	2
EE(CSE)391.4	2	3	2
EE(CSE)391.5	2	3	2

Course Name: Data Structures Lab
Course Code: CS391
Contact Hours/Week: 3P
Credit: 2

Course Outcomes (COs):

After attending the course students should be able to

CO1	Identify and propose appropriate data structures and data types to implement list using array and linked list and design effective programs to solve complex engineering problem using list and modern tools.
CO2	Design and develop effective programs for engineering and mathematical problems using stack, queue and recursive functions after implementing stack and queue using modular programming approach possibly as a team maintaining proper ethics of
CO3	Implement different data structures like binary tree, heap and use them to explain and organize data and manipulate them through programs leading to solution of complex engineering problem.
CO4	Implement different sorting and searching algorithm selecting appropriate data structures and analyze the efficiency of the resulting program using modern engineering tools and methods leading to lifelong learning.
CO5	Prepare laboratory reports on interpretation of experimental results and analyze it for validating the same maintaining proper ethics of collaboration.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS391.1	3	3	3	2	3							2
CS391.2	3	3	3	2	3							2
CS391.3	3	3	3	2	3							2
CS391.4	3	3	3	2	3							2
CS391.5	3	3	3	2	3							2

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS391.1	3	3	3
CS391.2	3	3	3
CS391.3	3	3	3
CS391.4	3	3	3
CS391.5	3	3	3

Course Name: Digital Electronics and Computer Organization Lab
Course Code: CS392
Contact Hours/Week: 3P
Credit: 2

Course Outcomes (COs):

After attending the course students should be able to

CO1	Understand the basic gate operations.
CO2	Understand and realize the process of Analog to Digital conversion and vice versa
CO3	Understand basic structure of different combinational circuit components- multiplexer, decoder, encoder etc.
CO4	Understand and apply different operations with flip-flop.
CO5	Understand, realize and apply different PLD operations for the given logical problem.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS392.1	3	3	3	2	3							2
CS392.2	3	3	3	2	3							2
CS392.3	3	3	3	2	3							2
CS392.4	3	3	3	2	3							2
CS392.5	3	3	3	2	3							2

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS392.1	3	3	3
CS392.2	3	3	3
CS392.3	3	3	3
CS392.4	3	3	3
CS392.5	3	3	3

Course Name: Technical Report Writing & Language Practice
Course Code: HU381
Contact Hours/Week: 2P
Credit: 1

Course Outcomes (COs):

After attending the course students should be able to

CO1	Understand and make use of a wide taxonomy of listening skills & sub-skillsfor comprehending & interpreting data in English
CO2	Speak in English, using appropriate vocabulary and pronunciation incontextualized situations
CO3	Understand and put into effective practice the pragmatics of Group Discussion
CO4	Understand and write a detailed technical report as per organizational needs
CO5	Understand and interact in professional presentations and interviews

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
HU381.1	2	2	2	2			3	3	3	3		3
HU381.2	2	2	2	2			3	3	3	3		3
HU381.3	2	2	2	2			3	3	3	3		3
HU381.4	2	2	2	2			3	3	3	3		3
HU381.5	2	2	2	2			3	3	3	3		3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
HU381.1	2	2	2
HU381.2	2	2	2
HU381.3	2	2	2
HU381.4	2	2	2
HU381.5	2	2	2

Course Name: Numerical Methods
Course Code: M(CSE) 401
Contact Hours/Week: 3P
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Recall the distinctive characteristics of various numerical techniques and theassociated error measures and Statistics.
CO2	Understand the theoretical workings of various numerical techniques and Statisticsto
CO3	Understand and put into effective practice the pragmatics of Group Discussion
CO4	Understand and write a detailed technical report as per organizational needs
CO5	Understand and interact in professional presentations and interviews

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
M(CSE)401.1	3	3	2	2								
M(CSE)401.2	3	3	2	2								
M(CSE)401.3	3	3	2	2								
M(CSE)401.4	3	3	2	2								
M(CSE)401.5	3	3	2	2								

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
M(CSE)401.1	2	2	2
M(CSE)401.2	2	2	2
M(CSE)401.3	2	2	2
M(CSE)401.4	2	2	2
M(CSE)401.5	2	2	2

Course Name: Environmental Science
Course Code: HU 401
Contact Hours/Week: 2
Credit: 2

Course Outcomes (COs):

After attending the course students should be able to

CO1	Understand the natural environment and its relationships with human activities.
CO2	Apply the fundamental knowledge of science and engineering to assess environmental and health risk.
CO3	Understand guidelines and procedures for health and safety issues obeying the environmental laws and regulations.
CO4	Develop guidelines and procedures for health and safety issues obeying the environmental laws and regulations. Acquire skills for scientific problem-solving related to air, water, noise& land pollution.
CO5	Develop skills for scientific problem-solving related to air, water, noise & land pollution.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
HU401.1			2			3	3					
HU401.2			2			3	3					
HU401.3			2			3	3					
HU401.4			2			3	3					
HU401.5			2			3	3					

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
HU401.1	2	2	2
HU401.2	2	2	2
HU401.3	2	2	2
HU401.4	2	2	2
HU401.5	2	2	2

Course Name: Computer Architecture
Course Code: CS 401
Contact Hours/Week: 3
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Illustrate the basic concept of computer architecture and its performance measurement, parallel processing, Flynn's classification and Amdahl's law and apply this knowledge in designing solution for real life engineering problem.
CO2	Summarize the basic concept of pipeline, instruction pipeline, arithmetic pipeline hazards detection and prevention and use this knowledge for designing and implementing mathematical and engineering problem leading to lifelong learning.
CO3	Identify the concept of Instruction-Level Parallelism to solve engineering problem.
CO4	Illustrate and Compare concept of Multiprocessor architecture and parallel architecture and apply this knowledge for developing an approach by means of existing and new methods as a team work.
CO5	Understand the concept of message passing architecture and interconnection network and design an optimized model for building a new solution as a professional engineering practice as a team.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS401.1	3	3	3	2								
CS401.2	3	3	3	3					2	2	2	3
CS401.3	2	2	2	3								
CS401.4	3	3	3	3								
CS401.5	3	3	3	3								

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS401.1	3	3	3
CS401.2	3	3	3
CS401.3	3	3	3
CS401.4	3	3	3
CS401.5	3	3	3

Course Name: Design and Analysis of Algorithms
Course Code: CS 402
Contact Hours/Week: 3
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	To understand and illustrate the concepts of time and space complexity, worst case, average case and best-case complexities and the asymptotic notation.
CO2	To analyze and apply the design principles and concepts to various basic algorithm design viz. dynamic programming, greedy method etc.
CO3	To understand and analyze various string matching and graph algorithms.
CO4	To understand, illustrate and analyze the different complexity classes
CO5	To discuss, implement and analyze, verify the efficiency of the randomized and approximation algorithms.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS402.1	2	2	2	2								2
CS402.2	3	3	3	3								2
CS402.3	3	3	3	3								2
CS402.4	3	3	3	3								2
CS402.5	3	3	3	3								2

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS402.1	3	3	3
CS402.2	3	3	3
CS402.3	3	3	3
CS402.4	3	3	3
CS402.5	3	3	3

Course Name: Formal Language and Automata Theory
Course Code: CS 403
Contact Hours/Week: 3
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Understand the fundamental concepts of Finite State Automata to Explain or Illustrate and Identify problems where students can Apply the concept appropriately to Solve them.
CO2	Understand the fundamental concepts of Regular Expressions and its relation with DFA so that they can Develop regular expression for a specified language and Validate it.
CO3	Understand the fundamental concepts of Context Free Grammar so that they can Design grammar for a specified language and Validate it.
CO4	Explain or Illustrate the fundamental operating principles of Push Down Automata and Use it appropriately to Solve problems.
CO5	Understand the operating principles of Turing Machine and Design Turing Machines to Propose solutions to the related problems appropriately and validate the effectiveness as well as limitations of computations making the students aware of its utilitarian importance for further explorations leading towards lifelong learning.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS403.1	3	3	3	3								3
CS403.2	2	2	2	2								3
CS403.3	3	3	3	3								3
CS403.4	3	3	3	3								3
CS403.5	3	3	3	3					2	2		3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS403.1	3	3	3
CS403.2	3	3	3
CS403.3	3	3	3
CS403.4	3	3	3
CS403.5	3	3	3

Course Name: Numerical Methods and Statistical Lab
Course Code: M(CSE)491
Contact Hours/Week: 3
Credit: 2

Course Outcomes (COs):

After attending the course students should be able to

CO1	Describe and explain the theoretical workings of numerical techniques with the help of C
CO2	Compute basic command and scripts in a mathematical programming language
CO3	Apply the programming skills to solve the problems using multiple numerical
CO4	Analyze if the results are reasonable, and then interpret and clearly communicate the
CO5	Apply the distinctive principles of numerical analysis and the associated error

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
M(CSE)491.1	3	3	2	2	3				3			
M(CSE)491.2	3	3	2	2	3				3			
M(CSE)491.3	3	3	2	2	3				3			
M(CSE)491.4	3	3	2	2	3				3			
M(CSE)491.5	3	3	2	2	3				3			

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
M(CSE)491.1	2	2	2
M(CSE)491.2	2	2	2
M(CSE)491.3	2	2	2
M(CSE)491.4	2	2	2
M(CSE)491.5	2	2	2

Course Name: Computer Architecture Lab
Course Code: CS491
Contact Hours/Week: 3
Credit: 2

Course Outcomes (COs):

After attending the course students should be able to

CO1	Illustrate and use proper syntax in appropriate platform for developing program to solve problems related to Mathematics and Engineering field leading to lifelong learning.
CO2	Apply the knowledge of algorithms in the computational area to efficient programming codes to design the problem using modern tools for solving complex engineering problems.
CO3	Outline different types of digital electronic circuits such as adder, subtract or, encoder, decoder, multiplexer, de-multiplexer, flip-flops, register, counter using various mapping and modern tools to prepare the most simplified circuit and optimize using various mapping and mathematical methods for solving the problem as a professional engineering practice as a team.
CO4	Apply the knowledge of digital electronic circuits to design memory and ALU and analyse the same to solve engineering-related computational problems as a team.
CO5	Interpret the result of the experiments, prepare laboratory reports based on observed output and analyse it to validate professional ethics and responsibilities and norms of the engineering practice.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS491.1	3	3	3	2	3				3			
CS491.2	3	3	3	3	3				3			
CS491.3	3	3	3	3	3				3			
CS491.4	3	3	3	3	3				3			
CS491.5	3	3	3	3	3				3			

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS491.1	3	3	3
CS491.2	3	3	3
CS491.3	3	3	3
CS491.4	3	3	3
CS491.5	3	3	3

Course Name: Algorithms Lab
Course Code: CS492
Contact Hours/Week: 3
Credit: 2

Course Outcomes (COs):

After attending the course students should be able to

CO1	To identify and prove the correctness and analyze the running time of the basic algorithms for those classic problems in various domains.
CO2	To understand and illustrate methods for analyzing the efficiency and correctness of algorithms (such as exchange arguments, recurrence, induction, and average case analysis)
CO3	To analyze and design algorithms using the dynamic programming, greedy method, Backtracking, Branch and Bound strategy, and recite algorithms that employ this strategy.
CO4	To understand, compare, contrast, and choose appropriate implementation of the algorithmic design techniques to present an algorithm that solves a given problem.
CO5	To Identify and analyze criteria and specifications appropriate to new problems.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS492.1	3	3	2	2	3				3			3
CS492.2	3	3	3	2	3				3			3
CS492.3	3	3	2	3	3				3			3
CS492.4	3	3	2	2	3				3			3
CS492.5	3	3	3	2	3				3			3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS492.1	3	3	3
CS492.2	3	3	3
CS492.3	3	3	3
CS492.4	3	3	3
CS492.5	3	3	3

Course Name: Programming with C++ Lab
Course Code: CS493
Contact Hours/Week: 3
Credit: 2

Course Outcomes (COs):

After attending the course students should be able to

CO1	Demonstrate a thorough understanding of modular programming by designing programs that requires the use of programmer-defined functions.
CO2	Demonstrate a thorough understanding of arrays by designing and implementing programs that search and sort arrays.
CO3	Demonstrate a thorough understanding of the object-oriented programming concepts of encapsulation, data abstraction and composition by designing and implementing classes including the use of overloaded functions and constructors.
CO4	Demonstrate a thorough understanding of the concept of pointers and dynamic memory allocation, the implementation of programmer-defined functions and classes by writing code, performing unit testing and debugging of multiple complex programs.
CO5	Demonstrate an understanding of the differences between C and C++ in the areas of strings, pass by reference/passing pointers, and structs by designing and implementing programs that use C strings, C++

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS493.1	3	3	3	2	2				3			
CS493.2	3	2	2	2	2				3			
CS493.3	3	3	3	2	2				3			
CS493.4	3	3	3	2	2				3			
CS493.5	3	3	3	2	2				3			

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS493.1	3	3	3
CS493.2	3	3	3
CS493.3	3	3	3
CS493.4	3	3	3
CS493.5	3	3	3

Course Name: Computer Graphics
Course Code: CS 501
Contact Hours/Week: 3
Credit: 3

Course Outcomes (COs):
After attending the course students should be able to

CO1	Understand the fundamental concept of Computer graphics and mathematical knowledge and explain the foundations of computer graphics and different display technology and devices.
CO2	Demonstrate different scan conversion algorithms, drawing algorithms, polygon filling algorithms, curves and surface drawing algorithms, clipping algorithms, surface removal algorithms using graphics tools.
CO3	Understand the basic concept of graphics programming and implement clipping with the comprehension of windows, view-ports in relation to images display on screen.
CO4	Analyze and compare different drawing algorithms, polygon filling algorithms, curves and surface drawing algorithms hidden surface illumination methods
CO5	Develop the concept of geometric models, mathematical and algorithmic approach necessary for programming computer graphics leading to lifelong learning.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS501.1	3	3	3	3	3							3
CS501.2	3	3	3	3	3							3
CS501.3	3	3	3	3	3							3
CS501.4	3	3	3	3	3							3
CS501.5	3	3	3	3	3							3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS501.1	3	3	3
CS501.2	3	3	3
CS501.3	3	3	3
CS501.4	3	3	3
CS501.5	3	3	3

Course Name: Operating System
Course Code: CS502
Contact Hours/Week: 3
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Understand the fundamental concepts of Operating System, Protection & Security and differentiate different types of Operating System.
CO2	Understand and implement process & thread; understand, apply, compare different process synchronization algorithm and inter process communication to solve engineering problems.
CO3	Understand/explain/analyze different synchronization techniques, critical section problems and deadlock and apply them to solve engineering problems.
CO4	Understand/explain different memory management techniques including virtual memory management; also able to apply, compare, and implement different page replacement algorithms to solve engineering problems.
CO5	Understand/explain different I/O mechanisms, File structures and disk management techniques and solving engineering problem applying different disk scheduling algorithm.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS502.1	3	3	3	3								3
CS502.2	3	3	3	3								3
CS502.3	3	3	3	3								3
CS502.4	3	3	3	3								3
CS502.5	3	3	3	3								3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS502.1	3	3	3
CS502.2	3	3	3
CS502.3	3	3	3
CS502.4	3	3	3
CS502.5	3	3	3

Course Name: Economics for Engineers
Course Code: HU503
Contact Hours/Week:2
Credit: 2

Course Outcomes (COs):

After attending the course students should be able to

CO1	Apply the appropriate engineering economics analysis method(s) for problem solving present worth, annual cost, rate-of-return, payback, break-even, benefit-cost ratio.
CO2	Evaluate the cost effectiveness of individual engineering projects using the methods learned and draw inferences for the investment decisions.
CO3	Compare the life cycle cost of multiple projects using the methods learned, and make a quantitative decision between alternate facilities and/or systems.
CO4	Evaluate the profit of a firm, carry out the break even analysis and employ this tool to make production decision.
CO5	Discuss and solve advanced economic engineering analysis problems including taxation and inflation.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
HU503.1							2	3			3	3
HU503.2							2	3			3	3
HU503.3							2	3			3	3
HU503.4							2	3			3	3
HU503.5							2	3			3	3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
HU503.1	2	2	2
HU503.2	2	2	2
HU503.3	2	2	2
HU503.4	2	2	2
HU503.5	2	2	2

Course Name: Database Management System
Course Code: CS503
Contact Hours/Week:3
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	To Understand and Describe the basic concepts and utility of Database management system, different data models of Database management system.
CO2	To Design an Entity Relationship (E-R) Diagram and relational model for any kind of real-life application and able to Apply relational algebra operations, SQL, Neo4j for solving
CO3	To Analyze and Create the relational database for any real-life applications based on normalization.
CO4	To Apply the query optimization techniques, different file organization techniques and Determine whether the transaction satisfies the ACID properties.
CO5	To Implement and organize the database of an organization as a team.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS503.1	3	3	2	2								3
CS503.2	3	3	2	2								3
CS503.3	3	3	2	2								3
CS503.4	3	3	2	2								3
CS503.5	3	3	2	2								3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS503.1	3	3	3
CS503.2	3	3	3
CS503.3	3	3	3
CS503.4	3	3	3
CS503.5	3	3	3

Course Name: Object Oriented Programming using Java
Course Code: CS(IT)504A
Contact Hours/Week: 3
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Design the process of interaction between Objects, classes & methods w.r.t. Object Oriented Programming.
CO2	Acquire a basic knowledge of Object Orientation with different properties as well as different features of Java.
CO3	Analyze various activities of different string handling functions with various I/O
CO4	Discuss basic code reusability feature w.r.t. Inheritance, Package and Interface.
CO5	Implement Exception handling, Multithreading and Applet (Web program in java) programming concept in Java.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS504A.1	3	3	2	3	2							
CS504A.2	3	3	3	3	2							
CS504A3	3	3	3	3	2							
CS504A.4	3	3	3	3	2							
CS504A.5	3	3	3	3	2							

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS504A.1	3	3	3
CS504A.2	3	3	3
CS504A3	3	3	3
CS504A.4	3	3	3
CS504A.5	3	3	3

Course Name: Multimedia Technology
Course Code: CS(IT)504B
Contact Hours/Week: 3
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Identify different media; representations of different multimedia data and data formats
CO2	Analyze various compression techniques.
CO3	Compare various audio and video file formats.
CO4	Apply different coding technique for solving real world problems
CO5	Choose optical storage media suitable for multimedia applications.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS504.1	3	3	2	3								
CS504.2	3	3	3	3								
CS504.3	3	3										
CS504.4	3	3	3	3								
CS504.5	3	3	3	3								

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS504.1	3	2	2
CS504.2	3	2	2
CS504.3	3	2	3
CS504.4	3	2	3
CS504.5	3	3	3

Course Name: Operations Research
Course Code: CS505A
Contact Hours/Week: 3L
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Understand Decision making procedure and its applications - Explain or Illustrate and Identify queuing model and simulation in real life scenario.
CO2	Understand the essential features and scope of optimization techniques - Learn and Analyze the properties of objective function and formalization of optimization problem.
CO3	Learn numerical methods to find optimum point and value of a function - Learn to solve the LPP.
CO4	Explain or Illustrate transportation problems and assignment problems. - Apply in real life situations.
CO5	Learn applications of network models and analyse the model – Learn to use Tabu Search methods in various fields.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS505A.1	2	3	3	2								
CS505A.2	2	3	3	2								
CS505A.3	2	3	3	2								
CS505A.4	2	3	3	2								
CS505A.5	2	3	3	2								

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS505A.1	3	3	3
CS505A.2	3	3	3
CS505A.3	3	3	3
CS505A.4	3	3	3
CS505A.5	3	3	3

Course Name: Digital Signal Processing
Course Code: CS505C
Contact Hours/Week: 3
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Determine the spectral coefficients and the Fourier series components of discrete-time signals.
CO2	Determine the discrete Fourier transform of discrete-time signals.
CO3	Calculate the outputs of discrete-time systems in response to inputs and design Finite Impulse Response (FIR) and Infinite Impulse Response (IIR) filters, and evaluate the performance to meet expected system specifications using MATLAB.
CO4	Determine the frequency response and the z-transform of discrete-time systems.
CO5	Demonstrate an understanding of contemporary issues by reviewing recent technical articles and establishing between the course material and the content of the article.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS505C.1	2	3	3	2								
CS505C.2	2	3	3	2								
CS505C.3	2	3	3	2								
CS505C.4	2	3	3	2								
CS505C.5	2	3	3	2								

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS505C.1	3	3	3
CS505C.2	3	3	3
CS505C.3	3	3	3
CS505C.4	3	3	3
CS505C.5	3	3	3

Course Name: Computer Graphics Lab
Course Code: CS591
Contact Hours/Week: 3
Credit: 2

Course Outcomes (COs):
After attending the course students should be able to

CO1	Understand the fundamental concept of Computer graphics and mathematical knowledge and explain the foundations of computer graphics and different display technology and devices.
CO2	Demonstrate different scan conversion algorithms, drawing algorithms, polygon filling algorithms, curves and surface drawing algorithms, clipping algorithms, surface removal algorithms using graphics tools.
CO3	Understand the basic concept of graphics programming and implement clipping with the comprehension of windows, view-ports in relation to images display on screen.
CO4	Analyze and compare different drawing algorithms, polygon filling algorithms, curves and surface drawing algorithms hidden surface illumination methods
CO5	Develop the concept of geometric models, mathematical and algorithmic approach necessary for programming computer graphics leading to lifelong learning.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS591.1	3	3	3	3	2				3			
CS591.2	3	3	3	3	2				3			
CS591.3	3	3	3	3	2				3			
CS591.4	3	3	3	3	2				3			
CS591.5	3	3	3	3	2				3			

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS591.1	3	3	3
CS591.2	3	3	3
CS591.3	3	3	3
CS591.4	3	3	3
CS591.5	3	3	3

Course Name: Operating System Lab
Course Code: CS592
Contact Hours/Week:3
Credit: 2

Course Outcomes (COs):

After attending the course students should be able to

CO1	Analyze and simulate CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority.
CO2	Understand the concepts of deadlock in operating systems.
CO3	Implement them in Multiprogramming system.
CO4	Create process creation and implement inter process communication
CO5	Analyze the performance of the various page replacement schemes

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS592.1	3	3	3	3	3				3			
CS592.2	3	3	3	3	3				3			
CS592.3	3	3	3	3	3				3			
CS592.4	3	3	3	3	3				3			
CS592.5	3	3	3	3	3				3			

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS592.1	3	3	3
CS592.2	3	3	3
CS592.3	3	3	3
CS592.4	3	3	3
CS592.5	3	3	3

Course Name: Data Base Management System Lab
Course Code: CS593
Contact Hours/Week: 3
Credit: 2

Course Outcomes (COs):

After attending the course students should be able to

CO1	To Understand and Describe the basic concepts and utility of Database management system, different data models of Database management system.
CO2	To Design an Entity Relationship (E-R) Diagram and relational model for any kind of real-life application and able to Apply relational algebra operations, SQL, Neo4j for solving query.
CO3	To Analyze and Create the relational database for any real-life applications based on normalization.
CO4	To Apply the query optimization techniques, different file organization techniques and Determine whether the transaction satisfies the ACID properties.
CO5	To Implement and organize the database of an organization as a team.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS593.1	3	2	2	2	2				3			3
CS593.2	3	2	2	2	2				3			3
CS593.3	3	3	2	2	2				3			3
CS593.4	3	2	2	2	2				3			3
CS593.5	3	2	2	2	2				3			3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS593.1	3	3	3
CS593.2	3	3	3
CS593.3	3	3	3
CS593.4	3	3	3
CS593.5	3	3	3

Course Name: Object Oriented Programming Lab
Course Code: CS(IT)594A
Contact Hours/Week: 3
Credit: 2

Course Outcomes (COs):

After attending the course students should be able to

CO1	Create the procedure of communication between Objects, classes & methods.
CO2	Understand the elementary facts of Object Orientation with various characteristics as well as several aspects of Java.
CO3	Analyze distinct features of different string handling functions with various I/O
CO4	Discuss simple Code Reusability notion w.r.t. Inheritance, Package and Interface.
CO5	Apply Exception handling, Multithreading and Applet (Web program in java) programming concept in Java.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS594A.1	3	3	2	3	2				3			2
CS594A.2	3	3	3	3	2				3			2
CS594A.3	3	3	3	3	2				3			2
CS594A.4	3	3	3	3	3				3			2
CS594A.5	3	3	3	3	3				3			2

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS594A.1	3	2	2
CS594A.2	3	2	2
CS594A.3	3	2	3
CS594A.4	3	2	3
CS594A.5	3	3	3

Course Name: General Aptitude/ Foreign Language
Course Code: MC581
Contact Hours/Week:3
Credit: 2

Course Outcomes (COs):

After attending the course students should be able to

CO1	Use their logical thinking and analytical abilities to solve Quantitative aptitude questions from company specific and other competitive tests.
CO2	Solve questions related to Time and distance and time and work etc. from company specific and other competitive tests.
CO3	Use their logical thinking and analytical abilities to solve reasoning questions from company specific and other competitive tests, operations.
CO4	Understand and solve puzzle related questions from specific and other competitive tests.
CO5	Solve questions related to permutation & combinations and probabilities from company specific and other competitive tests.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
MC581.1						3	3					
MC581.2						3	3					
MC581.3						3	3					
MC581.4						3	3					
MC581.5						3	3					

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
MC581.1	2	2	2
MC581.2	2	2	2
MC581.3	2	2	2
MC581.4	2	2	2
MC581.5	2	2	2

Course Name: Computer Networks
Course Code: CS601
Contact Hours/Week:3
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Understand basics of computer network and different architecture and topologies of computer network and analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies.
CO2	Understand/analyze different protocol of data link layer and apply them to solve engineering problems.
CO3	Understand/analyze different protocol of Network and Transport Layer and apply them to solve engineering problems.
CO4	Understand/analyze different protocol of session and application layer and apply them to solve engineering problems.
CO5	Develop Analyze, specify and design the topological and routing strategies using socket programming.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS601.1	3	3	2	2	2				2	2		3
CS601.2	3	3	3	3	3				2	2		3
CS601.3	3	3	3	3	3				2	2		3
CS601.4	3	3	3	3	3				2	2		3
CS601.5	2	3	3	3	3				2	2		3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS601.1	3	3	3
CS601.2	3	3	3
CS601.3	3	3	3
CS601.4	3	3	3
CS601.5	3	3	3

Course Name: Microprocessor and Microcontroller
Course Code: CS602
Contact Hours/Week:3
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	To acquire the knowledge of hardware details of 8085 and 8086 microprocessor AND 8051 microcontroller with the related signals and their implications.
CO2	To develop skill in assembly Language programming of 8085
CO3	To understand the concept and techniques of designing and implementing interfacing of microprocessor with memory and peripheral chips involving system design.
CO4	To analyze the performance of computers and its architecture to real-life applications
CO5	Analyze the data transfer information through serial & parallel ports.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS602.1	3	3	3	2								
CS602.2	3	3	3	2								
CS602.3	3	3	3	2								
CS602.4	3	3	3	2								
CS602.5	3	3	3	2								

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS602.1	3	3	3
CS602.2	3	3	3
CS602.3	3	3	3
CS602.4	3	3	3
CS602.5	3	3	3

Course Name: Software Engineering
Course Code: CS603
Contact Hours/Week:3L
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Understand the basic concept of Software Engineering and mathematical knowledge and apply them in designing solution to engineering problem including the specification, design, implementation, and testing of software systems that meet specification, performance, maintenance and quality requirements
CO2	Analyze, elicit and specify software requirements through a productive working relationship with various stakeholders of the project
CO3	Design applicable solutions in one or more application domains using software engineering approaches that integrates ethical, social, legal and economic concerns.
CO4	Develop the code from the design and effectively apply relevant standards and perform testing, and quality management and practice team work.
CO5	Identify and Use modern engineering tools necessary for software project management time management and software reuse, and an ability to engage in life-long learning.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS603.1	3	3	3	2								3
CS603.2	3	3	3	2								3
CS603.3	3	3	3	2								3
CS603.4	3	3	3	2								3
CS603.5	3	3	3	2								3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS603.1	3	3	3
CS603.2	3	3	3
CS603.3	3	3	3
CS603.4	3	3	3
CS603.5	3	3	3

Course Name: Compiler Design
Course Code: CS604A
Contact Hours/Week: 3
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Illustrate the basic concept of compilers and discuss on the components as well as the strengths and weaknesses of various phases of designing a compiler.
CO2	Design and analyze algorithms for syntactic or parsing techniques and semantic analysis of the process of designing compilers.
CO3	Develop the parsers and experiment the knowledge of activation tree, activation record and dynamic storage allocation techniques
CO4	Construct the intermediate code representations and generation.
CO5	Apply for various optimization techniques for dataflow analysis.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS604A.1	3	3	2	3								3
CS604A.2	3	3	3	3								3
CS604A.3	3	2	2	3								3
CS604A.4	2	2	3	3								3
CS604A.5	3	2	3	3								3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS604A.1	3	3	3
CS604A.2	3	3	3
CS604A.3	3	3	3
CS604A.4	3	3	3
CS604A.5	3	3	3

Course Name: Robotics
Course Code: CS604B
Contact Hours/Week: 3
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Understand the basic concepts of robotics exploring the characteristics of its various components, motion control, actuator and drive system and the functions of various sensors in robotics, and robot programming.
CO2	Apply the concepts of robotics for machine loading and their kinematics and analyze the kinematics of serial and parallel robots, motion control systems.
CO3	Illustrate concepts of Linear and angular velocity of links, Velocity propagation, Manipulator Jacobians for serial and parallel manipulators.
CO4	Understand classical control concepts and use advanced topics in non-linear control of manipulators.
CO5	Develop algorithmic solutions and corresponding robot-programs for designing various robotic systems.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS604B.1	3	3	3	3		3	3					
CS604B.2	3	3	3	3		3	3					
CS604B.3	3	2	3	3		3	3					
CS604B.4	2	2	3	3		3	3					
CS604B.5	3	2	3	3		3	3					

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS604B.1	3	3	3
CS604B.2	3	3	3
CS604B.3	3	3	3
CS604B.4	3	3	3
CS604B.5	3	3	3

Course Name: Pattern Recognition
Course Code: IT(CSE)605A
Contact Hours/Week: 3
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Explain and compare a variety of pattern classification, structural pattern recognition, and pattern classifier combination techniques.
CO2	Summarize, analyze, and relate research in the pattern recognition area verbally and in writing.
CO3	Apply performance evaluation methods for pattern recognition, and critique comparisons of techniques made in the research literature.
CO4	Apply pattern recognition techniques to real-world problems such as document analysis and recognition.
CO5	Implement simple pattern classifiers, classifier combinations, and structural pattern recognizers.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS605A.1	3	2	2	2								
CS605A.2	3	2	2	2								
CS605A.3	3	3	2	2								
CS605A.4	3	2	2	2								
CS605A.5	3	2	2	2								

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS605A.1	3	3	3
CS605A.2	3	3	3
CS605A.3	3	3	3
CS605A.4	3	3	3
CS605A.5	3	3	3

Course Name: Distributed Operating System
Course Code: IT(CSE)605B
Contact Hours/Week: 3
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Develop the fundamental knowledge of parallel and distributed models
CO2	Design, development, and performance analysis of parallel and distributed algorithms
CO3	Develop and implement parallel and distributed algorithms
CO4	Analyze the performance issues in parallel computing and trade-offs
CO5	Understand the different issues involved in distributed environment

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS605B.1	3	3	3	3								
CS605B.2	3	3	3	3								
CS605B.3	3	3	3	3								
CS605B.4	3	3	3	3								
CS605B.5	3	3	3	3								

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS605B.1	3	3	3
CS605B.2	3	3	3
CS605B.3	3	3	3
CS605B.4	3	3	3
CS605B.5	3	3	3

Course Name: Distributed Database
Course Code: IT(CSE)605C
Contact Hours/Week: 3
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Understand distributed database systems architecture and design
CO2	Be able to apply methods and techniques for distributed quey processing and optimisation
CO3	Understand the broad concepts of distributed transaction process
CO4	Understand the basic concepts of Data warehousing and OLAP technology
CO5	Be able to apply methods and techniques for association analysis, data classification and clustering

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS605C.1	3	2	2	2								
CS605C.2	3	2	2	3								
CS605C.3	3	3	2	2								
CS605C.4	3	3	2	3								
CS605C.5	3	2	2	2								

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS605C.1	3	3	3
CS605C.2	3	3	3
CS605C.3	3	3	3
CS605C.4	3	3	3
CS605C.5	3	3	3

Course Name: Computer Vision
Course Code: IT(CSE)605D
Contact Hours/Week: 3
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Identify basic concepts, terminology, theories, models and methods in the field of computer vision
CO2	Describe known principles of human visual system
CO3	Describe basic methods of computer vision related to multi-scale representation, edge detection and detection of other primitives, stereo, motion and object recognition
CO4	Suggest a design of a computer vision system for a specific problem
CO5	Identify, formulate and solve problems in image procecssing and computer vision.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS605D.1	3	3	2	2		2						3
CS605D.2	3	2	3	2		2						3
CS605D.3	3	3	2	3		2						3
CS605D.4	3	2	2	2		2						3
CS605D.5	3	3	2	2		2						3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS605D.1	3	3	3
CS605D.2	3	3	3
CS605D.3	3	3	3
CS605D.4	3	3	3
CS605D.5	3	3	3

Course Name: Data Warehousing and Data Mining
Course Code: IT(CSE)606A
Contact Hours/Week: 3
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Understand the functionality of the various data mining and data warehousing component
CO2	Appreciate the strengths and limitations of various data mining and data warehousing models
CO3	Explain the analyzing techniques of various data
CO4	Describe different methodologies used in data mining and data ware housing
CO5	Compare different approaches of data ware housing and data mining with various technologies

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS606A.1	3	2	2	2								
CS606A.2	3	2	2	2								
CS606A.3	3	3	2	2								
CS606A.4	3	2	2	2								
CS606A.5	3	2	2	2								

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS606A.1	3	3	3
CS606A.2	3	3	3
CS606A.3	3	3	3
CS606A.4	3	3	3
CS606A.5	3	3	3

Course Name: Digital Image Processing
Course Code: IT(CSE)606B
Contact Hours/Week: 3
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Understand the basic concepts of digital image processing to Explain or Illustrate and Identify problems where students can Apply the concept appropriately to Solve them.
CO2	Understand the fundamental concepts of image enhancement strategies and Identify the scope of enhancement where students can Apply the appropriate strategy and Analyze the performance.
CO3	Illustrate the fundamental image restoration strategies and Apply them appropriately to eliminate noise in the image.
CO4	Illustrate various Image Compression Techniques and Apply them to compress the images and Analyze their performances.
CO5	Understand and Develop ideas to Propose solutions to the problems of Morphological Image Processing and Image Segmentation and Analyze the effectiveness as well as limitations of solutions underscoring its utilitarian importance for further explorations leading towards lifelong learning.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS606B.1	3	2	2	2								
CS606B.2	3	3	2	3								
CS606B.3	3	3	2	2								
CS606B.4	3	2	3	2								
CS606B.5	3	2	2	2								

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS606B.1	3	3	3
CS606B.2	3	3	3
CS606B.3	3	3	3
CS606B.4	3	3	3
CS606B.5	3	3	3

Course Name: E-commerce and ERP
Course Code: IT(CSE)606C
Contact Hours/Week: 3
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Understand the basic concepts and technologies used in the field of management information systems
CO2	Have the knowledge of the different types of management information systems
CO3	Understand the processes of developing and implementing information systems.
CO4	Be aware of the ethical, social, and security issues of information systems.
CO5	An ability to effectively integrate IT-based solutions into the user environment

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS606C.1	3	2	2	2								
CS606C.2	3	2	2	2								
CS606C.3	3	3	2	2								
CS606C.4	3	2	2	2								
CS606C.5	3	2	2	2								

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS606C.1	2	2	2
CS606C.2	2	2	2
CS606C.3	2	2	2
CS606C.4	2	2	2
CS606C.5	2	2	2

Course Name: Computer Network Lab
Course Code: CS691
Contact Hours/Week:3P
Credit: 2

Course Outcomes (COs):

After attending the course students should be able to

CO1	To design and implement small size network and to understand various networking commands.
CO2	To provide the knowledge of various networking tools and their related concepts.
CO3	To understand various application layer protocols for its implementation in client/server environment
CO4	Understand the TCP/IP configuration for Windows and Linux
CO5	Learn the major software and hardware technologies used on computer networks

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS691.1	3	3	3	2	3							2
CS691.2	3	3	3	3	3							2
CS691.3	3	3	3	3	3							2
CS691.4	3	3	3	3	3							2
CS691.5	2	3	2	2	3							2

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS691.1	3	3	3
CS691.2	3	3	3
CS691.3	3	3	3
CS691.4	3	3	3
CS691.5	3	3	3

Course Name: Microprocessor and Microcontroller Lab
Course Code: CS692
Contact Hours/Week:3P
Credit: 2

Course Outcomes (COs):

After attending the course students should be able to

CO1	To understand and apply the fundamentals of assembly level programming of microprocessors and Microcontroller.
CO2	To work with standard microprocessor real time interfaces including GPIO, serial ports, digital-to-analog converters and analog-to-digital converters.
CO3	To troubleshoot interactions between software and hardware.
CO4	To analyze abstract problems and apply a combination of hardware and software to address the problem

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS692.1	3	3	3	2	3				3			
CS692.2	3	3	3	2	3				3			
CS692.3	3	3	3	2	3				3			
CS692.4	3	3	3	2	3				3			
CS692.5	3	3	3	2	3				3			

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS692.1	3	3	3
CS692.2	2	3	3
CS692.3	3	3	2
CS692.4	3	2	3
CS692.5	3	3	3

Course Name: Software Engineering Lab
Course Code: CS693
Contact Hours/Week:3
Credit: 2

Course Outcomes (COs):
After attending the course students should be able to

CO1	Understand the basic knowledge of how to apply Software Engineering and mathematical knowledge and designing solution to software engineering problem including the specification.
CO2	Analyze the cost-benefit trade-off.
CO3	Design solutions to the one or more application domains using software engineering approaches that integrates ethical.
CO4	Develop the code from the design and effectively apply relevant standards and perform testing .
CO5	Identify and use of modern software engineering tools necessary for software project management.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS693.1	3	3	3	3	3				3			3
CS693.2	3	3	3	3	3				3			3
CS693.3	3	3	3	3	3				3			3
CS693.4	3	3	3	3	3				3			3
CS693.5	3	3	3	3	3				3			3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS693.1	3	3	3
CS693.2	3	3	3
CS693.3	3	3	3
CS693.4	3	3	3
CS693.5	3	3	3

Course Name: Group Discussion and Seminar
Course Code: CS681
Contact Hours/Week:3
Credit: 2

Course Outcomes (COs):
After attending the course students should be able to

CO1	Clearly express and exchange your ideas
CO2	Avoid misunderstandings, can grab attention of evaluators
CO3	Negotiate on various issues in a group discussion
CO4	Avoid professional glitches in a team discussion
CO5	Show that you are stable, level headed, confident and quite well aware of the arguments.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS681.1						3	3	3	3	3		3
CS681.2						3	3	3	3	3		3
CS681.3						3	3	3	3	3		3
CS681.4						3	3	3	3	3		3
CS681.5						3	3	3	3	3		3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS681.1	3	3	3
CS681.2	3	3	3
CS681.3	3	3	3
CS681.4	3	3	3
CS681.5	3	3	3

Course Name: Artificial Intelligence
Course Code: CS701
Contact Hours/Week:3
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Understand and explain the fundamental concepts of Knowledge Representation and Inferencing in Artificial Intelligence and its utilitarian importance in current technological context for further exploration leading towards lifelong learning.
CO2	Identify and formulate an engineering problem primarily to fitaState-Space Exploration Framework or an Inferencing Model/Agent Design Framework within the scope of Artificial Intelligence paradigm.
CO3	Explore relevant literature and apply the concept of Heuristic Techniques of Artificial Intelligence to solve problems.
CO4	Develop Inferencing Models for proposing solutions to the problems of Artificial Intelligence.
CO5	Implement Inferencing Models of Artificial Intelligence through developing feasible algorithms and investigate their effectiveness by analyzing their performances in solving the relevant problems.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS701.1	3	3	2	2			2					3
CS701.2	3	3	3	3			2					3
CS701.3	3	3	3	3			2					3
CS701.4	3	3	3	3			2					3
CS701.5	3	3	3	3			2					3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS701.1	3	3	3
CS701.2	3	3	3
CS701.3	3	3	3
CS701.4	3	3	3
CS701.5	3	3	3

Course Name: Values & Ethics in Profession
Course Code: HU702
Contact Hours/Week:2L
Credit: 2

Course Outcomes (COs):

After attending the course students should be able to

CO1	Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field
CO2	Identify the multiple ethical interests at stake in a real-world situation or practice
CO3	Articulate what makes a particular course of action ethically defensible
CO4	Assess their own ethical values and the social context of problems
CO5	Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
HU702.1		2				2	3	3				3
HU702.2		2				2	3	3				3
HU702.3		2				2	3	3				3
HU702.4		2				2	3	3				3
HU702.5		2				2	3	3				3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
HU702.1	2	2	2
HU702.2	2	2	2
HU702.3	2	2	2
HU702.4	2	2	2
HU702.5	2	2	2

Course Name: Soft Computing
Course Code: CS702A
Contact Hours/Week: 3L
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Understand and explain the basic concept of soft computing and hard computing and apply them in designing solution to engineering problem.
CO2	Identify and formulate learning rules for each of the architectures and learn several neural network paradigms and its applications to solving engineering and other problems.
CO3	Explore relevant literature and apply fuzzy logic and reasoning to handle uncertainty and solving interdisciplinary engineering problems
CO4	Use genetic algorithms to combinatorial optimization problems and recognize the feasibility of applying a soft computing methodology for a particular problem.
CO5	Implement the concept and techniques of designing of soft computing methods in real world problem.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS702A.1	3	3	3	3								3
CS702A.2	3	3	3	3								3
CS702A.3	3	3	3	3								3
CS702A.4	3	3	3	3								3
CS702A.5	3	3	3	3								3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS702A.1	3	3	3
CS702A.2	3	3	3
CS702A.3	3	3	3
CS702A.4	3	3	3
CS702A.5	3	3	3

Course Name: Natural Language Processing
Course Code: CS702B
Contact Hours/Week: 3L
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Analyze and apply the morality and method of Human Languages such as English and other Indian Languages using computers.
CO2	Understand the semantics and pragmatics of English language for text processing
CO3	Create CORPUS linguistics based on digestive approach (Text Corpus method)
CO4	Illustrate, analyze and apply for the modern techniques for statistical approaches to machine translation.
CO5	Analyze and apply the POS tagging for a given natural language and select a suitable language modelling technique based on the structure of the language.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS702B.1	3	3	3	3								3
CS702B.2	3	3	3	3								3
CS702B.3	3	3	3	3								3
CS702B.4	3	3	3	3								3
CS702B.5	3	3	3	3								3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS702B.1	3	3	3
CS702B.2	3	3	3
CS702B.3	3	3	3
CS702B.4	3	3	3
CS702B.5	3	3	3

Course Name: Web Technology
Course Code: CS702C
Contact Hours/Week: 3L
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	To develop interactive web pages using HTML, DHTML, CSS and image map
CO2	To procure the knowledge of information interchange formats like XML
CO3	To validate fields of web pages using scripting languages like JavaScript
CO4	To develop web applications using PHP and ASP.net
CO5	To acquire the server side programming concepts using servlet, JSP

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS702C.1	3	3	3	3								3
CS702C.2	3	3	3	3								3
CS702C.3	3	3	3	3								3
CS702C.4	3	3	3	3								3
CS702C.5	3	3	3	3								3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS702C.1	3	3	3
CS702C.2	3	3	3
CS702C.3	3	3	3
CS702C.4	3	3	3
CS702C.5	3	3	3

Course Name: Cloud Computing
Course Code: CS703A
Contact Hours/Week: 3
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Identify the appropriate cloud services for a given application
CO2	Assess the comparative advantages and disadvantages of Virtualization technology
CO3	Analyze authentication, confidentiality and privacy issues in cloud computing
CO4	Identify security implications in cloud computing.
CO5	Understand the importance of protocols and standards in management for cloud services.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS703A.1	3	2	2	2								3
CS703A.2	3	3	3	2								3
CS703A.3	3	3	2	3								3
CS703A.4	2	3	2	2								3
CS703A.5	3	2	2	3								3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS703A.1	3	3	3
CS703A.2	3	3	3
CS703A.3	3	3	3
CS703A.4	3	3	3
CS703A.5	3	3	3

Course Name: Data Analytics
Course Code: CS703B
Contact Hours/Week: 3L
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Understand and explain the fundamental concepts of the Big Data Analytics which are primarily explored for making automated decisions using machine learning strategies on analyzing large scale structured as well as unstructured data distributed across multiple locations (Map Reduce, Hadoop and No SQL Framework) underscoring the utilitarian importance in current technological context for further exploration leading towards lifelong learning.
CO2	Identify and formulate an engineering problem of analyzing large scale data distributed across multiple locations to make automated meaningful decisions within the scope of Big Data Analytics Frameworks.
CO3	Explore relevant literature and apply the concepts of Big Data Analytics to solve problems of making automated decisions dealing with large scale structured as well as unstructured data using Map Reduce, Hadoop and advanced SQL Frameworks.
CO4	Excogitate ideas for proposing solutions to the challenging problems of Big Data Analytics.
CO5	Implement ideas of Big Data Analytics through developing feasible algorithms or frameworks and investigate their effectiveness in solving the relevant problems by analyzing the performances using proper techniques.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS703B.1	3	2	2	1								3
CS703B.2	3	3	3	2								3
CS703B.3	3	3	2	3								3
CS703B.4	2	3	2	2								3
CS703B.5	3	2	2	3								3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS703B.1	3	2	2
CS703B.2	3	3	2
CS703B.3	3	2	3
CS703B.4	2	2	3
CS703B.5	2	3	3

Course Name: Sensor Network and IOT
Course Code: CS703C
Contact Hours/Week: 3
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Understand and explain the Fundamental Concepts and applications of ad- hoc and wireless sensor networks
CO2	Describe and analyze the MAC protocol issues of ad-hoc networks
CO3	Design and develop routing protocols for ad-hoc wireless networks with respect to TCP design issues
CO4	Explain the concepts of network architecture and MAC layer protocol for WSN
CO5	Develop and analyze the WSN routing issues by considering QoS measurements

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS703C.1	3	2	2	1								3
CS703C.2	3	3	3	2								3
CS703C.3	3	3	2	3								3
CS703C.4	2	3	2	2								3
CS703C.5	3	2	2	3								3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS703C.1	3	2	2
CS703C.2	3	3	3
CS703C.3	3	3	2
CS703C.4	2	3	2
CS703C.5	3	2	2

Course Name: Distributed Algorithm
Course Code: CS704A
Contact Hours/Week: 3
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Develop the fundamental knowledge of parallel and distributed models
CO2	Design, development, and performance analysis of parallel and distributed
CO3	Develop and implement parallel and distributed algorithms
CO4	Analyze the performance issues in parallel computing and trade-offs
CO5	Understand the different issues involved in distributed environment

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS704A.1	3	3	3	3								3
CS704A.2	3	3	2	2								3
CS704A.3	3	2	3	3								3
CS704A.4	3	2	3	3								3
CS704A.5	2	2	2	2								3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS704A.1	3	3	3
CS704A.2	2	2	2
CS704A.3	3	3	2
CS704A.4	2	2	3
CS704A.5	3	3	3

Course Name: Bio Informatics
Course Code: CS704B
Contact Hours/Week: 3L
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Acquire the knowledge of Bioinformatics technologies with the related concept of DNA RNA and their implications
CO2	Develop idea in Molecular Biology
CO3	Understand the concept and techniques of different types of Data Organization and Sequence Databases with different types of Analysis Tools for Sequence Data Banks.
CO4	Acquire the knowledge of the DNA Sequence Analysis.
CO5	Analyze the performance of different types of Probabilistic models used in Computational Biology.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS704B.1	3	3	3	2	2							2
CS704B.2	3	2	2	2	2							3
CS704B.3	2	3	2	2	3							2
CS704B.4	2	2	3	2	3							2
CS704B.5	3	2	2	2	2							3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS704B.1	3	3	3
CS704B.2	3	2	2
CS704B.3	2	2	2
CS704B.4	3	3	3
CS704B.5	3	3	3

Course Name: Cryptography and Network Security
Course Code: CS704C
Contact Hours/Week: 3
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Understand cryptography and network security concepts and application.
CO2	Apply security principles to system design.
CO3	Identify and investigate network security threat
CO4	Analyze and design network security protocols.
CO5	Conduct research in network security.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS704C.1	3	3	3	2	2							2
CS704C.2	3	2	2	2	2							3
CS704C.3	2	3	2	2	3							2
CS704C.4	2	2	3	2	3							2
CS704C.5	3	2	2	2	2							3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS704C.1	3	3	3
CS704C.2	3	2	2
CS704C.3	2	2	2
CS704C.4	3	3	3
CS704C.5	3	3	3

Course Name: Artificial Intelligence Lab
Course Code: CS791
Contact Hours/Week:3
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Acquire foundational knowledge of PROLOG to implement an Artificial Intelligent Agent as an executable computer program for Knowledge Representation and Inferencing and understand the working principle of the agent and assess its utilitarian importance in current technological context leading towards lifelong learning.
CO2	Identify and formulate an engineering problem by analyzing its characteristics to fit a State-Space Exploration Framework or an Inferencing Agent Formulation Framework of Artificial Intelligence.
CO3	Explore relevant literature and apply the concepts of Artificial Intelligence to solve a problem by implementing well-known Artificial Intelligence strategies using proper techniques and tools of PROLOG.
CO4	Develop ideas and propose expert systems offering solutions to the challenging problems of Artificial Intelligence.
CO5	Plan and Implement Artificial Intelligence based ideas as executable PROLOG programs through developing intelligent heuristic strategies or expert systems with adequate documentation in collaborative environment for successfully carrying out projects on Artificial Intelligence Problems and investigate their effectiveness by analyzing the performances using proper techniques and tools.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS791.1	3	3	2	2	3				3	-		3
CS791.2	3	2	2	3	3				3	-		3
CS791.3	3	3	2	2	3				3	-		3
CS791.4	3	3	3	3	3				3	-		3
CS791.5	3	3	3	3	3				3	-		3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS791.1	3	2	2
CS791.2	3	3	3
CS791.3	3	3	3
CS791.4	3	2	3
CS791.5	3	3	3

Course Name: Soft Computing Lab
Course Code: CS792A
Contact Hours/Week: 3P
Credit: 2

Course Outcomes (COs):

After attending the course students should be able to

CO1	Understand and explain the basic concept of soft computing and hard computing and apply them in designing solution to engineering problem.
CO2	Identify and formulate learning rules for each of the architectures and learn several neural network paradigms and its applications to solving engineering and other problems.
CO3	Explore relevant literature and apply fuzzy logic and reasoning to handle uncertainty and solving interdisciplinary engineering problems
CO4	Use genetic algorithms to combinatorial optimization problems and recognize the feasibility of applying a soft computing methodology for a particular problem.
CO5	Implement the concept and techniques of designing of soft computing methods in real world problem.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS792A.1	3	3	3	3	3	2	2		2			3
CS792A.2	3	3	3	3	3	2	2		2			3
CS792A.3	3	3	3	3	3	2	2		2			3
CS792A.4	3	3	3	3	3	2	2		2			3
CS792A.5	3	3	3	3	3	2	2		2			3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS792A.1	3	3	3
CS792A.2	3	3	3
CS792A.3	3	3	3
CS792A.4	3	3	3
CS792A.5	3	3	3

Course Name: Natural Language Processing Lab
Course Code: CS792B
Contact Hours/Week: 3
Credit: 2

Course Outcomes (COs):

After attending the course students should be able to

CO1	Analyze and apply the morality and method of Human Languages such as English and other Indian Languages using computers.
CO2	Understand the semantics and pragmatics of English language for text processing
CO3	Create CORPUS linguistics based on digestive approach (Text Corpus method)
CO4	Illustrate, analyze and apply for the modern techniques for statistical approaches to machine translation.
CO5	Analyze and apply the POS tagging for a given natural language and select a suitable language modelling technique based on the structure of the language.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS792B.1	3	3	3	3	3	3	2		3			3
CS792B.2	3	3	3	3	3	3	2		3			3
CS792B.3	3	3	3	3	3	3	2		3			3
CS792B.4	3	3	3	3	3	3	2		3			3
CS792B.5	3	3	3	3	3	3	2		3			3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS792B.1	3	3	3
CS792B.2	3	3	3
CS792B.3	3	3	3
CS792B.4	3	3	3
CS792B.5	3	3	3

Course Name: Web Technology Lab
Course Code: CS792C
Contact Hours/Week: 3P
Credit: 2

Course Outcomes (COs):

After attending the course students should be able to

CO1	To develop interactive web pages using HTML, DHTML, CSS and image map
CO2	To procure the knowledge of information interchange formats like XML
CO3	To validate fields of web pages using scripting languages like JavaScript
CO4	To develop web applications using PHP and ASP.net
CO5	To acquire the server side programming concepts using servlet, JSP

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS792C.1	3	3	3	3	3				2			3
CS792C.2	3	3	3	3	3				2			3
CS792C.3	3	3	3	3	3				2			3
CS792C.4	3	3	3	3	3				2			3
CS792C.5	3	3	3	3	3				2			3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS792C.1	3	3	3
CS792C.2	3	3	3
CS792C.3	3	3	3
CS792C.4	3	3	3
CS792C.5	3	3	3

Course Name: Project 1
Course Code: CS795
Contact Hours/Week: 3
Credit: 2

Course Outcomes (COs):

After attending the course students should be able to

CO1	Understand project characteristics and various stages of a project
CO2	Understand the conceptual clarity about project organization and feasibility analyses – Market, Technical, Financial and Economic
CO3	Analyze the learning and understand techniques for Project planning, scheduling and Execution Control.
CO4	Apply the risk management plan and analyse the role of stakeholders
CO5	Understand the contract management, Project Procurement, Service level Agreements and productivity

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS795.1	3	3	3	3	3	3	3	3	3	3	3	3
CS795.2	3	3	3	3	3	3	3	3	3	3	3	3
CS795.3	3	3	3	3	3	3	3	3	3	3	3	3
CS795.4	3	3	3	3	3	3	3	3	3	3	3	3
CS795.5	3	3	3	3	3	3	3	3	3	3	3	3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS795.1	3	3	3
CS795.2	3	3	3
CS795.3	3	3	3
CS795.4	3	3	3
CS795.5	3	3	3

Course Name: Industrial Training
Course Code: CS781
Contact Hours/Week:
Credit: 2

Course Outcomes (COs):

After attending the course students should be able to

CO1	Participate in the projects in industries during his or her industrial training
CO2	Describe use of advanced tools and techniques encountered during industrial training and visit.
CO3	Interact with industrial personnel and follow engineering practices and discipline prescribed in industry.
CO4	Develop awareness about general workplace behavior and build interpersonal and team skills.
CO5	Prepare professional work reports and presentations

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS781.1	3	3	3	3	3	3	3	3	3	3	3	3
CS781.2	3	3	3	3	3	3	3	3	3	3	3	3
CS781.3	3	3	3	3	3	3	3	3	3	3	3	3
CS781.4	3	3	3	3	3	3	3	3	3	3	3	3
CS781.5	3	3	3	3	3	3	3	3	3	3	3	3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS781.1	3	3	3
CS781.2	3	3	3
CS781.3	3	3	3
CS781.4	3	3	3
CS781.5	3	3	3

Course Name: Technical Skill Development
Course Code: MC781
Contact Hours/Week: 3
Credit: 2

Course Outcomes (COs):

After attending the course students should be able to

CO1	Effectively communicate through verbal/oral communication and improve the listening skills
CO2	Write precise briefs or reports and technical documents
CO3	Actively participate in group discussion / meetings / interviews and prepare & deliver presentations
CO4	Become more effective individual through goal/target setting, self motivation and practicing creative thinking.
CO5	Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
MC781.1	3	3	3	3	3		3	3	3	3	3	3
MC781.2	3	3	3	3	3		3	3	3	3	3	3
MC781.3	3	3	3	3	3		3	3	3	3	3	3
MC781.4	3	3	3	3	3		3	3	3	3	3	3
MC781.5	3	3	3	3	3		3	3	3	3	3	3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
MC781.1	3	2	2
MC781.2	3	3	2
MC781.3	3	2	3
MC781.4	2	2	3
MC781.5	2	3	3

Course Name: Mobile Computing
Course Code: CS801A
Contact Hours/Week: 3L
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Illustrate the concepts and working of modern communication technologies.
CO2	Demonstrate the various routing algorithms for both infrastructure based and ad hoc networks.
CO3	Develop mobility and bandwidth management in cellular network
CO4	Design and build an energy efficient and secure mobile computing environment using heterogeneous wireless technologies
CO5	Predict the technical issues related to recent mobile computing environment.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS801A.1	3	3	3	3								3
CS801A.2	3	3	3	3								3
CS801A.3	3	3	3	3								3
CS801A.4	3	3	3	3								3
CS801A.5	3	3	3	3								3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS801A.1	3	3	3
CS801A.2	3	3	3
CS801A.3	2	3	3
CS801A.4	3	3	2
CS801A.5	3	3	3

Course Name: Human Computer Interaction
Course Code: CS801B
Contact Hours/Week: 3L
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Understand the fundamental concepts of Human Computer Interaction to Explain or Illustrate and Identify problems where students can Apply the concept appropriately to Solve them.
CO2	Understand the fundamental concepts of Interactive Design so that they can Design user interface as per specification and Validate it.
CO3	Understand and Explain the fundamental concepts of HCI Models and Analyse their effectiveness and limitations.
CO4	Explain or Illustrate the fundamental design principles of HCI for mobile platforms and Use it appropriately to Design user interface as per specification.
CO5	Understand the fundamental design principles of Web-interface and Design web-interface as per specification and analyse the effectiveness as well as limitations of them making the students aware of its utilitarian importance for further explorations leading towards lifelong learning.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS801B.1	3	3	3	3								3
CS801B.2	3	3	3	3								3
CS801B.3	3	3	3	3								3
CS801B.4	3	3	3	3								3
CS801B.5	3	3	3	3								3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS801B.1	3	3	3
CS801B.2	3	3	3
CS801B.3	2	3	3
CS801B.4	3	3	3
CS801B.5	3	3	3

Course Name: Cyber Law and Security Policy
Course Code: CS801C
Contact Hours/Week: 3L
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	To understand the importance of professional practice, Law and Ethics in their personal lives and professional careers.
CO2	To acquire in depth knowledge of information technology act, security policies, and legal framework of right to privacy, data security and data protection.
CO3	To develop the understanding of relationship between commerce and cyberspace
CO4	To be familiar with network security threats and countermeasures

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS801C.1	3	3	3	3								3
CS801C.2	3	3	3	3								3
CS801C.3	3	3	3	3								3
CS801C.4	3	3	3	3								3
CS801C.5	3	3	3	3								3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS801C.1	3	3	3
CS801C.2	3	3	3
CS801C.3	2	3	3
CS801C.4	3	3	2
CS801C.5	3	3	3

Course Name: VLSI Design
Course Code: CS801D
Contact Hours/Week: 3L
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Understand basic CMOS circuits and properties of CMOS transistors and able to draw stick diagram and layout of CMOS circuits.
CO2	Apply CMOS realization for combinational logic design and analyze the delay models for combinational circuits and understand power dissipation and low power design principles in CMOS circuits.
CO3	Describe fabrication steps of IC and construct stick diagram & layout of CMOS inverter and basic gates based on Layout design rules
CO4	Understand different architectures for address and analyze the speed and area trade off and also understand accumulators, multipliers, dividers and barrel shifters.
CO5	Understand the techniques of chip design using programmable devices like VHDL or Verilog Combinational & Sequential Logic circuit Design

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS801D.1	3	3	3	3	2							3
CS801D.2	3	3	3	3	3							3
CS801D.3	3	3	3	3	3							3
CS801D.4	3	3	3	3	3							3
CS801D.5	3	3	3	3	3							3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS801D.1	3	3	3
CS801D.2	3	3	3
CS801D.3	2	3	3
CS801D.4	3	3	2
CS801D.5	3	3	3

Course Name: Parallel Computing
Course Code: CS802A
Contact Hours/Week: 3L
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Understand the evolution of High Performance Computing (HPC) with respect to laws and the contemporary notion that involves mobility for data, hardware devices and software agents.
CO2	Understand, appreciate and apply parallel and distributed algorithms in problem Solving.
CO3	Evaluate the impact of network topology on parallel/distributed algorithm formulations and traffic their performance.
CO4	Gain hand-on experience with the agent-based and Internet-based parallel and distributed programming techniques.
CO5	Master skills to measure the performance of parallel and distributed programs.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS802A.1	3	3	3	3	2							3
CS802A.2	3	3	3	3	2							3
CS802A.3	3	3	3	3	2							3
CS802A.4	3	3	3	3	2							3
CS802A.5	3	3	3	3	2							3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS802A.1	3	3	3
CS802A.2	3	3	3
CS802A.3	3	3	3
CS802A.4	3	3	3
CS802A.5	3	3	3

Course Name: Machine Learning
Course Code: CS802B
Contact Hours/Week: 3L
Credit: 3

Course Outcomes (COs):

After completion of the course students would be able to

CO1	Understand the fundamental concepts of basics of machine learning to Explain or Illustrate and Identify problems where students can Apply the concept appropriately to Solve them.
CO2	Understand the fundamental concepts of regression problems so that they can propose models for predicting values based on exemplary data and Analyze their performances.
CO3	Explain or Illustrate the fundamental strategies of unsupervised machine learning paradigm to solve clustering problems and Analyze their performances.
CO4	Explain or Illustrate the concepts of Mining Frequent Patterns, Associations and Data Streams and Apply them to solve the relevant problems and Analyse their performances.
CO5	Develop ideas to Propose solutions to the problems of supervised learning and Identify problems where students can Apply the concept appropriately and Analyze the effectiveness as well as limitations of solutions making the students aware of its utilitarian importance for further explorations leading towards lifelong learning.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS802B.1	3	3	3	3								3
CS802B.2	3	3	3	3								3
CS802B.3	3	3	3	3								3
CS802B.4	3	3	3	3								3
CS802B.5	3	3	3	3								3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS802B.1	3	3	3
CS802B.2	3	3	3
CS802B.3	3	3	3
CS802B.4	3	3	3
CS802B.5	3	3	3

Course Name: Real Time Operating System and Embedded System
Course Code: CS802C
Contact Hours/Week: 3L
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Understand the architecture and classifications of different embedded systems and the related programming knowledge.
CO2	Identify and understand the concepts of embedded systems like I/O, timers, interrupts, interaction with peripheral devices
CO3	Choose case-specific debugging technique for an embedded system.
CO4	Design various real time systems using embedded systems.
CO5	Understand the working principles of microcontroller and apply this knowledge for developing an approach by means of existing and new methods as a team work.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS802C.1	3	3	3	3	2							3
CS802C.2	3	3	3	3	2							3
CS802C.3	3	3	3	3	2							3
CS802C.4	3	3	3	3	2							3
CS802C.5	3	3	3	3	2							3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS802C.1	3	3	3
CS802C.2	3	3	3
CS802C.3	3	3	3
CS802C.4	3	3	3
CS802C.5	3	3	3

Course Name: Advance Computer Architecture
Course Code: CS802D
Contact Hours/Week: 3L
Credit: 3

Course Outcomes (COs):

After attending the course students should be able to

CO1	Illustrate the basic concept of computer architecture and its performance measurement, parallel processing, Flynn's classification and Amdahl's law and apply this knowledge in designing solution for real life engineering problem.
CO2	Summarize the basic concept of pipeline, instruction pipeline, arithmetic pipeline, hazards detection and prevention and use this knowledge for designing and implementing mathematical and engineering problem leading to lifelong learning.
CO3	Identify the concept of Instruction-Level Parallelism to solve engineering problem.
CO4	Illustrate and Compare concept of Multiprocessor architecture and parallel architecture and apply this knowledge for developing an approach by means of existing and new methods as a team work.
CO5	Understand the concept of message passing architecture and interconnection network and design an optimized model for building a new solution as a professional engineering practice as a team.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS802D.1	3	3	3	3	2							3
CS802D.2	3	3	3	3	2							3
CS802D.3	3	3	3	3	2							3
CS802D.4	3	3	3	3	2							3
CS802D.5	3	3	3	3	2							3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS802D.1	3	3	3
CS802D.2	3	3	3
CS802D.3	3	3	3
CS802D.4	3	3	3
CS802D.5	3	3	3

Course Name: Project 2
Course Code: CS892
Contact Hours/Week:
Credit: 6

Course Outcomes (COs):

After attending the course students should be able to

CO1	Understand project characteristics and various stages of a project
CO2	Understand the conceptual clarity about project organization and feasibility analyses – Market, Technical, Financial and Economic
CO3	Analyze the learning and understand techniques for Project planning, scheduling and Execution Control.
CO4	Apply the risk management plan and analyse the role of stakeholders
CO5	Understand the contract management, Project Procurement, Service level Agreements and productivity

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS892.1	3	3	3	3	3	3	3	2	3	3	3	3
CS892.2	3	3	3	3	3	3	3	2	3	3	3	3
CS892.3	3	3	3	3	3	3	3	2	3	3	3	3
CS892.4	3	3	3	3	3	3	3	2	3	3	3	3
CS892.5	3	3	3	3	3	3	3	2	3	3	3	3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS892.1	3	3	3
CS892.2	3	3	3
CS892.3	3	3	3
CS892.4	3	3	3
CS892.5	3	3	3

Course Name: Seminar Presentation
Course Code: CS893
Contact Hours/Week: 3
Credit: 2

Course Outcomes (COs):

After attending the course students should be able to

CO1	Establish motivation for any topic of interest and develop a thought process for technical presentation
CO2	Organize a detailed literature survey and build a document with respect to technical publications
CO3	Analysis and comprehension of proof-of-concept and related data.
CO4	Effective presentation and improve soft skills.
CO5	Make use of new and recent technology (e.g. Latex) for creating technical reports

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS893.1	3	3	3	3			3		3	3		3
CS893.2	3	3	3	3			3		3	3		3
CS893.3	3	3	3	3			3		3	3		3
CS893.4	3	3	3	3			3		3	3		3
CS893.5	3	3	3	3			3		3	3		3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS893.1	3	3	3
CS893.2	3	3	3
CS893.3	3	3	3
CS893.4	3	3	3
CS893.5	3	3	3

Course Name: Grand Viva
Course Code: CS881
Contact Hours/Week:
Credit: 4

Course Outcomes (COs):

After attending the course students should be able to

CO1	Evaluate overall technical knowledge and industry readiness
CO2	Analyze various applications of Computer Science and engineering in real life problem solving
CO3	Accustomed with virtual environment of technical interview
CO4	Can identify and illustrate the working principles of all subjects formal presentation, verbal communication, logical reasoning, decision making, self-learning, teamwork, leadership, body language, learning attitude, group objective, moral, motivation, behaviour, recent trends in technology, emerging technologies, social, environmental and industrial aspects of technological developmental issues.
CO5	The main objective of this course is to prepare students to face interview both in academic and the industrial sector.

CO-PO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS881.1	3	3	3	3	3				3	3		3
CS881.2	3	3	3	3	3				3	3		3
CS881.3	3	3	3	3	2				3	3		3
CS881.4	3	3	3	3	3				3	3		3
CS881.5	3	3	3	3	3				3	3		3

CO-PSO Mapping

COs	PSO1	PSO2	PSO3
CS881.1	3	3	3
CS881.2	3	3	3
CS881.3	3	3	3
CS881.4	3	3	3
CS881.5	3	3	3

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