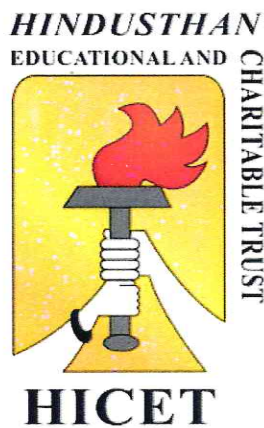


HINDUSTHAN COLLEGE OF ENGINEERING AND TECHNOLOGY

(An Autonomous Institution, Affiliated to Anna University, Chennai
Approved by AICTE, New Delhi & Accredited by NAAC with 'A' Grade)
Coimbatore – 641 032

B.E. COMPUTER SCIENCE AND ENGINEERING



Curriculum & Syllabus

2019-2020

CHOICE BASED CREDIT SYSTEM

VISION AND MISSION OF THE INSTITUTION

VISION

To become a premier institution by producing professionals with strong technical knowledge, innovative research skills and high ethical values.

MISSION

IM1: To provide academic excellence in technical education through novel teaching methods.

IM2: To empower students with creative skills and leadership qualities.

IM3: To produce dedicated professionals with social responsibility.


**Chairman - BoS
CSE - HiCET**




**Dean (Academics)
HiCET**

VISION AND MISSION OF THE DEPARTMENT

VISION

To provide an excellence for individuals to develop technologically superior, socially conscious and nationally responsible citizens.

MISSION

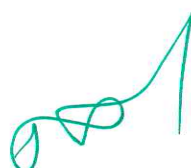
DM1: To develop competent Computer Science and Engineering professionals with knowledge in current technology.

DM2: To mould them to attain excellent leadership qualities there by making them excel in their careers.

DM3: To inspire and nurture students to come out with innovation and creativity solutions meeting the societal needs.


**Chairman - BoS
CSE - HiCET**




**Dean (Academics)
HiCET**

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

	Graduate attributes	Descriptions
PO1	Engineering knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis	Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	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.
PO4	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.
PO5	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.
PO6	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
PO7	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.
PO8	Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.


Chairman - BoS
CSE - HiCET




Dean (Academics)
HiCET

PO9	Individual and team work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	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.
PO11	Project management 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
PO12	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)

PSO1	An ability to apply, design and develop principles of software engineering, networking and database concepts for computer-based systems in solving engineering problems.
PSO2	An ability to understand, design and code engineering problems using programming skills.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1: To acquire knowledge in the latest technologies and innovations and an ability to identify, analyze and solve problems in computer engineering.

PEO2: To be capable of modeling, designing, implementing and verifying a computing system to meet specified requirements for the benefit of society.

PEO3: To possess critical thinking, communication skills, teamwork, leadership skills and ethical behavior necessary to function productively and professionally.

S. Singh
Chairman
CSE - HICET



[Signature]
Dean (Academics)
HICET

CURRICULUM



Hindusthan College of Engineering and Technology

(An Autonomous Institution, Affiliated to Anna University, Chennai
Approved by AICTE, New Delhi & Accredited by NAAC with 'A' Grade)
Coimbatore, Tamil Nadu.



DETAILS OF CHANGES CARRIED OUT IN CURRICULUM & SYLLABUS

CBCS PATTERN

UNDERGRADUATE PROGRAMMES

B.E. COMPUTER SCIENCE AND ENGINEERING (UG)

REGULATION 2016 & 2019

REGULATION-2019

For the students admitted during the academic year 2019-2020 and onwards

SEMESTER – I

S.No	Course Code	Name of the Course	Course Category	L	T	P	C	CIA	ESE	TOTAL
1	19HE1101	Technical English	HS	2	1	0	3	25	75	100
2	19MA1101	Calculus	BS	3	1	0	4	25	75	100
3	19PH1151	Applied Physics	BS	2	0	2	3	50	50	100
4	19CY1151	Chemistry for Engineers	BS	2	0	2	3	50	50	100
5	19CS1151	Python Programming and Practices	ES	2	0	2	3	50	50	100
6	19EC1154	Basics of Electron devices and Electric Circuits	ES	2	0	2	3	50	50	100
7	19HE1071	Value added Course I: Language Competency Enhancement Course - I	HS	0	0	2	1	100	0	100
8	19MC1191	Induction Program	MC	0	0	0	0	0	0	0
		Total Credits		13	2	10	20	350	350	700

SEMESTER - II

S.No	Course Code	Name of the Course	Course Category	L	T	P	C	CIA	ESE	TOTAL
1	19HE2101	Business English for Engineers	HS	2	1	0	3	25	75	100
2	19MA2104	Differential Equations And Linear Algebra	BS	3	1	0	4	25	75	100
3	19PH2151	Material Science	BS	2	0	2	3	50	50	100
4	19CY2151	Environmental Studies	BS	2	0	2	3	50	50	100
5	19CS2152	Essentials of C and C++ Programming	ES	2	0	2	3	50	50	100
6	19ME2154	Engineering Graphics	ES	1	0	4	3	50	50	100
7	19ME2001	Engineering Practices	ES	0	0	4	2	50	50	100
8	19HE2071	Language Competency Enhancement Course - II	HS	0	0	2	1	100	0	100
		Total Credits		12	2	16	22	400	400	800

REGULATION-2016

**For the students admitted during the academic year 2018-2019 and onwards
SEMESTER III**

S.No.	Course Code	Course Title	L	T	P	C	CIA	ESE	TOTAL
1	16MA3105	Discrete Mathematics and Graph Theory	3	1	0	4	25	75	100
2	16CS3201	Digital Principles and System Design	3	0	2	4	25	75	100
3	16CS3202	Data Structures	3	0	0	3	25	75	100
4	16CS3203	Software Analysis and Design	3	0	0	3	25	75	100
5	16CS3204	Operating Systems	3	0	0	3	25	75	100
6	16CS3205	Professional Ethics	3	0	0	3	25	75	100
7	16CS3001	Data Structures Laboratory	0	0	4	2	50	50	100
8	16CS3002	Operating Systems Laboratory	0	0	4	2	50	50	100
		TOTAL CREDITS	18	1	10	24	250	550	800

SEMESTER IV

S.No.	Course Code	Course Title	L	T	P	C	CIA	ESE	TOTAL
1	16MA4108	Probability and Queuing Theory	3	1	0	4	25	75	100
2	16CS4201	Java Programming	3	0	0	3	25	75	100
3	16CS4202	Microprocessors and Microcontrollers	3	0	0	3	25	75	100
4	16CS4203	Database Management Systems	3	0	0	3	25	75	100
5	16CS4204	Computer Graphics	3	0	0	3	25	75	100
6	16CS4205	Fundamentals of Algorithms	3	0	0	3	25	75	100
7	16CS4001	Java Programming Laboratory	0	0	4	2	50	50	100
8	16CS4002	Database Management and Systems Laboratory	0	0	4	2	50	50	100
9	16CS4003	Microprocessors and Microcontrollers Laboratory	0	0	4	2	50	50	100
		TOTAL CREDITS	18	1	12	25	300	600	900

**For the students admitted during the academic year 2017-2018 and onwards
SEMESTER V**

S.No.	Course Code	Course Title	L	T	P	C	CIA	ESE	TOTAL
1	16CS5201	Computer Networks	3	0	0	3	25	75	100
2	16CS5202	Free Open Source Software I	3	0	0	3	25	75	100
3	16CS5203	Computer Architecture	3	0	0	3	25	75	100
4	16CS5204	Theory of Computation	3	0	0	3	25	75	100
5	16CS53XX	Professional Elective – I	3	0	0	3	25	75	100
6	16CS5001	Networks Laboratory	0	0	4	2	50	50	100
7	16CS5002	Open Source Programming Laboratory	0	0	4	2	50	50	100
8	16CS5701	Technical Presentation	0	0	4	2	0	100	100
		TOTAL CREDITS	15	0	12	21	225	575	800

SEMESTER VI

S.No.	Course Code	Course Title	L	T	P	C	CIA	ESE	TOTAL
1	16CS6201	Free Open Source Software II	3	0	0	3	25	75	100
2	16CS6202	Compiler Design	3	0	0	3	25	75	100
3	16CS6203	Internet of Things	3	0	0	3	25	75	100
4	16CS6204	Software Quality Assurance	3	0	0	3	25	75	100
5	16CS63XX	Professional Elective – II	3	0	0	3	25	75	100

6	16XX64XX	Open Elective – I	3	0	0	3	25	75	100
7	16CS6001	Open Source Programming Laboratory II	0	0	4	2	50	50	100
8	16CS6002	Compiler Design Laboratory	0	0	4	2	50	50	100
9	16CS6801	Mini Project	0	0	6	3	50	50	100
		TOTAL CREDITS	18	0	14	25	300	600	900

LIST OF PROFESSIONAL ELECTIVES

S.No.	Course Code	Course Title	L	T	P	C	CIA	ESE	TOTAL
ELECTIVE I									
1	16CS5301	Advanced Java Programming	3	0	0	3	25	75	100
2	16CS5302	Visualization Techniques	3	0	0	3	25	75	100
3	16CS5303	Service Oriented Architecture	3	0	0	3	25	75	100
4	16CS5304	Information Storage Management	3	0	0	3	25	75	100
5	16CS5305	TCP/IP Principles and Architecture	3	0	0	3	25	75	100
6	16CS5306	System Software	3	0	0	3	25	75	100
ELECTIVE II									
1	16CS6301	Enterprise Computing	3	0	0	3	25	75	100
2	16CS6302	Social Network Analysis	3	0	0	3	25	75	100
3	16CS6303	Embedded Systems	3	0	0	3	25	75	100
4	16CS6304	Total Quality Management	3	0	0	3	25	75	100
5	16CS6305	Network and Routing Protocols	3	0	0	3	25	75	100
6	16CS6306	Signals and Systems	3	0	0	3	25	75	100

OPEN ELECTIVE									
S.No.	Course Code	Course Title	L	T	P	C	CIA	ESE	TOTAL
1	16CS6401	Programming Languages	3	0	0	3	25	75	100

For the students admitted during the academic year 2016-2017 and onwards
SEMESTER VII

S.No.	Course Code	Course Title	L	T	P	C	CIA	ESE	TOTAL
1	16CS7201	Cryptography and Network Security	3	0	0	3	25	75	100
2	16CS7202	Cloud Computing	3	0	0	3	25	75	100
3	16CS7203	Mobile Computing	3	0	0	3	25	75	100
4	16CS73XX	Professional Elective – III	3	0	0	3	25	75	100
5	16CS73XX	Professional Elective – IV	3	0	0	3	25	75	100
6	16XX74XX	Open Elective – II	3	0	0	3	25	75	100
7	16CS7001	Cryptography and Network Security Laboratory	0	0	4	2	50	50	100
8	16CS7002	Cloud Computing Laboratory	0	0	4	2	50	50	100
		TOTAL CREDITS	18	0	8	22	250	550	800

SEMESTER VIII

S.No.	Course Code	Course Title	L	T	P	C	CIA	ESE	TOTAL
1	16CS83XX	Professional Elective – V	3	0	0	3	25	75	100
2	16CS83XX	Professional Elective – VI	3	0	0	3	25	75	100
3	16CS8901	Project Work	0	0	24	12	100	100	200
Total Credits:			6	0	24	18	150	250	400

LIST OF PROFESSIONAL ELECTIVES

S.No.	Course Code	Course Title	L	T	P	C	CIA	ESE	TOTAL
ELECTIVE III									
1	16CS7301	C# and .NET Programming	3	0	0	3	25	75	100
2	16CS7302	Biometrics	3	0	0	3	25	75	100
3	16CS7303	E-Commerce	3	0	0	3	25	75	100
4	16CS7304	Wireless Sensor Networks	3	0	0	3	25	75	100

5	16CS7305	Data Mining and Warehousing	3	0	0	3	25	75	100
6	16CS7306	Digital Signal Processing	3	0	0	3	25	75	100
ELECTIVE IV									
1	16CS7307	Text Mining	3	0	0	3	25	75	100
2	16CS7308	Soft Computing	3	0	0	3	25	75	100
3	16CS7309	Human Interface System Design	3	0	0	3	25	75	100
4	16CS7310	Artificial Intelligence	3	0	0	3	25	75	100
5	16CS7311	High speed Networks	3	0	0	3	25	75	100
6	16CS7312	Semantic Web	3	0	0	3	25	75	100
ELECTIVE V									
1	16CS8301	Software Project Management	3	0	0	3	25	75	100
2	16CS8302	Web Technology	3	0	0	3	25	75	100
3	16CS8303	Pervasive Computing	3	0	0	3	25	75	100
4	16CS8304	Database Security and Privacy	3	0	0	3	25	75	100
5	16CS8305	R Programming	3	0	0	3	25	75	100
6	16CS8306	Database Tuning	3	0	0	3	25	75	100
ELECTIVE VI									
1	16CS8307	Visual Programming	3	0	0	3	25	75	100
2	16CS8308	Software Testing	3	0	0	3	25	75	100
3	16CS8309	High Performance Computing	3	0	0	3	25	75	100
4	16CS8310	Management Information System	3	0	0	3	25	75	100
5	16CS8311	Engineering Economics	3	0	0	3	25	75	100
6	16CS8312	Big data Analytics	3	0	0	3	25	75	100

OPEN ELECTIVE									
S.No.	Course Code	Course Title	L	T	P	C	CIA	ESE	TOTAL
1	16CS6401	Programming Languages	3	0	0	3	25	75	100
2	16CS7402	Optimization Techniques	3	0	0	3	25	75	100

CREDIT DISTRIBUTION

R2016

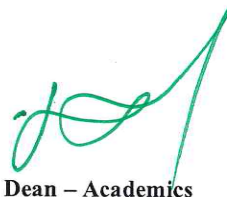
Semester	I	II	III	IV	V	VI	VII	VIII	Total
Credits	27	25	24	25	21	25	22	18	187

R2019

Semester	I	II	III	IV	V	VI	VII	VIII	Total
Credits	20	22	20	21	22	22	20	18	165



Chairman, Board of Studies



Dean – Academics

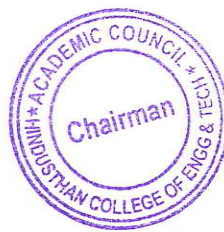


Principal

**Chairman - BoS
CSE - HiCET**

**Dean (Academics)
HiCET**

PRINCIPAL
Hindusthan College of Engineering & technology
COIMBATORE - 641 032



SYLLABUS

SEMESTER I

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	19HE1101	TECHNICAL ENGLISH	2	1	0	3
Course Objective	<ol style="list-style-type: none"> 1. To facilitate students to communicate effectively with coherence. 2. To train the learners in descriptive communication. 3. To introduce professional communication. 4. To enhance knowledge and to provide the information on corporate environment. 5. To equip the trainers with the necessary skills on critical thinking. 					
Unit	Description	Instructional Hours				
I	Listening and Speaking – Opening a conversation, maintaining coherence, turn taking, closing a conversation (excuse, general wishes, positive comments and thanks) Reading –Reading articles from newspaper, Reading comprehension Writing Chart analysis, process description, Writing instructions Grammar and Vocabulary - Tenses, Regular and irregular verb, technical vocabulary.	9				
II	Listening and Speaking - listening to product description, equipment & work place (purpose, appearance, function) Reading - Reading technical articles Writing - Letter phrases, writing personal letters, Grammar and Vocabulary -articles, Cause & effect, Prepositions.	9				
III	Listening and Speaking - - listening to announcements Reading - Reading about technical inventions, research and development Writing - Letter inviting a candidate for interview, Job application and resume preparation Grammar and Vocabulary - Homophones and Homonyms.	9				
IV	Listening and Speaking - - Practice telephone skills and telephone etiquette (listening and responding, asking questions). Reading - Reading short texts and memos Writing - invitation letters, accepting an invitation and declining an invitation Grammar and Vocabulary - Modal verbs, Collocation, Conditionals, Subject verb agreement and Pronoun-Antecedent agreement.	9				
V	Listening and Speaking - listening to technical group discussions and participating in GDs Reading - reading biographical writing - Writing - Proposal writing, Writing definitions, Grammar and Vocabulary - Abbreviation and Acronym, Prefixes & suffixes, phrasal verbs.	9				
Total Instructional Hours		45				


- Course Outcome**
- CO1- Trained to maintain coherence and communicate effectively.
 - CO2- Practiced to create and interpret descriptive communication.
 - CO3- Introduced to gain information of the professional world.
 - CO4- Acquired various types of communication and etiquette.
 - CO5- Taught to improve interpersonal and intrapersonal skills.

TEXT BOOKS:

- T1- Norman Whitby, "Business Benchmark-Pre-intermediate to Intermediate", Cambridge University Press,
- T2- Raymond Murphy, "Essential English Grammar", Cambridge University Press, 2019.

REFERENCE BOOKS :

- R1- Meenakshi Raman and Sangeetha Sharma. "Technical Communication- Principles and Practice", Oxford University Press, 2009.
- R2- Raymond Murphy, "English Grammar in Use"- 4th edition Cambridge University Press, 2004.
- R3- Kamalesh Sadanan "A Foundation Course for the Speakers of Tamil-Part-I &II", Orient Blackswan, 2010.


Chairman - BoS
CSE - HICET




Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	19MA1101	CALCULUS	3	1	0	4

- Course Objective**
1. Understand the concept of differentiation
 2. Interpret in the area of infinite series and their convergence.
 3. Evaluate the functions of several variables which are needed in many branches of engineering.
 4. Understand the concept of double integrals.
 5. Understand the concept of triple integrals.

Unit	Description	Instructional Hours
	DIFFERENTIAL CALCULUS	
I	Rolle's Theorem – Lagrange's Mean Value Theorem- Maxima and Minima – Taylor's and Maclaurin's Theorem.	12
	SEQUENCE AND SERIES	
II	Definition and examples – Series – Test for Convergence – Comparison Test – D' Alembert's Ratio Test – Alternative Series – Alembert's Leibnitz test.	12
	MULTIVARIATE CALCULUS (DIFFERENTIATION)	
III	Total derivatives - Jacobians – Maxima, Minima and Saddle points - Lagrange's method of undetermined multipliers – Gradient, divergence, curl and derivatives.	12
	DOUBLE INTEGRATION	
IV	Double integrals in Cartesian coordinates – Area enclosed by the plane curves (excluding surface area) – Green's Theorem (Simple Application) - Stoke's Theorem – Simple Application involving cubes and rectangular parelloiped.	12
	TRIPLE INTEGRATION	
V	Triple integrals in Cartesian co-ordinates – Volume of solids (Sphere, Ellipsoid, Tetrahedron) using Cartesian co-ordinates. Gauss Divergence Theorem – Simple Application involving cubes and rectangular parelloiped.	12

Total Instructional Hours 60

- Course Outcome**
- CO1: Apply the concept of differentiation in any curve.
CO2: Evaluation of infinite series approximations for problems arising in mathematical modeling.
CO3: Identify the maximum and minimum values of surfaces.
CO4: Apply double integrals to compute area of plane curves.
CO5: Evaluation of triple integrals to compute volume of solids.

TEXT BOOKS:

T1 - Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition, Wiley India Private Ltd., New Delhi, 2018.


T2 - Veerarajan T, "Engineering Mathematics ", McGraw Hill Education(India) Pvt Ltd, New Delhi, 2016.

REFERENCE BOOKS :

R1- Thomas & Finney " Calculus and Analytic Geometry" , Sixth Edition,,Narosa Publishing House

R2 - Weir,M.D and Joel Hass, ' Thomas Calculus" 12th Edition,Pearson India 2016..

R3 - Grewal B.S, "Higher Engineering Mathematics", 42nd Edition, Khanna Publications, Delhi, 2012.


Chairman - BoS
CSE - HiCET




Dean (Academics)
HiCET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	19PH1151	APPLIED PHYSICS	2	0	2	3

- Course Objective**
1. Enhance the fundamental knowledge in properties of matter
 2. Analysis the oscillatory motions of particles
 3. Extend the knowledge about wave optics
 4. Gain knowledge about laser and their applications
 5. Conversant with principles of optical fiber, types and applications of optical fiber

Unit	Description	Instructional Hours
I	PROPERTIES OF MATTER Elasticity – Hooke's law – Stress-strain diagram - Poisson's ratio – Bending moment – Depression of a cantilever – Derivation of Young's modulus of the material of the beam by Uniform bending theory and experiment. Determination of Young's modulus by uniform B.E.nding method.	6+3=9
II	OSCILLATONS Translation motion –Vibration motion – Simple Harmonic motion – Differential Equation of SHM and its solution – Damped harmonic oscillation - Torsion stress and deformations – Torsion pendulum: theory and experiment. Determination of Rigidity modulus – Torsion pendulum.	6+3=9
III	WAVE OPTICS Conditions for sustained Interference – air wedge and it's applications - Diffraction of light – Fresnel and Fraunhofer diffraction at single slit –Diffraction grating – Rayleigh's criterion of resolution power - resolving power of grating. Determination of wavelength of mercury spectrum – spectrometer grating. Determination of thickness of a thin wire – Air wedge method.	6+6=12
IV	LASER AND APPLICATIONS Spontaneous emission and stimulated emission – Population inversion – Pumping methods – Derivation of Einstein's coefficients (A&B) – Type of lasers – Nd:YAG laser and CO ₂ laser- Laser Applications – Holography – Construction and reconstruction of images. Determination of Wavelength and particle size using Laser.	6+3=9
V	FIB.E.R OPTICS AND APPLICATIONS Principle and propagation of light through optical fibers – Derivation of numerical aperture and acceptance angle – Classification of optical fibers (based on refractive index, modes and materials) – Fiber optical communication link – Fiber optic sensors – Temperature and displacement sensors.	6
Total Instructional Hours		45

- Course Outcome**
- CO1: Illustrate the fundamental properties of matter
CO2: Discuss the Oscillatory motions of particles
CO3: Analyze the wavelength of different colors
CO4: Understand the advanced technology of LASER in the field of Engineering
CO5: Develop the technology of fiber optical communication in engineering field

TEXT BOOKS:

- T1 - Rajendran V, Applied Physics, Tata McGraw Hill Publishing Company Limited, New Delhi, 2017.
T2- Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, Dhanpat Rai Publications (P) Ltd., New Delhi, 2015.

REFERENCE BOOKS:

- R1 - Arthur Beiser "Concepts of Modern Physics" Tata McGraw Hill, New Delhi – 2015
R2 - M.N Avadhanulu and PG Kshirsagar "A Text Book of Engineering physics" S. Chand and Company ltd
R3 - Dr. G. Senthilkumar "Engineering Physics – I" VRB publishers Pvt Ltd., 2016


Chairman - BoS
CSE - HiCET




Dean (Academics)
HiCET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	19CY1151	CHEMISTRY FOR ENGINEERS	2	0	2	3

The student should B.E. conversant with

- Course Objective**
1. The boiler feed water requirements, related problems and water treatment techniques.
 2. The principles of polymer chemistry and engineering applications of polymers and composites.
 3. The principles of electrochemistry and with the mechanism of corrosion and its control.
 4. The principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.
 5. The important concepts of spectroscopy and its applications.

Unit	Description	Instructional Hours
I	WATER TECHNOLOGY: Hard water and soft water- Disadvantages of hard water- Hardness: types of hardness, simple calculations, estimation of hardness of water – EDTA method – Boiler troubles - Conditioning methods of hard water – External conditioning - demineralization process - desalination: definition, reverse osmosis – Potable water treatment – breakpoint chlorination. Estimation of total, permanent and temporary hardness of water by EDTA.	6 +3=9
II	POLYMER & COMPOSITES: Polymerization – types of polymerization – addition and condensation polymerization – mechanism of free radical addition polymerization – copolymers – plastics: classification – thermoplastics and thermosetting plastics, preparation, Polymerization – types Polymerization – types of polymerization – addition and condensation polymerization – mechanism of free radical addition polymerization – copolymers – plastics: classification – thermoplastics and thermosetting plastics, preparation, properties and uses of commercial plastics – PVC, Bakelite – moulding of plastics (extrusion and compression); Composites: definition, types of composites – polymer matrix composites (PMC) –FRP	6
III	ELECTROCHEMISTRY AND CORROSION: Electrochemical cells – reversible and irreversible cells - EMF- Single electrode potential – Nernst equation (derivation only) – Conductometric titrations. Chemical corrosion – Pilling – Bedworth rule – electrochemical corrosion – different types –galvanic corrosion – differential aeration corrosion – corrosion control – sacrificial anode and impressed cathodic current methods - protective coatings – paints – constituents and functions. Conductometric titration of strong acid vs strong base (HCl vs NaOH). Conductometric titration (Mixture of strong acid and base). Conductometric precipitation titration using BaCl₂ and Na₂SO₄	6+9 =15
IV	ENERGY SOURCES AND STORAGE DEVICES: Introduction- nuclear energy- nuclear fission- controlled nuclear fission- nuclear fusion differences between nuclear fission and fusion- nuclear chain reactions- nuclear reactor power generator- classification of nuclear reactor- light water reactor- breeder reactor. Batteries and fuel cells: Types of batteries- alkaline battery- lead storage battery- lithium battery- fuel cell H ₂ -O ₂ fuel cell applications.	6

- V **ANALYTICAL TECHNIQUES:** Beer-Lambert's law – UV-visible spectroscopy and IR spectroscopy – principles – instrumentation (block diagram only) – flame photometry – principle – instrumentation (block diagram only) – estimation of sodium by flame photometry – atomic absorption spectroscopy – principles – instrumentation (block diagram only) – estimation of nickel by atomic absorption spectroscopy. 6+3

Determination of iron content of the water sample using spectrophotometer.(1,10 phenanthroline / thiocyanate method).

Total Instructional Hours 45

After the completion of the course, the learner will B.E. able to

Course Outcome

CO1: Differentiate hard and soft water and to solve the related problems on water purification and its significance in industries and daily life

CO2: Acquire the basic knowledge of polymers, composites and FRP and their significance.

CO3: Develop knowledge on the basic principles of electrochemistry and understand the causes of corrosion, its consequences to minimize corrosion to improve industrial design.

CO4: Develop knowledge about the renewable energy resources and batteries along with the need of new materials to improve energy storage capabilities.

CO5: Identify the structure and characteristics of unknown/new compound with the help of spectroscopy.

TEXT BOOKS

T1 - P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co., New Delhi (2018).

REFERENCES

R1 - B.Sivasankar "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, New Delhi (2012).

R2 - S.S.Dara "A Text book of Engineering Chemistry" S.Chand & Co. Ltd., New Delhi (2017).


**Chairman - BoS
CSE - HiCET**




**Dean (Academics)
HiCET**

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	19CS1151	PYTHON PROGRAMMING AND PRACTICES	2	0	2	3

- Course Objective**
- To know the basics of algorithmic problem solving
 - To read and write simple Python programs
 - To develop Python programs with conditionals and loops and to define Python functions and call them
 - To use Python data structures — lists, tuples, dictionaries
 - To do input/output with files in Python

Unit	Description	Instructional Hours
I	ALGORITHMIC PROBLEM SOLVING Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation(pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.	9
II	DATA, EXPRESSIONS, STATEMENTS Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments. <i>Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.</i>	7+2(P)
III	CONTROL FLOW, FUNCTIONS Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. <i>Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.</i>	5+4(P)
IV	LISTS, TUPLES, DICTIONARIES Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; <i>Illustrative programs: selection sort, insertion sort, merge sort, histogram.</i>	3+6(P)
V	FILES, MODULES, PACKAGES Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages. <i>Illustrative programs: word count, copying file contents.</i>	5+4(P)
Total Instructional Hours		(29 + 16) 45


Course Outcome	CO1:	CO2:	CO3:	CO4:	CO5:
	Develop algorithmic solutions to simple computational problems	Read, write, execute by hand simple Python programs	Structure simple Python programs for solving problems and Decompose a Python program into functions	Represent compound data using Python lists, tuples, dictionaries	Read and write data from/to files in Python Programs.

TEXT BOOKS:

- T1: Guido van Rossum and Fred L. Drake Jr, An Introduction to Python – Revised and updated for Python 3.6.2, Shroff Publishers, First edition (2017).
- T2: S. Annadurai, S. Shankar, I. Jasmine, M. Revathi, Fundamentals of Python Programming, Mc-Graw Hill Education (India) Private Ltd, 2019

REFERENCE BOOKS:

- R1: Charles Dierbach, —Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.
- R2: Timothy A. Budd, —Exploring Python, Mc-Graw Hill Education (India) Private Ltd., 2015
- R3: Robert Sedgewick, Kevin Wayne, Robert Dondero, —Introduction to Programming in Python


Chairman - BoS
CSE - HICET




Dean (Academics)
HICET

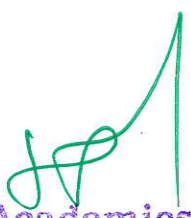
PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	19EC1154	BASICS OF ELECTRON DEVICES AND ELECTRIC CIRCUITS	2	0	2	3
Course Objective	<ol style="list-style-type: none"> To introduce the fundamental concepts of electrical circuits and theorems. To introduce the concept of circuit transients and resonance. To understand the basics theory, operational characteristics of diodes and transistors. To study the operating principles of special semiconductor devices.. To create awareness on the methods for electrical safety and protection. 					
Unit	Description					Instructional Hours
I	UNIT I : ELECTRICAL CIRCUITS AND ANALYSIS Ohm’s law, DC and AC circuits fundamentals, Kirchhoff’s laws, Mesh and Nodal analysis- Theorems and simple problems: Superposition, Maximum power transfer theorem - Experimental study -Verification of superposition theorem.					6+3
II	UNIT II : CIRCUIT TRANSIENTS AND RESONANCES Basic RL, RC and RLC circuits and their responses to DC and sinusoidal inputs –frequency response – Parallel and series resonances – Q factor. Experimental verification of series resonance. Experimental study-Determination of Resonance Frequency of Series RLC Circuits					6+3
III	UNIT III : DIODE AND TRANSISTOR Characteristics of PN Junction Diode – Zener Diode and its Characteristics – Zener Effect– Zener Voltage Regulator.Bipolar Junction Transistor (BJT) Construction – CB, CE, CC Configurations and Characteristics- Experimental study-PN Junction Diode Characteristics,Zener Diode Characteristics					6+3
IV	UNIT IV : SPECIAL SEMICONDUCTOR DEVICES Construction, Characteristics and Applications of FET - UJT – SCR, Photo diode, Photo Transistor - LED and LCD- Implementation of Photo diode application. Experimental study- FET Characteristics					6+3
V	UNIT V : BASICS OF POWER SUPPLY AND ELECTRICAL WIRING Introduction to Power supply circuits: Half wave, Full wave Rectifier –SMPS - UPS (online & offline).Cable and wire types and applications – Two way and three way control- Experimental study- Implementation of simple wiring circuit for a Computer network.					6+3
Total Instructional Hours						45
Course Outcome	CO1: Apply network theorems for AC and DC Circuits. CO2: Understand the concept of transient response of circuits. CO3: Ability to explain the theory, construction, and operation of diodes and BJT. CO4: Ability to explain the theory, construction, and operation of FET and special semiconductor diodes. CO5: Ability to apply the methods to ensure electrical safety.					
TEXT BOOKS:						
T1 - W David A. Bell, “Electronic Devices and Circuits”, Oxford University Press, 5Th Edition,(2008).						
T2 - Sudhakar A and Shyam Mohan SP, “Circuits and Network Analysis and Synthesis”,Tata McGraw Hill, (2007).						

REFERENCES BOOKS:

- R1 - M. Robert T. Paynter, "Introducing Electronics Devices and Circuits", Pearson Education, 7th Edition, (2006).
- R2 - J. Millman & Halkins, Satyabranta Jit, "Electronic Devices & Circuits", Tata McGraw Hill, 2nd Edition, 2008
- R3 - William H. Hayt, J.V. Jack, E. Kemmebly and Steven M. Durbin, "Engineering Circuit Analysis", Tata McGraw Hill, 6th Edition, 2002.
- R4 - Robert Boylestad and Louis Nashelsky, "Electron Devices and Circuit Theory" Prentice Hall, 10th edition, July 2008


**Chairman - BoS
CSE - HiCET**




**Dean (Academics)
HiCET**

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	19HE1071	VALUE ADDED COURSE I: LANGUAGE COMPETENCY ENHANCEMENT COURSE-I (COMMON TO ALL BRANCHES)	0	0	2	1


Course Objective	
	✓ To enhance student language competency
	✓ To identify individual students level of communication skills
	✓ To develop English Vocabulary and spoken communication skills.
	✓ To revive the fundamentals of English Grammar.

Unit	Description	Instructional Hours
I	Listening Language of Communication- English listening- Hearing Vs Listening- Verbal and Non-verbal communication – Listening strategies-Sounds of English.	3
	Reading	
III	English Language Enhancement – Indianism in English – Role of Reading in effective communication – Techniques for good reading (skimming and scanning) Reading articles from newspaper, magazine. Reading and interpreting a passage.	3
	Speaking	
III	Common errors in Pronunciation – Signposts in English (Role play) – Public Speaking skills – Social Phobia – Eliminating fear – Common etiquette of speaking - Debate and Discuss.	3
	Writing	
IV	Writing genre – Enhancement of basic English Vocabulary; Parts of Speech, Noun, Verbs, and Tenses – combining sentences, sentence formation and completion.	3
	Art of Communication	
V	Communication process – Word building and roleplay – Exercise on English Language for various situations through online and offline activities.	3
Total Instructional Hours		15

Course Outcome	
	CO1- Trained to maintain coherence and communicate effectively.
	CO2- Practiced to create and interpret descriptive communication.
	CO3- Introduced to gain information of the professional world.
	CO4- acquired various types of communication and etiquette.
	CO5- Taught to improve interpersonal and intrapersonal skills.

REFERENCE BOOKS:

1. Verbal Ability and Reading Comprehension by Arun Sharma, 9th edition, Tata Mc Graw Hill
2. Word Power Made Easy by Norman Lewis, – Print, 1 June 2011.
3. High School English Grammar by Wren and Martin, S.CHAND Publications, 1 January 2017.
4. Practical course in Spoken English by J.K. Gangal, PHI Learning , Second edition, 1 January 2018.


Chairman - BoS
CSE - HICET




Dean (Academics)
HICET

SEMESTER II

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	19HE2101	BUSINESS ENGLISH FOR ENGINEERS	2	1	0	3
Course Objective	1. To introduce to business communication. 2. To train the students to react to different professional situations. 3. To make the learner familiar with the managerial skills 4. To empower the trainee in business writing skills. 5. To learn to interpret and expertise different content.					
Unit	Description					Instructional Hours
I	Listening and Speaking – listening and discussing about programme and conference arrangement Reading –reading auto biographies of successful personalities Writing Formal & informal email writing, Recommendations Grammar and Vocabulary - Business vocabulary, Adjectives & adverbs.					9
II	Listening and Speaking - listening to TED talks Reading - Making and interpretation of posters Writing - Business letters: letters giving good and bad news, Thank you letter, Congratulating someone on a success” Grammar and Vocabulary - Active & passive voice, Spotting errors (Tenses, Preposition, Articles).					9
III	Listening and Speaking -travel arrangements and experience Reading - travel reviews Writing - Business letters (Placing an order, making clarification & complaint letters). Grammar and Vocabulary - Direct and Indirect speech.					9
IV	Listening and Speaking - Role play - Reading - Sequencing of sentence Writing - Business report writing (marketing, investigating) Grammar and Vocabulary - Connectors, Gerund & infinitive.					9
V	Listening and Speaking - Listen to Interviews & mock interview Reading - Reading short stories, reading profile of a company - Writing - Descriptive writing (describing one’s own experience) Grammar and Vocabulary - Editing a passage(punctuation, spelling & number rules).					9
Total Instructional Hours						45

- Course Outcome**
- CO1- Introduced to different modes and types of business communication.
 - CO2- Practiced to face and react to various professional situations efficiently.
 - CO3- learnt to practice managerial skills.
 - CO4- Familiarized with proper guidance to business writing.
 - CO5- Trained to analyze and respond to different types of communication.

TEXT BOOKS:

- T1 - Norman Whitby, “Business Benchmark-Pre-intermediate to Intermediate”,Cambridge University Press,
- T2- Ian Wood and Anne Willams. “Pass Cambridge BEC Preliminary”, Cengage Learning press 2015.

REFERENCE BOOKS :

- R1 - Michael Mc Carthy, “Grammar for Business”, Cambridge University Press, 2009.
- R2- Bill Mascull, “Business Vocabulary in use: Advanced 2nd Edition”, Cambridge University Press, 2009.
- R3- Frederick T. Wood, “Remedial English Grammar For Foreign Students”, Macmillan publishers, 2001.

S.M.J.
Chairman - BoS
CSE - HICET



[Signature]
Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	19MA2104	DIFFERENTIAL EQUATIONS AND LINEAR ALGEBRA	3	1	0	4

- Course Objective**
1. Develop the skill to use matrix algebra techniques that is needed by engineers for practical applications
 2. Extend the knowledge of vector spaces
 3. Describe some methods to solve different types of first order differential equations.
 4. Solve ordinary differential equations of certain types using Wronskian technique.
 5. Use the effective mathematical tools for the solutions of partial differential equations

Unit	Description	Instructional Hours
	MATRICES	
I	Eigen values and Eigen vectors of a real matrix – Properties of Eigen values and Eigen vectors (without proof) Cayley - Hamilton Theorem (excluding proof) - Orthogonal matrices – Definition – Reduction of a quadratic form to canonical form by orthogonal transformation.	12
	VECTOR SPACES	
II	Complex matrices – Conjugate of the matrix – Hermitian and Skew Hermitian matrices – Properties (without proof) – Unitary matrix – Properties (without proof) - Inner product spaces – Gram – Schmidt orthogonalization.	12
	FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS	
III	Equations of the first order and of the first degree – Homogeneous equations – Exact differential equations – Linear equations – Equations reducible to the linear form – Benoulli's equation.	12
	ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER	
IV	Second order linear differential equations with constant and variable co-efficients – Cauchy – Euler equations – Cauchy – Legendre equation – Method of variation of paramers.	12
	PARTIAL DIFFERENTIAL EQUATIONS	
V	Formation of partial differential equations by the elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations of the form $f(p,q)=0$, Clairaut's type : $z = px+qy +f(p,q)$ – Lagrange's linear equation.	12
Total Instructional Hours		60

- Course Outcome**
- CO1: Calculate Eigen values and Eigen vectors for a matrix which are used to determine the natural frequencies
- CO2: Infer the knowledge of vector spaces
- CO3: Apply few methods to solve different types of first order differential equations.
- CO4: Develop sound knowledge of techniques in solving ordinary differential equations.
- CO5: Solve Partial Differential Equations using various methods.

TEXT BOOKS:

- T1- Grewal B.S, "Higher Engineering Mathematics", 43rd Edition, Khanna Publications, Delhi, 2018.
- T2- Howard Anton, Chris Rorres, Elements of Linear Algebra with Applications, Wiley, New Delhi, 2nd Edition, 2015.

REFERENCE BOOKS :

- R1-E. A. Coddington, An Introduction to ordinary Differential Equations, Prentice Hall India, 1995.
- R2 - G.F.Simmons and S. G. Krantz, Differential Equations, Tata McGraw Hill, 2007.
- R3 - Veerarajan T, "Engineering Mathematics", McGraw Hill Education(India) Pvt Ltd, New Delhi, 2016


Chairman - BoS
CSE - HICET




Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	19PH2151	MATERIAL SCIENCE	2	0	2	3

The student should B.E. able to

- Course Objective**
1. Acquire fundamental knowledge of semiconducting materials which is related to the engineering program
 2. Extend the knowledge about the magnetic materials
 3. Explore the behavior of super conducting materials
 4. Gain knowledge about Crystal systems
 5. Understand the importance of ultrasonic waves

Unit	Description	Instructional Hours
I	SEMICONDUCTING MATERIALS Introduction – Intrinsic semiconductor – Compound and elemental semiconductor - direct and indirect band gap of semiconductors. Carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination. Optical properties of semiconductor – Light through optical fiber(Qualitative). Determination of band gap of a semiconductor. Determination of acceptance angle and numerical aperture in an optical fiber.	6+(6)
II	MAGNETIC MATERIALS Origin of magnetic moment – Bohr magneton – comparison of Dia, Para and Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – anti ferromagnetic materials – Ferrites and its applications. B – H curve by Magnetic hysteresis experiment.	6+(3)
III	SUPERCONDUCTING MATERIALS Superconductivity : properties(Messiner effect, effect of magnetic field, effect of current and isotope effects) – Type I and Type II superconductors – High Tc superconductors – Applications of superconductors –Cryotron and magnetic levitation.	6
IV	CRYSTAL PHYSICS Crystal systems - Bravais lattice - Lattice planes - Miller indices - Interplanar spacing in cubic lattice - Atomic radius, Coordination number and Packing factor for SC, BCC and FCC crystal structures.	6
V	ULTRASONICS Production – Magnetostrictive generator – Piezoelectric generator – Determination of velocity using acoustic grating – Cavitations – Viscous force – co-efficient of viscosity. Industrial applications – Drilling and welding – Non destructive testing – Ultrasonic pulse echo system. Determination of velocity of sound and compressibility of liquid – Ultrasonic wave. Determination of Coefficient of viscosity of a liquid –Poiseuille’s method.	6+(6)

Total Instructional Hours 45

After completion of the course the learner will B.E. able to

- Course Outcome**
- CO1: Understand the purpose of acceptor or donor levels and the band gap of a semiconductor
CO2: Interpret the basic idea behind the process of magnetism and its applications in everyday
CO3: Discuss the behavior of super conducting materials
CO4: Illustrate the types and importance of crystal systems
CO5: Evaluate the production of ultrasonics and its applications in NDT

TEXT BOOKS:

T1 - Rajendran V, Applied Physics, Tata McGraw Hill Publishing Company Limited, New Delhi, 2017.

T2- Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, Dhanpat Rai Publications (P) Ltd., New Delhi, 2015.

REFERENCE BOOKS:

R1 - Arthur Beiser “Concepts of Modern Physics” Tata McGraw Hill, New Delhi – 2015

R2 - M.N Avadhanulu and PG Kshirsagar “A Text Book of Engineering physics” S. Chand and Company ltd., New Delhi

R3 - Dr. G. Senthilkumar “Engineering Physics – II” VRB publishers Pvt Ltd., 2016


Chairman - BoS
CSE - HICET




Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	19CY2151	ENVIRONMENTAL STUDIES	2	0	2	3

The student should B.E. conversant with

- Course Objective**
1. The natural resources, exploitation and its conservation
 2. The importance of environmental education, ecosystem and biodiversity.
 3. The knowledge about environmental pollution – sources, effects and control measures of environmental pollution.
 4. Scientific, technological, economic and political solutions to environmental problems.
 5. An awareness of the national and international concern for environment and its protection.

Unit	Description	Instructional Hours
I	NATURAL RESOURCES Renewable and Non renewable resources - Forest resources: Use and over-exploitation, deforestation, timber extraction, mining, dams and their effects on forests and tribal people - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture – Energy resources: Renewable and non renewable energy sources – Solar energy and wind energy - role of an individual in conservation of natural resources.	6
II	ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY Importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem - energy flow in the ecosystem – ecological succession processes – Introduction, types, characteristic features, structure and function of the forest and ponds ecosystem – Introduction to biodiversity definition: types and value of biodiversity – hot-spots of biodiversity – threats to biodiversity– endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.	6
III	ENVIRONMENTAL POLLUTION Definition – causes, effects and control measures of: Air pollution- Water pollution – Water quality parameters- Soil pollution - Noise pollution- Nuclear hazards – role of an individual in prevention of pollution. Determination of Dissolved Oxygen in sewage water by Winkler’s method. Estimation of alkalinity of water sample by indicator method. Determination of chloride content of water sample by argentometric method.	6+9=15
IV	SOCIAL ISSUES AND THE ENVIRONMENT From unsustainable to sustainable development – urban problems related to energy- environmental ethics: Issues and possible solutions – 12 Principles of green chemistry- Municipal solid waste management. Global issues – Climatic change, acid rain, greenhouse effect and ozone layer depletion – Disaster Management – Tsunami and cyclones. Determination of pH in B.E.verages.	6+3=9
V	HUMAN POPULATION AND THE ENVIRONMENT Population growth, variation among nations – population explosion – family welfare programme – environment and human health – effect of heavy metals – human rights – value education – HIV / AIDS – women and child welfare –Environmental impact analysis (EIA)- GIS-remote sensing-role of information technology in environment and human health. Estimation of heavy metal ion (copper) in effluents by EDTA.	6+3=9
Total Instructional Hours		45

After the completion of the course, the learner will B.E. able to

- Course Outcome**
- CO1: Develop an understanding of different natural resources including renewable resources.
CO2: Realise the importance of ecosystem and biodiversity for maintaining ecological balance.
CO3: Understand the causes of environmental pollution and hazards due to manmade activities.
CO4: Demonstrate an appreciation for need for sustainable development and understand the various social issues and solutions to solve the issues.
CO5: Gain knowledge about the importance of women and child education and know about the existing technology to protect environment.

TEXT BOOKS:

T1- Anubha Kaushik and C. P. Kaushik, “Perspectives in Environmental studies”, Sixth edition, New Age International Publishers, New Delhi, 2019.

T2 – S. Annadurai and P.N. Magudeswaran, “Environmental studies”, Cengage Learning India Pvt.Ltd, Delhi, 2018

REFERENCES:

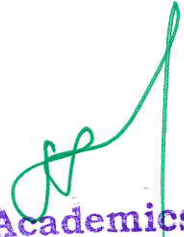
R1 – Erach Bharucha, “Textbook of environmental studies” University Press (I) Pvt.ltd, Hyderabad, 2015

R2 - G.Tyler Miller, Jr and Scott E. Spoolman “Environmental Science” Thirteenth Edition, Cengage Learning, 2010.

R3 - Gilbert M. Masters and Wendell P. Ela “Introduction to Environmental Engineering and Science”, 3rd edition, Pearson Education, 2013.


Chairman - BoS
CSE - HiCET




Dean (Academics)
HiCET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	19CS2152	ESSENTIALS OF C AND C++ PROGRAMMING	2	0	2	3

- Course Objective**
1. To Learn and develop basics of C programming
 2. To understand Object Oriented Programming concepts and basic characteristics of C++.
 3. Be familiar with the constructors and operator overloading.
 4. To understand the concepts of inheritance, polymorphism and virtual function
 5. To learn and define concept of templates and exception handling.

Unit	Description	Instructional Hours
	BASICS OF 'C' PROGRAMMING	
I	<p>Fundamentals of 'C' programming – Structure of a 'C' program – Constants - Variables – Data Types – Expressions using operators in 'C' – Managing Input and Output operations-Branching and Looping - Arrays – One dimensional and Two dimensional arrays.</p> <p><i>Programs: 1. Write a C program to calculate sum of individual digits of a given number. 2. Write a C program to count no. of positive numbers, negative numbers and zeros in the array. 3. Write a C program to find sum of two numbers using functions with arguments and without return type.</i></p>	3+6(P)
	BASICS OF 'C++' PROGRAMMING	
II	<p>Introduction to C++ – structures and unions- Object oriented programming concepts– Defining a Class – creating objects - access specifiers – Function in C++ - function and data members default arguments – function overloading – Inline functions - friend functions – constant with class – static member of a class – nested classes – local classes.</p> <p><i>Program: Write a C++ program to accept the student detail such as name and 3 differentmarks by get_data() method and display the name and average of marks using display() method. Define a friend class for calculating the average of marks using the method mark_avg().</i></p>	6+3(P)
	CONSTRUCTOR AND OPERATOR OVERLOADING	
III	<p>Constructors - Default, Copy, Parameterized, Dynamic constructors, Default argument – Destructor. - Function overloading- Operator overloading-Unary, Binary - Binary operators using friend function.</p> <p><i>Program: Write a C++ program to calculate the volume of different geometric shapes like cube, cylinder and sphere and hence implement the concept of Function Overloading.</i></p>	7+2(P)
	INHERITANCE AND POLYMORPHISM	
IV	<p>Inheritance – Public, Private and Protected derivations– Single– Multiple– Multilevel– Hybrid– Hierarchical - Virtual base class – abstract class – composite objects- Runtime polymorphism – virtual functions – pure virtual functions.</p> <p><i>Program: Demonstrate Simple Inheritance concept by creating a base class FATHER with data members SurName and BankBalance and creating a derived class SON, which inherits SurName and BankBalance feature from base class but provides its own feature FirstName and DOB. Create and initialize F1 and S1 objects with appropriate constructors and display the Father & Son details. (Hint : While creating S1 object, call Father base class parameterized constructor through derived class by sending values).</i></p>	7+2(P)
V	TEMPLATES AND EXCEPTION HANDLING	7+2(P)

Function and class templates - Exception handling – try-catch-throw paradigm – exception specification – terminate and Unexpected functions – Uncaught exception.

Program: Write a C++ program to create a template function for Bubble Sort and demonstrate sorting of integers and doubles.

Total Instructional Hours

45(30+15)

**Course
Outcome**

- CO1:** Able to develop simple applications in C using basic constructs.
- CO2:** Able to apply solutions to real world problems using basic characteristics of C++.
- CO3:** Able to write object-oriented programs using operator overloading, constructors and destructors.
- CO4:** Able to develop programs with the concepts of inheritance and polymorphism.
- CO5:** Able to understand and define solutions with C++ advanced features such as templates and exception handling.

TEXT BOOKS:

T1: E. Balagurusamy, “Programming in ANSI C”, 7th Edition, McGraw Hill Publication, 2016.

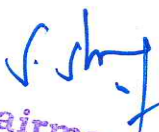
T2: E. Balagurusamy, “Object Oriented Programming with C++”, 7th Edition, McGraw Hill Publication, 2017.

REFERENCE BOOKS:

R1: Yashavant P. Kanetkar. “Let Us C”, BPB Publications, 2011.

R2: Rohit Khurana, “Object Oriented Programming with C++”, Vikas Publishing, 2nd Edition, 2016.

R3: B. Trivedi, “Programming with ANSI C++”, Oxford University Press, 2007.


**Chairman - BoS
CSE - HICET**




**Dean (Academics)
HICET**

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	19ME2154	ENGINEERING GRAPHICS	1	0	4	3

- Course Objective**
1. To gain the knowledge of Engineer's language of expressing complete details about objects and construction of conics and special curves.
 2. To learn about the orthogonal projections of straight lines and planes.
 3. To acquire the knowledge of projections of simple solid objects in plan and elevation.
 4. To learn about the projection of sections of solids and development of surfaces.
 5. To study the isometric projections of different objects.

Unit	Description	Instructional Hours
PLANE CURVES		
I	Importance of engineering drawing; drafting instruments; drawing sheets – layout and folding; Lettering and dimensioning, BIS standards, scales.	12
	Geometrical constructions, Engineering Curves Conic sections – Construction of ellipse, parabola and hyperbola by eccentricity method. Construction of cycloids and involutes of square and circle – Drawing of tangents and normal to the above curves.	
PROJECTIONS OF POINTS, LINES AND PLANE SURFACES		
II	Introduction to Orthographic projections- Projection of points. Projection of straight lines inclined to both the planes, Determination of true lengths and true inclinations by rotating line method.	12
	Projection of planes (polygonal and circular surfaces) inclined to both the planes by rotating object method (First angle projections only).	
PROJECTIONS OF SOLIDS		
III	Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is perpendicular and inclined to one plane by rotating object method.	12
SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES		
IV	Sectioning of simple solids with their axis in vertical position when the cutting plane is inclined to one of the principal planes and perpendicular to the other – Obtaining true shape of section.	12
	Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids, cylinder and cone. Development of lateral surfaces of truncated solids.	
ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS		
V	Isometric views and projections simple and truncated solids such as - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions. Free hand sketching of multiple views from a pictorial drawing. Basics of drafting using AutoCAD software.	12
Total Instructional Hours		60

COURSE OUTCOMES:

CO1: Understand and interpret the engineering drawings in order to visualize the objects and draw the conics and special curves.

CO2: Draw the orthogonal projections of straight lines and planes.

CO3: Interpret the projections of simple solid objects in plan and elevation.

CO4: Draw the projections of section of solids and development of surfaces of solids.

CO5: Draw the isometric projections and the perspective views of different objects.

TEXT BOOK:

1. K.Venugopal, V.Prabu Raja, "Engineering Drawing, AutoCAD, Building Drawings", 5thedition New Age International Publishers, New delhi 2016.

2. K.V.Natarajan, "A textbook of Engineering Graphics", Dhanlaksmi Publishers, Chennai.

REFERENCES:

1. Basant Agrawal and C.M.Agrawal, "Engineering Drawing", Tata McGraw Hill Publishing company Limited, New Delhi 2008.

2. N.S. Parthasarathy, Vela Murali, "Engineering Drawing", Oxford University PRESS, India 2015.


Chairman - BoS
CSE - HICET




Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	19ME2001	ENGINEERING PRACTICES	0	0	4	2

OBJECTIVES:

To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical and Electrical Engineering.

GROUP A (CIVIL & MECHANICAL)

S.No Description of the Experiments

CIVIL AND MECHANICAL ENGINEERING PRACTICES

- 1 Preparation of Single pipe line and Double pipe line connection by using valves, taps, couplings, unions, reducers and elbows.
- 2 Arrangement of bricks using English bond for 1brick thick wall and 11/2 brick thick wall for right angle corner junction.
- 3 Arrangement of bricks using English bond for 1brick thick wall and 11/2 brick thick wall for T junction.
- 4 Preparation of arc welding of Butt joints, Lap joints and Tee joints.
- 5 Practice on sheet metal Models– Trays and funnels
- 6 Hands-on-exercise in wood work, joints by sawing, planing and cutting.
- 7 Practice on simple step turning, taper turning and drilling.
- 8 Demonstration on Smithy operation.
- 9 Demonstration on Foundry operation.
- 10 Demonstration on Power tools.

GROUP B (ELECTRICAL)

S.No Description of the Experiments

ELECTRICAL ENGINEERING PRACTICES

- 1 Residential house wiring using switches, fuse, indicator, lamp and energy meter.
- 2 Fluorescent lamp wiring.
- 3 Stair case wiring.
- 4 Measurement of Electrical quantities – voltage, current, power & power factor in single phase circuits.
- 5 Measurement of energy using single phase energy meter.
- 6 Soldering practice using general purpose PCB.
- 7 Measurement of Time, Frequency and Peak Value of an Alternating Quantity using CRO and Function Generator.
- 8 Study of Energy Efficient Equipment's and Measuring Instruments.

Total Practical Hours 45

COURSE OUTCOME:

- CO1:** Fabricate wooden components and pipe connections including plumbing works.
- CO2:** Fabricate simple weld joints.
- CO3:** Fabricate different electrical wiring circuits and understand the AC Circuits.

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	19HE2071	LANGUAGE COMPETENCY ENHANCEMENT COURSE- II (COMMON TO ALL BRANCHES)	0	0	2	1

- Course Objective**
- ✓ To improve communication skills and Professional Grooming.
 - ✓ To impart deeper knowledge of English Language and its practical application in different facets of life.
 - ✓ To equip the techniques of GD, Public Speaking, debate etc.

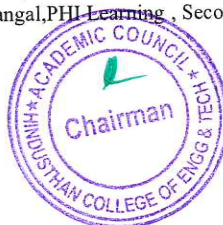
Unit	Description	Instructional Hours
I	Listening Listening for gist and respond – Listen for detail using key words to extract specific meaning – listen for phonological detail – Listen and identify the main points for short explanations and presentation.	3
II	Reading Strategies for effective reading – read and recognize different text types – Genre and Organization of Ideas – Quantifying reading – reading to comprehend – Interpreting sentences – contrasting, summarizing or approximating	3
III	Speaking Speak to communicate – Make requests and ask questions to obtain personal information – use stress and intonation – articulate the sounds of English to make the meaning understood – speaking to present & Interact – opening and closing of speech.	3
IV	Writing Plan before writing – develop a paragraph: topic sentences, supporting sentences – write a descriptive paragraph – elements of good essay – descriptive, narrative, argumentative – writing emails – drafting resumes – project writing – convincing proposals.	3
V	Language Development Demonstration at level understanding of application of grammar rules – revision of common errors : preposition, tenses, conditional sentences –reference words – pronouns and conjunctions.	3
Total Instructional Hours		15

- Course Outcome**
- CO1- Introduced to different modes and types of communication.
 - CO2- Practiced to face and react to various professional situations efficiently.
 - CO3- learnt to practice managerial skills.
 - CO4- Familiarized with proper guidance to writing.
 - CO5- Trained to analyze and respond to different types of communication.

REFERENCE BOOKS:

1. Verbal Ability and Reading Comprehension by Arun Sharma, 9th edition, Tata Mc graw Hill
2. Word Power Made Easy by Norman Lewis, – Print, 1 June 2011.
3. High School English Grammar by Wren and Martin, S.CHAND Publications, 1 January 2017.
4. Practical course in Spoken English by J.K. Gangal, PHI Learning, Second edition, 1 January 2018.

S. Singh
**Chairman - BoS
CSE - HICET**



[Signature]
**Dean (Academics)
HICET**

SYLLABUS

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16MA3105	DISCRETE MATHEMATICS AND GRAPH THEORY (COMMON TO CSE & IT)	3	1	0	4

- Course Objectives**
1. Introduce logical theory and proportional calculus techniques that will create logical thinking.
 2. Generalize counting problems using mathematical induction, inclusion and exclusion principles.
 3. Study the Boolean algebra which is used in the Boolean logics and circuits.
 4. Create the basic knowledge of graph theory which is applied in Computer networks.
 5. Recognize the concepts of trees in computer engineering.

Unit	Description	Instructional Hours
MATHEMATICAL LOGIC		
I	Propositional logic - Tautology and Contradiction - Propositional equivalences - Normal forms - Principal normal forms - Theory of Inference.	12
COMBINATORICS		
II	Mathematical induction – Recurrence relations – Solving linear recurrence relations - generating functions – principle of inclusion and exclusion – applications.	12
LATTICES AND BOOLEAN ALGEBRA		
III	Lattices – Properties of lattices – Lattices as algebraic system – Sub lattices - some special lattices – Boolean algebra – Definition and simple properties.	12
GRAPHS		
IV	Graphs – introduction – types of graphs – matrix representation of graphs – paths, cycles connectivity – connectedness in undirected graphs – Euler and Hamiltonian graphs – connectedness in directed graphs.	12
TREES		
V	Trees – properties of trees –spanning tree – minimum spanning tree – Rooted and binary trees – properties of binary trees - spanning trees in a weighted graph.	12
TOTAL INSTRUCTIONAL HOURS		60

- Course Outcome**
- CO1: Study the notion of mathematical thinking, mathematical proofs, and algorithmic thinking and be able to apply them in problem solving.
- CO2: Solve problems using counting techniques and recurrence relations.
- CO3: Gain knowledge about Lattices and Boolean Algebra.
- CO4: Apply the properties of graphs and related discrete structures in computer networks.
- CO5: Analyze the various types of trees and their properties.

TEXT BOOKS:

- T1 - Ralph. P. Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", Fifth Edition, Pearson Education Asia, Delhi, 2014.
- T2- T.Veerarajan, "Discrete Mathematics with Graph Theory and Combinatorics", Tata. McGraw-Hill Education, 15th reprint, 2012.

REFERENCE BOOKS :

- R1 - Jean Paul Trembley ,R Manohar, "Discrete Mathematical Structures with Application to Computer Science", McGraw Hill,Inc. New York, 30th reprint, 2008.
- R2 - Kenneth H.Rosen, "Discrete Mathematics and its Applications", seventh Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 2013.


Chairman - BoS
CSE - HICET




Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS3201	DIGITAL PRINCIPLES AND SYSTEM DESIGN (CSE & IT)	3	0	2	4

- Course Objective**
1. To understand different methods used for the simplification of Boolean functions.
 2. To study combinational circuits.
 3. To learn synchronous sequential circuits.
 4. To understand asynchronous sequential circuits.
 5. To study the fundamentals of HDL.

Unit	Description	Instructional Hours
I	BOOLEAN ALGEBRA AND LOGIC GATES Boolean algebra and laws-De-Morgan's Theorem-Principle of Duality-Minimization of Boolean expressions – Minterm – Maxterm – Sum of Products (SOP) – Product of Sums (POS) – Karnaugh map Minimization – Don't care conditions-Tabulation method- Implementation of Boolean functions using logic gates.	10
II	COMBINATIONAL CIRCUITS Analysis and design of combinational circuits- Circuits for arithmetic operations: adder, subtractor, Serial adder/ Subtractor - Parallel adder/ Subtractor-Carry look ahead adder-BCD adder-Magnitude comparator-Encoders and Decoders-Multiplexers and Demultiplexers, Code converters-Memory and Programmable logic.	10
III	SYNCHRONOUS SEQUENTIAL CIRCUITS Flip flops - Design of synchronous sequential circuits: State diagram - State table – State minimization - State assignment. Shift registers-Counters.	9
IV	ASYNCHRONOUS SEQUENTIAL CIRCUITS Analysis and design of asynchronous sequential circuits - Reduction of state and flow tables – Race-free state assignment – Hazards.	9
V	HARDWARE DESCRIPTION LANGUAGE Introduction to Hardware Description Language (HDL)- HDL for combinational circuits- Half adder, Full adder, Multiplexer, De-multiplexer, HDL for Sequential Circuits- Flip flops, Synchronous and Asynchronous Counters, Registers.	7
TOTAL INSTRUCTIONAL HOURS		45

DIGITAL LABORATORY: LIST OF EXPERIMENTS

1. Verification of Boolean theorems using digital logic gates.
2. Design and implementation of Half/Full Adder & Half/Full Subtractor.
3. Design and implementation of Binary to Gray and Gray to Binary Conversion.
4. Design and implementation of Parity generator/checker.
5. Design and implementation of Multiplexers and Demultiplexers.
6. Design and implementation of Synchronous and Asynchronous Counters.
7. Coding Combinational/Sequential circuits using HDL.

TOTAL INSTRUCTIONAL HOURS 15

Total(45+15) 60

Course Outcome

- CO1: Simplify boolean functions using different methods.
- CO2: Design and implement combinational logic circuits.
- CO3: Design and implement various sequential logic circuits.
- CO4: Design using PLD.
- CO5: Write HDL code for digital circuits.

TEXT BOOKS:

T1 - Morris Mano M. and Michael D. Ciletti, "Digital Design", IV Edition, Pearson Education, 2008.
T2 - Charles H.Roth,Jr.,Lizy Kurian John, and Byeong Kil Lee,"Digital Systems Design using Verilog"
First Edition,Cengage Learning, 2014.

REFERENCE BOOKS :

R1-.S. Salivahanan and S. Arivazhagan, "Digital Circuits and Design",SecondEdition, Vikas Publishing House Pvt. Ltd, New Delhi, 2010.
R2-.Thomas L. Floyd, "Digital Fundamentals", Pearson Education, Inc, New Delhi, 2013
R3-.Donald D.Givone, "Digital Principles and Design", Tata Mc-Graw-Hill Publishing company limited, New Delhi, 2013.


**Chairman - BoS
CSE - HICET**




**Dean (Academics)
HICET**

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS3202	DATA STRUCTURES (CSE & IT)	3	0	0	3

- Course Objective**
1. To study the design and applications of ADTs and Linked List
 2. To understand the various non-linear data structures like binary tree, binary search tree, AVL, and Binary Heap Tree
 3. To build an application using sorting and searching
 4. To understand the graph ADT and its applications
 5. To understand various hashing techniques.

Unit	Description	Instructional Hours
I	LINEAR STRUCTURES Abstract Data Types (ADT) – List ADT – array-based implementation – linked list implementation – cursor-based linked lists – doubly-linked lists – applications of lists	9
II	STACK AND QUEUES Stack ADT – Queue ADT – circular queue implementation – Applications of stacks and queues.	7
III	NON LINEAR DATA STRUCTURES-TREE Tree ADT –Representation of trees–Binary Tree ADT – expression trees – applications of trees – BST ADT – tree traversals. AVL Trees –B-Tree – heaps – binary heaps – applications of binary heaps–Binomial heaps.	10
IV	NON LINEAR DATA STRUCTURES-GRAPHS Introduction to Graphs- Definitions – Breadth First Search -Depth First Search-Topological sort – Shortest-Path Algorithms – Dijkstra algorithm- MST- Prim's and Kruskal's algorithms – Floyd algorithm- Warshall's Algorithm - Biconnectivity – Euler circuits – applications of graphs.	10
V	SORTING, SEARCHING Sorting algorithms: Insertion sort -Selection sort -Shell sort -Bubble sort -Quick sort - Merge sort -Radix sort –Searching: Linear search –Binary Search - Hashing – Separate chaining – open addressing – rehashing – extendible hashing	9
TOTAL INSTRUCTIONAL HOURS		45

- Course Outcome**
- CO1: Understand the concepts basic data structures and apply it in implementing linked list.
CO2: Understand the implementation of Stack and Queue
CO3: Understand the concepts of different Non-Linear Data Structures tree and apply it to design algorithms for various applications trees
CO4: Understand the Graph algorithms and apply it to finding shortest path and Minimum spanning Tree
CO5: Understand sorting, searching and hash functions.

TEXT BOOKS:

- T1 - Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Third Edition, Addison-Wesley, 2007.
T2 - A. V. Aho, J. E. Hopcroft, and J. D. Ullman, "Data Structures and Algorithms", Pearson Education, 2009.

REFERENCE BOOKS :

- R1 - Goodrich, Michael T., Roberto Tamassia, David Mount, "Data Structures and Algorithms in C++", 7th Edition, Wiley, 2004.
R2 - Ellis Horowitz, Sartaj Sahni and Dinesh Mehta, "Data Structures in C++", Galgotia Publications , 2007.
R3 - Y. Langsam, M. J. Augenstein and A. M. Tenenbaum, "Data Structures using C and C++", 2nd ed, Prentice-Hall of India, 2009.

S. Shrivastava
**Chairman - BoS
CSE - HICET**



[Signature]
**Dean (Academic)
HICET**

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS3203	SOFTWARE ANALYSIS AND DESIGN	3	0	0	3

Course Objective	Description
	<ol style="list-style-type: none"> To understand the basic concepts of software engineering, life cycle models and project management concepts. To understand in detail about the requirement analysis and requirement engineering processes. Learn the basics of OO analysis and design skills. Learn the UML design diagrams. Learn to map design to code.

Unit	Description	Instructional Hours
	SOFTWARE PROCESS AND PROJECT MANAGEMENT	
I	Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models – Software Project Management: Estimation – LOC and FP Based Estimation, COCOMO Model – Project Scheduling – Scheduling, Earned Value Analysis - Risk Management.	9
	REQUIREMENTS ANALYSIS AND SPECIFICATION	
II	Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document – Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management-Classical analysis: Structured system Analysis, Petri Nets-Data Dictionary.	9
	UML DIAGRAMS	
III	Introduction to OOAD – Unified Process – UML diagrams – Use Case – Class Diagrams– Interaction Diagrams – State Diagrams – Activity Diagrams – Package, component and Deployment Diagrams	9
	DESIGN PATTERNS	
IV	GRASP: Designing objects with responsibilities – Creator – Information expert – Low Coupling – High Cohesion – Controller – Design Patterns – creational – factory method – structural – Bridge – Adapter – behavioral – Strategy – observer.	9
	CASE STUDY	
V	Case study – the Next Gen POS system, Inception -Use case Modeling – Relating Use cases – include, extend and generalization – Elaboration – Domain Models – Finding conceptual classes and description classes – Associations – Attributes – Domain model refinement – Finding conceptual class Hierarchies – Aggregation and Composition.	9
TOTAL INSTRUCTIONAL HOURS		45

Course Outcome	Description
	CO1: Understand and gain knowledge to implement projects using OO concepts
	CO2: Understand the functional requirements of UML analysis and design diagrams.
	CO3: Apply the UML diagrams to understand the conceptual classes and class hierarchies
	CO4: Apply appropriate design patterns..
	CO5: Understand the concepts of use case modeling.

TEXT BOOKS:

- T1 - Roger S. Pressman, "Software Engineering – A Practitioner's Approach", Seventh Edition, Mc Graw-Hill International Edition, 2010.
T2 - Craig Larman, "Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development", Third Edition, Pearson Education, 2005.

REFERENCE BOOKS :

- R1 - Ian Sommerville, "Software Engineering", 9th Edition, Pearson Education Asia, 2011.
R2 - Simon Bennett, Steve Mc Robb and Ray Farmer, "Object Oriented Systems Analysis and Design Using UML", Fourth Edition, Mc-Graw Hill Education, 2010.
R3 - Erich Gamma, and Richard Helm, Ralph Johnson, John Glissades, "Design patterns-Addison-Wesley, 1995.


Chairman - BoS
CSE - HICET




Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS3204	OPERATING SYSTEMS (CSE & IT)	3	0	0	3

- Course Objective**
1. Study the basic concepts and Understand the structure of operating systems
 2. Learn about Processes, Scheduling algorithms and Deadlocks.
 3. Learn various memory management schemes.
 4. Study I/O management and File systems.
 5. Learn the Distributed operating systems

Unit	Description	Instructional hours
	OPERATING SYSTEMS OVERVIEW	
I	Introduction –operating systems overview- Evolution of Operating System.- Computer System Organization-Operating System Structure and Operations- System Calls, System Programs, OS Generation and System Boot.	7
	PROCESS MANAGEMENT	
II	Processes-Process Concept, Process Scheduling, Inter-process Communication; Threads-Overview, Multicore Programming, Multithreading Models. Process Synchronization - Critical Section Problem, Mutex Locks, Semaphores, Monitors; CPU Scheduling and Deadlocks	11
	STORAGE MANAGEMENT	
III	Main Memory-Contiguous Memory Allocation, Segmentation, Paging, Virtual Memory-Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory	9
	FILE SYSTEM IMPLEMENTATION & MASS STORAGE STRUCTURE	
IV	Mass Storage Structure- Overview, Disk Scheduling and Management; File System Storage-File Concepts, Directory and Disk Structure, Sharing and Protection; File System Implementation- File System Structure, Directory implementation, Allocation Methods, Free Space Management	9
	CASE STUDY: LINUX	
V	Linux system – History- Design Principles – Kernel Modules – Process Management – Scheduling – Memory Management – File Systems – Input and output – Inter-process Communication- Network Structure – Security- Virtualization- Basic Concepts,	9
	TOTAL INSTRUCTIONAL HOURS	45

- Course Outcome**
- CO1: Understand and gain knowledge about the basic structure of OS and system calls.
CO2: Understand the concepts of CPU scheduling, deadlock and analyze it with various process management techniques.
CO3: Apply and analyze the page replacement algorithm with various memory management schemes
CO4: Understand the Mass Storage Structure and File system Structure to apply a prototype file system..
CO5: Understand the virtualization concept in Linux operating system.

TEXT BOOK:

- T1: Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, 9th Edition, John Wiley and Sons Inc., 2012.
T2: Tom Adelstein, Bill Lubanovic , “Linux System Administration Solve Real-life Linux Problems Quickly”, O’Reilly Media.

REFERENCES:

- R1: Andrew S. Tanenbaum, “Modern Operating Systems”, 4/E, Pearson Publications, 2014.
R2: Charles Crowley, “Operating Systems: A Design-Oriented Approach”, Tata McGraw Hill Education”, 1996.
R3: Harvey M. Deitel-Operating systems, Third Edition, Pearson/Prentice Hall, 2004.
R4: William Stallings, “Operating Systems –Internals and Design Principles”, 8/E, Pearson Publications, 2014

S. Dhya
Chairman - BoS
CSE - HICET



[Signature]
Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS3205	PROFESSIONAL ETHICS	3	0	0	3

- Course Objective**
- To understand the importance of engineering ethics in an organizational setting.
 - To learn the various ethics and human values in workplace.
 - To understand the features of moral reasoning, moral explanations and the role of moral theories.
 - Understand the features of moral reasoning, moral explanations and the role of moral theories
 - Develop a case resolution model for resolving moral dilemmas faced by professionals

Unit	Description	Instructional Hours
I	HUMAN VALUES Morals, Values and Ethics –Integrity –Work Ethic –Service Learning –Civic Virtue –Respect for Others –Living Peacefully –caring –Sharing –Honesty –Courage –Valuing Time –Co-operation –Commitment –Empathy –Self-Confidence –Character –Spirituality	9
II	ENGINEERING ETHICS Senses of 'Engineering Ethics' -variety of moral issues -types of inquiry -moral dilemmas – moral autonomy -Kohlberg's theory -Gilligan's theory -consensus and controversy –Models of Professional Roles -theories about right action -Self-interest -customs and religion -uses of ethical theories.	9
III	ENGINEERING AS SOCIAL EXPERIMENTATION Engineering as experimentation -engineers as responsible experimenters -codes of ethics –a balanced outlook on law -the challenger case study	9
IV	SAFETY, RESPONSIBILITIES AND RIGHTS Safety and risk -assessment of safety and risk -risk benefit analysis and reducing risk -the Three Mile Island and Chernobyl case studies. Collegiality and loyalty - respect for authority –collective bargaining -confidentiality -conflicts of interest -occupational crime -professional rights –employee rights -Intellectual Property Rights (IPR) -discrimination.	9
V	GLOBAL ISSUES Multinational corporations -Environmental ethics -computer ethics -weapons development -engineers as managers-consulting engineers-engineers as expert witnesses and advisors – moral leadership-sample code of Ethics like ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute of Materials Management, Institution of electronics and telecommunication engineers (IETE) ,India, etc	9
TOTAL INSTRUCTIONAL HOURS		45

- Course Outcome**
- CO1: Understand the core values that shape the ethical behavior of an engineer and expose awareness on professional ethics and human values.
- CO2: Understand the basic perception of profession, professional ethics, various moral issues, dilemmas and uses of ethical theories.
- CO3: Apply professional engineering ethical theories, models and emphasize engineers' responsibility.
- CO4: Understand and implement the laws, recalling the facts on case studies and practice professional safety responsibilities and rights.
- CO5: Understand the sample code of ethics given by ASME, ASCE, IEEE, IETE and apply them in real environment.

TEXT BOOKS:

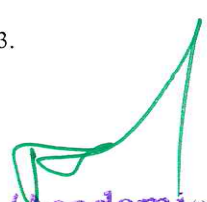
- T1 - Mike Martin and Roland Schinzinger, —Ethics in Engineeringl, McGraw - Hill, New York, 2005
- T2 - Govindarajan M, Natarajan S, Senthil Kumar V. S, —Engineering Ethicsl, Prentice Hall of India, New Delhi, 2004.

REFERENCE BOOKS :

- R1 - Charles D. Fleddermann, —Engineering Ethicsl, Pearson Education / Prentice Hall, New Jersey, 2004 (Indian Reprint).
- R2 - Charles E Harris, Michael S. Protchard and Michael J Rabins, —Engineering Ethics–Concepts and Casesl, Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available).
- R3 - John R Boatright, —Ethics and the Conduct of Businessl, Pearson Education, New Delhi, 2003.


Chairman / BoS
CSE - HICET




Dean (Academics),
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS3001	DATA STRUCTURES LABORATORY (CSE & IT)	0	0	4	2
Course Objective	1. To learn the methodical way of solving problem 2. To comprehend the different methods of organizing large amount of data 3. To efficiently implement the different data structures.					

Expt. No.

DESCRIPTION OF THE EXPERIMENTS

1. Write a C++ program that uses functions to perform the following:
 - a) Create a singly linked list of integers.
 - b) Delete a given integer from the above linked list.
 - c) Display the contents of the above list after deletion.
2. Write a C++ program that uses functions to perform the following:
 - a) Create a doubly linked list of integers.
 - b) Delete a given integer from the above doubly linked list.
 - c). Display the contents of the above list after deletion.
3. Write a C++ program that uses stack operations to convert a given infix expression into its postfix Equivalent, Implement the stack using an array.
4. Write C++ programs to implement a double ended queue ADT using i) array and ii) doubly linked list respectively..
5. Write a C++ program that uses functions to perform the following:
 - a) Create a binary search tree of characters.
 - Traverse the above Binary search tree recursively in Postorder.
6. Write a C++ program that uses functions to perform the following:
 - a) Create a binary search tree of integers.
 - Traverse the above Binary search tree non recursively in inorder.
7. Write C++ programs for implementing the following sorting methods to arrange a list of integers in ascending order:
 - a) Insertion sort b) Merge sort
 - b)
8. Write C++ programs for implementing the following sorting methods to arrange a list of integers in ascending order:
 - a) Quick sort b) Selection sort
9. Write C++ programs to perform the following searching
 - i. Linear search ii) Binary Search
 - ii.
10. i) write a C++ program to perform the following operation:
 - A) Insertion into a B-tree
 - ii) Write a C program for implementing Heap sort algorithm for sorting a given list of integers in ascending order
11. Write a C++ program to implement all the functions of a dictionary (ADT) using hashing.
12. Write C++ programs for implementing the following graph traversal algorithms: a)Depth first traversal b)Breadth first traversal

TOTAL PRACTICAL HOURS

45

Course Outcome

CO1 : Understand the appropriate data structure for a given problem.
CO2 : Understand different data structures for implementing solutions to practical problems.
CO3 : Understand various tree operations.
CO4 : Apply data set to solve problems using graphs.
CO5: Apply the concepts of sorting and searching techniques to solve the problems.

REFERENCE:

R1 - R. Gilberg, B. Forouzan, "Data Structures: A pseudo Code Approach with C++", Cengage Learning, ISBN 9788131503140. 2. E. Horowitz, S. Sahni, D. Mehta, "Fundamentals of Data Structures in C++", Galgotia Book Source, New Delhi, 1995, ISBN 16782928.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

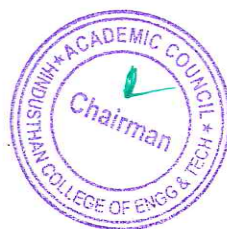
SOFTWARE

- Turbo C++ Compiler
- Operating System (Windows, UNIX, Linux...)

HARDWARE

Standalone desktops 30 Nos


Chairman/- BoS
CSE - HiCET




Dean (Academics)
HiCET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS3002	OPERATING SYSTEMS LABORATORY (CSE & IT)	0	0	4	2

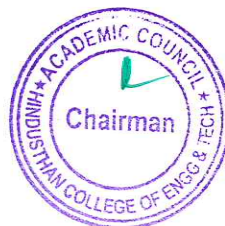
- Course Objective**
1. Learn shell programming and the use of filters in the UNIX environment.
 2. Be familiar with implementation of CPU Scheduling Algorithms and file allocation strategies.
 3. Gain knowledge in page replacement algorithms.
 4. Acquire the knowledge about Deadlock detection and avoidance algorithms.
 5. Learn to use the paging techniques in memory management.

Expt. No.	Description of the Experiments
1	Basics of UNIX commands.
2	Shell Programming.
3	Implement the following CPU scheduling algorithms a. Round Robin b. SJF c. FCFS d. Priority
4	Implement all file allocation strategies a. Sequential b. Indexed c. Linked
5	Implement Semaphores
6	Implement all File Organization Techniques a. Single level directory b. Two level c. Hierarchical d. DAG
7	Implement Bankers Algorithm for Dead Lock Avoidance
8	Implement an Algorithm for Dead Lock Detection
9	Implement all page replacement algorithms a. FIFO b. LRU c. LFU
10	Implement IPC using Shared memory.
11	Experiments on fork
12	Implement Paging Technique of memory management.

TOTAL INSTRUCTIONAL HOURS 45

- Course Outcome**
- CO1: Understand the basic UNIX commands and apply the concept in shell programming.
CO2: Apply scheduling algorithms and analyze it with various process management techniques.
CO3: Apply the conceptual knowledge of various page replacement algorithms
CO4: Implement deadlock avoidance and Detection Algorithms
CO5: Compare the paging techniques of memory management..


**Chairman - BoS
CSE - HiCET**




**Dean (Academics)
HiCET**

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16MA4108	PROBABILITY AND QUEUEING THEORY (COMMON TO CSE & IT)	3	1	0	4

- Course Objectives**
1. Construct a well defined knowledge of probability and random variables.
 2. Understand the concept of standard distributions which can describe the real life phenomenon.
 3. Know the concept of two dimensional random variables and determine covariance.
 4. Understand the concept of random processes and Markov chain.
 5. Apply the basic characteristic features of a queuing system and acquire skills in analyzing queuing models.

Unit	Description	Instructional Hours
	PROBABILITY AND RANDOM VARIABLE	
I	Definition – Axioms of Probability – Conditional Probability – Total Probability – Bayes Theorem (with out proof) -Random variable –Discrete and continuous random variables – Moment generating functions.	12
	STANDARD DISTRIBUTIONS	
II	Discrete Distributions - Binomial, Poisson, Geometric distributions - Continuous Distributions - Uniform, Exponential and Normal distributions.	12
	TWO DIMENSIONAL RANDOM VARIABLES	
III	Joint distributions – discrete and continuous random variables – marginal and conditional probability distributions – covariance – correlation.	12
	RANDOM PROCESSES	
IV	Classification - Stationary process - Markov process - Markov chains - Transition probabilities - Limiting distributions - Poisson process – Birth and death process.	12
	QUEUEING THEORY	
V	Markovian models – Birth and death queueing models – Steady state results – Single and Multiple server queueing models – (M/M/1):(∞/FCFS), (M/M/1):(N/FCFS), (M/M/C):(∞/FCFS) and (M/M/C):(N/FCFS) – Little’s formula. (Derivations excluded).	12
TOTAL INSTRUCTIONAL HOURS		60

- Course Outcome**
- CO1 : Understand the concepts of probability and random variables.
CO2 : Describe various discrete and continuous distribution functions.
CO3 : Understand and characterize phenomenon of two-dimensional random variables.
CO4 : Obtain a fundamental knowledge of the random processes which evolves with respect to time in a probabilistic manner.
CO5: Identify the queuing models in the given system, find the performance measures and analyze the result

TEXT BOOKS:

- T1 Gupta, S.C., & Kapoor, V.K., Fundamentals of Mathematical Statistics, Sultan Chand & Sons, Reprint 2011.
T2 - Veerarajan, T., Probability, Statistics and Random Processes, Tata McGraw-Hill, 2nd Edition, New Delhi, 2010.

REFERENCE BOOKS:

- R1- O.C. Ibe, “Fundamentals of Applied Probability and Random Processes”, Elsevier, First Indian Reprint, 2010.
R2 - A.O. Allen, “Probability, Statistics and Queueing Theory with Computer Applications”, Elsevier, Second Edition, 2012.
R3 - K.S. Trivedi, “Probability and Statistics with Reliability, Queueing and Computer Science Applications”, John Wiley and Sons, Second Edition, 2003.


**Chairman - BoS
CSE - HiCET**




**Dean (Academics)
HiCET**

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS4201	JAVA PROGRAMMING (CSE & IT)	3	0	0	3

- Course Objective**
1. Learn the basics of java programming language
 2. Discuss the packages and interfaces in java programming
 3. Learn input and output streams in java
 4. Understand the event handling classes in java
 5. Learn frames and windows in java and its applications

Unit	Description	Instructional Hours
	OVERVIEW OF JAVA PROGRAMMING	
I	Review of Object oriented programming-Introduction to java programming-Features of Java Language, JVM -The Java Environment-Primitive Data types-variables-arrays-control statements-classes and objects-access specifier-methods-constructor-finalize method-strings-Inheritance – class hierarchy – polymorphism – dynamic binding – final keyword – abstract classes.	9
	PACKAGES AND INTERFACES	
II	Packages-defining package-access protection-importing packages- interfaces-Defining an interface-implementing an interface-applying interface-variables in interface-extended interface-Exception Handling-exception types-uncaught exception-multiple catch-nested try-throw and finally-built-in exceptions-multithreaded programming-java thread model-thread priorities-synchronization-thread class and runnable interface-creating multiple threads- inter thread communication-string-input and output	9
	INPUT AND OUTPUT STREAMS	
III	I/O basics-reading console input-writing console output-reading and writing files-applet, fundamentals-Applet Basics-An Applet Skeleton-Simple Applet Display Methods-The HTML APPLET Tag-Passing Parameters to Applets-using instanceof-native method.	9
	EVENT HANDLING	
IV	The Delegation Event Model-Event Classes-The ActionEvent Class-The AdjustmentEvent Class-The ComponentEvent Class-The ContainerEvent Class-Event Listener Interfaces-The ActionListener Interface-The AdjustmentListener Interface-The ComponentListener Interface-The ContainerListener Interface-Using the Delegation Event Model-adapter class-inner classes.	9
	FRAMES AND WINDOWS	
V	Window Fundamentals-Working with Frame Windows-Creating a Frame Window in an Applet-Displaying Information Within a Window-Working with Graphics-Drawing Lines-Drawing Rectangles-Drawing Ellipses and Circles-Working with Color-Working with Fonts.	9
	TOTAL INSTRUCTIONAL HOURS	45

- Course Outcome**
- CO1: Understand the fundamentals of Java Programming
CO2: Implementation of user defined packages and interfaces
CO3: Develop applications using applet class in java
CO4: Apply event handling classes to create different events in java
CO5: Design real time applications using frames and windows

TEXT BOOKS:

T1- Herbert Schildt, "The complete reference java 2",seventh edition, McGraw – Hill 2007.

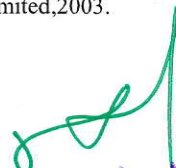
REFERENCE BOOKS :

R1 - E.Balagurusamy,"Programming with java A Primer", fifth edition, McGraw – Hill 2014

R2 - H.M.Deitel, P.J.Deitel, "Java : how to program", Fifth edition, Prentice Hall of India private limited,2003.


Chairman + Bos
CSE - HICET




Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS4202	MICROPROCESSORS AND MICROCONTROLLERS	3	0	0	3

- Course Objective**
1. Study the Architecture of 8086 microprocessor.
 2. Learn the design aspects of I/O and Memory Interfacing circuits.
 3. Study about communication and bus interfacing.
 4. Study the Architecture of 8051 microcontroller
 5. Study the concepts of microcontroller interfacing

Unit	Description	Instructional Hours
	THE 8086 MICROPROCESSOR	
I	Introduction to 8086 – Microprocessor architecture – Addressing modes - Instruction set and assembler directives – Assembly language programming – Modular Programming - Linking and Relocation - Stacks - Procedures – Macros – Interrupts and interrupt service routines – Byte and String Manipulation.	9
	8086 SYSTEM BUS STRUCTURE	
II	8086 signals – Basic configurations – System bus timing –System design using 8086 – IO programming – Introduction to Multiprogramming – System Bus Structure - Multiprocessor configurations – Coprocessor, Closely coupled and loosely Coupled configurations – Introduction to advanced processors.	9
	I/O INTERFACING	
III	Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communication interface – D/A and A/D Interface - Timer – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications Case studies: Traffic Light control, LED display , LCD display, Keyboard display interface and Alarm Controller.	9
	MICROCONTROLLER	
IV	Architecture of 8051 – Special Function Registers(SFRs) - I/O Pins Ports and Circuits - Instruction set - Addressing modes - Assembly language programming	9
	INTERFACING MICROCONTROLLER	
V	Programming 8051 Timers - Serial Port Programming - Interrupts Programming – LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor and Waveform generation..	9
TOTAL INSTRUCTIONAL HOURS		45

- Course Outcome**
- CO1: Design and implement programs on 8086 microprocessor.
CO2: Design I/O circuits.
CO3 Design Memory Interfacing circuits.
CO4: Design and implement 8051 microcontroller based systems.
CO5: Design various interfacing and its programming methodologies

TEXT BOOKS:

- T1- Yu-Cheng Liu, Glenn A.Gibson, “Microcomputer Systems: The 8086 / 8088 Family - Architecture, Programming and Design”, Prentice Hall of India, 2011.
T2- Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, “The 8051 Microcontroller and Embedded Systems: Using Assembly and C”, Second Edition, Pearson education, 2011

REFERENCE BOOKS :

- R1 - Douglas V.Hall, “Microprocessors and Interfacing, Programming and Hardware”,TMH,2012

S. Shy
Chairman - BoS
CSE - HICET



[Signature]
Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS4203	DATABASE MANAGEMENT SYSTEMS	3	0	0	3

- Course Objective**
- To learn the data models, conceptualize and depict a database system using E-R diagram.
 - To learn SQL and relational database design.
 - To understand various normal forms
 - To understand the internal storage structures using different file and indexing techniques.
 - To know the concepts of transaction processing, concurrency control techniques and recovery procedure

Unit	Description	Instructional Hours
	INTRODUCTION	
I	Introduction: Database system application, purpose of database system - View of Data –Database Languages- Data Storage and Querying-Database Architecture – Database design and E-R model: Overview of the design process- The Entity – Relationship Model-Constraints- Removing redundant attributes in Entity Sets- Entity – Relationship Diagram- Reduction to Relational Schemas-Entity Relationship Design Issues.	9
	RELATIONAL MODEL AND DATABASE DESIGN	
II	Introduction to Relational Model – Formal Relational Query Languages - Introduction to SQL: Data definition Basic structure of SQL Queries-Additional Basic operations - Set operations- Aggregate functions-Nested sub queries- Intermediate SQL: Joins- Views – Integrity Constraints.	9
	DATABASE DESIGN AND NORMAL FORMS	
III	Functional Dependencies – Normal Forms Based on primary Keys- General Definition of Second and Third Normal Form - Boyce Codd Normal Form – Algorithms for relational database schema design - Multivalued dependencies and Fourth Normal Form.	9
	DATA STORAGE AND QUERY PROCESSING	
IV	Overview of Physical Storage Media – Magnetic disk Flash storage- RAID - File and Record Organization –Indexing and Hashing: Ordered Indices – B + Tree Index File- Static Hashing – Dynamic Hashing- Query Processing: Overview - measures of Query Cost.	9
	TRANSACTION MANAGEMENT	
V	Transactions: Transaction concept– Transaction Atomicity and Durability- Transaction Isolation – Serializability -Transaction Isolation and Atomicity - Transaction Isolation levels- Implementation of Isolation Levels – Concurrency Control: Lock based protocols - Deadlock handling - Multiple Granularity - Time stamp based protocols – Recovery system: Failure classification – Storage - Recovery and atomicity – Recovery Algorithms.	9
TOTAL INSTRUCTIONAL HOURS		45

- Course Outcome**
- CO1: Able to design an Entity Relationship (ER) diagram for an application
CO2: Apply Relational queries and SQL queries in real time
CO3: Apply normalization concepts for real time applications.
CO4: Evaluate the performance of various storage media and query processing
CO5: Apply various protocols and algorithms to manage the transactions and concurrency control

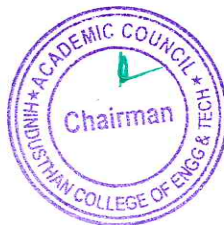
TEXT BOOKS:

- T1- Abraham Silberschatz, Henry F. Korth and S. Sudharshan, “Database System Concepts”, Sixth Edition, Tata Mc Graw Hill, 2011.
T2- Ramez Elmasri and Shamkant B. Navathe, “Fundamentals of Database Systems”, Fifth Edition, Pearson Education, 2008.

REFERENCE BOOKS :

- R1 - C.J.Date, A.Kannan and S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.
R2- Raghu Ramakrishnan, “Database Management Systems”, Fourth Edition, Tata Mc Graw Hill, 2010.
R3- Rob Cornell, “Database Systems Design and Implementation”, Cengage Learning, 2011.
R4- Atul Kahate, “Introduction to Database Management Systems”, Pearson Education, New Delhi, 2006.

S. Shy
Chairman - Bos
CSE - HICET



[Signature]
Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS4204	COMPUTER GRAPHICS	3	0	0	3

- Course Objective**
1. Acquire knowledge about graphics devices, software and basic algorithms for geometric objects.
 2. Understand the two dimensional graphics with their transformations and clipping techniques.
 3. Understand the three dimensional graphics with their transformations and clipping techniques.
 4. Gain knowledge about illumination methods, rendering and color models.
 5. Understand the design of animations and its realistic features.

UNIT	DESCRIPTION	TOTAL INSTRUCTIONAL HOURS
	BASIC OF COMPUTER GRAPHICS Basic of Computer Graphics-Applications of computer graphics, Display devices, Random and Raster scan systems, Graphics input devices, Graphics software and standards. Scan conversion: Points & lines, Line drawing algorithms; DDA algorithm, Bresenham's line algorithm, Circle generation algorithm; Ellipse generating algorithm; Fill area primitives: scan-line polygon filling, inside-outside test, Scan-Line fill of Curved Boundary Areas boundary and flood-fill, line attributes, area-fill attributes, character attributes.	9
I	2DTRANSFORMATION&VIEWING Basic transformations: translation, rotation, scaling, matrix representation, homogeneous coordinates, composite transformations, reflection and shearing transformation. Viewing: viewing pipeline and coordinates system, window-to-viewport transformation, two dimensional viewing functions. Clipping: point clipping, line clipping (cohen-sutherland, liang- bersky, NLN), polygon clipping, curve clipping & text clipping.	9
II	THREE DIMENSIONAL CONCEPTS Three dimensional display methods, Three dimensional object representations – Polygon surfaces- Polygon tables- Plane equations – Polygon meshes; Curved Lines and surfaces, Quadratic surfaces, Blobby objects, spline representations, Bezier curves and surfaces -B-Spline curves and surfaces. 3D transformation: translation, scaling and rotation, composite transformation, viewing pipeline and coordinates, projection, visible surface detection methods.	11
III	OBJECT RENDERING, ILLUMINATION & COLOR MODELS Basic illumination methods - ambient, diffuse reflection, specular reflection and the phong model, warn model, Surface-rendering- gouraud shading, phong shading, constant intensity shading, Color models-properties of light, XYZ, RGB, YIQ and CMY color models	7
IV	COMPUTER ANIMATIONS & REALISM ANIMATION: Design of Animation sequences – animation function – raster animation – key frame systems – motion specification –morphing – tweening. REALISM: Recursively defined curves – Koch curves – C curves – Dragons – space filling curves –fractals-Mandelbrot sets – Julia Sets – Random Fractals –overview of ray tracing.	9
V	TOTAL INSTRUCTIONAL HOURS	45

- Course Outcome**
- CO1. To understand the Design and manipulate graphical objects.
 - CO2. To apply and understand two dimensional transformations and clipping techniques to graphics.
 - CO3. To understand and design three dimensional graphics and apply three dimensional transformations.
 - CO4. To understand and remember the concepts for Illumination, shading and colors to objects.
 - CO5. To understand and design animation sequences and various curves.

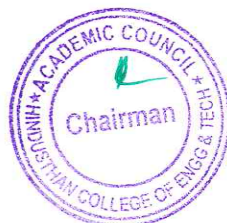
TEXT BOOKS:

- T1. Donald Hearn and Pauline Baker M, "Computer Graphics", Prentice Hall, New Delhi, 2007.
- T2. James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, Computer Graphics- Principles and practice, Second Edition in C, Pearson Education, 2007.

REFERENCE BOOKS :

- R1. Jeffrey McConnell, "Computer Graphics: Theory into Practice", Jones and Bartlett Publishers, 2006.
- R2. Hill F S Jr., "Computer Graphics", Maxwell Macmillan , 1990.
- R3. Peter Shirley, Michael Ashikhmin, Michael Gleicher, Stephen R Marschner, Erik Reinhard, Kelvin Sung, and AK Peters, Fundamental of Computer Graphics, CRC Press, 2010.
- R4. William Newman and Robert F.Sproull, "Principles of Interactive Computer Graphics", Mc Graw Hill1978.
- R5. <http://nptel.ac.in>


Chairman - BoS
CSE - HICET




Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS4205	FUNDAMENTALS OF ALGORITHMS	3	0	0	3

- Course Objective**
1. Learn the algorithm analysis techniques.
 2. Become familiar with the different algorithm design techniques
 3. Learn greedy technique to solve problems
 4. Understand backtracking and iterative development of algorithms
 5. Understand the limitations of Algorithm power

Unit	Description	Instructional Hours
	ANALYSIS OF ALGORITHM	
I	Introduction – Algorithms- Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving- Analysis Framework – Asymptotic Notations and its properties – Mathematical analysis for Recursive and Non-recursive algorithms	9
	BRUTE FORCE AND DIVIDE-AND-CONQUER	
II	Brute Force – Closest-Pair and Convex-Hull Problems-Exhaustive Search – Traveling Salesman Problem – Knapsack Problem – Assignment problem- Divide and conquer methodology – Merge sort – Quick sort – Binary search – Multiplication of Large Integers- Single Source Shortest Path Algorithm	9
	DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE	
III	Computing a Binomial Coefficient – All Pairs Shortest Path Algorithm -Warshall’s and Floyd’ algorithm – Optimal Binary Search Trees – Knapsack Problem and Memory functions. Greedy Technique–MST- Prim’s algorithm- Kruskal’s Algorithm- Dijkstra’s Algorithm-Huffman Trees	9
	BACKTRACKING AND ITERATIVE IMPROVEMENT	
IV	The Simplex Method-The Maximum-Flow Problem – maximum Matching in Bipartite Graphs-The Stable marriage Problem- The General Method – 8-Queens Problem- Sum of Subsets – Graph Coloring- Hamiltonian Cycle	9
	P AND NP COMPLETENESS	
V	Decision Trees -Polynomial time – Nondeterministic Algorithms and NP – Reducibility and NP completeness – NP complete Problems – Approximation Algorithms for NP- More on NP completeness	9
TOTAL INSTRUCTIONAL HOURS		45

- Course Outcome**
- CO1: Design algorithms for various computing problems
 - CO2: Analyze the time and space complexity of algorithms
 - CO3: Critically analyze the different algorithm design techniques for a given problem
 - CO4: Modify existing algorithms to improve efficiency
 - CO5: Apply algorithm techniques for real time applications

TEXT BOOKS:

- T1- Anany Levitin, “Introduction to the Design and Analysis of Algorithms”, Third Edition, Pearson Education, 2012.
- T2- Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, “Introduction to Algorithms”, Third Edition, PHI Learning Private Limited, 2012

REFERENCE BOOKS :

- R1 - Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, “Data Structures and Algorithms”, Pearson Education, Reprint 2006.
- R2- Donald E. Knuth, “The Art of Computer Programming”, Volumes 1& 3 Pearson Education, 2009. Steven S. Skiena, “The Algorithm Design Manual”, Second Edition, Springer, 2008.
- R3- E.Horowitz , Sahni & Sanguthevar Rajasekaran, “Fundamentals of Computer Algorithms”, Galgotia Publications, 1997.

S. Shy
Chairman - BOS
CSE - HICET



[Signature]
Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS4001	JAVA PROGRAMMING LABORATORY (CSE & IT)	0	0	4	2

- Course Objective**
1. Be familiarized with good programming design methods
 2. Study the basic object oriented concepts of Java
 3. Develop a system using event driven programming paradigm
 4. Learn about the database connectivity using Java and client server communications
 5. Getting exposure in implementing the different applications using java

- | Expt. No. | Description of the Experiments |
|-----------|---|
| 1. | Develop Rational number class in Java. Use JavaDoc comments for documentation. Your implementation should use efficient representation for a rational number, i.e. (500 / 1000) should be represented as (1/2). |
| 2. | Develop Date class in Java similar to the one available in java.util package. Use JavaDoc comments. |
| 3. | Implement Lisp-like list in Java. Write basic operations such as 'car', 'cdr', and 'cons'. If L is a list [3, 0, 2, 5], L.car() returns 3, while L.cdr() returns [0,2,5]. |
| 4. | Design a Java interface for ADT Stack. Develop two different classes that implement this interface, one using array and the other using linked-list. Provide necessary exception handling in both the implementations. |
| 5. | Design a Vehicle class hierarchy in Java. Write a test program to demonstrate polymorphism |
| 6. | Design classes for Currency, Rupee, and Dollar. Write a program that randomly generates Rupee and Dollar objects and write them into a file using object serialization. Write another program to read that file, convert to Rupee if it reads a Dollar, and while leave the value as it is if it reads a Rupee. |
| 7. | Design a scientific calculator using event-driven programming paradigm of Java. |
| 8. | Write a multi-threaded Java program to print all numbers below 100,000 that are both prime and fibonacci number (some examples are 2, 3, 5, 13, etc.). Design a thread that generates prime numbers below 100,000 and writes them into a pipe. Design another thread that generates fibonacci numbers and writes them to another pipe. The main thread should read both the pipes to identify numbers common to both. |
| 9. | Develop a simple OPAC system for library using even-driven and concurrent programming paradigms of Java. Use JDBC to connect to a back-end database |
| 10. | Develop multi-threaded echo server and a corresponding GUI client in Java |
| 11. | [Mini-Project] Develop a programmer's editor in Java that supports syntax highlighting, compilation support, debugging support, etc. |
| 12. | Write a java program that prints the meta-data of a given table. |

TOTAL PRACTICAL HOURS 45

- Course Outcome**
- CO1: Apply good programming design methods for program development.
CO2: Apply the different event driven programming for implementing solutions to practical problems.
CO3: Design and implement polymorphism, exception handling and multi threading in java.
CO4: Ability to access data from a DB with Java programs.
CO5: Able to create client server communication for data sharing using Java

S. S. H.
Chairman - BoS
CSE - HICET



[Signature]
Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS4002	DATABASE MANAGEMENT AND SYSTEMS LABORATORY	0	0	4	2

- Course Objective**
1. To learn the fundamental concepts of SQL queries.
 2. To understand the concept of designing a database with the necessary attributes.
 3. To know the methodology of Accessing, Modifying and Updating data and information from the relational databases.

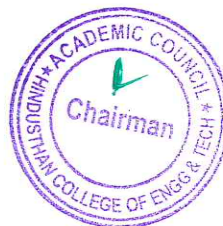
Expt. No. Description of the Experiments

1. Working with SQL commands like DDL, DML, TCL, DCL
2. forming Single-row functions and group functions in SQL.
3. Execute simple queries using joins and Integrity constraints
4. Creation and manipulation of database objects (Views, Synonyms, Sequence, Indexes, Save point).
5. Simple programs using PL/SQL block.
6. Implementation of cursor in PL/SQL block.
7. Generate trigger in PL/SQL block.
8. Write PL/SQL block Programs using exception handling.
9. Design PL/SQL blocks using subprograms namely functions and procedures.
10. Mini project.

TOTAL PRACTICAL HOURS 45

- Course Outcome**
- CO1: Design and implement a database schema for a given problem-domain.
 - CO2: Populate and query a database
 - CO3: Create and maintain tables using PL/SQL.
 - CO4: Prepare reports for maintaining databases
 - CO5: Utilize various constraints for managing database

S. J. J.
Chairman - BoS
CSE - HiCET



[Handwritten Signature]
Dean (Academics)
HiCET

PROGRAMME	COURSECODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS4003	MICROPROCESSORS AND MICROCONTROLLERS LABORATORY	0	0	4	2

- Course Objective**
1. Introduce ALP concepts and features
 2. Write ALP for arithmetic and logical operations in 8086 and 8051
 3. Differentiate Serial and Parallel Interface
 4. Interface different I/Os with Microprocessors
 5. Be familiar with MASM

Expt. No. Description of the Experiments

1. Basic arithmetic and Logical operations.
 2. Code conversion, decimal arithmetic and Matrix operations.
 3. Floating point operations, string manipulations, sorting and searching
 4. Counters and Time Delay
- Peripherals and Interfacing Experiments**
5. Traffic light control
 6. Stepper motor control
 7. Key board and Display
 8. Serial interface and Parallel interface
 9. A/D and D/A interface and Waveform Generation
- 8051 Experiments using kits and MASM**
10. Basic arithmetic and Logical operations.
 11. Square and Cube program, Find 2's complement of a number
 12. Unpacked BCD to ASCII

TOTAL PRACTICAL HOURS 45

- Course Outcome**
- CO1: Write ALP Programmes for fixed and Floating Point and Arithmetic
CO2: Interface different I/Os with processor
CO3: Generate waveforms using Microprocessors.
CO4: Execute Programs in 8051
CO5: Explain the difference between simulator and Emulator

**Chairman - BoS
CSE - HiCET**



**Dean (Academics)
HiCET**

SYLLABUS

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS5201	COMPUTER NETWORKS (CSE & IT)	3	0	0	3

- Course Objective**
1. Understand the division of network functionalities into layers.
 2. Be familiar with the components required to build different types of networks
 3. Be expose to the required functionality at each layer
 4. Learn the flow control and congestion control algorithms
 5. Have knowledge in different applications that use computer networks

Unit	Description	Instructional hours
I	INTRODUCTION & DATA LINK LAYER Building a network – Requirements – Layering and protocols – Internet Architecture – networking devices – modems, routers, switches, gateways; Link layer Services – Framing – Error Detection – Flow control- media access control.	10
II	DATA COMMUNICATION Signal characteristics – Data transmission – Physical links and transmission media – Signal encoding techniques - Channel access techniques – TDM – FDM-CDM	8
III	NETWORK AND ROUTING Circuit switching – packet switching – virtual circuit switching – Routing– RIP – OSPF - – IPv6-Metrics- IP – Global Address – Subnetting – CIDR - ARP – DHCP.	9
IV	TRANSPORT LAYER Overview of Transport layer – UDP – Reliable byte stream (TCP) – Connection management – Flow control – Retransmission – TCP Congestion control – Congestion avoidance (DECbit, RED) – QoS – Application requirements	9
V	APPLICATION LAYER Traditional applications -Electronic Mail (SMTP, POP3, IMAP, MIME) – HTTP – Web Services – DNS – SNMP	9
TOTAL INSTRUCTIONAL HOURS		45

- Course Outcome**
- CO1: Understand the components required to build different types of networks and aware of media access control
- CO2: Understand the data communication system and the purpose of layered architecture
- CO3: Understand the concepts of Routing methods and Subnetting
- CO4: Apply the Congestion control mechanism and Connection methods
- CO5: Understand protocols such as SMTP, HTTP, POP3, DNS for various application

TEXT BOOK:

- T1: Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, Fifth Edition, Morgan Kaufmann Publishers, 2011.
- T2: Behrouz A. Forouzan, “Data communication and Networking”, Fourth Edition, Tata McGraw – Hill, 2011.

REFERENCES:

- R1: James F. Kurose, Keith W. Ross, “Computer Networking – A Top-Down Approach Featuring the Internet”, Fifth Edition, Pearson Education, 2009.
- R2: Nader. F. Mir, “Computer and Communication Networks”, Pearson Prentice Hall Publishers, 2010.
- R3: Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, “Computer Networks: An Open Source Approach”, McGraw Hill Publisher, 2011.
- R4: Andrew S Tanenbaum, David J. Wetherall “Computer Networks”, Prentice Hall of India Pearson Education, New Delhi, 2010.

S. Shy
Chairman BOS
CSE - HICET



[Signature]
Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS5202	FREE OPEN SOURCE SOFTWARE I	3	0	0	3

Course Objective

1. This course provides an overview of the historical and modern context and operation of free and open source software (FOSS) communities and associated software projects.
2. The practical objective of the course is to teach students how they can begin to participate in a FOSS project in order to contribute to and improve aspects of the software that they feel are wrong.
3. Students will learn some important FOSS tools and techniques for contributing to projects and how to set up their own FOSS projects.
4. Students will learn some important FOSS versions and its working in real time projects
5. Students will learn some important FOSS programming language.

Unit	Description	Instructional Hours
------	-------------	---------------------

	INTRODUCTION Introduction to Open sources – Need of Open Sources – Advantages of Open Sources– Application of Open Sources. List of open source software and open source hardware –Open source operating systems: LINUX: Introduction – General Overview – Kernel Mode and user mode – Process – Advanced Concepts – Scheduling – Personalities – Cloning – Signals – Development with Linux.	8
I	OPEN SOURCE DATABASE MySQL: Introduction – Setting up account – Starting, terminating and writing your own SQL programs – Record selection Technology – Working with strings – Date and Time– Sorting Query Results – Generating Summary – Working with metadata – Using sequences –MySQL and Web.	10
II	OPEN SOURCE PROGRAMMING LANGUAGES PHP: Introduction – Programming in web environment – variables – constants – data types – operators – Statements – Functions – Arrays – OOP – String Manipulation and regular expression – File handling and data storage – PHP and SQL database – PHP and LDAP – PHP Connectivity – Sending and receiving E-mails – Debugging and error handling – Security – Templates. case study- Symfony.	10
III	PYTHON Syntax and Style – Python Objects – Numbers – Sequences – Strings – Lists and Tuples – Dictionaries – Conditionals and Loops – Files – Input and Output – Errors and Exceptions – Functions – Modules – Classes and OOP – Execution Environment.	10
IV	PYTHON DATABASES AND PERSISTENCE Persistence options in python-DBM Files-Pickled Objects-Shelve Files-The ZODB Object- Oriented Database-SQL Database Interfaces- ORMs: Object Relational Mappers- PyForm: A Persistent Object Viewer	7
V		

TOTAL INSTRUCTIONAL HOURS 45

Course Outcome	Description
CO1:	Understand the concepts of open-source software and apply the procedure to install categories of software.
CO2:	Understand and apply the concepts of SQL/MYSQL to gather information using own programs in connection with record sequences
CO3:	Understand the scripts and basics of PHP, SQL database and apply in connecting the databases with various dynamic webpage development.
CO4:	Understand the notions of python programming and apply the knowledge of programming in executing the constrained environment development
CO5:	Understand the concepts of various python databases, objects and apply them in managing files and object viewers

TEXT BOOKS:

- T1.Remy Card, Eric Dumas and Frank Mevel, "The Linux Kernel Book", Wiley Publications, 2003
T2.Steve Suchring, "MySQL Bible", John Wiley, 2002
T3.Mark Lutz, "Programming Python 4th Edition", O'Reilly Publication, 2010

REFERENCE BOOKS :

- R1- Rasmus Lerdorf and Levin Tatroe, "Programming PHP", O'Reilly, 2002
R2- Wesley J. Chun, "Core Python Programming", Prentice Hall, 2001
R3- Steven Holzner, "PHP: The Complete Reference", 2nd Edition, Tata McGraw-Hill


Chairman - BoS
CSE - HICET




Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS5203	COMPUTER ARCHITECTURE	3	0	0	3

- Course Objective**
1. Give students a broad and deep knowledge of contemporary computer architecture issues and techniques.
 2. Give students knowledge of advanced hardware-based techniques for exploiting instruction level parallelism.
 3. Give students ability to apply the learned knowledge to conduct computer architecture research using performance simulators.
 4. Give the students ability to learned knowledge to work in various computer components.
 5. Give the student about the wide knowledge about the current system working with the existing mechanisms.

Unit	Description	Total Instructional Hours
	INTRODUCTION & INSTRUCTIONS	
I	Brief history of computers- Eight ideas – Components of a computer system – Technology – Performance – Power wall –Uniprocessors to multiprocessors; Instructions – operations and operands – representing instructions– Logical operations – control operations – Addressing and addressing modes.	9
	COMPUTER ARITHMETIC	
II	The Arithmetic and Logic Unit (ALU) - Integer Representation - Integer Arithmetic - Floating-Point Representation - Floating-Point Arithmetic	8
	PROCESSOR AND CONTROL UNIT	
III	Basic MIPS implementation – Building datapath – Control Implementation scheme – Pipelining –Pipelined datapath and control – Handling Data hazards & Control hazards – Exceptions	10
	PARALLELISM	
IV	Instruction-level-parallelism – Parallel processing challenges – Flynn's classification – Hardwaremultithreading – Multicore processors	9
	MEMORY AND I/O SYSTEMS	
V	Computer Memory System Overview - Cache Memory Principles – Elements of Cache Design - Virtual memory, TLBs - Input/output system, programmed I/O, DMA and interrupts	9
	TOTAL INSTRUCTIONAL HOURS	45

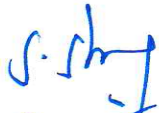
- Course Outcome**
- CO1: Understand the basic instructions and addressing modes.
CO2: Apply Arithmetic and Logic Unit operations.
CO3: Understand the concepts of pipelined control units.
CO4: Understand the parallel processing architectures.
CO5: Understand the performance of memory systems

TEXT BOOKS:

- T1. David A. Patterson and John L. Hennessey, "Computer organization and design", MorganKauffman / Elsevier, Fifth edition, 2014.
T2. William Stallings "Computer Organization and Architecture", Eighth Edition, PearsonEducation, 2010.

REFERENCE BOOKS :

- R1. V. Carl Hamacher, Zvonko G. Varanasic and Safat G. Zaky, "Computer Organisation", Vith edition, Mc Graw-Hill Inc, 2012.
R2. Vincent P. Heuring, Harry F. Jordan, "Computer System Architecture", Second Edition, Pearson Education,
R3. Govindarajalu, "Computer Architecture and Organization, Design Principles and Applications", first edition, Tata McGraw Hill, New Delhi, 2005.


Chairman - BoS
CSE - HICET




Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS5204	THEORY OF COMPUTATION (CSE & IT)	3	0	0	3

- Course Objective**
1. Understand about Finite State Machine
 2. Learn Regular expressions
 3. Understand the various types of Grammars and Pushdown Automata
 4. Expose the Turing Machine concept
 5. Understand about Decidability and Un-decidability of various problems.

Unit	Description	Instructional Hours
	FINITE AUTOMATA	
I	Introduction- Basic Mathematical Notation and techniques- Finite State systems – Basic Definitions – Finite Automaton – DFA & N DFA – Finite Automaton with ϵ - moves- Equivalence of DFA and NFA- NFA to DFA conversion-Applications of finite automata.	9
	REGULAR EXPRESSIONS	
II	Regular Languages- Regular Expression- Converting Regular Expression to FA- Converting FA to Regular Expression - Equivalence of finite Automaton and regular expressions –Minimization of DFA- - Pumping Lemma for Regular sets – Problems based on Pumping Lemma.	9
	GRAMMARS AND PUSMATA	
III	Chomsky hierarchy of languages-Context-Free Grammar (CFG) - Parse Trees - Ambiguity in grammars and languages - Definition of the Pushdown automata - Languages of a Pushdown Automata - Equivalence of Pushdown automata and CFG, Deterministic Pushdown Automata- Normal forms for CFG – Chomsky Normal Form (CNF) – Greibach Normal Form (GNF) - Pumping Lemma for Context Free Language (CFL) - Closure Properties of CFL.	9
	TURING MACHINE	
IV	Definitions of Turing machines – Models – Computable languages and functions –Techniques for Turing machine construction – Multi head and Multi tape Turing Machines - The Halting problem – Partial Solvability – Problems on Turing machine.	9
	COMPUTATIONAL COMPLEXITY	
V	Undecidability- Basic definitions- Decidable and undecidable problems-Properties of Recursive and Recursively enumerable languages – PCP – MPCP. Introduction to Computational Complexity: Definitions-Time and Space complexity of TMs–Complexity classes – Introduction to NP-Hardness and NP-Completeness	9
TOTAL INSTRUCTIONAL HOURS		45

- Course Outcome**
- CO1: Understand the finite state machine and to check given regular expression is regular or not..
- CO2: Understand a grammar for the given language and evaluate the ambiguous conditions
- CO3: Apply pushdown automata for given language in real time applications.
- CO4: Apply Turing machine concept for the real time applications.
- CO5: Understand about decidability and undecidability of various problems

TEXT BOOKS:

- T1- Hopcroft J.E., Motwani R. and Ullman J.D, “Introduction to Automata Theory, Languages and Computations”, Second Edition, Pearson Education, 2008.
- T2- John C Martin, “Introduction to Languages and the Theory of Computation”, Third Edition, Tata Mc Graw Hill Publishing Company, New Delhi, 2007.

REFERENCE BOOKS :

- R1 - Mishra K L P and Chandrasekaran N, “Theory of Computer Science - Automata, Languages and Computation”, Third Edition, Prentice Hall of India, 2004.
- R2- Harry R Lewis and Christos H Papadimitriou, “Elements of the Theory of Computation”, Second Edition, Prentice Hall of India, Pearson Education, New Delhi, 2003.
- R3- Peter Linz, “An Introduction to Formal Language and Automata”, Third Edition, Narosa Publishers

S. Shy
Chairman - BoS
CSE - HiCET



[Signature]
Dean (Academics)
HiCET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS5001	NETWORKS LABORATORY (CSE & IT)	0	0	4	2

Course Outcome

1. Use simulation tools.
2. Implement the various protocols.
3. Analyse the performance of the protocols in different layers.
4. Analyze various routing algorithms.
5. Analyze various real time problems for projects.

Expt. No. Description of the Experiments

1. Implementation of Stop and Wait Protocol and Sliding Window Protocol
2. Study of Socket Programming and Client – Server model
3. Write a code simulating ARP /RARP protocols
4. Write a code simulating PING and TRACEROUTE commands
5. Create a socket for HTTP for web page upload and download
6. Write a program to implement RPC (Remote Procedure Call)
7. Implementation of Subnetting
8. Applications using TCP Sockets like
 - a. Echo client and echo server
 - b. Chat
 - c. File Transfer
9. Applications using TCP and UDP Sockets like
 - d. DNS
 - e. SNMP
 - f. File Transfer
10. Perform a case study about the different routing algorithms to select the network path with its optimum and economical during data transfer.
 - a. Link State routing
 - b. Flooding
 - c. Distance vector

Total Practical Hours 45

Course Outcome

CO1: Use simulation tools
 CO2: Implement the various protocols
 CO3: Analyze the performance of the protocols in different layers
 CO4: Analyze various routing algorithms
 CO5: Learn about the network simulation

LAB EQUIPMENT FOR A BATCH OF 30 STUDENTS:

SOFTWARE

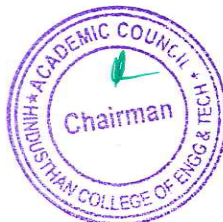
- Turbo C++ Compiler
- Operating System (Windows, UNIX, Linux...)

HARDWARE

Standalone desktops : 30 Nos

REFERENCE : spoken-tutorial.org

S. S. Singh
**Chairman - BoS
 CSE - HICET**



[Signature]
**Dean (Academics)
 HICET**

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS5002	OPEN SOURCE PROGRAMMING LABORATORY	0	0	4	2

Course Objective

1. Common open source software licenses, open source project structure, distributed team software development, and current events in the open source world
2. Explain common open source licenses and the impact of choosing a license
3. Installation of open source software and tools.

S.NO DESCRIPTION OF THE EXPERIMENTS

- 1 Windows and Linux installation with dual boot.
- 2 Micro kernel installation like MYSQL, PHP and PYTHON
- 3 Running PHP: Simple applications like login forms
To implement the following the concept using PHP
- 4 File handling
Exception handling
Database connectivity
- 5 Running Python: some simple exercise – e.g. control flow statement, string manipulation and function
- 6 To implement Python's data structures - lists, dictionaries, and tuples in detail.
To implement the following the concept using PYTHON
- 7 File handling
Exception handling
Database connectivity
- 8 To implement PYTHON GUI program using Django

TOTAL INSTRUCTIONAL HOURS 45

CO1: Understand the concepts of open-source software and learn to install the kernel and micro-kernel installation..

Course Outcome CO2: Understand and apply the concepts of SQL/MYSQL to gather information using own programs in connection with record sequences
CO3: Understand the scripts and basics of PHP, Python, SQL database and apply in connecting the databases with various dynamic webpage development

REFERENCE:
Spoken-tutorial.org

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

SOFTWARE: Latest distribution of Linux
HARDWARE: Standalone desktops 30 Nos

S. Singh
**Chairman - BOS
CSE - HiCET**



[Signature]
**Dean (Academics)
HiCET**

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS5701	TECHNICAL PRESENTATION	0	0	4	2

Course Objective

1. To encourage the students to study advanced engineering developments.
2. To prepare and present technical reports.
3. To encourage the students to use various teaching aids such as over head projectors, power point presentation and demonstrative model.
4. To promote and develop presentation skills and import a knowledgeable society.
5. To set the stage for future recruitment by potential employers.


Expt. No.

Description of the Experiments

- During the seminar session each student is expected to present a topic on engineering/ technology, for duration of about 8 to 10 minutes. In a session of three periods per week, 15 students are expected to present the seminar each student is expected to present at least twice during the semester and the student is evaluated based on that. At the end of the semester, the students have to submit a report on their topic of seminars. The Report will be evaluated and marks will be given. A faculty guide will be allotted to monitor the progress of the student and also to maintain attendance.
- 1.

Total Practical Hours 45

Course Outcome
 Upon completion of this course, the students will be able to
 CO1: Ability to review, prepare and present technological developments
 CO2: Ability to face the placement interviews
 CO3: Develops Communication Confidence skills
 CO4: Builds Confidence
 CO5: Utilize Technical Resources


Chairman - BoS
CSE - HICET




Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS6201	FREE OPEN SOURCE SOFTWARE - II	3	0	0	3

- Course Objective**
1. Provides an overview of the historical and modern context of free and open source software (FOSS)
 2. Gain Knowledge about Web server and Web Services
 3. To learn about NS2 Simulator
 4. Study important FOSS tools and techniques
 5. To learn knowledge about Python Programming

Unit	Description	Instructional Hours
WEB SERVICE		
I	Web Server: Apache Web server – Working with Web Server – Configuring and Using apache web services MDA: Introduction to MDA – Genesis of MDA – Meta Object Facility – UML – UML Profiles – MDA Applications. case study: Apache Spark	9
NS2		
II	Introduction to Network Simulator 2-Linkage Between OTel and C++ in NS2-Network Objects: Creation, Configuration, and Packet Forwarding	9
PYTHON REGULAR EXPRESSION		
III	Introducing Regular Expressions-Regular Expressions with Python-Grouping-Look Around-Performance of Regular Expressions.	9
PYTHON NLP		
IV	Language Processing and Python - Accessing Text Corpora and Lexical Resources-Processing Raw Text-Writing Structured Programs-Categorizing and Tagging Words	9
PYTHON NLP		
V	Learning to Classify Text-Extracting Information from Text-Analyzing Sentence Structure-Analyzing Sentence Structure-Analyzing the Meaning of Sentences-Managing Linguistic Data.	9
TOTAL INSTRUCTIONAL HOURS		45

- Course Outcome**
- CO1: Apply the concepts of Apache Web server installation, Apache configuration services and Understand the Model Driven Architecture, UML profiles and Apache Spark
- CO2: Understand the basics of network simulator NS2 and configuration of simulator for packet forwarding
- CO3: Understand regular expression in python and apply python for grouping of regular expressions.
- CO4: Understand language processing in python and apply python to process raw text and text categorization
- CO5: Understand text classification and information extraction to analyze the sentence structure and meaning of the sentence

TEXT BOOKS:


- T1 - Issariyakul, Teerawat, Hossain, Ekram “Introduction to Network Simulator NS2”,Springer,2012
- T2 - Steven Bird, Ewan Klein, and Edward Loper, “Natural Language Processing with Python”,oreilly,2009

REFERENCE BOOKS:

- R1 - Mark Lutz, “Learning Python” 5th Edition.Published by O’Reilly Media 2013
- R2 - Eitan Altman “NS simulator for beginners”


Chairman - BoS
CSE - HICET




Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS6202	COMPILER DESIGN	3	0	0	3

- Course Objective**
1. Learn the design principles of a Compiler.
 2. To introduce the various techniques involved in the translation of source programs into object programs by a compiler
 3. Learn the various parsing techniques and different levels of translation
 4. To understand the inner working of a compiler using the various data structures used in the translation process
 5. Learn how to optimize and effectively generate machine codes

Unit	Description	Instructional Hours
	INTRODUCTION TO COMPILERS	
I	Introduction - Analysis of the source program -Translators-Compilation and Interpretation-Language processors -The Phases of Compiler-Errors Encountered in Different Phases-The Grouping of Phases-Compiler Construction Tools.	5
	LEXICAL ANALYSIS	
II	Lexical Analysis-Need and Role of Lexical Analyzer- Lexical Errors- Specification of tokens - Recognition of tokens -Expressing Tokens by Regular Expressions-Converting Regular Expression to DFA- Minimization of DFA-Language for Specifying Lexical Analyzers-LEX-Design of Lexical Analyzer for a sample Language	9
	SYNTAX ANALYSIS	
III	Syntax analysis -Need and Role of the Parser-Context Free Grammars -Top Down Parsing - General Strategies-Recursive Descent Parser Predictive Parser-LL(1) Parser-Shift Reduce Parser-LR Parser- LR (0)Item-Construction of SLR Parsing Table -Introduction to LALR Parser - Error Handling and Recovery in Syntax Analyzer-YACC-Design of a syntax Analyzer for a Sample Language	10
	SYNTAX DIRECTED TRANSLATION & RUN TIME ENVIRONMENT	
IV	Syntax directed Definitions-S-attributed definitions - L-attributed definitions -Construction of Syntax Tree- Bottom-up and Top-down translation - type checking - Design of predictive translator - Type Systems-Specification of a simple type checker-Equivalence of Type Expressions-Type Conversions.RUN-TIME ENVIRONMENT: Source Language Issues-Storage Organization-Storage Allocation-Access to non- local names-Parameter Passing-Symbol Tables-Dynamic Storage Allocation	12
	CODE OPTIMIZATION AND CODE GENERATION	
V	Intermediate code generation - Intermediate languages - Declarations - Assignment statements - Boolean Expressions - Procedure calls - Introduction to code optimization - Principal sources of optimization - DAG- Optimization of Basic Blocks -Introduction to global data-flow analysis - Introduction to code generation - Issues in the design of a code generator - The target machine - A simple code generator	9
Total Instructional Hours		45

- Course Outcome**
- CO1: Able to know the various techniques involved in translation
 - CO2: Able to design and implement a prototype compiler
 - CO3: Able to apply various code optimization techniques
 - CO4: Able to apply various code generation techniques
 - CO5: Able to use the different compiler construction tools

TEXT BOOKS:

T1 - Alfred V Aho, Monica S. Lam, Ravi Sethi and Jeffrey D Ullman, "Compilers – Principles, Techniques and Tools", 2nd Edition, Pearson Education, 2007.

REFERENCE BOOKS:

- R1 - Randy Allen, Ken Kennedy, "Optimizing Compilers for Modern Architectures: A Dependence-based Approach", Morgan Kaufmann Publishers, 2002.
- R2 - Steven S. Muchnick, "Advanced Compiler Design and Implementation", "Morgan Kaufmann Publishers - Elsevier Science, India, Indian Reprint 2003.
- R3 - Keith D Cooper and Linda Torczon, "Engineering a Compiler", Morgan Kaufmann Publishers Elsevier Science, 2004.

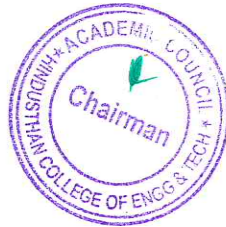
(Signature)
Chairman - BoS
CSE - HICET

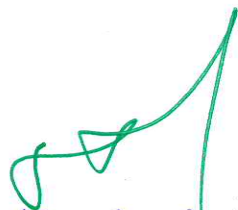


(Signature)
Dean (Academic)
HICET

- R4 - Charles N. Fischer, Richard. J. LeBlanc, "Crafting a Compiler with C", Pearson Education, 2008
- R5 - Aho A. V., Ullman J.D. Principles of Compiler Design, Narosa
- R6 - Holub A.I., Compiler Design in C, Prentice Hall India
- R7 - Appel A.W., Modern Compiler Implementation in C, Cambridge University Press
- R8 - Dick Grune, Henri E Bal, Criel J.H Jacobs, Koen G Langendoen, Modern Compiler design, Dreamtech.


Chairman - BoS
CSE - HiCET




Dean (Academics)
HiCET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS6203	INTERNET OF THINGS	3	0	0	3

- Course Objective**
1. Learn the components of IOT
 2. Learn about the IOT objects
 3. Understand the components and the protocols in Internet.
 4. Understand the various modes of communications with internet.
 5. Understand the various cloud services for IOT

Unit	Description	Instructional Hours
I	INTRODUCTION TO INTERNET OF THINGS Definition and Characteristics of IoT, Physical Design of IoT-n IoT Protocols, IoT communication models, Iot Communication APIs IoT enabled Technologies-Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates.	9
II	PROTOTYPING IOT OBJECTS USING MICROPROCESSOR/MICROCONTROLLER Overview of Microprocessor and Microcontroller, Basics of Sensors and actuators-examples and working principles of sensors and actuators, Equivalent Microcontroller platform-Setting up the board-Programming for IOT-Reading from Sensors, Communication: Connecting microcontroller with mobile devices-communication through bluetooth, wifi, Ethernet.	11
III	IOT ARCHITECTURE AND PROTOCOLS Introduction, State of the art, Architecture Reference Model-Introduction, Reference Model and architecture, IoT reference Model-Zigbee, RFID, BLE, NFC , BACnet , 6LowPAN, RPL, CoAP, MQTT.	9
IV	DEVICE DISCOVERY Device Discovery capabilities-Registering a device, De-register a device, Querying for devices. Technologies available -IBM Foundation Device Management Service, Intel IOTivity, XMPP Discovery extension.	8
V	CLOUD SERVICES FOR IOT Introduction to Cloud Storage models and communication APIs Web server -Web server for IoT, Cloud for IoT- Create a unmanned supermarket for a common man to procure items using IoT concepts.	8
TOTAL INSTRUCTIONAL HOURS		45

- Course Outcome**
- CO1: Identify the components of IOT
CO2: Design a portable IOT using appropriate boards
CO3: Explore the IOT architecture and protocols
CO4: Develop schemes for device discovery.
CO5: Explicate the use of cloud services for IOT

REFERENCE BOOKS:

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, From Machine -to-Machine to the Internet of Things: Introduction to a New Age of Intelligence, 1st Edition, Academic Press, 2014.
2. Vijay Madisetti and ArshdeepBahga, Internet of Things (A Hands-on-Approach), 1stEdition, VPT, 2014.
3. Francis daCosta, Rethinking the Internet of Things: A Scalable Approach to Connecting Everything, 1st Edition, Apress Publications, 2013
4. Olivier Hersent, David Boswarthick, Omar Elloumi , The Internet of Things Key applications and Protocols,
5. Getting Started with the Internet of Things: Connecting Sensors and Microcontrollers to the Cloud (Make: Projects) [Kindle Edition] by CunoPfister ,2011
6. Designing the Internet of Things (Nov 2013) by Adrian McEwen &Hakim Cassimally

S. Shy
Chairman - Bos
CSE - HICET



[Signature]
Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS6204	SOFTWARE QUALITY ASSURANCE	3	0	0	3
Course Objective	1. Understand the quality management framework and related quality program concepts 2. Understand commercial standards and the impact on quality assurance 3. Study the relationship of process and product quality assurance (PPQA) to SQA 4. Learn the quality management in information technology 5. Study the metrics for software quality assurance					

Unit	Description	Instructional Hours
ORGANIZING QUALITY MANAGEMENT		
I	Quality management framework - Quality program concepts - Organizational aspects of quality program -Quality Program organizational relationship-Mapping quality program functions to project organizational entities	7
SOFTWARE QUALITY ASSURANCE STANDARDS		
II	Software Quality Assurance (SQA) in ISO standards-SQA in IEEE standards IEEE STD 730 - 2002-IEEE STD 829-1998-IEEE STD 1028-1997- ITIL standards- ANSI/EIA Standards and RTLA/DO standards	8
SOFTWARE QUALITY ASSURANCE		
III	Identifying SQA personnel needs-Characteristics of a good SQA engineer-SQA engineering staff-Pareto principle applied to SQA-Software inspections and walkthroughs-Measurements-Transition of cost to quality - Software audit-Performing the audit - Software safety and its relation to SQA-PPQA relationship to SQA	11
QUALITY MANAGEMENT IN IT		
IV	ITSM Processes-IT best practices-ITSM standards-Process improvement models-Customer requirements- Monitoring and measuring ITSM performance - Procurement quality-IT quality professional-Cost of software quality system CoSQ system to organization	11
SQA METRICS		
V	Software quality indicators-PSM -CMMI- PSP and TSP-Six sigma - Seven quality control tools: traditional and modern tools-check sheet-Pareto diagram-Histogram-Run chart-Scatter diagram-Control chart	8
TOTAL INSTRUCTIONAL HOURS		45

- Course Outcome
- CO1. Identify the quality management framework and related quality program concepts.
 - CO2. Analyze the commercial standards and the impact on quality assurance.
 - CO3. Analyze the relationship of process and product quality assurance (PPQA) to SQA.
 - CO4. Explore the quality management in information technology.
 - CO5. Elucidate Software quality metrics methodology and software quality control tools.

REFERENCES

1. Schulmeyer G. Gordon, Handbook of Software Quality Assurance. London: Artech House Inc, 2008
2. Daniel Galin, Software Quality Assurance from theory to implementation, Pearson Education Limited, 2009
3. Stephen H. Kan. Metrics and Models in Software Quality Engineering, Addison-Wesley Professional, 2003
4. Murali Chemuturi, Mastering Software Quality Assurance: Best Practices, Tools and Techniques for Software Developers, J. Ross Publishing Inc, 2011
5. Murali Chemuturi, Mastering Software Quality Assurance: Best Practices, Tools and Techniques for Software Developers, J. Ross Publishing Inc, 2011

J. S. K.
 Chairman - BoS
 CSE - HICET



[Signature]
 Dean (Academics),
 HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS6001	OPEN SOURCE PROGRAMMING LABORATORY - II	0	0	4	2

Course Objective

1. To expose students to FOSS environment
2. To introduce the use of open source packages.
3. To provide practical experience in software development using open source tools like Perl, Python, PHP and MySql

Expt. No. Description of the Experiments

1. Develop a necessary class and method of sorting algorithms such as bubble sort, insertion sort, merge sort, and quick sort.
2. Develop a Linked List Class and its Methods and implement Stack and Queue concept.
3. Develop a database connection program and implement the following concept
 - a. Inheritance
 - b. Overloading
 - c. Overriding
 - d. Data hiding
4. To implement the following concept using regular expression
 - a. Remove duplicate word
 - b. Find a phone number in a list
 - c. Validate E-mail address
5. Install the NLP package and implement the following concept
 - a. Extracting Information from Text
 - b. Learning to Classify Text
 - c. Building Feature Based Grammars
6. Mini project (Application Development using PYTHON / MYSQL)
 - a. Inventory Control System.
 - b. Material Requirement Processing.
 - c. Hospital Management System.
 - d. Railway Reservation System.
 - e. Personal Information System.
 - f. Web Based User Identification System.
 - g. Timetable Management System.
 - h. Hotel Management System

TOTAL PRACTICAL HOURS 45

Course Outcome

CO1: Understand, analyze and apply the role of languages like HTML, DHTML, CSS, JavaScript and PHP
 CO2: Analyze a web page and identify its elements and attributes
 CO3: Create web pages using HTML, DHTML and Cascading Style Sheets
 CO4: Create dynamic web pages using JavaScript, XML.
 CO5: Build web applications using PHP

REFERENCE:
 Spoken-tutorial.org

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

SOFTWARE: Latest distribution of Linux
HARDWARE: Standalone desktops 30 Nos


Chairman - BoS
CSE - HICET




Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS6002	COMPILER DESIGN LABORATORY	0	0	4	2

Course Objective

1. Be exposed to compiler writing tools.
2. Learn to implement the different Phases of compiler
3. Be familiar with control flow and data flow analysis.

Expt. No.

Description of the Experiments

1. Design a lexical analyzer for given language and the lexical analyzer should ignore redundant spaces, tabs, comments and new lines. Although the syntax specification states that the identifiers can be arbitrary long, you may restrict the length to some reasonable value. Simulate the same in C language
2. Implementation of Lexical Analyzer using JLex, flex or other lexical analyser generating tools
Generate YACC specification for a few syntactic categories.
3.
 - a. Program to recognize a valid arithmetic expression that uses operator +, -, *, / and /.
 - b. Program to recognize a valid variable which starts with a letter followed by any number of letters or digits.
 - c. Implementation of Calculator using LEX and YACC
4. Implementation of LALR Parsing
5. Convert the BNF rules into Yacc form and write code to generate Abstract Syntax Tree
6. Implementation of Symbol Table
7. Implement type checking
8. Implement control flow analysis and Data flow Analysis
9. Implement any one storage allocation strategies(Heap,Stack,Static)
10. Construction of DAG
11. Implement the back end of the compiler which takes the three address code and produces the 8086 assembly language instructions that can be assembled and run using a 8086 assembler.The target assembly instructions can be simple move, add, sub, jump. Also simple addressing modes are used.
12. Implementation of Simple Code Optimization Techniques (Constant Folding., etc.)

Total Practical Hours 45

Course Outcome

- CO1: Understand about the working of different phases of compiler with the compiler tools..
 CO2: Understand about the control flow and data flow through code optimization and generation.
 CO3: Apply the optimization techniques to have a better code for code generation.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Standalone desktops with C / C++ / Java / Equivalent compiler : 30 Nos.
(or)

Server with C / C++ compiler and Compiler writing tools supporting 30 terminals or more-LEX and YACC

TEXT BOOKS:

- T1. Enterprise Cloud Computing by Gautam Shroff, Cambridge,2010
- T2. Cloud Security by Ronald Krutz and Russell Dean Vines, Wiley - India, 2010 , ISBN:978-0-470-58987-8
- T3. Getting Started with OwnCloud by Aditya Patawar , Packt Publishing Ltd, 2013
- T4. www.openstack.org

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Standalone desktops with PHP, HTML, JOSSO and own Cloud, Microsoft azure. 30 Nos.

S. Shrivastava
**Chairman - BOS
 CSE - HICET**



[Signature]
**Dean (Academics)
 HICET**

ELECTIVE-I

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS5301	ADVANCED JAVA PROGRAMMING	3	0	0	3

- Course Objective**
1. To learn advanced java programming concepts like interface, threads, swings etc.
 2. To develop network programs in java
 3. To understand concepts needed for distributed and multi-tier applications
 4. To understand issues in enterprise application development
 5. To demonstrate approaches for performance and effective coding

Unit	Description	Instructional hours
	JAVA FUNDAMENTALS	
I	Object oriented programming concepts - Extending classes and inheritance - packages - user interfaces - graphic programming - exception handling and debugging - array and string - multithreading - collections - Java I/O streaming-filter and pipe streams - byte code interpretation - threading - swing - applets	9
	NETWORK PROGRAMMING IN JAVA	
II	Sockets - secure sockets - custom sockets - UDP datagrams - multicast sockets - URL classes - Reading data from the server - writing data - configuring the connection - Reading the header - sending Email - telnet application - Java messaging services.	9
	APPLICATIONS IN DISTRIBUTED ENVIRONMENT	
III	Remote method invocation - Activation models - RMI custom sockets - Object serialization - RMI- IIop implementation -CORBA - IDL technologies - Naming services - CORBA programming model - JAR file creation - Case studies.	9
	MULTI-TIER APPLICATION DEVELOPMENT	
IV	Web application Basics - Architectures and challenges of Web application - Introduction to servlet - servlet life cycle - Developing and deploying servlets - Exploring deployment - descriptor(web.xml),handling request and response - Intoduction to JDBC-JDBC drivers and architectures - CURD operation using JDBC-connecting to non conventional database - Applet to Applet communication-applet to servlet communication - multimedia streaming applications - Java media framework.	9
	ENTERPRISE APPLICATIONS	
V	Server side component architecture - Introduction to J2EE - session beans - entity beans - persistent entity beans - case studies.	9
Total Instructional Hours		45

- Course Outcome**
- CO1. To cover topics in various java technologies.
 - CO2. Use the methods of the Applet and Component classes required for a basic applet
 - CO3. To make the students to develop distributed business applications and multitier applications
 - CO4. To develop web pages using advanced server-side programming through servlets and java server pages.
 - CO5. Develop program using javax.servlet package

TEXT BOOKS:

- T1. Elliotte Rusty Harold,"Java Network programming",o'Reilly publishers,2000(unit II)
- T2. Ed Roman,"Mastering Enterprise Java Beans",John Wiley & sons Inc.,1999.(unit III and unit V)
- T3. Hortsman & Cornell,"core Java 2 Advanced Feature,Vol II",pearson Education,2002.(Unit I and Unit IV)

REFERENCE BOOKS:

- R1. Http://Java.Sun.Com
- R2. Patrick Naughton,"Complete Reference: Java2",Tata McGraw-Hill,2003

S. Singh
Chairman - BOS
CSE - HICET



S. Singh
Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS5302	VISUALIZATION TECHNIQUES	3	0	0	3

- Course Objective**
1. To learn about different Visualization Techniques
 2. To study the Interaction techniques in information visualization fields
 3. To study about Multi dimension visualization Techniques
 4. To understand various abstraction mechanisms
 5. To create interactive visual interfaces

Unit	Description	Instructional hours
I	FOUNDATION OF DATA VISUALIZATION Introduction to visualization, Visualization stages, Experimental semiotics on perception, Gibson's affordance theory, Limitation of Gibson's affordance theory, Model of perceptual processing, Cost and benefits of visualization, Type of data, Abstraction.	9
II	COMPUTER VISUALIZATION Computer Visualization and Non-Computer Visualization, Exploring the complex information space, Fisheye view applications, Comprehensible Fisheye Views, Fisheye views for 3D data, Non linear magnification, Comparing visualization of information space, Abstraction in computer graphics, Abstraction in user interface.	9
III	MULTI DIMENSIONAL VISUALIZATION Single dimension, Two dimension, Three dimension, Trees, Web works, Data Mapping, Document Visualization, Work space.	9
IV	TEXTUAL METHOD OF ABSTRACTION From graphics to full text, Figure captions in visual interfaces, Interactive 3D illustration with image and text, Consistency of rendering, Images and its textual labels, Architecture, Zoom Technique for illustration purpose, Interactive handling of images and text.	9
V	ABSTRACTION IN TIME AND INTERACTIVE SYSTEMS Animating non Photo realistic Computer Graphics, Interaction Facilities and High Level Support for Animation Design, Zoom Navigation in User Interfaces, Interactive Medical Illustrations, Rendering Gestural Expressions, Animating design for Simulation, Tactile Maps for Blind People – Synthetic holography, Abstraction Versus Realism, Integrating Spatial and Non Spatial Data..	9
Total Instructional Hours		45

- Course Outcome**
- CO1. Ability to understand the data visualization concepts
 - CO2. Ability to understand modern visualization techniques
 - CO3. Ability to understand various interaction techniques
 - CO4. Ability to understand various textual methods of abstraction
 - CO5. Ability to create interactive visual interface applications

TEXT BOOKS:

- T1. Colin Ware "Information Visualization Perception for Design", 3rd edition, Morgan Kaufman 2012. (UNIT 1)
- T2. Stuart.K.Card, Jock.D.Mackinlay and Ben Shneiderman, "Readings in Information Visualization Using Vision to think", Morgan Kaufmann Publishers, 1999. (UNIT 3)
- T3. Thomas Strothotte, "Computer Visualization–Graphics Abstraction and Interactivity", Springer Verlag Berlin Heiderberg 1998. (UNIT 2, 4, 5)

REFERENCE BOOKS:

- R1. Chaomei Chan, "Information Visualization", Beyond the horizon, 2nd edition, Springer Verlag, 2004.
- R2. Pauline Wills, "Visualisation: A Beginner's Guide", Hodder and Stoughlon, 1999.
- R3. Benedikt. M, "Cyberspace: Firot Steps", MIT Press, 1991.

(Handwritten Signature)
**Chairman - BoS
 CSE - HiCET**



(Handwritten Signature)
**Dean (Academics)
 HiCET**

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS5303	SERVICE ORIENTED ARCHITECTURE	3	0	0	3

- Course Objective**
1. To learn service oriented analysis techniques
 2. To learn technology underlying the service design
 3. To learn advanced concepts such as service composition, orchestration and Choreography
 4. To know about various Web Service specification standards
 5. To learn about SOA Platforms

Unit	Description	Instructional Hours
I	INTRODUCTION Roots of SOA ,Characteristics of SOA, Comparing SOA to client-server and distributed internet architectures, Anatomy of SOA, How components in an SOA interrelate , Principles of service orientation	9
II	SERVICE ORIENTED ARCHITECTURE IN WEB SERVICES Web services, Service descriptions, Messaging with SOAP, Message exchange Pattern, Coordination, Atomic Transactions, Business activities, Orchestration , Choreography, Service layer abstraction, Application Service Layer, Business Service Layer, Orchestration Service Layer	9
III	BUILDING SOA Service oriented analysis, Business-centric SOA, Deriving business services, service modeling, Service Oriented Design, WSDL basics, SOAP basics, SOA composition guidelines, Entity-centric business service design, Application service design, Task centric business service design.	9
IV	SOA PLATFORMS SOA platform basics, SOA support in J2EE, Java API for XML-based web services (JAX-WS), Java architecture for XML binding (JAXB), Java API for XML Registries (JAXR) , Java API for XML based RPC (JAX-RPC), Web Services Interoperability Technologies (WSIT), SOA support in .NET , Common Language Runtime, ASP.NET web forms, ASP.NET web services, Web Services Enhancements (WSE).	9
V	SOA DESIGN Web Service, BPEL- process, elements, functions, Web Service, Coordination, overview, elements, web service business activity & atomic transaction coordination type , Business process design Web Service , Choreography, Web Service, Policy-elements, Web Service Security, XML, Signature element	9
Total Instructional Hours		45

- Course Outcome**
- CO1. Ability to understand service oriented architecture
 - CO2. Ability to build service oriented architecture applications
 - CO3. Ability to understand various service oriented architecture techniques
 - CO4. Ability to understand service oriented architecture platforms
 - CO5. Ability to understand service oriented architecture design

TEXT BOOKS:

- T1. Thomas Erl, "Service-Oriented Architecture: Concepts, Technology, and Design", Pearson Education, 2009.
- T2. Thomas Erl, "SOA Principles of Service Design" (The Prentice Hall Service- Oriented Computing Series from Thomas Erl), 2005.

REFERENCE BOOKS:

- R1. Newcomer, Lomow, "Understanding SOA with Web Services", Pearson Education, 2005.
- R2. Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services, An Architect's Guide", Pearson Education, 2005.

(Signature)
**Chairman - BoS
CSE - HICET**



(Signature)
**Dean (Academics)
HICET**

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS5304	INFORMATION STORAGE MANAGEMENT	3	0	0	3

- Course Objective**
1. Understand about the storage system
 2. Learn the storage networking technologies
 3. Describe the core elements in a data center.
 4. Learn the Cloud computing characteristics and benefits
 5. Understand RAID and its various levels for data backup.

Unit	Description	Instructional Hours
I	STORAGE SYSTEM Introduction to information storage, Virtualization and cloud computing, Key data center elements, Compute, application, and storage virtualization, Disk drive & flash drive components and performance, RAID, Intelligent storage system and storage provisioning (including virtual provisioning)	9
II	STORAGE NETWORKING TECHNOLOGIES AND VIRTUALIZATION Fibre Channel SAN components, FC protocol and operations, Block level storage virtualization, iSCSI and FCIP as an IP-SAN solutions, Converged networking option FcoE, Network Attached Storage (NAS) components, protocol and operations, File level storage virtualization, Object based storage and unified storage platform.	9
III	BACKUP, ARCHIVE AND REPLICATION Business continuity terminologies, planning and solutions, Clustering and multipathing to avoid single points of failure, Backup and recovery methods, targets and topologies, data deduplication and backup in virtualized environment, fixed content and data archive, Local replication in classic and virtual environments, Remote replication in classic and virtual environments, Three-site remote replication and continuous data protection.	9
IV	CLOUD COMPUTING CHARACTERISTICS AND BENEFITS Cloud Enabling Technologies - Characteristics of Cloud Computing- Benefits of Cloud Computing-Cloud Service Models Cloud deployment models- Cloud Computing Infrastructure-Cloud Challenges, Cloud migration considerations	9
V	SECURING AND MANAGING STORAGE INFRASTRUCTURE Security threats, and countermeasures in various domains, Security solutions for FC-SAN, IP-SAN and NAS environments, Security in virtualized and cloud environments, Monitoring and managing various information infrastructure components in classic and virtual environments, Information lifecycle Management (ILM) and storage tiering.	9
TOTAL INSTRUCTIONAL HOURS		45

- Course Outcome**
- CO1. Explain physical and logical components of a storage infrastructure including storage subsystems, RAID and intelligent storage systems.
- CO2. Describe storage networking technologies such as FC-SAN, IP-SAN, FCoE, NAS and object based, and unified storage.
- CO3. Illustrate and articulate business continuity solutions, backup and replications, along with archive for managing fixed content.
- CO4. Explain key characteristics, services, deployment models, and infrastructure components for a cloud computing.
- CO5. Implement the concept of security storage infrastructure management.

REFERENCE BOOKS:

R1: Information Storage and Management: Storing, Managing and Protecting Digital Information in classic, Virtualized and Cloud Environments, 2nd Edition, EMC Education Services, Wiley, May 2012.

R2: Information Storage and Management: Storing, Managing, and Protecting Digital Information, EMC Education Services, Wiley, January 2010

R3: Ulf Troppens, Rainer Erkens, Wolfgang Mueller-Friedt, Rainer Wolafka, Nils Hausteil, "Storage Networks Explained: Basics and Application of Fibre Channel SAN, NAS, iSCSI, InfiniBand and FCoE, 2nd Edition, Wiley, July 2009

S. S. H.
Chairman - BoS
CSE - HICET



[Signature]
Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS5305	TCP/IP PRINCIPLES AND ARCHITECTURE	3	0	0	3

- Course Objective**
- To learn the principles of TCP / IP and its Architecture.
 - To understand the basic concepts of TCP/IP Architecture
 - To enhance the knowledge to UDP and its applications
 - To provide knowledge on TCP features and SMTP
 - To understand the concepts on Transport layer

Unit	Description	Instructional hours
	INTRODUCTION	
I	Intermediate communication entities- Layering network addresses-DNS-Client server model- Port numbers- Standardization process-RFC's-Standard simple services- Application programming interfaces-Ethernet & IEEE 802 – encapsulation-SLIP-PPP-loop back interface-MTU-path MTU-ARP cache – Packet format – proxy ARP & Gratuitous ARP – ARP command – RARP- Structure TCP/IP s/w in operating system.	9
	NETWORK LAYER AND APPLICATION	
II	Introduction- IP header- IP routing - Subnet addressing- Subnet mask- Special case IP addresses – Examples- Ifconfig – Netstat- routing principles - ICMP host and Network unreachable errors - ICMP redirect errors – ICMP router discovery messages- Dynamic routing - UNIX routing daemons- routing information protocol (RIP)-OSPF-CIDR – Case study: Voice over IP for two way Communication.	9
	UDP AND APPLICATIONS	
III	Introduction- UDP header- UDP checksum- examples-IP fragmentation - ICMP unreachable errors – Path MTU discovery- Interaction between UDP and ARP-UDP datagram size- ICMP source quench error- Broad casting and Multi casting - IGMP- NFS- -TFTP-BOOTP	9
	TCP	
IV	Introduction- TCP services- TCP header – Connection establishment and termination – Maximum size – TCP half close – TCP state transition diagram – Reset segments- Simultaneous open and close – TCP options – Interactive input – Delayed acknowledgement – Nagle algorithm – Window size advertisement- Normal data flow – Sliding window – Window size - PUSH flag – Slow start– Bulk data throughput – Urgent mode	9
	TRANSPORT LAYER RELIABILITY AND APPLICATION	
V	CP/IP time out – Retransmission – Roundtrip time measurement – Congestion avoidance algorithms – Fast retransmit and fast recover algorithm – Repackitization - ICMP errors- TCP persistent – TCP features and performance – Telnet and rlogin - SMTP – TCP dump	9
	TOTAL INSTRUCTIONAL HOURS	45

- Course Outcome**
- CO1. Able to learn the principles of TCP / IP and its Architecture.
 - CO2. Able to understand the basic concepts of TCP/IP Architecture
 - CO3. Able to understand UDP and its applications.
 - CO4. Able to understand the sliding window and delayed acknowledgement methodologies.
 - CO5. Able to enhance the knowledge on broadcasting and multi casting in UDP.

TEXT BOOKS:

- T1. W. Richard Stevens, "TCP/IP Illustrated, The Protocol-Volume I", Addison-Wesley Pub Co, 1st Edition, 1994
- T2. Douglas E. Comer, "Internetworking with TCP/IP-Principles, Protocols & Architecture", Pearson education, 4th Edition, 2000

REFERENCE BOOKS:

- R1. Behrouz A. Forouzan, "TCP/IP Protocol Suite", Tata McGraw Hill, 2000
- R2. Michael Santifaller, "TCP/IP – ONC/NFS, Internetworking in UNIX Environment", Addison Wesley Professional, 2nd Edition, 1994.

(Signature)
Irman - BoS
CSE - HICET



(Signature)
Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS5306	SYSTEM SOFTWARE	3	0	0	3

- Course Objective**
1. To understand the relationship between system software and machine architecture.
 2. To know the design and implementation of assemblers
 3. To know the design and implementation of loaders and linkers
 4. To have an understanding of compilers, interpreters, and macro processors.
 5. To have an understanding of system software tools.

UNIT	DESCRIPTION	TOTAL INSTRUCTIONAL HOURS
	INTRODUCTION	
I	Language processors, Language processing activities–fundamentals of language processing– System software and machine architecture – The Simplified Instructional Computer (SIC) - Machine architecture - Data and instruction formats - addressing modes - instruction sets	8
	ASSEMBLERS	
II	Basic assembler functions - A simple SIC assembler – Assembler algorithm and data structures - Machine dependent assembler features - Instruction formats and addressing modes – Program relocation - Machine independent assembler features - Literals – Symbol-defining statements – Expressions - One pass assemblers and Multi pass assemblers - Implementation example - MASM assembler.	10
	LOADERS AND LINKERS	
III	Basic loader functions - Design of an Absolute Loader – A Simple Bootstrap Loader - Machine dependent loader features - Relocation – Program Linking – Algorithm and Data Structures for Linking Loader - Machine-independent loader features - Automatic Library Search – Loader Options - Loader design options - Linkage Editors – Dynamic Linking – Bootstrap Loaders - Implementation example - MSDOS linker.	9
	COMPILERS AND INTERPRETERS - MACROS	
IV	Compilers and Interpreters: Aspects of compilation–memory allocation–compilation of expressions–compilation of control structure code optimization–interpreters. Macro definition and Call macro expression–nested macro calls–advanced macro facilities–design of macro processors.	9
	SYSTEM SOFTWARE TOOLS	
V	Text editors - Overview of the Editing Process - User Interface – Editor Structure. - Interactive debugging systems - Debugging functions and capabilities – Relationship with other parts of the system – User-Interface Criteria.	9
TOTAL INSTRUCTIONAL HOURS		45

- Course Outcome**
- CO1. Understands the language processing activities
 - CO2. Understands How to implement the assemblers
 - CO3. Understands the concept of loaders and linkers
 - CO4. Understands how to implement compilers, interpreters and macros
 - CO5. Understands the system software tools

TEXT BOOKS:

T1..D.M. Dhamdhare–System programming & operating system, Tat McGraw Hill Publishing Co., 1997.Reference Books

T2. J.J.Donovan, System programming, Tata McGraw Hill , 1996.

T3. Leland L. Beck, "System Software – An Introduction to Systems Programming", 3rd Edition, Pearson Education Asia, 2007.

REFERENCE BOOKS:

R1. D. M. Dhamdhere, "Systems Programming and Operating Systems", Second Revised Edition, Tata McGraw-Hill, 1999.

R2. John J. Donovan "Systems Programming", Tata McGraw-Hill Edition, 2001

R3. John R. Levine, Linkers & Loaders – Harcourt India Pvt. Ltd., Morgan Kaufmann Publishers, 2000.


Chairman BoS
CSE - HICET




Dean (Academics)
HICET

ELECTIVE- II


PROGRAM	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS6301	ENTERPRISE COMPUTING	3	0	0	3

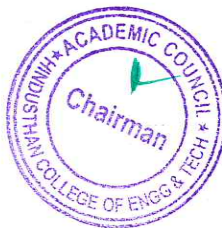
Course Objective	Description
	1. Understand the concepts of enterprise computing.
	2. Learn the incepting enterprise Applications
	3. Understand how to design an enterprise architecture.
	4. Construct and roll out the designed architecture as application.
	5. Testing and rolling out on the enterprise Application.


Unit	Description	Instructional Hours
	INTRODUCTION	
I	Enterprise Applications-Software Engineering Methodologies-Life Cycle of Raising Enterprise Applications-Three Key Determinants of Successful Enterprise Applications	9
	INCEPTING ENTERPRISE APPLICATIONS	
II	Enterprise Analysis-Business Modeling-EM Bank-A Case Study-Requirement Elicitation and Analysis-Actors and Use Cases-User Prototypes-Non-Functional Requirements-Requirements Validation	9
	ARCHITECTING AND DESIGNING ENTERPRISE APPLICATIONS	
III	Architecture, Views and Viewpoints-Enterprise Application-An Enterprise Architecture Perspective-Logical Architecture-Technical Architecture and Design -Data Architecture and Design-Infrastructure Architecture and Design	9
	CONSTRUCTING ENTERPRISE APPLICATIONS	
IV	Construction Readiness-Introduction to Software Construction Map-Constructing the Solution Layers-Code Review-Static Code Analysis-Build Process and Unit Testing.	9
	TESTING AND ROLLING OUT ENTERPRISE APPLICATIONS	
V	Testing Enterprise Applications-Enterprise Application Environments-Integration Testing-System Testing-User Acceptance Testing	9
	TOTAL INSTRUCTIONAL HOURS	45
	CO1: Identify information systems used in the functional units of an enterprise.	
	CO2.Analyze the integrated information systems used throughout an enterprise.	
	CO3.Create and manage large-scale computing systems for an organization.	
	CO4.Demonstrate skills to understand business environment.	
	CO5.Analyze the applications of testing on the enterprise environment..	

REFERENCE BOOKS:

- R1. Anubhav Pradhan, B.Satheesha Nanjappa, Senthil Nallasamy and E.Veerakumar, "Raising Enterprise Applications : A Software Engineering Perspective", Wiley India Pvt Ltd, 2010
- R2. Paul J Perrone, Venkata S.R. Krishna R and Chayanti, "Building Java Enterprise Systems with J2EE", Techmedia, New Delhi, 2000.
- R3. Tom Valesky -"Enterprise Java Beans"-Addison Wesley Longman Inc. New Delhi, 2000.
- R4. Ed Roman-"Mastering EJB"-John Wiley & Sons, New Delhi, 2001.


Chairman / BoS
CSE - HICET




Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS6302	SOCIAL NETWORK ANALYSIS	3	0	0	3

- Course Objective**
- To understand the components of web based social networks
 - To model and visualize the social networks in various aspects
 - To mine the users community in social networks.
 - To understand the evolution of social networks through various models
 - To mine the opinions of the users in social networks

Unit	Description	Instructional Hours
I	INTRODUCTION Introduction to Web - Limitations of current Web – Development of Semantic Web – Emergence of the Social Web – Statistical Properties of Social Networks -Network analysis - Development of Social Network Analysis - Key concepts and measures in network analysis - Discussion networks - Blogs and online communities - Web-based networks	9
II	MODELING AND VISUALIZATION Visualizing Online Social Networks - A Taxonomy of Visualizations - Graph Representation - Centrality- Clustering - Node-Edge Diagrams - Visualizing Social Networks with Matrix-Based Representations- Node-Link Diagrams - Hybrid Representations - Modelling and aggregating social network data – Random Walks and their Applications –Use of Hadoop and Map Reduce - Ontological representation of social individuals and relationships.	9
III	MINING COMMUNITIES Aggregating and reasoning with social network data, Advanced Representations – Extracting evolution of Web Community from a Series of Web Archive - Detecting Communities in Social Networks - Evaluating Communities – Core Methods for Community Detection & Mining - Applications of Community Mining Algorithms - Node Classification in Social Networks.	9
IV	EVOLUTION Evolution in Social Networks – Framework - Tracing Smoothly Evolving Communities - Models and Algorithms for Social Influence Analysis - Influence Related Statistics - Social Similarity and Influence - Influence Maximization in Viral Marketing - Algorithms and Systems for Expert Location in Social Networks - Expert Location without Graph Constraints - with Score Propagation – Expert Team Formation - Link Prediction in Social Networks - Feature based Link Prediction – Bayesian Probabilistic Models	9
V	TEXT AND OPINION MINING Text Mining in Social Networks -Opinion extraction – Sentiment classification and clustering - Temporal sentiment analysis - Irony detection in opinion mining - Wish analysis - Product review mining – Review Classification – Tracking sentiments towards topics over time.	9
TOTAL INSTRUCTIONAL HOURS		45

- Course Outcome**
- CO1: Work on the internal components of social networks
 - CO2 : Model and visualize social networks
 - CO3 : Mine the behavior of the users in social networks
 - CO4 : Predict the possible next outcome of social networks
 - CO5 : Mine the opinions of the user social networks.

TEXT BOOKS:

- T1 - Charu C. Aggarwal, “Social Network Data Analytics”, Springer; 2011
- T2 - Peter Mika, “Social Networks and the Semantic Web”, Springer, 1st edition, 2007.
- T3 - Borko Furht, “Handbook of Social Network Technologies and Applications”, Springer, 1st edition, 2010.

REFERENCE BOOKS :

- R1 - Guandong Xu , Yanchun Zhang and Lin Li, “Web Mining and Social Networking – Techniques and applications”, Springer, 1st edition, 2011.
- R2 - Giles, Mark Smith, John Yen, “Advances in Social Network Mining and Analysis”, Springer, 2010.
- R3 - . Ajith Abraham, Aboul Ella Hassanien, Václav Snášel, “Computational Social Network Analysis: Trends, Tools and Research Advances”, Springer, 2009.
- R4 - . Toby Segaran, “Programming Collective Intelligence”, O’Reilly, 2012


Chairman / BoS
CSE - HiCET




Dean (Academics)
HiCET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS6303	EMBEDDED SYSTEMS	3	0	0	3

- Course Objective**
1. To be familiar with 8051 microcontoller.
 2. Understand the basic Memory and I/O managements.
 3. Learn about the Process and OS
 4. Learn the embedded software.
 5. Design and develop embedded systems

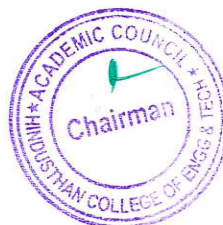
Unit	Description	Total instructional hours
I	EMEDDED COMPUTING Challenges of Embedded Systems - Embedded system design process. Embedded processors – 8051 Microcontroller, ARM processor - Architecture, Instruction sets and programming.	9
II	MEMORY AND I/O MANAGEMENT Programming Input and Output - Memory system mechanisms - Memory and I/O devices and interfacing- Interrupts handling.	9
III	PROCESSES AND OPERATING SYSTEMS Multiple tasks and processes - Context switching - Scheduling policies - Interprocess communication mechanisms - Performance issues.	9
IV	EMBEDDED SOFTWARE Programming embedded systems in assembly and C - Meeting real time constraints - Multi-state systems and function sequences. Embedded software development tools - Emulators and debuggers.	9
V	EMBEDDED SYSTEM DEVELOPMENT Design issues and techniques - Case studies - Complete design of example embedded systems.	9
Total Instructional Hours		45

- Course Outcome**
- CO1: Explore the concepts of embedded computing with 8051 microcontroller.
 CO2: Illustrate the memory and I/O operations.
 CO3: Explain the processes and operating system concepts.
 CO4: Elucidate the embedded software concepts.
 CO5: Develop embedded systems using case studies. to develop web-based multimedia applications.

REFERENCE BOOKS:

1. Wayne Wolf, Computers as Components: Principles of Embedded Computer System Design, Elsevier, 2008.
2. Michael J. Pont, Embedded C, Pearson Education, 2007.
3. Steve Heath, Embedded System Design, Elsevier, 2005.
4. Muhammed Ali Mazidi, Janice Gillispie Mazidi and Rolin D. McKinlay, "The 8051 Microcontroller and Embedded Systems" , Pearson Education, 2nd edition, 2007.

S. J. Singh
Chairman - BoS
CSE - HICET



[Signature]
Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS6304	TOTAL QUALITY MANAGEMENT	3	0	0	3

- Course Objective**
1. Understand the basic concepts of Total Quality Management
 2. Study principles and philosophies of quality management.
 3. Understand the different quality systems.
 4. Learn the tools and techniques for management.
 5. Understand about the Quality systems and its implementation

Unit	Description	Instructional Hours
I	INTRODUCTION TO QUALITY MANAGEMENT Definitions - TQM framework, benefits, awareness and obstacles. Quality vision, mission and policy statements. Customer Focus -customer perception of quality, Translating needs into requirements, customer retention. Dimensions of product and service quality.	9
II	PRINCIPLES AND PHILOSOPHIES OF QUALITY MANAGEMENT Overview of the contributions of Deming, Juran Crosby, Masaaki Imai, Feigenbaum, Ishikawa, Taguchi techniques - introduction, loss function, parameter and tolerance design, signal to noise ratio. Concepts of Quality circle, Japanese 5S principles.	9
III	STATISTICAL PROCESS CONTROL AND PROCESS CAPABILITY Meaning and significance of statistical process control (SPC) -construction of control charts for variables and attributed. Process capability - meaning, significance and measurement - Six sigma concepts of process capability. Reliability concepts -definitions, reliability in series and parallel, and product life characteristics curve. Total productive maintenance (TMP)	9
IV	TOOLS AND TECHNIQUES FOR QUALITY MANAGEMENT Quality functions development (QFD) -Benefits, Voice of customer, information organization, House of quality (HOQ), building a HOQ, QFD process. Failure mode effect analysis (FMEA) - requirements of reliability, failure rate, FMEA stages, design, process and documentation. Seven old (statistical) tools. Seven new management tools.	9
V	QUALITY SYSTEMS ORGANIZING AND IMPLEMENTATION Introduction to IS/ISO 9004:2000 - quality management systems - guidelines for performance improvements. Quality Audits. TQM culture, Leadership - quality council, employee involvement, motivation, empowerment, recognition and reward	9
TOTAL INSTRUCTIONAL HOURS		45

- Course Outcome**
- CO1: Understand the importance of quality and customer perception of quality
CO2: Understand the principles and philosophies of total quality management and peculiarities of their implementation.
CO3 Apply statistical process control to enhance quality
CO4: Apply various TQM tools and techniques to enhance organization's quality performance..
CO5: Understand quality standards and management methods for solving problems of organization

REFERENCE BOOKS:

1. Dale H. Besterfield, et al, Total Quality Management, Pearson Education Asia, Third Edition
2. James R. Evans and William M. Lindsay, The Management and Control of Quality, 8th Edition, South-Western (Thomson Learning), 2011.
3. Oakland, J.S. TQM Text with Cases, Butterworth Heinemann Ltd., Oxford, 3rd Edition, 2003.

(Signature)
**Chairman BoS
CSE - HiCET**



(Signature)
**Dean (Academics)
HiCET**

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS6305	NETWORK AND ROUTING PROTOCOLS	3	0	0	3

- Course Objective**
1. Learn the basics of networks.
 2. Understand the Ethernet Technologies.
 3. Understand about subnetting
 4. Learn the Routing Protocols.
 5. Learn about IPv4 ACLs.

Unit	Description	Instructional Hours
	NETWORKING FUNDAMENTALS	
I	Exploring the Network: Globally Connected-LANs, WANs, and the Internet-The Network as a Platform- The Changing Network Environment-Configuring a Network Operating System: IOS Bootcamp-Getting Basic Addressing Schemes -Network Protocols and Communications: Rules of Communication-Network Protocols and Standards-Moving Data in the Network-Network Access.	9
	TCP/IP LAYER	
II	Ethernet- Network Layer-Transport Layer: Role of the Transport Layer- Conversation Multiplexing- Transport Layer Reliability - Introducing TCP and UDP- IP Addressing: IPv4 Network Addresses-IPv6 Network Addresses- Connectivity Verification.	9
	SUBNETTING	
III	Subnetting IP Networks: Subnetting an IPv4 Network-Addressing Schemes-Design Considerations for IPv6-Application Layer: Application Layer Protocols-Well-Known Application Layer Protocols and Service-The Message Heard Around the World-Introduction to Switched Networks.	9
	VLAN AND ROUTING	
IV	VLANs-Routing Concepts-Inter-VLAN Routing: Inter-VLAN Routing Configuration-Troubleshooting Inter-VLAN Routing-Layer 3 Switching-Static Routing: Static Routing Implementation-Configure Static and Default Routes-Review of CIDR and VLSM-Configure Summary and Floating Static Routes- Troubleshoot Static and Default Route Issues.	9
	ROUTING PROTOCOLS AND ACL	
V	Routing Dynamically-Single-Area OSP: Characteristics of OSPF-Configuring Single-area OSPFv2- Configure Single-area OSPFv3-F-Access Control Lists: IP ACL Operation-Standard IPv4 ACLs Extended IPv4 ACLs-Contextual Unit: Debug with ACLs-Troubleshoot ACLs-Contextual Unit- IPv6 ACLs-DHCP: Dynamic Host Configuration Protocol v4-Dynamic Host Configuration Protocol v6-- Network Address Translation for IPv4: NAT Operation-Configuring NAT-Troubleshooting NAT.	9
	TOTAL INSTRUCTIONAL HOURS	45

- Course Outcome**
- CO1: Explain the basics of networks and cable media.
 - CO2: Demonstrate the TCP/IP layer.
 - CO3: Describe the subnetting IP Networks.
 - CO4: Troubleshoot VLAN and trunk configurations in a switched network.
 - CO5: Configure standard IPv4 ACLs to filter traffic according to networking requirements.

REFERENCE BOOKS:

1. Todd Lammle, CCNA Routing and Switching Study Guide, Wiley India Pvt Ltd 2013.
2. Todd Lammle, CCNA Cisco Certified Network Associate Study Guide, Wiley India Pvt Ltd, 7th Edition, 2011.
3. Wendell Odom, Cisco CCNA Routing and Switching 200-120 Official Cert Guide Library, Academic Edition, Cisco Systems, 2013.
4. Scott Empson, CCNA Routing and Switching Portable Command Guide, 3rd Edition, Cisco Press, 2013

S. S. Singh
Chairman - BoS
CSE - HICET



J. S. Singh
Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS6306	SIGNALS AND SYSTEMS	3	0	0	3

- Course Objective**
- To understand the basic properties of signal and systems and the various methods of classification.
 - To learn Laplace Transform and Fourier transform and their properties.
 - To know Z transform and DTFT and their properties.
 - To characterize LTI systems in the Time domain and various Transform domains.
 - To know about Discrete Fourier and Z transform.

Unit	Description	Instructional Hours
	CLASSIFICATION OF SIGNALS AND SYSTEMS	
I	Continuous time signals (CT signals) - Discrete time signals (DT signals) - Step, Ramp, Pulse, Impulse, Sinusoidal, Exponential, Classification of CT and DT signals - Periodic & Aperiodic signals, Deterministic & Random signals, Energy & Power signals -CT systems and DT systems - Classification of systems – Static & Dynamic, Linear & Nonlinear, Time-variant & Time-invariant, Causal & Noncausal, Stable & Unstable.	9
	ANALYSIS OF CONTINUOUS TIME SIGNALS	
II	Fourier series analysis - spectrum of Continuous Time (CT) signals - Fourier and Laplace Transforms in CT Signal Analysis – Properties.	9
	LINEAR TIME INVARIANT-CONTINUOUS TIME SYSTEMS	
III	Differential Equation - Block diagram representation - impulse response, convolution integrals – Fourier and Laplace transforms in Analysis of CT systems.	9
	ANALYSIS OF DISCRETE TIME SIGNALS	
IV	Baseband Sampling – DTFT – Properties of DTFT - Z Transform – Properties of Z Transform.	9
	LINEAR TIME INVARIANT-DISCRETE TIME SYSTEMS	
V	Difference Equations - Block diagram representation – Impulse response - Convolution sum - Discrete Fourier and Z Transform Analysis of Recursive & Non - Recursive systems.	9
	TOTAL INSTRUCTIONAL HOURS	45

- Course Outcome**
- CO1: Analyze the properties of signals and systems.
CO2: Apply Laplace transform, Fourier transform, Z transform and DTFT in signal analysis.
CO3: Analyze continuous time LTI systems using Fourier and Laplace Transforms.
CO4: Analyze discrete time LTI systems using Z transform and DTFT.
CO5: Apply the fourier and Z transforms of recursive & Non recursive systems.

TEXT BOOKS:

T1 - Allan V.Oppenheim, S.Wilsky and S.H.Nawab, "Signals and Systems", Pearson, 2007.

REFERENCE BOOKS:

- R1- B. P. Lathi, "Principles of Linear Systems and Signals", Second Edition, Oxford, 2009.
R2- R.E.Zeimer, W.H.Tranter and R.D.Fannin, "Signals & Systems - Continuous and Discrete", Pearson, 2007.
R3- John Alan Stuller, "An Introduction to Signals and Systems", Thomson, 2007.
R4- M.J.Roberts, "Signals & Systems Analysis using Transform Methods & MATLAB", Tata McGraw Hill, 2007.

S. Shy
Chairman BoS
CSE - HICET



[Signature]
Dean (Academics)
HICET

OPEN ELECTIVE

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS6401	PROGRAMMING LANGUAGES	3	0	0	3

- Course Objective**
1. Familiarize the concepts of programming languages.
 2. Build an understanding of the fundamental concepts of C programming
 3. Introduce the concepts of object oriented programming language
 4. Understand the concepts of web development language – java programming
 5. Allow the students to gain expertise in the basic features of .Net and develop the application using .net

Unit	Description	Instructional Hours
	PROGRAMMING LANGUAGES OVERVIEW	
I	Introduction to computer programming – Algorithm – Pseudocode – Source Code – Flowchart – History of programming languages – Generations of Programming languages – Machine Level Language – Low Level Language – High Level Language- Compiler – Classification of programming language – Software development languages – Web development languages – Debugger	8
	C PROGRAMMING	
II	Fundamentals of C programming – Structure of a C Program – Arrays: One Dimensional Array, Two Dimensional Array – Stings: String Library Functions. Function – Call by value, Call by reference. Pointers: Pointers and arrays.	8
	OBJECT ORIENTED PROGRAMMING FUNDAMENTALS	
III	C++ Programming Features – Polymorphism: Compile Time Polymorphism and Run Time Polymorphism – Inheritance : Virtual functions – File handling concepts	9
	JAVA PROGRAMMING	
IV	An overview of Java – Exception handling: Uncaught exception – using Try Catch – Multiple Catch – Nested try- Built in Exceptions – Introduction to Threads- Multithreading – Applets: Applet architecture – Skeleton – Simple Applet Display Methods – HTML Applet tag.	10
	C# AND .NET FRAMEWORK	
V	.Net Overview - Overview of C# - Object oriented aspects of C# - Application development on .Net: Build windows application – Accessing data with ADO.Net	10
TOTAL INSTRUCTIONAL HOURS		45

- Course Outcome**
- CO1: To be independently understanding the basic concepts of programming languages.
 CO2: Understand the concepts of arrays and functions in C Programming.
 CO3: Master the concepts of structured programming language OOPS.
 CO4: Familiar with Java programming with the basic concepts and applets.
 CO5: Understand the importance of C# and develop the windows based application.

REFERENCE BOOKS:

- R1-Introduction to Computer Programming - <http://cevre.beun.edu.tr/zeydan/pdf/introduction-to-computer-programming.pdf>
 R2-Brian W. Kernighan and Dennis M. Ritchie, “The C Programming Language”, 2nd Edition, Pearson Education, 1988.
 R3 - Bjarne Stroustrup, “The C++ Programming Language”, 3rd Edition, Pearson Education, 2007.
 R4 - D.Norton and H. Schildt, “Java 2 the complete Reference Fifth edition”, TMH, 2002 (Re print 2009)
 R5 - E. Balagurusamy, “Programming in C#”, Tata McGraw-Hill, 2004.
 R6- J. Liberty, “Programming C#”, 2nd ed., O’Reilly, 2002.

S. S. Jay
Chairman + BoS
CSE - HiCET



[Signature]
Dean (Academics)
HiCET

SYLLABUS

SEMESTER VII

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS7201	CRYPTOGRAPHY AND NETWORK SECURITY	3	0	0	3

- Course Objective**
1. To know the methods of conventional encryption.
 2. To understand the concepts of public key encryption and number theory
 3. To understand authentication and Hash functions.
 4. To know the network security tools and applications.
 5. To understand the system level security used.

Unit	Description	Instructional Hours
	INTRODUCTION	
I	The OSI Security Architecture-Security Attacks, Security Services -Security Mechanisms -A Model for Network Security -Classical Encryption Techniques: Symmetric Cipher Model -Substitution -Transposition Techniques -Basic Concepts in Number Theory and Finite Fields -Euclidean Algorithm -Modular Arithmetic -Polynomial Arithmetic	9
	BLOCK CIPHERS	
II	Symmetric Ciphers Block Cipher Principles - Data Encryption Standard (DES) -DES Example -Strength of DES -Differential and Linear Cryptanalysis -Block Cipher Design Principles -Advanced Encryption Standard(AES) -Structure -Round Functions -Key Expansion -AES Example.	9
	ASYMMETRIC CIPHERS AND KEY MANAGEMENT	
III	Asymmetric Ciphers & Key Management Prime Numbers -Fermat's and Euler's Theorems -Testing for Primality -Discrete Logarithms -Public-Key Cryptography and RSA -Diffie-Hellman Key Exchange -Key Management and Distribution -Symmetric Key Distribution Using Asymmetric Encryption -Distribution of Public Keys -X.509 Certificates -Public Key Infrastructure.	9
	CRYPTOGRAPHIC DATA INTEGRITY ALGORITHMS	
IV	Cryptographic Data Integrity Algorithms Cryptographic Hash Functions -Applications -Two Simple Hash Functions -Requirements and Security Hash Functions based on Cipher Block Chaining -Secure Hash Algorithm (SHA) -SHA-3 -Message Authentication Codes -Requirements -Functions -Security of MACs -MACs based on Hash Functions: HMAC -Digital Signatures -Digital Signature Standard (DSS) - Kerberos.	9
	NETWORK & INTERNET SECURITY TRANSPORT LEVEL SECURITY	
V	Network and Internet Security Transport Level Security -Web Security Issues - Secure Sockets Layer (SSL) -Transport Layer Security (TLS)-HTTPS -Secure Shell (SSH) -Electronic Mail Security -Pretty Good Privacy (PGP) -S/MIME -IP Security -Firewalls.	9
Total Instructional Hours		45

- Course Outcome**
- CO1: Able to design and conduct experiments to analyze and interpret data.
 - CO2: Able to use Cryptography in different fields of Engineering and Mathematics.
 - CO3: Able to analyze and select a suitable Cipher for an application.
 - CO4: Able to use the best solution for a threat
 - CO5: Able to analyze the system level security

TEXT BOOKS:

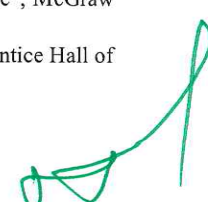
- T1- William Stallings, "Cryptography and Network Security: Principles and Practice", Prentice Hall of India/Pearson Education, New Delhi, 2010
- T2 - Atul Kahate, "Cryptography and Network Security", Tata McGraw Hill Publishing Company, New Delhi, 2007

REFERENCE BOOKS :

- R1 - Behrouz Forouzan, Debdeep Mukhopadhyay, "Cryptography and Network Security", Tata McGraw Hill Publishing Company, New Delhi, 2010.
- R2 - Roberta Bragg, Mark Rhodes Ousley, Keith Strassberg, "Network Security: The Complete Reference", McGraw Hill Publishing Company, Singapore, 2004.
- R3 - Kaufman, Perlman and Speciner, "Network Security: Private Communication in a public world", Prentice Hall of India/ Pearson Education, New Delhi, 2004.


Chairman - BoS
CSE - HICET




Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS7202	CLOUD COMPUTING	3	0	0	3

- Course Objective**
1. To layout foundations of Distributed Systems.
 2. To introduce the idea of middleware and related issues
 3. To analyze the components of cloud computing and its business perspective.
 4. To evaluate the various cloud development tools.
 5. To collaborate with real time cloud services

Unit	Description	Instructional Hours
INTRODUCTION TO DISTRIBUTED SYSTEMS		
I	Characterization of Distributed systems - System Models -Inter-process –Communication -Remote Invocation-Indirect Communication-Distributed Object and Components -SOAP-based Web Services and Restful Web Services -Peer-to-Peer Systems	9
CLOUD COMPUTING FUNDAMENTALS		
II	Motivation for Cloud Computing, The Need for Cloud Computing, Definition of Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics..Four Cloud Deployment Models Service providers- Google App Engine, Amazon EC2, Microsoft Azure, Sales force.	9
VIRTUALIZATION FOR CLOUD		
III	Need for Virtualization – Pros and cons of Virtualization – Types of Virtualization – System Vm, Process VM, Virtual Machine monitor – Virtual machine properties - Interpretation and binary translation, HLL VM - Hypervisors – Xen, KVM , VMWare, Virtual Box, Hyper-V.	9
SECURITY, STANDARDS, AND APPLICATIONS		
IV	Security in Clouds: Cloud security challenges – Software as a Service Security, Common Standards: The Open Cloud Consortium – The Distributed management Task Force – Standards for application Developers – Standards for Messaging – Standards for Security, End user access to cloud computing, Mobile Internet devices and the cloud.	9
PROGRAMMING MODEL		
V	Introduction to Hadoop Framework – Map reduce, Input splitting, map and reduce functions, specifying input and output parameters, configuring and running a job – Design of Hadoop file system, HDFS concepts, command line and java interface, dataflow of File read & File write.	9
Total Instructional Hours		45

- Course Outcome**
- CO1: Understanding the knowledge about the state-of-the-art in distributed-systems architectures.
CO2: Understanding the various service delivery models of a cloud computing architecture.
CO3: Understanding the performance, scalability, and availability of the underlying cloud technologies and software.
CO4: Understanding the Identify security and privacy issues in cloud computing.
CO5: Understanding the ways in which the cloud can be programmed and deployed

TEXT BOOKS:

1. Rajkumar Buyya, James BroB.E.erg, Andrzej M. Goscinski, "Cloud Computing: Principles and Paradigms", John Wiley & Sons, 2010.
2. Distributed and Cloud Computing. Kal Hwang. Geoffeiy C.Fox. Jack J.Dongarra. Elsevier. 2012.

REFERENCE BOOKS

1. Cloud Computing: A Practical Approach. Anthony T.Velte. Toby J.VeFte, Robert Elsenpeter. Tata McGraw Hill. rp2011.
2. Enterprise Cloud Computing Gautam Shroif, Cambridge University Press. 2010.
3. Cloud Computing: Implementation, Management and Security, John W. Rittinouse, James F Ransome. CRC Press, rp2012.
4. Cloud Application Architectures: Building Applications and Infrastructure in the Cloud. George Reese, O'RedI SPD, rp2011.


Chairman - BoS
CSE - HICET




Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS7203	MOBILE COMPUTING	3	0	0	3

- Course Objective**
1. Understand the basic concepts of mobile computing
 2. Be familiar with the network protocol stack
 3. Learn the basics of mobile telecommunication system
 4. Be exposed to Ad-Hoc networks
 5. Gain knowledge about different mobile platforms and application development

Unit	Description	Instructional Hours
INTRODUCTION		
I	Mobile Computing – Mobile Computing Vs wireless Networking – Mobile Computing Applications – Characteristics of Mobile computing – Structure of Mobile Computing Application. MAC Protocols – Wireless MAC Issues – Fixed Assignment Schemes – Random Assignment Schemes – Reservation Based Schemes.	9
MOBILE INTERNET PROTOCOL AND TRANSPORT LAYER		
II	Overview of Mobile IP – Features of Mobile IP – Key Mechanism in Mobile IP – route Optimization – Overview of TCP/IP – Architecture of TCP/IP – Adaptation of TCP Window – Improvement in TCP Performance.	9
MOBILE TELECOMMUNICATION SYSTEM		
III	In Global System for Mobile Communication (GSM) – General Packet Radio Service (GPRS) – Universal Mobile Telecommunication System (UMTS).	9
MOBILE AD-HOC NETWORKS		
IV	Ad-Hoc Basic Concepts – Characteristics – Applications – Design Issues – Routing – Essential of Traditional Routing Protocols – Popular Routing Protocols – Vehicular Ad Hoc networks (VANET) – MANET Vs VANET – Security.	9
MOBILE PLATFORMS AND APPLICATIONS		
V	Mobile Device Operating Systems – Special Constrains & Requirements – Commercial Mobile Operating Systems – Software Development Kit: iOS, Android, BlackBerry, Windows Phone – MCommerce – Structure – Pros & Cons – Mobile Payment System – Security Issues	9
Total Instructional Hours		45

- Course Outcome**
- CO1: Understand the basics of mobile telecommunication system
CO2: Understand the features of mobile IP and TCP-IP.
CO3: Understand the various telecommunication systems
CO4: Apply adhoc based routing and security mechanisms
CO5: Apply the knowledge gained and build a Mobile Application using the software development kit.

TEXT BOOKS:

T1 - Prasant Kumar Pattnaik, Rajib Mall, "Fundamentals of Mobile Computing", PHI Learning Pvt. Ltd, New Delhi – 2012.

REFERENCE BOOKS:

- R1 - Jochen H. Schller, "Mobile Communications", Second Edition, Pearson Education, New Delhi, 2007.
R2 - Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, 2005.
R3 - Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, 2003.
R4 - C.K.Toth, "AdHoc Mobile Wireless Networks", First Edition, Pearson Education, 2002.
R5 - Android Developers : <http://developer.android.com/index.html>
R6 - Apple Developer : <https://developer.apple.com/>
R7 - Windows Phone Dev Center : <http://developer.windowsphone.com>
R8 - BlackBerry Developer : <http://developer.blackberry.com/>


Chairman - BoS
CSE - HICET




Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS7001	CRYPTOGRAPHY AND NETWORK SECURITY LABORATORY	0	0	4	2

- Course Objective**
1. Be exposed to the different cipher techniques
 2. Learn to implement the algorithms DES, RSA, MD5, SHA-1
 3. Learn to use network security tools like GnuPG, KF sensor, Net Stumbler

Expt. No.	Description of the Experiments	
	Implement the following SUBSTITUTION & TRANSPOSITION TECHNIQUES concepts:	
1.	<ol style="list-style-type: none"> a. Caesar Cipher b. Playfair Cipher c. Hill Cipher d. Vigenere Cipher e. Rail fence – row & Column Transformation 	9
	Implement the following algorithms	
2.	<ol style="list-style-type: none"> a. DES b. RSA Algorithm c. Diffie-Hellman d. MD5 e. SHA-1. 	12
3.	Implement the SIGNATURE SCHEME - Digital Signature Standard	3
4.	Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures (GnuPG).	3
5.	Setup a honey pot and monitor the honeypot on network (KF Sensor)	6
6.	Installation of rootkits and study about the variety of options	3
7.	Perform wireless audit on an access point or a router and decrypt WEP and WPA.(Net Stumbler)	6
8.	Demonstrate intrusion detection system (ids) using any tool (snort or any other s/w)	3
Total Practical Hours		45

- Course Outcome**
- CO1: Apply various cipher techniques
- CO2: Apply and develop the various security algorithms
- CO3: Apply the different open-source tools for network security and analysis


LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

SOFTWARE:

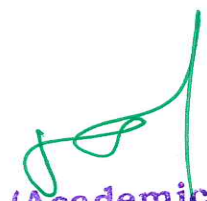
- C / C++ / Java or equivalent compiler
 GnuPG, KF Sensor or Equivalent, Snort, Net Stumbler or Equivalent

HARDWARE:

- Standalone desktops - 30 Nos.
 (or)
 Server supporting 30 terminals or more.


Chairman - BoS
CSE - HICET




Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS7002	CLOUD COMPUTING LABORATORY	0	0	4	2

- Course Objective**
1. To implement Basics, techniques and tools for Cloud Computing
 2. Be familiar with developing web services.
 3. To know the concepts of Cloud Infrastructure and services.
 4. Learn to run virtual machines of different configuration with modern cloud tools.
 5. Understand the concept of Cloud security.

Expt. No. Description of the Experiments

1. Implement a method to run the virtual machine of different configuration. Check how many virtual machines can be utilized at particular time.
2. Create procedure to attach virtual block to the virtual machine and check whether it holds the data even after the release of the virtual machine.
3. Install a C compiler in the virtual machine and execute a sample programs.
4. Show the virtual machine migration based on the certain condition from one node to the other.
5. Find procedure to install storage controller and interact with it.
6. Find procedure to set up the one node Hadoop cluster.
7. Mount the one node Hadoop cluster using FUSE.
8. Write a program to use the API's of Hadoop to interact with it.
9. Write a word count program to demonstrate the use of Map and Reduce tasks

Total Practical Hours 45

- Course Outcome**
- CO1: Understand the Basic Requirements of cloud
 - CO2: Use the cloud infrastructure tool kits
 - CO3: Design and implement applications on the Cloud Infrastructure
 - CO4: Design and implement applications on the cloud security.
 - CO5: Implement the Concept of Cloud Services


Chairman - BoS
CSE - HICET




Dean (Academics)
HICET

ELECTIVE – III

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS7301	C# AND .NET PROGRAMMING	3	0	0	3

- Course Objective**
1. Basics of C# and .NET
 2. C# language constructs and programming
 3. Advanced programming in C#
 4. Fundamental window programming
 5. Build web based applications

Unit	Description	Instructional Hours
	INTRODUCTION	
I	Understanding .NET framework – understanding the .NET runtime environment – Introduction to C# - Examining basic C# components – writing and compiling a simple C# program.	7
	C# & OOP	
II	C# data types – variables – operators – statements – Input/output – control flow – methods – debugging and error handling – namespaces – array – structs – OOP concepts – classes – abstract data type – constructors – destructors - conversions – inheritance – operator overloading.	10
	INTERFACE AND INHERITANCE	
III	Interfaces – Indexes – Delegates – Events – Variable argument Lists – Collection – Reflection – Events – Variable argument lists – collection – reflection – dynamic creation and invocation – Preprocessor.	9
	I/O & WINDOWS PROGRAMMING	
IV	File and Folder operations – Dates and Times – browsing the Internet – Windows Form Controls – Advanced windows – Form features using dialogs.	9
	WEB & DATABASE	
V	Developing Windows Applications – Accessing data with ADO.NET, .NET assemblies, Web programming basics – Web services – Case Study.	10
TOTAL INSTRUCTIONAL HOURS		45

- Course Outcome**
- CO1: To learn the basics of .net Frame work and C# language.
 CO2: To learn C# elements and OOPS concepts.
 CO3: To learn interface and inheritance concepts in C# language.
 CO4: To learn fundamentals of window application programming and create a window application.
 CO5: To develop web applications and learn advanced features of C#.

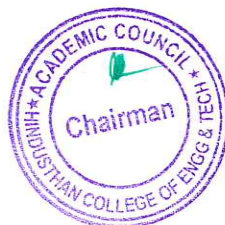
TEXT BOOKS:

- T1 - Stanley B.Lippman , “C# Primer : A practical approach”, Pearson Education,1991.
 T2 - David.S.Platt, Introducing Microsoft . Net , Microsoft Press, 3rd, Edition, 2003.

REFERENCE BOOKS :

- R1 -Ben Albahari, Pter Drayton, Brad Merrill, “C# Essentials”, Oreilly& Associates, 2001.
 R2 - E.Balagurusamy, Programming in C # Tata McGraw Hill, 2002.
 R3 - Conard.J., et.al., Introducing .Net, wrox Press, 2000.
 R4 - Eric Gunnerson , “A Programmers Introduction to C# “,A Press, 2000.


Chairman - BoS
CSE - HICET




Dean (Academic)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS7302	BIOMETRICS	3	0	0	3

- Course Objective**
1. To provide students with understanding of biometrics, biometric equipment and standards applied to security.
 2. Perform R&D on biometrics methods and systems
 3. Evaluate and design security systems incorporating biometrics
 4. Understand the technology of biometrics for public policy matters involving security and privacy.
 5. To learn some basic biometrics systems based on the learned techniques.

Unit	Description	Instructional Hours
	INTRODUCTION Biometric fundamentals – Biometric technologies – Biometrics Vs traditional techniques – Characteristics of a good biometric system – Benefits of biometrics – Key biometric processes: verification, identification and biometric matching – Assessing the privacy risks of biometrics - Designing privacy sympathetic biometric systems, Different biometric standards, Application properties - Performance measures in biometric systems: FAR, FRR, FTE rate, EER and ATV rate.	9
I	PHYSIOLOGICAL BIOMETRICS Physiological Biometric Technologies: Fingerprints - Technical description – characteristics - Competing technologies - strengths – weaknesses – deployment - Facial scan - Technical description - characteristics - weaknesses-deployment - Iris scan - Technical description – characteristics - strengths – weaknesses – deployment - Retina vascular pattern - Technical description – characteristics - strengths – weaknesses –deployment - Hand scan - Technical description-characteristics - strengths – weaknesses deployment – DNA biometrics.	9
II	AUTOMATED BIOMETRIC SYSTEM AND B.E.HAVIOURAL BIOMETRICS Automated fingerprint identification systems - Leading technologies: Behavioral Biometric Technologies: Handprint Biometrics - DNA Biometrics - signature and handwriting technology - Technical description – classification - keyboard / keystroke dynamics - Voice – data acquisition - feature extraction - characteristics - strengths – weaknesses- deployment.	9
III	BIOMETRIC APPLICATIONS Categorizing biometric applications – application areas: criminal and citizen identification, surveillance, PC/network access, e-commerce and retail/ATM – costs to deploy – other issues in deployment - Multi biometrics: Multi biometrics and multi factor biometrics - two-factor authentication with passwords - tickets and tokens – executive decision - implementation Plan.	9
IV	PRIVACY AND STANDARDS IN BIOMETRICS Assessing the Privacy Risks of Biometrics – Designing Privacy-Sympathetic Biometric Systems – Need for standards – different biometric standards.	9
V	CASE STUDIES: Physiological, Behavioural and multifactor biometrics in identification systems.	9
Total Instructional Hours		45

- Course Outcome**
- CO1: Demonstrate knowledge of the basic physical and biological science and engineering principles underlying biometric systems.
- CO2: Understand and analyze biometric systems at the component level and be able to analyze and design basic biometric system applications.
- CO3: Be able to work effectively in teams and express their work and ideas orally and in writing.
- CO4: Identify the sociological and acceptance issues associated with the design and implementation of biometric systems.
- CO5: Understand various Biometric security issues.

(Signature)
Chairman - BoS
CSE - HICET



(Signature)
Dean (Academics)
HICET

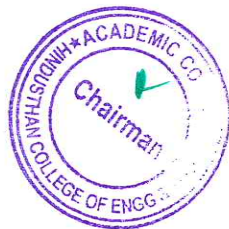
TEXT BOOKS:

- T1- Samir Nanavati, Michael Thieme, Raj Nanavati, "Biometrics – Identity Verification in a Networked World", Wiley-dreamtech India Pvt Ltd, New Delhi, 2003
T2- Paul Reid, "Biometrics for Network Security", Pearson Education, New Delhi, 2004.
T3- John Chirillo and Scott Blaul "Implementing Biometric Security", 1st Edition, Wiley Eastern Publication, 2005.

REFERENCE BOOKS :

- R1- John R Vacca, "Biometric Technologies and Verification Systems", Elsevier Inc, 2007
R2- Anil K Jain, Patrick Flynn, Arun A Ross, "Handbook of Biometrics", Springer, 2008
R3- Samir Nanavathi, Michel Thieme, and Raj Nanavathi, "Biometrics -Identity verification in a network", Wiley Eastern, 2002.
R4- John Chirillo and Scott Blaul," Implementing Biometric Security", Wiley Eastern Publications, 2005.
R5- John Berger," Biometrics for Network Security", Prentice Hall, 2004.


**Chairman - BoS
CSE - HiCET**




**Dean (Academics)
HiCET**

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS7303	E- COMMERCE	3	0	0	3

- Course Objective**
1. The students can understand basic idea about internet, WWW and its applications
 2. The students can understand basic idea about internet, WWW and its applications
 3. The students will study about Electronic Data Interchange and its applications
 4. The students will study about electronic payment system and its security
 5. The students will study about web based marketing and online advertisement

Unit	Description	Instructional Hours
INTRODUCTION		
I	History of E- Commerce – Overview of E- Commerce framework –E- Business models – Network infrastructure - Role of Internet – E- commerce and World wide Web.	9
E COMMERCE		
II	Packet switched networks – TCP/IP protocol script – Internet utility programmes – SGML, HTML and XML – web client and servers – Web client/server architecture – intranet and extranets.	9
ORGANIZATIONAL COMMERCE AND EDI		
III	Electronic Data Interchange – EDI applications in Business – EDI and E - Commerce – EDI standardization and implementation – Internet based EDI.	9
SECURITY		
IV	Internet security standards – secure electronic payment protocols ; cryptography and authentication – security issues – encryption techniques; e commerce payment mechanisms –SET protocol – electronic check – electronic cash; E-commerce ethics, regulations and social responsibility	9
INTELLIGENT AGENTS		
V	Definition and capabilities – limitation of agents – security – web based marketing – search engines and Directory registration – online advertisements – Portables and info mechanics – website design issues.	9

TOTAL INSTRUCTIONAL HOURS 45

Course Outcome	Description
CO1:	Understand the importance of E-commerce, network infrastructure and apply the knowledge of E-commerce in various E-business models
CO2:	Remember the concepts of switching networks and understand the basic markup languages for client server communication
CO3 :	Understand the concepts of Electronic Data Interchange, its standardizations and apply the acquired knowledge of EDI into internet-based Data Exchange.
CO4:	Understand the security standards, techniques of internet-based payment systems and apply the concepts in business-oriented E-commerce applications.
CO5:	Understand the notion of intelligent agents and apply it in web-based marketing, web advertisements to handle web design issues

TEXT BOOKS:

- T1 - Ravi Kalakota and Andrew B Whinston, “ *Frontiers of Electronic Commerce* “, Pearson Education Asia,
T2 - Marilyn Greenstein and Todd M Feinman , ” *Electronic commerce: Security, Risk Management and Control* “
Tata McGraw-Hill , 2000.
T3 - Gary P Schneider “Electronic commerce”, Thomson learning & James T Pen Cambridge USA, 2001.

REFERENCE BOOKS :

- R1 - Pete Lohsin , John Vacca “Electronic Commerce”, New Age International.
R2 - Goel, Ritendra “E-commerce”, New Age International.
R3 - Laudon, “E-Commerce: Business, Technology, Society”, Pearson Education.
R4 - Bajaj and Nag, “E-Commerce the cutting edge of Business”, TMH.


Chairman - BoS
CSE - HiCET




Dean (Academics)
HiCET

PROGRAM	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS7304	WIRELESS SENSOR NETWORKS	3	0	0	3

- Course Objective**
1. Understand the design issues in ad hoc and sensor networks.
 2. Learn the different types of MAC protocols.
 3. Be familiar with different types of adhoc routing protocols.
 4. Be exposing to the TCP issues in adhoc networks.
 5. Learn the architecture and protocols of wireless sensor networks.

Unit	Description	Instructional Hours
	INTRODUCTION	
I	Introduction: Fundamentals of wireless communication technology, the electromagnetic spectrum radio propagation, characteristics of wireless channels, modulation techniques, multiple access techniques, wireless LANs, PANs, WANs, and MANs, Wireless Internet.	9
	MAC PROTOCOLS FOR WIRELESS NETWORKS	
II	Introduction to adhoc/sensor networks: Key definitions of adhoc/ sensor networks, unique constraints and challenges, advantages of ad-hoc/sensor network, driving applications, issues in adhoc wireless networks, issues in design of sensor network, sensor network architecture, data dissemination and gathering	9
	DATA STORAGE AND MANIPULATION IN WSN	
III	Data Storage and Manipulation: Data centric and content based routing, storage and retrieval in network, compression technologies for WSN, Data aggregation technique. Applications: Detecting unauthorized activity using a sensor network, WSN for Habitat Monitoring.	9
	WIRELESS SENSOR NETWORKS (WSNS) AND MAC PROTOCOLS	
IV	Single node architecture: hardware and software components of a sensor node – WSN Network architecture: typical network architectures-data relaying and aggregation strategies -MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA based MAC- IEEE 802.15.4.	9
	WSN ROUTING & QOS	
V	Routing Protocols: Issues in designing a routing protocol, classification of routing protocols, table-driven, on-demand, hybrid, flooding, hierarchical, and power aware routing protocols. QoS and Energy Management : Issues and Challenges in providing QoS, classifications, MAC, network layer solutions, QoS frameworks, need for energy management, classification, battery, transmission power, and system power management schemes.	9
TOTAL INSTRUCTIONAL HOURS		45

- Course Outcome**
- CO1: Explain the concepts, network architectures and applications of ad hoc and wireless sensor networks.
CO2: Analyze the protocol design issues of ad hoc and sensor networks
CO3: Design routing protocols for ad hoc and wireless sensor networks with respect to some protocol design issues
CO4: Evaluate the QoS related performance measurements of WIRE LESS sensor networks
CO5: Introduced to some existing applications of wireless sensor actuator networks

TEXT BOOKS:

T1 - C. Siva Ram Murthy, and B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols ", Prentice Hall Professional Technical Reference, 2008.

REFERENCE BOOKS:

- R1 - Carlos De Morais Cordeiro, Dharma Prakash Agrawal "Ad Hoc & Sensor Networks: Theory and Applications", World Scientific Publishing Company, 2006.
R2 - Feng Zhao and Leonides Guibas, "Wireless Sensor Networks", Elsevier Publication – 2002.
R3 - Holger Karl and Andreas Willig "Protocols and Architectures for Wireless Sensor Networks", Wiley, 2005.
R4 - Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks-Technology, Protocols, and Applications", John Wiley, 2007.


Chairman - Bos
CSE - HICET




Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS7305	DATA MINING AND WAREHOUSING	3	0	0	3

- Course Objective**
1. Understand the basic concepts of Data mining
 2. Understand the basic concepts of data warehousing
 3. To study the methodology of engineering legacy databases for data warehousing and data mining to derive business rules for decision support systems.
 4. To analyze the data, identify the problems, and choose the relevant models and algorithms to apply.
 5. Learn about Rule mining and Classification

Unit	Description	Instructional Hours
	DATA MINING	
I	Introduction to Data Mining; Knowledge Discovery in Database (KDD), What can be Data to be Mined, Related Concept to Data Mining, Data Mining Technique, Application and Issues in Data Mining – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Data Warehouse – Issues –Data Preprocessing.	9
	DATA WAREHOUSING	
II	The Need for Data Warehousing- Benefits of Data Warehousing -Features of a Data Warehouse- Data warehousing Components –Building a Data warehouse – Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – The Information Flow Mechanism; Role of Metadata; Classification of Metadata.	9
	BUSSINESS ANALYSIS	
III	Reporting and Query tools and Applications – Tool Categories – The Need for Applications – Cognos Impromptu – Online Analytical Processing (OLAP) – Need – Multidimensional Data Model – OLAP Guidelines – Multidimensional versus Multirelational OLAP – Categories of Tools – OLAP Tools and the Internet.	9
	MINING FREQUENT PATTERN AND ASSOCIATION RULE	
IV	Market Basket Analysis- Frequent Itemsets- Closed Itemsets, and Association Rules; Frequent Pattern Mining, Efficient and Scalable Frequent Itemset Mining Methods -The Apriori Algorithm for finding Frequent Itemsets Using Candidate Generation -Generating Association Rules from Frequent Itemsets, Improving the Efficiency of Apriori- A pattern growth approach for mining Frequent Itemsets; Mining Frequent itemsets using vertical data formats-Mining closed and maximal patterns;	9
	ASSOCIATION RULE MININNG AND CLASSIFICATION	
V	Introduction to Mining Multilevel Association Rules and Multidimensional Association Rules; From Association Mining to Correlation Analysis, Pattern Evaluation Measures; Classification: Basic Concepts; Classification methods: Decision Tree Induction: Attribute Selection Measures, Tree pruning. 2. Bayesian Classification: Naïve Bayes' Classifier. Prediction: Structure of regression models; Simple linear regression, Multiple linear regression.Model Evaluation & Selection: Accuracy and Error measures, Holdout, Random Sampling, Cross Validation, Bootstrap; Comparing Classifier performance using ROC Curves.	9
	Total Instructional Hours	45

Course Outcome	<p>CO1: Enable students to understand and implement classical algorithms in data mining and data warehousing.</p> <p>CO2 students will be able to assess the strengths and weaknesses of the algorithms.</p> <p>CO3: To identify the application area of algorithms, and apply them.</p> <p>CO4: Students would learn data mining techniques as well as methods in integrating and interpreting the data sets</p> <p>CO5: To improve effectiveness, efficiency and quality for data analysis.</p>
-----------------------	---

TEXT BOOKS:

- T1 - Han, Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann 3rd Edition
- T2 - Alex Berson and Stephen J. Smith, "Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, Tenth Reprint 2007.
- T3- Paulraj Ponniah, "Data Warehousing: Fundamentals for IT Professionals", Wiley India
- T4- Reema Theraja "Data warehousing", Oxford University Press.

REFERENCE BOOKS :

- R1- Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction To Data Mining", Person Education, 2007.
- R2- K.P. Soman, Shyam Diwakar and V. Ajay "Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.
- R3- G. K. Gupta, "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
- R4- Daniel T.Larose, "Data Mining Methods and Models", Wile-Interscience, 2006.
- M.H. Dunham, "Data Mining Introductory and Advanced Topics", Pearson Education



**Chairman - BoS
CSE - HiCET**





**Dean (Academics)
HiCET**

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS7306	DIGITAL SIGNAL PROCESSING	3	0	0	3

- Course Objective**
1. To understand the structures of Discrete time signals and systems
 2. To introduce discrete Fourier transform and its applications
 3. To learn the Frequency response characteristics and to design FIR filters
 4. To learn the Frequency response characteristics and to design IIR filters
 5. To study the fundamentals of DSP Processor- TMS320C5X

Unit	Description	Instructional Hours
I	SIGNALS AND SYSTEMS Basic elements of DSP – concepts of frequency in Analog and Digital Signals – sampling theorem –Discrete – time signals, systems – Analysis of discrete time LTI systems – Z transform – Convolution– Correlation.	9
II	FOURIER ANALYSIS AND FOURIER TRANSFORM Discrete Time Fourier Transform(DTFT) – Properties of DTFT – The frequency domain representation of LTI systems- Sampling and Reconstruction of Analog signals- Discrete Fourier Transform – The discrete Fourier series- sampling and reconstruction in the Z domain– Discrete Fourier Transform- Properties of Discrete Fourier transform- Linear convolution using the DFT- Fast Fourier Transform.	9
III	IIR FILTER DESIGN Structures of IIR – Analog filter design – Discrete time IIR filter from analog filter – IIR filter design by Impulse Invariance, Bilinear transformation, Approximation of derivatives – (LPF, HPF, BPF, BRF) filter design using frequency translation.	9
IV	FIR FILTER DESIGN Structures of FIR – Linear phase FIR filter – Fourier Series - Filter design using windowing techniques (Rectangular Window, Hamming Window, Hanning Window), Frequency sampling techniques	9
V	UNIT V DSP PROCESSOR FUNDAMENTALS Architecture and features: Features of DSP processors - DSP processor packaging(Embodiments) - Fixed point Vs floating point DSP processor data paths - Memory architecture of a DSP processor (Von Neumann - Harvard) - Addressing modes - pipelining - TMS320 family of DSPs (architecture of C5x).	9
TOTAL INSTRUCTIONAL HOURS		45

Course Outcome	Description
CO1:	Perform frequency transforms for the signals
CO2:	To implement DFTs using Fast Fourier Transforms
CO3:	Design IIR filters
CO4:	Design FIR filters
CO5:	Learn the architecture details and instruction sets of fixed and floating point DSPs

TEXT BOOKS:

- T1 - John. G. Proakis and Dimitris C. Manolakis, "Digital Signal Processing Principles, Algorithms and Applications," Pearson Education, Third edition 2006.
T2 - Venkataramani B., M.Bhaskar, "Digital Signal Processors, Architecture, Programming and Application", First Edition, Tata McGraw Hill, New Delhi, 2008.
T3 - T4 - Hayes M.H., "Digital Signal Processing ", Schaum's Outlines, TATA Mc-Graw Hill, Tata McGraw Hill, Second Edition New Delhi, 2007

REFERENCE BOOKS :

- R1 - Emmanuel C.Ifeachor, and Barrie.W.Jervis, "Digital Signal Processing", Second Edition, Pearson Education, Prentice Hall, 2002.
R2 - Sanjit K. Mitra, "Digital Signal Processing – A Computer Based Approach", Third Edition, Tata Mc Graw Hill, 2007.
R3 - A.V.Oppenheim, R.W. Schafer and J.R. Buck, Discrete-Time Signal Processing, 8th Indian Reprint, Pearson, 2004 & R4 - Andreas Antoniou, "Digital Signal Processing", Tata McGraw Hill, 2006.


Chairman - BoS
CSE - HICET




Dean (Academics)
HICET

ELECTIVE - IV

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS7307	TEXT MINING	3	0	0	3

- Course Objective**
1. To understand the basic issues and types of text mining
 2. To appreciate the different aspects of text categorization and clustering
 3. To understand the role played by text mining in Information retrieval and extraction
 4. To appreciate the use of probabilistic models for text mining
 5. To appreciate the current trends in text mining

Unit	Description	Instructional Hours
	INTRODUCTION Overview of text mining- Definition- General Architecture– Algorithms– Core Operations – Preprocessing–Types of Problems-basics of document classification-information retrieval-clustering andOrganizing documents-information extraction-prediction andevaluation-Textual information to numerical vectors-Collectingdocuments-document standardization- tokenization-lemmatization-vector generation for prediction- sentence boundary determination -evaluation performance.	9
I	TEXT CATEGORIZATION AND CLUSTERING Text Categorization – Definition – Document Representation –Feature Selection - Decision Tree Classifiers - Rule-based Classifiers - Probabilistic and Naive Bayes Classifiers - Linear Classifiers-Classification of Linked and Web Data - Meta-Algorithms– Clustering –Definition- Vector Space Models - Distance-based Algorithms- Word and Phrase-based Clustering -Semi-Supervised Clustering - Transfer Learning	9
II	TEXT MINING FOR INFORMATION RETRIEVAL AND INFORMATION Information retrieval and text mining- keyword search- nearest-neighbor methods- similarity-webbased document search- matching-Inverted lists- evaluation. Information Extraction-Architecture-Co-Reference-Named Entity and Relation Extraction-TemplateFilling and database construction–Applications.Inductive -Unsupervised Algorithms for Information Extraction. Text Summarization Techniques - Topic Representation - Influence of Context - Indicator Representations – Pattern Extraction - Apriori Algorithm – FP Tree algorithm	9
III	PROBABILISTIC Probabilistic Models for Text Mining -Mixture Models - Stochastic Processes in Bayesian Nonparametric Models - Graphical Models - Relationship Between Clustering, Dimension Reduction and Topic Modeling - Latent Semantic Indexing - Probabilistic Latent Semantic Indexing -Latent Dirichlet Allocation- Interpretation and Evaluation - Probabilistic Document Clustering and Topic Models - Probabilistic Models for Information Extraction - Hidden Markov Models -Stochastic Context-Free Grammars - Maximal Entropy Modeling - Maximal Entropy Markov Models -Conditional Random Fields	9
IV	RECENT TRENDS Visualization Approaches - Architectural Considerations - Visualization Techniques in Link Analysis - Example- Mining Text Streams - Text Mining in Multimedia - Text Analytics in Social Media - Opinion Mining and Sentiment Analysis - Document Sentiment Classification – Opinion Lexicon Expansion - Aspect-Based Sentiment Analysis - Opinion Spam Detection – Text MiningApplications and Case studies	9
V		
Total Instructional Hours		45

- Course Outcome**
- CO1: Identify the different features that can be mined from text and web documents
 CO2: Use available open source classification and clustering tools on some standard text data sets
 CO3: Modify existing classification/clustering algorithms in terms of functionality or features used
 CO4: Design a system that uses text mining to improve the functions of an existing open source search engine
 CO5: Implement a text mining system that can be used for an application of your choice

TEXT BOOKS:

T1 - .Sholom Weiss, Nitin Indurkha, Tong Zhang, Fred Damerau “The Text Mining Handbook:Advanced Approaches in Analyzing Unstructured Data”, Springer, paperback 2010

T2 - Ronen Feldman, James Sanger -“ The Text Mining Handbook: Advanced Approaches in Analyzing Unstructured Data”-Cambridge University press, 2006.

REFERENCE BOOKS:

- R1 - Manu Konchady “Text Mining Application Programming”, CengageLearning, Fourth Indian Reprint, 2009.
- R2 - Thomas W. Miller, Prentice Hall, “Data and Text Mining-A Business Applications Approach”, Second impression, 2011.
- R3 - Charu C. Aggarwal ,ChengXiangZhai, Mining Text Data, Springer; 2012


Chairman - BoS
CSE - HICET




Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS7308	SOFT COMPUTING	3	0	0	3

- Course Objective**
1. Study an overview of Artificial Neural Networks
 2. Learn about Fuzzy systems.
 3. Understand the Special networks.
 4. Learn about Genetic algorithms
 5. Understand the applications of soft computing.

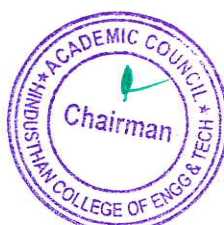
UNIT	DESCRIPTION	TOTAL INSTRUCTIONAL HOURS
I	ARTIFICIAL NEURAL NETWORKS Fundamental Concept - Basic Model of ANN - Terminologies of ANN - Supervised Learning Neural Networks: Perception Networks - Adaptive Linear Neuron - Multiple Adaptive Linear Neurons – Back Propagation Network - Unsupervised Learning Neural Networks: Kohonen self-organizing Feature Maps- Learning vector Quantization	10
II	FUZZY SYSTEMS Classical sets - Fuzzy sets - Classical relation - Fuzzy relations - Defuzzification - Fuzzy rule base and approximate reasoning: Fuzzy reasoning - Fuzzy Inference Systems - Fuzzy decision making – Fuzzy logic control systems.	10
III	SPECIAL NETWORKS Counter propagation Networks - Adaptive Resonance Theory Network - Simulated Annealing Network - Boltzmann Machine - Gaussian Machine - Cauchy Machine - Probabilistic Neural Net – Cascade Correlation Network.	9
IV	GENETIC ALGORITHMS Introduction - Basic operators and terminologies in GA - Traditional vs Genetic Algorithm - Simple GA - General Genetic Algorithm - Classification of Genetic Algorithm - Holland classifier systems – Genetic Programming.	8
V	APPLICATIONS OF SOFT COMPUTING Image Fusion - Neural network classification - Traveling salesman problem using Genetic algorithm - Genetic algorithm based Internet searching technique - Soft Computing Based Hybrid Fuzzy Controllers - Soft Computing Based Rocket Engine Control.	8
TOTAL INSTRUCTIONAL HOURS		45

- course outcome**
- Demonstrate different types of artificial neural networks.
 - Explain the concept of fuzzy systems.
 - Summarize the various special networks.
 - Develop the solutions using genetic algorithms.
 - Develop application using soft computing techniques.

REFERENCE BOOKS:

- R1. S.N.Sivanandam and S.N.Deepa, Principles of Soft Computing, Wiley India Ltd, 2011
- R2. Timothy J. Ross, Fuzzy Logic with Engineering Applications, McGraw-Hill, 2000
- R3. Davis E. Goldberg, Genetic Algorithms: Search, Optimization and Machine Learning, Addison Wesley, N.Y., 2001.
- R4. Jang, J.S.R. Sun, C.T. and Mizutani, E, Neuro fuzzy and Soft computing, Prentice Hall, New Jersey-2010


Chairman - BoS
CSE - HiCET




Dean (Academics)
HiCET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS7309	HUMAN INTERFACE SYSTEM DESIGN	3	0	0	3

- Course Objective**
- To learn the basic fundamentals of the HISD.
 - To learn the various aspects of managing the human interface design.
 - To understand the various aspects involved in virtual environment and manipulation.
 - To be familiar with various interfaces available.
 - To design the web page and communicate other resource

Unit	Description	Instructional Hours
	INTRODUCTION	
I	Goals of System Engineering - Goals of User Interface Design - Motivations of Human factors in Design - High Level Theories - Object - Action Interface Design - Three Principles - Guidelines for Data Display and Data Entry.	9
	MANAGING DESIGN PROCESS	
II	Introduction - Examples of Direct Manipulation Systems - Explanation of Direct Manipulation - Visual Thinking and Icons - Direct manipulation Programming - Home Automation - Remote Direct Manipulation - Virtual Environments - Task - Related Organization - Item Presentation Sequence - Response Time and Display Rate - Fast Movement Through Menus - Menu Layouts - Form Fillin - Dialog Box - Functionality to Support User's Tasks - Command Organization Strategies - Benefits of Structure - Naming and Abbreviations - Command Menus - Natural Language in Computing.	9
	MANIPULATION AND VIRTUAL ENVIRONMENTS	
III	Introduction - Examples of Direct Manipulation Systems - Explanation of Direct Manipulation - Visual Thinking and Icons - Direct Manipulation Programming - Home Automation - Remote Direct Manipulation - Virtual Environments - Task - Related Organization - Item Presentation Sequence - Response Time and Display Rate - Fast Movement Through Menus - Menu Layouts - Form Fillin - Dialog Box - Functionality to Support User's Tasks - Command Organization Strategies - Benefits of Structure - Naming and Abbreviations - Command Menus - Natural Language in Computing.	9
	INTERACTION DEVICES	
IV	Introduction: Keyboards and Functions - Pointing Devices - Speech recognition, Digitization and Generation - Image and Video Displays - Printers - Theoretical Foundations - Expectations and Attitudes - User Productivity - Variability - Error messages - Nonanthropomorphic Design - Display Design - color - Reading from Paper versus from Displays - Preparation of Printed Manuals - Preparation of Online Facilities.	9
	WINDOWS STRATEGIES AND INFORMATION SEARCH	
V	Introduction - Individual Widow Design - Multiple Window Design - Coordination by Tightly - Coupled Widow - Image Browsing - Personal Role Management and Elastic Windows - Goals of Cooperation - Asynchronous Interaction - Synchronous Distributed - Face to Face - Applying Computer Supported Cooperative Work to Education - Database query and phrase search in Textual documents - Multimedia Documents Searches - Information Visualization - Advance Filtering Hypertext and Hypermedia - World Wide Web - Genres and Goals and Designers - Users and their tasks - Object Action Interface Model for Website Design.	9
TOTAL INSTRUCTIONAL HOURS		45

- Course Outcome**
- CO1: Describe the basic fundamentals of the HISD.
CO2: Examine the various aspects of managing human interface design.
CO3: Describe the various aspects involved in virtual environment and manipulation.
CO4: Identify various interfaces available.
CO5: Describe the web page and communicate other resource

TEXT BOOKS:

- T1 - Ben Shneiderman J., "Designing the User Interface", 3rd Edition, Addison "Wesley, 2001.
T2 - Robert D.Braun, Introduction to Instrumental Analysis, PharmaMed Press/BSP books, Second edition, 2012

REFERENCE BOOKS:

- R1 - Wilbert O. Galiz, "The Essential guide to User Interface Design", Wiley Dreamtech, 2002.
R2 - Jacob Nielsen, "Usability Engineering", Academic Press, 1993.

richy
Chairman - Bos
CSE - HICET



gal
Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS7310	ARTIFICIAL INTELLIGENCE	3	0	0	3

Course Objective	
	1. Understand the problem solving intelligent agents
	2. Understand about searching techniques.
	3. Impart domain knowledge in propositional and first-order logic.
	4. Learn about Planning.
	5. Formulate and solve optimization challenges as planning problems.

Unit	Description	Instructional Hours
	INTRODUCTION	
I	Intelligent Agents -Agents and environments-Good behavior-The nature of environments - Structure of agents -Problem Solving-Problem solving agents-Uniformed search strategies-heuristic function.	9
	SEARCHING TECHNIQUES	
II	Local search algorithms and optimization problems -Local search in continuous spaces-Online search agents and unknown environments-optimal Decisions in games-Constraint satisfaction problems(CSP)	9
	KNOWLEDGE REPRESENTATION	
III	First order logic : Representation revisited -Syntax and semantics for first order logic-Using first order logic-Knowledge engineering in first order logic-Inference in First order logic: Propositional versus first order logic-Unification and lifting-Forward chaining -Backward chaining.	9
	PLANNING	
IV	Classical planning: Definition of Classical Planning -Algorithms for Planning as State -Space Search-Planning Graphs-Other Classical Planning Approaches-Analysis of Planning Approaches-Time, Schedules, and Resources-Hierarchical Planning-Planning and Acting in Nondeterministic Domains-Multiagent Planning	9
	LEARNING	
V	Learning from examples: Forms of learning -supervised learning-Learning decision trees-Ensemble learning-A Logical formulation of learning-Knowledge in learning- Explanation based learning-Learning using relevant information.	9
TOTAL INSTRUCTIONAL HOURS		45

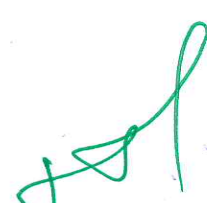
Course Outcome	
	CO1: Apply the characteristics of AI that make it useful to real -world problems.
	CO2: Apply the different searching techniques
	CO3: Understand the domain knowledge representation in propositional and first-order logic
	CO4: Understand the planning process of various state-space search algorithms, and choose the appropriate algorithm for a problem.
	CO5: Apply the different techniques for learning and reasoning under uncertainty

REFERENCE BOOKS

- R1. Russell, Peter Norvig, Artificial Intelligence A Modern Approach, 3rd Edition, Prentice Hall of India, 2010
- R2. Nils J. Nilsson, Artificial Intelligence: A new Synthesis, Harcourt Asia Pvt. Ltd., 2000
- R3. Elaine Rich and Kevin Knight, Artificial Intelligence, 3rd Edition, Tata McGraw-Hill, 2011
- R4. George F. Luger, Artificial Intelligence-Structures And Strategies For Complex Problem Solving, Pearson Education / PHI, 2002


Chairman - BoS
CSE - HiCET




Dean (Academics)
HiCET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS7311	HIGH SPEED NETWORKS	3	0	0	3

- Course Objective**
1. To learn the basis of ATM and Frame relay concepts and explain the various types of LAN's and to know about their applications.
 2. To know techniques involved to support real-time traffic and congestion control in ATM
 3. To learn the basis of ISA and explain the various types of queuing discipline.
 4. To understand the protocols for quality of service (Qos) to different applications.
 5. To study wireless network operations and functions

UNIT	DESCRIPTION	TOTAL INSTRUCTIONAL HOURS
	HIGH SPEED NETWORKS	
I	Introduction-frame relay networks –ATM protocol architecture-ATM logical connection –ATM cells-ATM service categories -AAL- High Speed LANs: Fast Ethernet, Gigabit Ethernet, Fiber Channel – Wireless LANs	9
	CONGESTION AND TRAFFIC MANAGEMENT	
II	Congestion control in data networks and internets-link level flow and error control-TCP traffic -congestion control in ATM networks-Internet Routing: Interior routing protocols.	9
	INTEGRATED AND DIFFERENTIATED SERVICES	
III	Integrated Services (IntServ), Queuing Discipline- FQ, PS, BRFQ, GPS, WFQ, Random Early Detection, Differentiated Services (DiffServ)	9
	PROTOCOLS FOR QOS SUPPORT	
IV	Resource Reservation Protocol (RSVP), Multiprotocol Label Switching (MPLS), Real-Time Transport Protocol (RTP), RTCP, IP version six.	9
	LOCAL BROAD BAND AND AD HOC NETWORKS	
V	Introduction to wireless LANS-IEEE 802.11 WLAN-Wireless ATM-HIPERLAN-Ad hoc networking and WPAN.	9
TOTAL INSTRUCTIONAL HOURS		45

- Course Outcome**
- CO1: Understand various concepts of high-speed networks.
CO2: Understand different types of congestion control mechanisms and traffic management.
CO3: Understand the concepts of integrated and differentiated services.
CO4: Understand various protocols for QOS support
CO5: Understand the concepts of wireless network operations and functions

TEXT BOOKS:

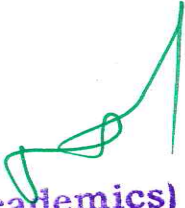
- T1 - Williams Stallings, "High Speed networks And Internet Performance And Quality Of Service", Pearson Second Edition, 2002.
T2 -KavenPahlavanAnd Prashant Krishnamoorthy, "Principles Of Wireless Network", Prentice Hall Of India, 2010.

REFERENCE BOOKS :

- R1 - Behrouz A. Forouzan, "Data Communication And Computer Networking", 4th, 2011.
R2 - Larry L. Peterson and Bruce S.Davie, "Computer Networks", Third edition, Elsevier Publications, 2003


Chairman - BoS
CSE - HICET




Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS7312	SEMANTIC WEB	3	0	0	3

- Course Objective**
1. To understand the need of semantic web in web services
 2. To know the methods to discover, classify and build ontology for more reasonable results in searching.
 3. To implement the RDF structure and Model
 4. To build and implement a small ontology that is semantically descriptive of chosen problem domain.
 5. To implement applications that can access, use and manipulate the ontology

Unit	Description	Instructional Hours
	INTRODUCTION	
I	Introduction to the Syntactic web and Semantic Web – Evolution of the Web – The visual and syntactic web – Levels of Semantics – Metadata for web information - The semantic web architecture and technologies –Contrasting Semantic with Conventional Technologies –Semantic Modeling - Potential of semantic web solutions and challenges of adoption	9
	ONTOLOGICAL ENGINEERING	
II	Ontologies – Taxonomies –Topic Maps – Classifying Ontologies – Terminological aspects: concepts, terms, relations between them – Complex Objects –Subclasses and Sub-properties definitions –Upper Ontologies – Quality – Uses - Types of terminological resources for ontology building –Methods and methodologies for building ontologies – Multilingual Ontologies - Ontology Development process and Life cycle – Methods for Ontology Learning – Ontology Evolution – Versioning	9
	STRUCTURING AND DESCRIBING WEB RESOURCES	
III	Structured Web Documents - XML – Structuring – Namespaces – Addressing – Querying – Processing - RDF – RDF Data Model – Serialization Formats- RDF Vocabulary –Inferencing - RDFS –basic Idea – Classes – Properties- Utility Properties – RDFS Modeling for Combinations and Patterns-Transitivity	9
	WEB ONTOLOGY LANGUAGE	
IV	OWL – Sub-Languages – Basic Notions -Classes- Defining and Using Properties – Domain and Range – Describing Properties - Data Types – Counting and Sets- Negative Property Assertions – Advanced Class Description – Equivalence – Owl Logic.	9
	SEMANTIC WEB TOOLS AND APPLICATIONS	
V	Development Tools for Semantic Web – Jena Framework – SPARL –Querying semantic web - Semantic Wikis - Semantic Web Services – Modeling and aggregating social network data - Ontological representation of social relationships, Aggregating and reasoning with social network data.	9
	TOTAL INSTRUCTIONAL HOURS	45

- Course Outcome**
- CO1: Able to understand semantic web basics, architecture and technologies
CO2: Able to represent data from a chosen problem in XML with appropriate semantic tags obtained or derived from the ontology
CO3: Able to understand the semantic relationships among these data elements using Resource Description Framework (RDF)
CO4: Able to design and implement a web services application that “discovers” the data and/or other web services via the semantic web.
CO5: Able to discover the capabilities and limitations of semantic web technology for social networks

TEXT BOOKS:

- T1 - Williams Stallings, “High Speed networks And Internet Performance And Quality Of Service”, Pearson Second Edition, 2002.
T2 -KavenPahlavanAnd Prashant Krishnamoorthy, “Principles Of Wireless Network”, Prentice Hall Of India, 2010.

REFERENCE BOOKS:

- R1 - John Hebel, Matthew Fisher, Ryan Blace and Andrew Perez-Lopez, "Semantic Web Programming", Wiley, First Edition, 2009.
- R2 - Grigoris Antoniou, Frank van Harmelen, "A Semantic Web Primer", Second Edition (Cooperative Information Systems) (Hardcover), MIT Press, 2008
- R3 - Robert M. Colomb, "Ontology and the Semantic Web", Volume 156 Frontiers in Artificial Intelligence and Applications (Frontier in Artificial Intelligence and Applications), IOS Press, 2007.
- R4 - Dean Allemang and James Hendler, "Semantic Web for the Working Ontologist: Effective Modeling in RDFS and OWL, Morgan Kaufmann", Second Edition, 2011.
- R5 - Michael C. Daconta, Leo J. Obrst and Kevin T. Smith, "The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management", Wiley, First Edition 2003
- R6 - Karin Breitman, Marco Antonio Casanova and Walt Truszkowski, "Semantic Web: Concepts, Technologies and Applications (NASA Monographs in Systems and Software Engineering)", Springer, Softcover, 2010.
- R7 - Vipul Kashyap, Christoph Bussler and Matthew Moran, "The Semantic Web: Semantics for Data and Services on the Web (Data-Centric Systems and Applications), Springer, 2008.
- R8 - Peter Mika, "Social networks and the Semantic Web", Springer, 1st edition 2007.


Chairman - BoS
CSE - HICET




Dean (Academics)
HICET

ELECTIVE-V

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS8301	SOFTWARE PROJECT MANAGEMENT	3	0	0	3

- Course Objective**
1. Learn about Project Evaluation and Project Planning
 2. Understand the concepts of Project life cycle and effort estimation
 3. To highlight different techniques for software cost estimation and activity planning
 4. Study about Project Management and Control
 5. Learn about hoew to manage people

Unit	Description	Instructional Hours
	PROJECT EVALUATION AND PROJECT PLANNING	
I	Importance of Software Project Management–Activities Methodologies–Categorization of Software Projects–Setting objectives–Management Principles–Management Control–Project portfolio Management–Cost-benefit evaluation technology–Risk evaluation–Strategic program Management–Stepwise Project Planning.	9
	PROJECT LIFE CYCLE AND EFFORT ESTIMATION	
II	Software process and Process Models–Choice of Process models–mental delivery–Rapid Application development–Agile methods–Extreme Programming–SCRUM–Managing interactive processes–Basics of Software estimation–Effort and Cost estimation techniques–COSMIC Full function points -COCOMO II A Parametric Productivity Model -Staffing Pattern	9
	ACTIVITY PLANNING AND RISK MANAGEMENT	
III	Objectives of Activity planning–Project schedules–Activities–Sequencing and scheduling –Network Planning models–Forward Pass & Backward Pass techniques–Critical path (CRM) method–Risk identification–Assessment–Monitoring–PERT technique–Monte Carlo simulation –Resource Allocation–Creation of critical patterns–Cost schedules	9
	PROJECT MANAGEMENT AND CONTROL	
IV	Framework for Management and control –Collection of data Project termination–Visualizing progress –Cost monitoring–Earned Value Analysis–Project tracking–Change control–Software Configuration Management–Managing contracts–Contract Management.	9
	STAFFING IN SOFTWARE PROJECTS	
V	Managing people–Organizational behavior–Best methods of staff selection–Motivation–The Oldham-Hackman job characteristic model–Ethical and Programmed concerns–Working in teams–Decision making–Team structures–Virtual teams–Communications genres–Communication plans.	9
	TOTAL INSTRUCTIONAL HOURS	45

Course Outcome

- CO1: Describe project evaluation and planning
- CO2: Explain project life cycle and effort estimation.
- CO3: Discuss activity planning and risk management
- CO4: Analyze project management and control.
- CO5: Able to practice Project Management principles while developing a software

TEXTBOOK:

T1. Bob Hughes, Mike Cottere II and Rajib Mall: Software Project Management–Fifth Edition, TataMcGraw Hill, New Delhi, 2012.


REFERENCE BOOKS

R1. Robert K. Wysocki “Effective Software Project Management”–Wiley Publication, 2011.

R2. Walker Royce: “Software Project Management”-Addison-Wesley, 1998.

R3. Gopaldaswamy Ramesh, “Managing Global Software Projects”–McGraw Hill Education (India), Fourteenth Reprint 2013.




Chairman - BoS
CSE - HICET


Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS8302	WEB TECHNOLOGY	3	0	0	3

Course Objective	
	1. Understand the scripting languages XHTML, JavaScript and PHP
	2. Familiar with the different server technologies
	3. Gain knowledge in the concepts of web services.
	4. Study about Project Management and Control
	5. Learn about hoew to manage people

Unit	Description	Instructional Hours
	INTRODUCTION TO WEB AND XHTML	
I	Introduction - Blogging - Social Networking - Social media - Tagging - Software development - Introduction to XHTML and Editing XHTML Headings - Linking - Images - Special characters and Horizon rules - Lists - Tables - Forms -Internal Linking- Meta Elements - Cascading Style Sheets	10
	JAVASCRIPT	
II	Introduction to scripting - Control statements I, II - Functions: Definition - Random Number Generation -Global function - Recursion - Arrays: Declaring and allocating arrays Multidimensional arrays - Objects :Math object - String object - Date object - Boolean, Number object - Document object - Window object -Events.	10
	INTERNET APPLICATION SERVER TECHNOLOGIES	
III	Web server (IIS and Apache): Multitier Architecture - Client/ Server side scripting - Accessing web services - Microsoft IIS - Apache HTTP server - Database: Relational database - SQL - PHP: Basics -String and Form Processing - connecting to database - Ruby on Rails - Rail framework - Database driven web application	8
	ASP.NET AND AJAX	
IV	Introduction - creating and running a simple web form - Web controls - session tracking - case study: Connecting to a database in ASP.NET. - Introduction to AJAX- AJAX XML Http request- AJAX Events..	9
	WEB SERVICES	
V	Introduction - Java web services Basics - Creating Publishing, Testing and describing web service -Consuming web service - SOAP - Session Tracking in web services - Consuming a Database driven web service from a web application - Passing an object of a User defined type to a web service	8
	TOTAL INSTRUCTIONAL HOURS	45

Course Outcome	
	CO1: Explore the internet related technologies and hierarchy of objects in XHTML, CSS and Social media.
	CO2: Design dynamic and interactive web pages by embedding Java Script code in XHTML.
	CO3: Implement server side programming and build web applications using PHP.
	CO4: Develop the interactive web applications using ASP.NET.
	CO5: Build and consume web services.

REFERENCE BOOKS

- R1. P.J. Deitel AND H.M. Deitel, Internet and World Wide Web - How to Program, Pearson Education, 2009.
- R2. Deitel, Deitel and Nieto, Internet and World Wide Web How to Program, Pearson Education,2002.
- R3. Uttam K.Roy, Web Technologies, Oxford University Press, 2010.
- R4. Rajkamal, Web Technology, Tata McGraw-Hill, 2009.
- R5. www.w3schools.com/ajax.


Chairman - BoS
CSE - HiCET




Dean (Academics)
HiCET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS8303	PERVASIVE COMPUTING	3	0	0	3

- Course Objective**
1. To provide the student with knowledge and skills about a new trend in computing.
 2. To study about creating a ubiquitous environment.
 3. To learn about connectivity of devices and web applications
 4. To learn WAP and voice technology.
 5. To study about architecture of PDA

Unit	Description	Instructional Hours
I	INTRODUCTION Pervasive Computing: Past, Present and Future - Pervasive computing Market – m-Business – Application examples: Retail, Airline check-in and booking – Healthcare – Car information system – E-mail access via WAP and voice.	9
II	DEVICE TECHNOLOGY Hardware – Human Machine Interfaces – Biometrics – Operating Systems – Java for Pervasive devices.	9
III	DEVICE CONNECTIVITY & WEB APPLICATION CONCEPTS Protocols – Security – Device Management - Web Application Concepts: WWW architecture – Protocols – Transcoding - Client Authentication via Internet.	9
IV	WAP & VOICE TECHNOLOGY WAP and B.E.yond: Components of the WAP architecture – WAP infrastructure – WAP security issues – WML – WAP push – Products – i-Mode – Voice Technology: Basics of Speech recognition- Voice Standards – Speech applications – Speech and Pervasive Computing.	9
V	PDA & PERVASIVE WEB APPLICATION ARCHITECTURE Device Categories – PDA operation Systems – Device Characteristics – Software Components - Standards – Mobile Applications - PDA Browsers - Pervasive Web Application architecture: Background – Development of Pervasive Computing web applications - Pervasive application architecture.	9
Total Instructional Hours		45


- Course Outcome**
- CO1: Learn the basics of pervasive computing and recent developments
CO2: Knowledge about various Human Computer interaction devices
CO3: Exposure on various connectivity models
CO4: Get idea on WAP technology and the working mechanism
CO5: Study of different architecture of PDA devices

TEXT BOOK

T1 - Jochen Burkhardt, Horst Henn, Stefan Hepper, Thomas Schaech & Klaus Rindtorff, "Pervasive Computing, Technology and Architecture of Mobile Internet Applications", Pearson Education, 2012.

REFERENCES

- R1 - Frank Adelstein, Sandeep KS Gupta, Golden Richard III, Loren Schwiebert, "Fundamentals of Mobile and Pervasive Computing", McGraw Hill edition, 2006.
R2 - Uwe Hansmann, L. Merk, Nicklous M., Stober T., Hansmann U., "Pervasive Computing (Springer Professional Computing)", 2003, Springer Verlag, ISBN:3540002189.
R3 - <http://www.cs.iit.edu/courses/cs553.html>
R4 - http://www.luc.ac/courses/bsc_computer-science-is.shtml
R5 - <http://www.cs.cf.ac.uk/teaching/modules/CM0256.pdf>


Chairman - BoS
CSE - HiCET




Dean (Academics)
HiCET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS8304	DATABASE SECURITY AND PRIVACY	3	0	0	3
Course Objective	1. To understand the fundamentals of security, and how it relates to information systems 2. To identify risks and vulnerabilities in operating systems from a database perspective 3. To learn good password policies, and techniques to secure passwords in an organization 4. To get exposure about various auditing activities done in servers 5. To learn on different security measures available for securing the database					

Unit	Description	Instructional Hours
	SECURITY ARCHITECTURE & OPERATING SYSTEM SECURITY FUNDAMENTALS	
I	Security Architecture: Introduction-Information Systems- Database Management Systems-Information Security Architecture- Database Security- Asset Types and value-Security Methods Operating System Security Fundamentals: Introduction-Operating System Overview-Security Environment – Components- Authentication Methods-User Administration-Password Policies-Vulnerabilities-E-mail Security	7
II	ADMINISTRATION OF USERS & PROFILES,PASSWORD POLICIES, PRIVILEGES AND ROLES Administration of Users: Introduction-Authentication-Creating Users, SQL Server User-Removing, Modifying Users-Default, Remote Users-Database Links-Linked Servers-Remote Servers-Practices for Administrators and Managers-Best Practices Profiles, Password Policies, Privileges and Roles: Introduction-Defining and Using Profiles-Designing and Implementing Password Policies-Granting and Revoking User Privileges-Creating, Assigning and Revoking User Roles-Best Practices	11
III	DATABASE APPLICATION SECURITY MODELS & VIRTUAL PRIVATE DATABASES Database Application Security Models: Introduction-Types of Users-Security Models- Application Types-Application Security Models-Data Encryption Virtual Private Databases: Introduction-Overview of VPD-Implementation of VPD using Views, Application Context in Oracle-Implementing Oracle VPD-Viewing VPD Policies and Application contexts using Data Dictionary, Policy Manager- Implementing Row and Column level Security with SQL Server	9
IV	AUDITING DATABASE ACTIVITIES Auditing Database Activities: Using Oracle Database Activities-Creating DLL Triggers with Oracle-Auditing Database Activities with Oracle-Auditing Server Activity with SQL Server 2000-Security and Auditing Project Case Study	7
V	PRIVACY PRESERVING DATA MINING TECHNIQUES Privacy Preserving Data Mining Techniques: Introduction- Privacy Preserving Data Mining Algorithms-General Survey-Randomization Methods-Group Based Anonymization-Distributed Privacy Preserving Data Mining-Curse of Dimensionality-Application of Privacy Preserving Data Mining	11
	TOTAL INSTRUCTIONAL HOURS	45
Course Outcome	CO1:Knowledge about secure OS and Architecture CO2:Exposure of security privileges and policies for database CO3:Study of virtual database and security model CO4:Various auditing and management activities CO5:To learn different mining methods involved in securing database	

TEXT BOOKS

T1 - Hassan A. Afyouni, "Database Security and Auditing", Third Edition, Cengage Learning, 2009.(UNIT 1 to IV)

T2 - Charu C. Aggarwal, Philip S Yu, "Privacy Preserving Data Mining": Models and Algorithms, Kluwer Academic Publishers, 2008.(UNIT V).

REFERENCES

R1 - Ron Ben Natan, "Implementing Database Security and Auditing", Elsevier Digital Press, 2005.

R2 - <http://charuaggarwal.net/toc.pdf>

R3 - <http://adrem.ua.ac.be/sites/adrem.ua.ac.be/files/securitybook.pdf>



**Chairman - BoS
CSE - HICET**



**Dean (Academics)
HICET**

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS8305	R PROGRAMMING	3	0	0	3

- Course Objective**
1. To study the characteristics of the Multimedia data
 2. To understand the Multimedia data Indexing and Retrieval
 3. Understand the basics of R programming.
 4. Gain knowledge about the data analysis and statistical models in R.
 5. Impart knowledge about using graphics in R.

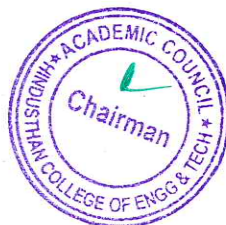
Unit	Description	Instructional Hours
	GETTING STARTED AND BASICS	
I	Introduction to R -R Installation-Basic syntax-R as a calculator-R Libraries-Importing Data-Getting help and loading packages-Data entry and exporting data-Creating and Manipulating objects in R-Vectors-Matrices-Data Frames-Lists	9
	EXPLORATORY DATA ANALYSIS WITH R	
II	Summary statistics-Validating & Exploring Data-Manipulating Data-Summarizing-Sorting-Sub-setting- Merging.	9
	GRAPHICS	
III	Basic plotting -3D plotting-Histograms-Multi-panel plotting-Boxplots-ggplot2-Manipulating the plotting window-Advanced plotting using lattice library-Saving plots.	9
	STANDARD STATISTICAL MODELS IN R	
IV	Univariate Analysis -Multivariate Analysis-Linear & Nonlinear Models-Logistic Regression and Survival Analysis in R	9
	ADVANCED R	
V	Writing R functions-Introduction to Clustering and Classification-k-Means Partitioning-Partitioning around Medoids -Introduction to Unconstrained & Constrained Ordination-Principal Components Analysis (PCA)-Redundancy Analysis (RDA)	9
TOTAL INSTRUCTIONAL HOURS		45

- Course Outcome**
- CO1: Explain the basic concepts of R.
 - CO2: Illustrate exploratory data analysis with R.
 - CO3: Summarize the use of graphics in R.
 - CO4: Compare the different statistical models in R.
 - CO5: Demonstrate the use of advanced concepts in R

REFERENCE BOOKS:

- R1-Jared P Lander R for Everyone, Kindle Edition, 2014.
- R2-Grolemund and Garrett Hands-On Programming with R, Kindle Edition, 2014.
- R3-Mark Gardener Beginning R: The Statistical Programming Language, 2013.
- R4-Norman Matloff, The Art of R Programming-A Tour of Statistical Software Design, 2011.
- R5-Richard F. Gilberg, and Behrouz A. Forouzan, Data Structures-A Pseudocode Approach with C, Thomson 2009
- R6-John E.Hopcroft, Rajeev Motwani and Jeffrey.D Ullman, Introduction to Automata Theory, Languages and Computations, Pearson Education,3rd Edition, 2009.


Chairman - BoS
CSE - HiCET




Dean (Academics)
HiCET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS8306	DATABASE TUNING	3	0	0	3

- Course Objective**
1. To help you tune your application on your database management system, operating system, and hardware.
 2. To teach you the principles underlying any tuning puzzle
 3. To study real time processing of work load sharing
 4. To apply tuning tools and troubleshoot the various DBMS queries
 5. To tune to data warehouse and CRM applications

Unit	Description	Instructional Hours
I	CONCURRENCY CONTROL AND RECOVERY Review of Relational Databases – Locking and Concurrency Control — Logging and the Recovery Subsystem — Operating Systems Considerations – Hardware Tuning.	9
II	INDEX TUNING AND NORMALIZATION Types of Queries – Data Structures – Clustering Indexes – Non Clustering Indexes – Composite Indexes – Hot Tables – Tuning Relational Systems – Normalization – Clustering Two Tables – Aggregate Maintenance – Record Layout- Query Tuning – Triggers	9
III	REAL TIME DATABASES Client Server Mechanisms – Objects, Application Tools and Performance – Tuning the Application Interface – Bulk Loading Data – Accessing Multiple Databases - Real- time databases – transaction chopping – optimal Chopping algorithm – Understanding Access plans case study	9
IV	TROUBLESHOOTING Consumption chain approach-Query Plan Explainers – Performance Monitors – Event Monitors – Finding “Suspicious” Queries – Analyzing a Query’s Access Plan – Profiling a Query Execution – DBMS Subsystems - Checking DBMS resources	9
V	TUNING DATAWAREHOUSE AND E-COMMERCE APPLICATIONS Data Warehouse Tuning– Tuning for CRM Systems – Federated Data Warehouse Tuning -E-commerce architecture- Tuning e-commerce architecture – Capacity planning - Case study .	9
TOTAL INSTRUCTIONAL HOURS		45

- Course Outcome**
- CO1:Understanding the recovery system and security of Database system
- CO2:Analyze normalization and tuning for various data formats
- CO3:Exposure to real time tuning process
- CO4:Study various querying methods and improvements in tuning
- CO5:Knowledge about application that used for tuning database systems

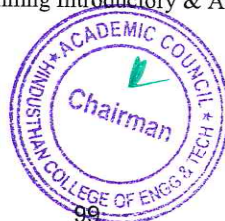
TEXT BOOK

T1 - Dennis Shasha and Philippe Bonnet, “Database Tuning, Principles, Experiments, and Troubleshooting Techniques”, Morgan Kaufmann, An Imprint of Elsevier, 2003.

REFERENCES

- R1 - Thomas Connolly and Carolyn Begg, “Database Systems, A Practical Approach to Design, Implementation and Management”, Third Edition, Pearson Education, 2003.
- R2 - Tamer M. Ozsu , Patrick Ualdurriel, “Principles of Distributed Database Systems”, Second Edition, Pearson Education, 2003.
- R3 - Margaret H. Dunham, S. Sridhar “Data Mining Introductory & Advance Topics”, PHI, 2002.

**Chairman - BoS
CSE - HiCET**



**Dean (Academics)
HiCET**

- R4 - <http://www.cs.helsinki.fi/u/laine/tikape/k03/material03.html>
- R5 - <http://infolab.stanford.edu/~ullman/dscb.html>
- R6 - <http://cs.nyu.edu/courses/spring06/G22.2433-001/>
- R7 - <http://www.doc.ic.ac.uk/~pjm/adb/index.html>
- R8 - <http://www.cs.manchester.ac.uk/postgraduate/taught/programmes / fulllist/>


**Chairman BoS
CSE - HiCET**




**Dean (Academics)
HiCET**

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS8307	VISUAL PROGRAMMING	3	0	0	3

- Course Objective**
1. To Learn the Basics of Windows Programming
 2. To Design applications using Visual Basic
 3. To Design applications using Visual C++ Programming
 4. To Learn the visual C++ menus and SDI MDI environments
 5. To Study the applications of Visual C++ Programming

Unit	Description	Instructional Hours
	INTRODUCTION TO WINDOWS PROGRAMMING	
I	GUI Concepts – Overview of Windows programming – Creating the window – Displaying the window - message Loop – windows procedure-WM_PAINT message - WM_DESTROY message – An Introduction to GDI – device context – basic drawing – Text output Scroll Bars –Keyboard – Mouse – Menus.	9
	VISUAL BASIC PROGRAMMING	
II	IDE – First Visual Basic Program - Introduction to Forms – Control statements – control arrays – Creating and using Controls – Menus and Dialogs- Intrinsic Controls – Objects and instances – Debugging – Responding to mouse events – Drag and Drop events- Responding to keyboard events - working with Files - Accessing databases with data control - Classes and Objects – ADO Object Model.	9
	VISUAL C++ PROGRAMMING	
III	Visual C++ components – Introduction to Microsoft foundation classes Library Application Framework – Getting Started with AppWizard – Basic Event handling, Mapping modes, and a Scrolling View - Graphics Device Interface, Colors and fonts – modal and modeless dialog – windows common controls – bitmaps	9
	THE DOCUMENT AND VIEW ARCHITECTURE	
IV	Menus – Keyboard Accelerators – Rich Edit Control – Tool bars – Status bars – A reusable Frame Window Base Class - Reading and writing documents - SDI and MDI environments – splitter windows and multiple views.	9
	APPLICATIONS OF VISUAL PROGRAMMING	
V	Dynamic link library – ActiveX controls Vs. Ordinary Windows Controls – Installing ActiveX controls – Calendar Control – ActiveX control container programming – create ActiveX control at runtime - Component Object Model - Object linking and embedding – Data Base Management with Microsoft ODBC- Threading.	9
	TOTAL INSTRUCTIONAL HOURS	45

- Course Outcome**
- CO1: To Understand the Basics of Windows Programming
- CO2: To Develop applications using Visual Basic
- CO3: To Develop applications using Visual C++ Programming
- CO4: To Understand the visual C++ menus and SDI MDI environments
- CO5: To develop the applications of Visual C++ Programming

TEXT BOOKS:


- T1 - Charles Petzold, "Windows Programming", Microsoft press, 1998.
- T2 - Francesco Balena, "Programming Microsoft Visual Basic6.0", Microsoft press, Indian Reprint, 2001.
- T3 - David Kruglirski.J, "Programming Microsoft Visual C++", Fifth Edition, Microsoft press, 1998.

REFERENCE BOOKS :

- R1 - Visual C++ 6 From the grounded up , 2nd Edition by John Mueller, McGraw – HILL INTERNATIONAL EDITION, Indian Reprint, 2008.
- R2 - Visual Basic 6.0 Programming, Content Development Group, Tata McGraw-Hill Publishing Company Limited, Indian Reprint, 2008.


Chairman - BoS
CSE - HICET




Dean (Academics)
HICET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS8308	SOFTWARE TESTING	3	0	0	3

- Course Objective**
1. Understand the fundamental concepts in software testing, including definition, principles, roles and defects.
 2. Understand the strategies for software testing and understand black box and white box testing methods
 3. Understand various levels of software testing for software project
 4. Identify the issues in testing management and understand test planning.
 5. Understand test measurements and Reviews.

Unit	Description	Instructional Hours
	SOFTWARE TESTING FUNDAMENTALS	
I	Testing as an Engineering Activity - Role of Process in Software Quality - Testing as a Process- The six essentials of software testing - Basic Definitions: Software Testing Principles - The role of a software tester - Origins of Defects- Defect Classes the Defect Repository	9
	TESTING DESIGN STRATEGIES	
II	Introduction to Testing Design Strategies - The Smarter Tester - Test Case Design Strategies - Black Box testing - Random Testing - Equivalence Class Partitioning - Boundary Value Analysis - Cause and error graphing and state transition testing - Error Guessing - Black-box testing and COTS - White-Box testing - Test Adequacy Criteria - Coverage and Control Flow Graphs.	9
	LEVELS OF TESTING	
III	The Need for Levels of Testing- Unit Test - Unit Test Planning- Designing the Unit Tests. The Class as a Testable Unit - The Test Harness - Running the Unit tests and Recording results- Integration tests- Designing Integration Tests - Integration Test Planning - System Test - Types-of system testing - Regression Testing.	9
	TEST MANAGEMENT	
IV	People and organizational issues in testing - organization structures for testing teams - testing services - Test Planning - Test Plan Components - Test Plan Attachments - Locating Test Items - test management - test process - Reporting Test Results - The role of three groups in Test Planning and Policy Development - Introducing the test specialist - Skills needed by a test specialist - Building a Testing Group.	9
	TEST MEASUREMENTS AND REVIEWS	
V	Defining Terms - Measurements and Milestones for Controlling and Monitoring- Status Meetings- Reports and Control Issues - Criteria for Test Completion- SCM - Types of reviews - developing a review program - Components of Review Plans- Reporting review results. Testing Tools-Case Selenium, Autoit	9

TOTAL INSTRUCTIONAL HOURS 45

- Course Outcome**
- CO1: Understand the fundamental concepts in software testing, including definition, principles, roles and defects.
- CO2: Understand the strategies for software testing and understand black box and white box testing methods
- CO3: Apply various levels of software testing for software project.
- CO4: Understand the issues in testing management and understand test planning
- CO5: Apply the test measurements and Reviews for software testing

TEXT BOOKS:

T1 - 1.John Vince, "Virtual Reality Systems ", Pearson Education Asia, 2007.

REFERENCE BOOKS :

R1 - 1.Adams, "Visualizations of Virtual Reality", Tata McGraw Hill, 2000.

R2 - Grigore C. Burdea, Philippe Coiffet , "Virtual Reality Technology ", Wiley Interscience, 2nd Edition, 2006.

R3 - William R. Sherman, Alan B. Craig, " Understanding Virtual Reality: Interface, Application, and Design", Morgan Kaufmann, 2008.


Chairman / BoS
CSE - HiCET




Dean (Academics)
HiCET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS8309	HIGH PERFORMANCE COMPUTING	3	0	0	3

- Course Objective**
1. To learn about Modern Processors and concepts
 2. To understand the concepts of Optimizations
 3. To learn about Parallel Computers and Programming
 4. To study about Memory Parallel Programming using Open MP and MPI
 5. To understand the point-to-point communication

Unit	Description	Instructional Hours
I	<p>MODERN PROCESSORS</p> <p>Stored Program Computer Architecture- General purpose cache-based microprocessor-Performance based metrics and benchmarks-Moore's Law- Pipelining-Superscalarity-SIMDMemory Hierarchies Cache- mapping-prefetch-Multicore processors-Mutithreaded processors- Vector Processors-Design Principles-Maximum performance estimates- Programming for vector architecture.</p>	9
II	<p>BASIC OPTIMIZATION TECHNIQUES FOR SERIAL CODE</p> <p>Scalar profiling- Function and line based runtime profiling- Hardware performance counters-Common sense optimizations-Simple measures, large impact-Elimination of common subexpressions- Avoiding branches- Using SIMD instruction sets- The role of compilers-General optimization options-Inlining- Aliasing- Computational Accuracy- Register optimizations- Using compiler logs-C++ optimizations-Temporaries-Dynamic memory management- Loop kernels and iterators Data Access Optimization: Balance analysis and lightspeed estimates- Storage order- Case study: Jacobi algorithm and Dense matrix transpose.</p>	9
III	<p>PARALLEL COMPUTERS</p> <p>Taxonomy of parallel computing paradigms- Shared memory computers- Cache coherence- UMA-ccNUMA-Distributed-memory computers- Hierarchical systems-Networks-Basic performance characteristics- Buses- Switched and fattree networks- Mesh networks- Hybrids Basics of parallelization - Why parallelize - Data Parallelism - Function Parallelism-Parallel Scalability- Factors that limit parallel execution- Scalability metrics-Simple scalability laws- parallel efficiency - serial performance Vs Strong scalability- Refined performance models- Choosing the right scaling baseline.Case Study : Can slow processors compute faster- Load balance.</p>	9
IV	<p>SHARED MEMORY PARALLEL PROGRAMMING WITH OPENMP</p> <p>Introduction to OpenMP - Parallel execution - Data scoping- OpenMP work sharing for loops-Synchronization-Reductions-Loop Scheduling - Tasking -Case Study: OpenMP- parallel Jacobi algorithm- Advanced OpenMP wavefront parallelization- Efficient OpenMP rogramming: Profiling OpenMP programs - Performance pitfalls- Case study: Parale Sparse matrix-vector multiply.</p>	9
V	<p>DISTRIBUTED-MEMORY PARALLEL PROGRAMMING WITH MPI</p> <p>Message passing - Introduction to MPI- Example- Messages and point-to-point communication-Collective communication- Nonblocking point-to-point communication- Virtual topologies - MPI parallelization of Jacobi solver-MPI implementation-performance properties Efficient MPI programming: MPI performance tools- communication parameters-Synchronization, serialization, contention- Reducing communication overhead optimal domain decomposition- Aggregating messages - Nonblocking Vs Asynchronous communication- Collective communication- Understanding intra node point-to-point communication.</p>	9
TOTAL INSTRUCTIONAL HOURS		45

Course Outcome


- CO1: Identify the Modern Processors and concepts
- CO2: Discuss the various concepts of Optimizations
- CO3: Analyze the parallel computers and programming
- CO4: Analyze about Memory Parallel Programming using Open MP and MPI.
- CO5: Identify the point-to-point communication.

TEXT BOOKS:

T1 - Georg Hager, Gerhard Wellein, "Introduction to High Performance Computing for Scientists and Engineers", Chapman & Hall / CRC Computational Science series, 2011.

REFERENCE BOOKS :

R1 - Charles Severance, Kevin Dowd, "High Performance Computing", O'Reilly Media, 2nd Edition, 1998.
R2 - Kai Hwang, Faye Alaye Briggs, "Computer Architecture and Parallel Processing", McGraw Hill, 1984.


Chairman - BoS
CSE - HiCET




Dean (Academics)
HiCET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS8310	MANAGEMENT INFORMATION SYSTEMS	3	0	0	3

- Course Objective**
1. Gain knowledge about the major types of information systems used in a business environment.
 2. Impart knowledge on the ethical issues of information systems.
 3. Impart knowledge on the social issues of information systems
 4. Impart knowledge on the security issues of information systems
 5. Understand the processes of developing and implementing information systems.

Unit	Description	Instructional Hours
	INTRODUCTION TO INFORMATION SYSTEMS	
I	Information Systems in Global Business Today: Role of Information Systems in Business Today -Perspectives of Information Systems - Approaches to Information Systems - Global E-Business and Collaboration: Business Process and Information Systems - Types of Information Systems Enterprise Systems	9
	INFORMATION TECHNOLOGY INFRASTRUCTURE	
II	Information Systems, Organizations and Strategy: Organizations and Information Systems - Impact of Information Systems on organizations and Business Firms - Ethical and Social Issues in Information Systems: Understanding Ethical and Social Issues Related to Systems - Ethics in an information society - IT Infrastructure and Emerging Technologies: Infrastructure Components - Hardware Platform Trends - Software Platform Trends	9
	DATABASES AND INFORMATION MANAGEMENT	
III	Organizing Data in Traditional File Environment - Database Approach to Data Management – Using Databases to improve Business Performance and Decision Making - Managing Data Resources	9
	NETWORKS AND SECURITY	
IV	Telecommunications and Networking in today's Business Needs: Networking and Communication Trends - Key Digital Networking Technologies - Securing Information Systems: System Vulnerability – Business Value of Security and Control - Establishing Management Framework for Security and Control - Technologies and Tools for Protecting Information Resources.	9
	NEW IT INITIATIVES	
V	Enterprise Applications: Enterprise Systems - Supply Chain Management Systems – Customer Relationship Management Systems - Electronic Commerce: Types of Electronic Commerce – Mcommerce Services and Applications - The Knowledge Management Landscape: Important Dimensions of Knowledge - The Knowledge Management Value Chain - Types of Knowledge Management Systems.	9
	TOTAL INSTRUCTIONAL HOURS	45

- Course Outcome**
- CO1: Understand the basics of Management Information systems.
- CO2: Formulate solutions social and ethical issues related to information technology infrastructure.
- CO3: Apply the knowledge on database management systems to store hybrid information in a business organization.
- CO4: Recognize the use of security mechanisms to share business information over various types of networks.
- CO5: Explore the new IT initiatives for enhancing knowledge management information systems.

REFERENCE BOOKS:

- R1- Kenneth C. Laudon, Jane P. Laudon, Management Information Systems -Managing the digital firm, Pearson Education, 2012.
- R2- Waman S Jawadekar, Management Information Systems-Texts and Cases, the McGraw-Hill Company, 2009.

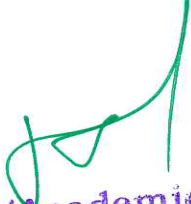
R3- James O' Brien, Management Information Systems-Managing Information Technology in the Ebusiness enterprise, McGraw-Hill Higher Education, 2011.

R4- Turban, McLean and Wether, Information Technology for Management-Transforming Organisations in the Digital Economy, John Wiley, 2008.

R5- Raymond McLeod and Jr. George P. Schell, Management Information Systems, Pearson Education, 2008.


Chairman / BoS
CSE - HiCET




Dean (Academics)
HiCET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS8311	ENGINEERING ECONOMICS	3	0	0	3

- Course Objective**
1. Provide the theoretical foundations in micro and macro analysis in terms of concepts and theories
 2. Learn the functions of demand and supply
 3. Emphasis the systematic evaluation of the costs and benefits associated with projects.
 4. Understand about the market structure
 5. Learn about financial Accounting

Unit	Description	Instructional Hours
	INTRODUCTION	
I	Introduction to Micro and Macro economics-Kinds of Economic Systems-Production Possibility Frontier-Opportunity Cost-Objective of Organizations-Kinds of Organization.	9
	DEMAND AND SUPPLY	
II	Functions of Demand and Supply -Law of diminishing Marginal Utility Law of Demand and Supply -Elasticity of Demand -Demand Forecasting Methods-Indifference curve	9
	PRODUCTION AND COST	
III	Production Function>Returns to Scale-Law of Variable Proportion-Cost and Revenue concepts and Cost Curves-Revenue curves-Economies and Dis-economies of scale-Break Even point	9
	MARKET STRUCTURE	
IV	Market Structure-Perfect Competition-Monopoly-Monopolistic-Oligopoly-Components of Pricing- Methods of Pricing-Capital Budgeting IRR-ARR-NPV-Return on Investment-Payback Period	9
	INTRODUCTION TO MACRO ECONOMICS AND FINANCIAL ACCOUNTING	
V	National Income-Calculation Methods-Problems-Inflation-Deflation-Business Cycle-Taxes-Direct and Indirect Taxes -Fiscal and monetary policies	9
	TOTAL INSTRUCTIONAL HOURS	45

- Course Outcome**
- CO1: Understand the micro economic environment for creating a favorable business environment.
- CO2: Take decision by making use of the major concepts and techniques of engineering economic analysis.
- CO3: Compare the cost of multiple projects by using the methods learned, and make a quantitative decision between alternate facilities and/or systems.
- CO4: Apply the appropriate engineering economics analysis method(s) for problem solving: present worth, annual cost, rate-of-return, payback, break-even, benefit-cost ratio.
- CO5: Examine and evaluate the issues in macro-economic analysis.

REFERENCE BOOKS:

- R1-A Ramachandra Aryasri and V V RamanaMurthy, Engineering Economics and Financial Accounting, Tata McGraw Hill Publishing Company Limited, New Delhi, 2006.
- R2-V L Samuel Paul and G S Gupta, Managerial Economics Concepts and Cases, Tata McGraw Hill Publishing Company Limited, New Delhi, 1981.

R3.-R Kesavan, C Elanchezhian and T Sunder Selwyn, Engineering Economics and Financial Accounting, Laxmi Publication Ltd, New Delhi, 2005.
R4-S N Maheswari, Financial and Management Accounting, Sultan Chand
R5.V L Samuel Paul and G S Gupta, Managerial Economics-Concepts and Cases


Chairman - BoS
CSE - HiCET




Dean (Academics)
HiCET

PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS8312	BIG DATA ANALYTICS	3	0	0	3

- Course Objective**
1. To understand the basics of data analytics.
 2. To Learn the Business Intelligence and its Framework.
 3. To understand the technologies for big data analytics.
 4. To Learn Hadoop and HDFS
 5. To Learn Business implementation for real time data

Unit	Description	Instructional Hours
	INTRODUCTION TO DATA ANALYTICS	
I	Data and Relations, Data Visualization, Correlation, Regression, Forecasting, Classification, Clustering. Big Data Technology Landscape: Fundamentals of Big Data Types, Big data Technology Components, Big Data Architecture, Big Data Warehouses, Functional vs. Procedural Programming Models for Big Data.	9
	INTRODUCTION TO BUSINESS INTELLIGENCE	
II	Business View of IT Applications, Digital Data, OLTP vs. OLAP, Why, What and How BI? , BI Framework and components, BI Project Life Cycle, Business Intelligence vs. Business Analytics.	9
	BIG DATA ANALYTICS	
III	Big Data Analytics, Framework for Big Data Analysis, Approaches for Analysis of Big Data, ETL in Big Data, Introduction to Hadoop Ecosystem, HDFS, Map-Reduce Programming, Understanding Text Analytics and Big Data, Predictive analysis on Big Data, Role of Data analyst.	9
	BUSINESS IMPLEMENTATION OF BIG DATA	
IV	Big Data Implementation, Big Data workflow, Operational Databases, Graph Databases in a Big Data Environment, Real-Time Data Streams and Complex Event Processing, Applying Big Data in a business scenario, Security and Governance for Big Data.	9
	BIG DATA ON CLOUD	
V	Big Data on Cloud, Best practices in Big Data implementation, Latest trends in Big Data, Latest trends in Big Data, Big Data Computation, More on Big Data Storage, Big Data Computational Limitations. Introduction to most recent advancements in Big Data technology along with their usage and implementation with relevant tools and technologies.	9
TOTAL INSTRUCTIONAL HOURS		45

- Course Outcome**
- CO1: Understand the basics of data analytics and big data technology
CO2: Understand the business intelligence and its framework.
CO3: Understand the implementation of big data analysis using Hadoop
CO4: Understand the HDFS concepts
CO5: Understand the implementation of Big data and its techniques in a variety of applications.

TEXT BOOKS:

T1 - Michael Minelli, Michele Chambers, AmbigaDhiraj, Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley CIO Series (2013), First Edition.

REFERENCE BOOKS :

R1 - T. white, Hadoop: The Definitive Guide, O' Reilly Media (2012), Third Edition.
R2 - Data-Intensive Text Processing with MapReduce. Jimmy Lin and Chris Dyer. Morgan & Claypool Publishers, 2010.

S. J. K.
Chairman - BOS
CSE - HICET



[Signature]
Dean (Academics)
HICET

OPEN ELECTIVE						
PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS7402	OPTIMIZATION TECHNIQUES	3	0	0	3
Course Objective		1. Introducing the basic concepts of Linear Programming 2. Educating on the advancements in Linear programming techniques 3. Introducing Non Linear programming techniques 4. Introducing the interior point methods of solving problems 5. Introducing the Dynamic programming method				
Unit	Description					Instructional Hours
LINEAR PROGRAMMING						
I	Introduction - formulation of linear programming model-Graphical solution-solving LPP using simplex algorithm – Revised Simplex Method.					9
ADVANCES IN LPP						
II	Dualit theory- Dual simplex method - Sensitivity analysis--Transportation problems– Assignment problems-Traveling sales man problem -Data Envelopment Analysis..					9
NON LINEAR PROGRAMMING						
III	Classification of Non Linear programming – Lagrange multiplier method – Karush – Kuhn Tucker conditions–Reduced gradient algorithms–Quadratic programming method – Penalty and Barrier method.					9
INTERIOR POINT METHODS						
IV	Karmarkar’s algorithm–Projection Scaling method–Dual affine algorithm–Primal affine algorithm Barrier algorithm.					9
DYNAMIC PROGRAMMING						
V	Formulation of Multi stage decision problem–Characteristics–Concept of sub-optimization and the principle of optimality–Formulation of Dynamic programming–Backward and Forward recursion– Computational procedure–Conversion of final value problem in to Initial value problem.					9
TOTAL INSTRUCTIONAL HOURS						45

Course Outcome

CO1: Understand the ethical issues
 CO2: Understand the environmental impact
 CO3: Gain knowledge of management skills
 CO4: To analyze the problems and find the optimized solution
 CO5: Explain the principle of dynamic programming

TEXT BOOKS:

- T1 - Hillier and Lieberman “Introduction to Operations Research”, TMH, 2000.
 T2 - R.Panneerselvam, “Operations Research”, PHI, 2006.
 T3 - Hamdy ATaha, “Operations Research –An Introduction”, Prentice Hall India, 2003.

REFERENCE BOOKS :

- R1 - Philips, Ravindran and Solberg, “Operations Research”, John Wiley, 2002.
 R2 - Ronald L.Rardin, “Optimization in Operation Research” Pearson Education Pvt. Ltd.New Delhi, 2005

S.S.H.
Chairman - BoS
CSE - RICE



[Signature]
Dean (Academics)
HICET

CO'S, PO'S & PSO'S MAPPING – ACADEMIC YEAR (2019-2020)

Semester – I

Course Code & Name: 19HE1101 Technical English

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	1	1	1	2	-	1	2	1	2	3	1	3	3	2
CO2	1	2	1	1	1	2	1	1	1	3	1	2	2	3
CO3	1	2	1	1	1	2	1	1	2	3	1	2	2	2
CO4	1	1	-	1	1	1	1	1	2	3	1	2	3	3
CO5	-	1	1	1	1	1	1	2	2	3	1	2	2	2
Avg	1	1.4	1	1.2	1	1.4	1.2	1.2	1.8	3	1	2.2	2.4	2.4

Course Code & Name: 19MA1101 Calculus

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	2	2	-	-	-	-	-	-	2	2	2
CO2	3	3	3	3	3	-	-	-	-	-	-	2	2	3
CO3	3	3	3	3	3	-	-	-	-	-	-	2	1	2
CO4	3	3	3	3	3	-	-	-	-	-	-	2	2	1
CO5	3	3	3	2	3	-	-	-	-	-	-	2	2	2
Avg	3	3	3	2.6	2.8	-	-	-	-	-	-	2	1.8	2

Course Code & Name: 19PH1151 Applied Physics

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	2	1	1	1	-	-	-	-	-	1	2	1
CO2	3	3	1	1	2	-	-	-	-	-	-	1	3	3
CO3	3	2	1	2	2	-	-	-	-	-	-	1	3	3
CO4	3	2	3	2	3	1	-	-	-	-	-	1	2	2
CO5	3	2	3	2	2	2	-	-	-	-	-	1	2	3
Avg	3	2.2	2	1.6	2	1.333333	-	-	-	-	-	1	2.4	2.4

Course Code & Name: 19CY1151 Chemistry for Engineers

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	2	-	2	1	1	-	-	-	-	1	1	1
CO2	3	2	2	-	2	1	-	-	-	-	-	1	1	-
CO3	3	2	2	-	2	1	1	-	-	-	-	1	1	-
CO4	3	2	2	2	2	1	-	-	-	-	-	1	1	1
CO5	3	2	2	-	2	1	-	-	-	-	-	1	1	1
Avg	3	2	2	2	2	1	1	-	-	-	-	1	1	1

Course Code & Name: 19CS1151 Python Programming and Practices

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	3	3	-	2	-	-	-	-	-	-	2	2	2
CO2	2	3	3	-	2	-	-	-	2	-	-	2	2	2
CO3	2	3	3	-	2	-	-	-	2	-	-	2	2	2
CO4	2	3	3	-	2	-	-	-	2	-	-	2	2	2
CO5	2	3	3	-	2	-	-	-	2	-	-	2	2	2
Avg	2	3	3	-	2	-	-	-	2	-	-	2	2	2

Course Code & Name: 19EC1154 Basics of Electron Devices and Electric Circuits

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	2	2	1	1				1	2	3	3
CO2	3	3	2	2	2	1	1				1	2	3	2
CO3	3	2	3	2	2	1	1				1	2	2	2
CO4	3	3	3	2	2	1	1				1	2	3	2
CO5	3	3	3	2	2	1	1				1	2	3	2
Avg	3	2.8	2.8	2	2	1	1				1	2	2.8	2.2

Semester – II

Course Code & Name: 19HE2101 Business English for Engineers

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	1	2	1	1	1	2	1	2	2	3	-	3	1	-
CO2	2	1	1	1	1	2	2	2	2	3	-	2	-	1
CO3	2	2	1	1	1	2	2	2	2	3	1	3	1	-
CO4	2	2	1	1	2	2	2	2	3	3	1	3	1	1
CO5	1	1	1	1	1	2	2	1	2	3	1	3	1	1
Avg	1.6	1.6	1	1	1.2	2	1.8	1.8	2.2	3	1	2.8	1	1

Course Code & Name: 19MA2104 Differential Equations and Linear Algebra

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	2	2	-	-	-	-	-	-	2	2	2
CO2	3	3	3	2	2	-	-	-	-	-	-	2	2	3
CO3	3	3	3	3	2	-	-	-	-	-	-	2	2	2
CO4	3	3	3	3	2	-	-	-	-	-	-	2	2	2
CO5	3	3	3	3	2	-	-	-	-	-	-	2	2	2
Avg	3	3	3	2.6	2	-	-	-	-	-	-	2	2	2.2

Course Code & Name: 19PH2151 Material Science

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	1	1	1	1	-	-	-	-	-	1	2	1
CO2	3	3	1	1	2	-	-	-	-	-	-	1	2	2
CO3	3	2	1	2	2	-	-	-	-	-	-	1	2	3
CO4	3	3	1	2	2	1	-	-	-	-	-	1	2	2
CO5	3	2	2	3	2	1	2	-	-	-	-	1	2	3
Avg	3	2.4	1.2	1.8	1.8	1	2	-	-	-	-	1	2	2.2

Course Code & Name: 19CY2151 Environmental Studies

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	-	-	-	-	2	3	3	2	-	-	2	-	-
CO2	2	-	-	-	-	2	3	3	2	-	-	2	-	-
CO3	2	1	1	-	-	2	3	3	2	-	-	2	-	-
CO4	2	1	2	-	-	2	3	3	2	-	-	2	-	-
CO5	2	1	2	-	-	2	3	3	2	-	-	2	-	-
Avg	2	1	1.7	-	-	1	2	3	2	-	-	2	-	-

Course Code & Name: 19CS2152 Essentials of C and C++ Programming

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	-		3	-	-	1	1	-	2	2	3	3
CO2	3	3	2	2	3	-	-	1	1	-	2	2	2	3
CO3	3	3	2	2	3	-	-	1	1	-	2	2	2	3
CO4	3	3	-	2	3	-	-	1	1	-	2	2	2	3
CO5	3	-	2	2	3	-	-	1	1	-	2	2	2	3
Avg	3	2.4	1.2	1.6	3	0	0	1	1	0	2	2	2.2	3

Course Code & Name: 19ME2154 Engineering Graphics

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	2	2	-	-	-	-	-	-	2	1	1
CO2	3	3	3	2	2	-	-	-	-	-	-	3	2	2
CO3	3	3	3	2	2	-	-	-	-	-	-	3	3	3
CO4	3	3	3	2	2	-	-	-	-	-	-	3	1	1

CO5	3	3	3	2	2	-	-	-	-	-	-	3	2	2
Avg	3	3	3	2	2	-	-	-	-	-	-	2.8	1.8	1.8

Course Code & Name: 19ME2001 Engineering Practices Laboratory

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	-	3	-	3	-	1	-	1	-	-	-	1	2
CO2														
CO3														
CO4														
CO5														
Avg	3		3		3				1				1	2

Semester – III-REGULATION - 2016

Course Code & Name: 16MA3105 Discrete Mathematics and Graph Theory

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	2	2	1	1	0	1	0	1	1	3	0	0
CO2	3	3	2	2	2	2	0	1	0	1	0	1	0	2
CO3	3	3	2	2	2	2	0	1	0	1	0	2	0	1
CO4	3	3	2	2	2	2	0	1	0	1	1	1	0	1
CO5	3	3	2	2	2	2	0	1	0	1	1	1	0	2
Avg	3	3	2	2	2	2	0	1	0	1	1	2	0	1

Course Code & Name: 16CS3201 Digital Principles and System Design

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	0	0	0	1	0	0	0	0	0	1	1	1	0

CO2	3	2	1	1	1	0	0	0	1	0	0	1	1	0
CO3	3	2	1	1	1	0	0	0	1	1	0	1	0	1
CO4	3	2	1	1	0	0	0	0	1	0	1	1	0	1
CO5	3	0	0	0	0	0	0	0	0	1	1	1	1	0
Avg	3	1	1	1	1	0	0	0	1	0	1	1	1	0

Course Code & Name: 16CS3202 Data Structures

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	0	0	2	0	0	0	0	0	1	2	3	0
CO2	3	2	1	0	1	0	0	0	0	0	0	3	2	0
CO3	3	2	0	0	3	0	0	0	0	1	0	2	0	0
CO4	3	3	1	0	0	0	0	0	0	0	1	2	0	0
CO5	3	3	0	0	0	0	0	0	0	1	1	3	1	0
Avg	3	2	0	0	1	0	0	0	0	0	1	2	1	0

Course Code & Name: 16CS3203 Software Analysis and Design

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	3	0	0	0	0	0	0	0	0	1	3	3	2
CO2	2	1	1	0	0	0	0	0	0	0	0	1	2	2
CO3	2	1	2	0	0	0	0	0	0	1	0	2	0	2
CO4	3	3	1	0	0	0	0	0	0	0	1	1	0	2
CO5	3	1	1	0	0	0	0	0	0	1	1	1	1	2
Avg	2	2	1	0	0	0	0	0	0	0	1	2	1	2

Course Code & Name: 16CS3204 Operating System

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	2	2	1	1	0	1	0	1	1	3	0	0

CO2	3	3	2	2	2	2	0	1	0	1	0	1	0	2
CO3	3	3	2	2	2	2	0	1	0	1	0	2	0	1
CO4	3	3	2	2	2	2	0	1	0	1	1	1	0	1
CO5	3	3	2	2	2	2	0	1	0	1	1	1	0	2
Avg	3	3	2	2	2	2	0	1	0	1	1	2	0	1

Course Code & Name: 16CS3001 Data Structures Laboratory

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	0	0	0	1	0	0	0	0	0	1	1	1	0
CO2	3	2	1	1	1	0	0	0	1	0	0	1	1	0
CO3	3	2	1	1	1	0	0	0	1	1	0	1	0	1
CO4	3	2	1	1	0	0	0	0	1	0	1	1	0	1
CO5	3	0	0	0	0	0	0	0	0	1	1	1	1	0
Avg	3	1	1	1	1	0	0	0	1	0	1	1	1	0

Course Code & Name: 16CS3002 Operating Systems Laboratory

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	0	0	2	0	0	0	0	0	1	2	3	0
CO2	3	2	1	0	1	0	0	0	0	0	0	3	2	0
CO3	3	2	0	0	3	0	0	0	0	1	0	2	0	0
CO4	3	3	1	0	0	0	0	0	0	0	1	2	0	0
CO5	3	3	0	0	0	0	0	0	0	1	1	3	1	0
Avg	3	2	0	0	1	0	0	0	0	0	1	2	1	0

Course Code & Name: 16CS3205 Professional Ethics

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	3	0	0	0	0	0	0	0	0	1	3	3	2

CO2	2	1	1	0	0	0	0	0	0	0	0	1	2	2
CO3	2	1	2	0	0	0	0	0	0	1	0	2	0	2
CO4	3	3	1	0	0	0	0	0	0	0	1	1	0	2
CO5	3	1	1	0	0	0	0	0	0	1	1	1	1	2
Avg	2	2	1	0	0	0	0	0	0	0	1	2	1	2

Semester – IV

Course Code & Name: 16MA4108 Probability and Queuing Theory

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	3	2	1	1	-	-	-	-	-	1	2	2	2
CO2	2	3	2	1	1	-	-	-	-	-	1	2	2	2
CO3	2	2	2	2	1	-	-	-	-	-	1	2	2	2
CO4	2	2	3	1	2	-	-	-	-	-	2	2	3	3
CO5	2	3	3	2	2	-	-	-	-	-	3	2	3	3
Avg	2	2.6	2.4	1.4	1.4	-	-	-	-	-	1.6	2	2.4	2.4

Course Code & Name: 16CS4201 Java Programming

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	0	0	3	0	0	0	0	0	2	2	1	2
CO2	3	1	3	0	3	0	0	0	1	0	0	1	1	2
CO3	3	3	2	0	3	0	0	0	0	1	0	3	0	1
CO4	1	1	3	0	0	0	0	0	1	0	1	1	0	1
CO5	3	1	1	0	0	0	0	0	0	1	1	1	1	1
Avg	3	2	2	0	2	0	0	0	0	0	1	2	1	1

Course Code & Name: 16CS4202 Microprocessors and Microcontrollers

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO	PSO
---------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-------	-------	-------	-----	-----

													1	2
CO1	3	2	1	0	2	0	0	1	0	1	1	3	1	0
CO2	3	2	2	0	1	0	0	1	0	1	0	1	0	0
CO3	3	2	1	0	3	0	0	1	0	1	0	2	1	0
CO4	3	2	3	0	2	0	0	1	0	1	1	1	1	1
CO5	3	2	3	0	1	0	0	1	0	1	1	1	1	0
Avg	3	2	2	0	2	0	0	1	0	1	1	2	1	0

Course Code & Name: 16CS4203 Database Management Systems

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	3	2	0	0	0	3	0	3	0	1	0
CO2	3	1	2	2	2	3	0	1	2	0	3	2	1	0
CO3	3	3	2	2	2	3	0	1	2	0	2	2	1	0
CO4	3	1	2	2	0	3	0	1	0	0	2	2	1	0
CO5	3	1	2	1	2	0	0	0	0	0	2	3	1	0
Avg	3	2	2	2	2	2	0	1	1	0	2	2	1	0

Course Code & Name: 16CS4204 Computer Graphics

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	1	0	2	0	0	1	0	1	1	3	1	0
CO2	3	2	2	0	1	0	0	1	0	1	0	1	0	0
CO3	3	2	1	0	3	0	0	1	0	1	0	2	1	0
CO4	3	2	3	0	2	0	0	1	0	1	1	1	1	1
CO5	3	2	3	0	1	0	0	1	0	1	1	1	1	0
Avg	3	2	2	0	2	0	0	1	0	1	1	2	1	0

Course Code & Name: 16CS4205 Fundamentals of Algorithms

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO	PSO
--------------------	------------	------------	------------	------------	------------	------------	------------	------------	------------	--------------	--------------	--------------	------------	------------

													1	2
CO1	3	1	0	0	3	0	0	0	0	0	2	2	1	2
CO2	3	1	3	0	3	0	0	0	1	0	0	1	1	2
CO3	3	1	2	0	3	0	0	0	0	1	0	3	0	1
CO4	1	1	3	0	0	0	0	0	1	0	1	1	0	1
CO5	3	1	1	0	0	0	0	0	0	1	1	1	1	1
Avg	3	1	2	0	2	0	0	0	0	0	1	2	1	1

Course Code & Name: 16CS4001 Java Programming Laboratory

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	0	0	0	1	0	0	0	0	0	1	1	1	0
CO2	3	2	1	1	1	0	0	0	1	0	0	1	1	0
CO3	3	2	1	1	1	0	0	0	1	1	0	1	0	1
CO4	3	2	1	1	0	0	0	0	1	0	1	1	0	1
CO5	3	0	0	0	0	0	0	0	0	1	1	1	1	0
Avg	3	1	1	1	1	0	0	0	1	0	1	1	1	0

Course Code & Name: 16CS4002 Database Management and Systems Laboratory

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	3	2	0	0	0	3	0	3	0	1	0
CO2	3	1	2	2	2	3	0	1	2	0	3	2	1	0
CO3	3	3	2	2	2	3	0	1	2	0	2	2	1	0
CO4	3	1	2	2	0	3	0	1	0	0	2	2	1	0
CO5	3	1	2	1	2	0	0	0	0	0	2	3	1	0
Avg	3	2	2	2	2	2	0	1	1	0	2	2	1	0

Course Code & Name: 16CS4003 Microprocessors and Microcontrollers Laboratory

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO	PSO
--------------------	------------	------------	------------	------------	------------	------------	------------	------------	------------	--------------	--------------	--------------	------------	------------

													1	2
CO1	3	0	3	0	0	0	0	0	3	0	3	0	1	0
CO2	3	0	2	0	0	3	0	1	2	0	3	0	1	0
CO3	3	0	2	0	0	3	0	1	2	0	2	0	1	0
CO4	3	0	2	0	0	3	0	1	0	0	2	0	1	0
CO5	3	0	2	0	0	0	0	0	0	0	2	0	1	0
Avg	3	0	2	0	0	2	0	1	1	0	2	0	1	0

Semester – V

Course Code & Name: 16CS5201 Computer Networks

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	1	3	3	2	0	0	0	3	0	3	0	1	0
CO2	3	1	2	2	2	3	0	1	2	0	3	2	1	0
CO3	3	2	2	2	2	3	0	1	2	0	2	2	1	0
CO4	3	1	2	2	0	3	0	1	0	0	2	2	1	0
CO5	3	1	2	1	2	0	0	0	0	0	2	3	1	0
Avg	3	1	2	2	2	2	0	1	1	0	2	2	1	0

Course Code & Name: 16CS5202 Free Open Source Software I

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1	3	2	1	0	0	2	0	0	1	1	0
CO2	3	2	1	3	2	3	0	1	2	0	0	2	1	1
CO3	3	3	1	3	2	1	0	1	2	0	0	1	1	1
CO4	3	2	1	3	0	1	0	1	0	0	0	2	1	1
CO5	3	1	1	3	2	2	0	0	2	0	0	1	1	0
Avg	3	2	1	3	2	2	0	1	2	0	0	1	1	1

Course Code & Name: 16CS5203 Computer Architecture

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO	PSO
--------------------	------------	------------	------------	------------	------------	------------	------------	------------	------------	--------------	--------------	--------------	------------	------------

													1	2
CO1	3	3	3	3	2	0	0	0	3	0	3	0	1	0
CO2	3	1	2	2	2	3	0	1	2	0	3	2	1	0
CO3	3	3	2	2	2	3	0	1	2	0	2	2	1	0
CO4	3	1	2	2	0	3	0	1	0	0	2	2	1	0
CO5	3	1	2	1	2	0	0	0	0	0	2	3	1	0
Avg	3	2	2	2	2	2	0	1	1	0	2	2	1	0

Course Code & Name: 16CS5204 Theory Of Computation

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1	3	2	1	0	0	2	0	0	1	1	0
CO2	3	2	1	3	2	3	0	1	2	0	0	2	1	1
CO3	3	3	1	3	2	1	0	1	2	0	0	1	1	1
CO4	3	2	1	3	0	1	0	1	0	0	0	2	1	1
CO5	3	1	1	3	2	2	0	0	2	0	0	1	1	0
Avg	3	2	1	3	2	2	0	1	2	0	0	1	1	1

Course Code & Name: 16CS5001 Network Laboratory

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	1	1	0	2	0	0	1	0	1	1	3	1	0
CO2	3	1	2	0	1	0	0	1	0	1	0	1	0	0
CO3	3	1	1	0	3	0	0	1	0	1	0	2	1	0
CO4	3	1	3	0	2	0	0	1	0	1	1	1	1	1
CO5	3	1	3	0	1	0	0	1	0	1	1	1	1	0
Avg	3	1	2	0	2	0	0	1	0	1	1	2	1	0

Course Code & Name: 16CS5002 Open Source Programming Laboratory

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO	PSO
--------------------	------------	------------	------------	------------	------------	------------	------------	------------	------------	--------------	--------------	--------------	------------	------------

													1	2
CO1	3	3	3	3	2	0	0	0	3	0	3	0	1	0
CO2	3	1	2	2	2	3	0	1	2	0	3	2	1	0
CO3	3	3	2	2	2	3	0	1	2	0	2	2	1	0
CO4	3	1	2	2	0	3	0	1	0	0	2	2	1	0
CO5	3	1	2	1	2	0	0	0	0	0	2	3	1	0
Avg	3	2	2	2	2	2	0	1	1	0	2	2	1	0

Course Code & Name: 16CS5301 Advanced Java Programming

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1	3	2	1	0	0	2	0	0	1	1	0
CO2	3	2	1	3	2	3	0	1	2	0	0	2	1	1
CO3	3	3	1	3	2	1	0	1	2	0	0	1	1	1
CO4	3	2	1	3	0	1	0	1	0	0	0	2	1	1
CO5	3	1	1	3	2	2	0	0	2	0	0	1	1	0
Avg	3	2	1	3	2	2	0	1	2	0	0	1	1	1

Course Code & Name: 16CS5302 Visualization Techniques

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	1	0	2	0	0	1	0	1	1	3	1	0
CO2	3	2	2	0	1	0	0	1	0	1	0	1	0	0
CO3	3	2	1	0	3	0	0	1	0	1	0	2	1	0
CO4	3	2	3	0	2	0	0	1	0	1	1	1	1	1
CO5	3	2	3	0	1	0	0	1	0	1	1	1	1	0
Avg	3	2	2	0	2	0	0	1	0	1	1	2	1	0

Course Code & Name: 16CS5303 Service Oriented Architecture

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO	PSO
--------------------	------------	------------	------------	------------	------------	------------	------------	------------	------------	--------------	--------------	--------------	------------	------------

													1	2
CO1	3	1	0	0	3	0	0	0	0	0	2	2	1	2
CO2	3	1	3	0	3	0	0	0	1	0	0	1	1	2
CO3	3	1	2	0	3	0	0	0	0	1	0	3	0	1
CO4	1	1	3	0	0	0	0	0	1	0	1	1	0	1
CO5	3	1	1	0	0	0	0	0	0	1	1	1	1	1
Avg	3	1	2	0	2	0	0	0	0	0	1	2	1	1

Course Code & Name: 16CS5304 Information Storage Management

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	0	0	3	0	0	0	0	0	2	2	1	2
CO2	3	1	3	0	3	0	0	0	1	0	0	1	1	2
CO3	3	3	2	0	3	0	0	0	0	1	0	3	0	1
CO4	1	1	3	0	0	0	0	0	1	0	1	1	0	1
CO5	3	1	1	0	0	0	0	0	0	1	1	1	1	1
Avg	3	2	2	0	2	0	0	0	0	0	1	2	1	1

Course Code & Name: 16CS5305 TCP/IP Principles and Architecture

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	0	0	0	1	0	0	0	0	0	1	1	1	0
CO2	3	2	1	1	1	0	0	0	1	0	0	1	1	0
CO3	3	2	1	1	1	0	0	0	1	1	0	1	0	1
CO4	3	2	1	1	0	0	0	0	1	0	1	1	0	1
CO5	3	0	0	0	0	0	0	0	0	1	1	1	1	0
Avg	3	1	1	1	1	0	0	0	1	0	1	1	1	0

Course Code & Name: 16CS5306 System Software

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO	PSO
--------------------	------------	------------	------------	------------	------------	------------	------------	------------	------------	--------------	--------------	--------------	------------	------------

													1	2
CO1	3	2	1	0	0	0	0	0	0	2	3	3	2	1
CO2	3	2	1	2	1	0	0	0	0	1	3	1	3	0
CO3	3	2	1	1	1	0	0	0	0	2	0	2	1	0
CO4	3	2	1	0	0	0	0	0	0	1	1	1	2	1
CO5	3	2	1	0	0	0	0	0	0	2	1	1	1	0
Avg	3	2	1	1	0	0	0	0	0	2	2	2	2	0

Semester – VI

Course Code & Name: 16CS6201 Free Open Source Software II

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	1	1	0	2	0	0	1	0	1	1	3	1	0
CO2	3	1	1	0	1	0	0	1	0	1	0	1	0	0
CO3	3	1	1	0	3	0	0	1	0	1	0	2	1	0
CO4	3	1	1	0	2	0	0	1	0	1	1	1	1	1
CO5	3	1	1	0	1	0	0	1	0	1	1	1	1	0
Avg	3	1	1	0	2	0	0	1	0	1	1	2	1	0

Course Code & Name: 16CS6202 Compiler Design

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	3	2	0	0	0	3	0	3	0	1	0
CO2	3	1	2	2	2	3	0	1	2	0	3	2	1	0
CO3	3	3	2	2	2	3	0	1	2	0	2	2	1	0
CO4	3	1	2	2	0	3	0	1	0	0	2	2	1	0
CO5	3	1	2	1	2	0	0	0	0	0	2	3	1	0
Avg	3	2	2	2	2	2	0	1	1	0	2	2	1	0

Course Code & Name: 16CS6203 Internet of Things

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO	PSO
--------------------	------------	------------	------------	------------	------------	------------	------------	------------	------------	--------------	--------------	--------------	------------	------------

													1	2
CO1	3	2	1	0	0	0	0	0	0	2	3	3	2	1
CO2	3	2	1	2	1	0	0	0	0	1	3	1	3	0
CO3	3	2	1	1	1	0	0	0	0	2	0	2	1	0
CO4	3	2	1	0	0	0	0	0	0	1	1	1	2	1
CO5	3	2	1	0	0	0	0	0	0	2	1	1	1	0
Avg	3	2	1	1	0	0	0	0	0	2	2	2	2	0

Course Code & Name: 16CS6204 Software Quality Assurance

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	1	0	2	0	0	1	0	1	1	3	1	0
CO2	3	2	1	0	1	0	0	1	0	1	0	1	0	0
CO3	3	2	1	0	3	0	0	1	0	1	0	2	1	0
CO4	3	2	1	0	2	0	0	1	0	1	1	1	1	1
CO5	3	2	1	0	1	0	0	1	0	1	1	1	1	0
Avg	3	2	1	0	2	0	0	1	0	1	1	2	1	0

Course Code & Name: 16CS6001 Open Source Programming Laboratory II

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	3	2	0	0	0	3	0	3	0	1	0
CO2	3	1	2	2	2	3	0	1	2	0	3	2	1	0
CO3	3	3	2	2	2	3	0	1	2	0	2	2	1	0
CO4	3	1	2	2	0	3	0	1	0	0	2	2	1	0
CO5	3	1	2	1	2	0	0	0	0	0	2	3	1	0
Avg	3	2	2	2	2	2	0	1	1	0	2	2	1	0

Course Code & Name: 16CS6002 Compiler Design Laboratory

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO	PSO
--------------------	------------	------------	------------	------------	------------	------------	------------	------------	------------	--------------	--------------	--------------	------------	------------

													1	2
CO1	3	3	1	0	0	0	0	0	0	2	3	3	2	1
CO2	3	3	1	2	1	0	0	0	0	1	3	1	3	0
CO3	3	3	1	1	1	0	0	0	0	2	0	2	1	0
CO4	3	3	1	0	0	0	0	0	0	1	1	1	2	1
CO5	3	3	1	0	0	0	0	0	0	2	1	1	1	0
Avg	3	3	1	1	0	0	0	0	0	2	2	2	2	0

Course Code & Name: 16CS6301 Enterprise Computing

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1	3	2	1	0	0	2	0	0	1	1	0
CO2	3	2	1	3	2	3	0	1	2	0	0	2	1	1
CO3	3	3	1	3	2	1	0	1	2	0	0	1	1	1
CO4	3	2	1	3	0	1	0	1	0	0	0	2	1	1
CO5	3	1	1	3	2	2	0	0	2	0	0	1	1	0
Avg	3	2	1	3	2	2	0	1	2	0	0	1	1	1

Course Code & Name: 16CS6302 Social Network Analysis

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	1	0	2	0	0	1	0	1	1	3	1	0
CO2	3	2	2	0	1	0	0	1	0	1	0	1	0	0
CO3	3	2	1	0	3	0	0	1	0	1	0	2	1	0
CO4	3	2	3	0	2	0	0	1	0	1	1	1	1	1
CO5	3	2	3	0	1	0	0	1	0	1	1	1	1	0
Avg	3	2	2	0	2	0	0	1	0	1	1	2	1	0

Course Code & Name: 16CS6303 Embedded Systems

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	3	2	0	0	0	3	0	3	0	1	0
CO2	3	1	2	2	2	3	0	1	2	0	3	2	1	0
CO3	3	3	2	2	2	3	0	1	2	0	2	2	1	0
CO4	3	1	2	2	0	3	0	1	0	0	2	2	1	0
CO5	3	1	2	1	2	0	0	0	0	0	2	3	1	0
Avg	3	2	2	2	2	2	0	1	1	0	2	2	1	0

Course Code & Name: 16CS6304 Total Quality Management

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	1	0	0	0	0	0	0	2	3	3	2	1
CO2	3	2	1	2	1	0	0	0	0	1	3	1	3	0
CO3	3	2	1	1	1	0	0	0	0	2	0	2	1	0
CO4	3	2	1	0	0	0	0	0	0	1	1	1	2	1
CO5	3	2	1	0	0	0	0	0	0	2	1	1	1	0
Avg	3	2	1	1	0	0	0	0	0	2	2	2	2	0

Course Code & Name: 16CS6305 Network and Routing Protocols

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	3	2	0	0	0	3	0	3	0	1	0
CO2	3	1	2	2	2	3	0	1	2	0	3	2	1	0
CO3	3	3	2	2	2	3	0	1	2	0	2	2	1	0
CO4	3	1	2	2	0	3	0	1	0	0	2	2	1	0
CO5	3	1	2	1	2	0	0	0	0	0	2	3	1	0
Avg	3	2	2	2	2	2	0	1	1	0	2	2	1	0

Course Code & Name: 16CS6306 Signals and Systems

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1	3	2	1	0	0	2	0	0	1	1	0
CO2	3	2	1	3	2	3	0	1	2	0	0	2	1	1
CO3	3	3	1	3	2	1	0	1	2	0	0	1	1	1
CO4	3	2	1	3	0	1	0	1	0	0	0	2	1	1
CO5	3	1	1	3	2	2	0	0	2	0	0	1	1	0
Avg	3	2	1	3	2	2	0	1	2	0	0	1	1	1

Course Code & Name: 16CS6401 Programming Languages

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	1	0	0	0	0	0	0	0	2	3	3	2	1
CO2	3	1	0	2	1	0	0	0	0	1	3	1	3	0
CO3	3	1	0	1	1	0	0	0	0	2	0	2	1	0
CO4	3	1	0	0	0	0	0	0	0	1	1	1	2	1
CO5	3	1	0	0	0	0	0	0	0	2	1	1	1	0
Avg	3	1	0	1	0	0	0	0	0	2	2	2	2	0

Semester – VII

Course Code & Name: 16CS7201 Cryptography and Network Security

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1	3	2	1	0	0	2	0	0	1	1	0
CO2	3	3	1	3	2	3	0	1	2	0	0	2	1	1
CO3	3	3	1	3	2	1	0	1	2	0	0	1	1	1
CO4	3	3	1	3	0	1	0	1	0	0	0	2	1	1
CO5	3	2	1	3	2	2	0	0	2	0	0	1	1	0
Avg	3	3	1	3	2	2	0	1	2	0	0	1	1	1

Course Code & Name: 16CS7202 Cloud Computing

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	1	3	3	2	0	0	0	3	0	3	0	1	0
CO2	3	1	2	2	2	3	0	1	2	0	3	2	1	0
CO3	3	1	2	2	2	3	0	1	2	0	2	2	1	0
CO4	3	1	2	2	0	3	0	1	0	0	2	2	1	0
CO5	3	1	2	1	2	0	0	0	0	0	2	3	1	0
Avg	3	1	2	2	2	2	0	1	1	0	2	2	1	0

Course Code & Name: 16CS7203 Mobile Computing

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1	3	2	1	0	0	2	0	0	1	1	0
CO2	3	2	1	3	2	3	0	1	2	0	0	2	1	1
CO3	3	3	1	3	2	1	0	1	2	0	0	1	1	1
CO4	3	2	1	3	0	1	0	1	0	0	0	2	1	1
CO5	3	1	1	3	2	2	0	0	2	0	0	1	1	0
Avg	3	2	1	3	2	2	0	1	2	0	0	1	1	1

Course Code & Name: 16CS7001 Cryptography and Network Security Laboratory

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1	1	2	0	0	0	0	0	0	1	1	0
CO2	3	2	1	1	2	0	0	1	0	0	0	2	1	1
CO3	3	3	1	1	2	0	0	1	0	0	0	1	1	1
CO4	3	2	1	1	0	0	0	1	0	0	0	2	1	1
CO5	3	1	1	1	2	0	0	0	0	0	0	1	1	0
Avg	3	2	1	1	2	0	0	1	0	0	0	1	1	1

Course Code & Name: 16CS7002 Cloud Computing Laboratory

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	0	0	0	0	0	0	0	2	3	3	2	1
CO2	3	2	0	2	1	0	0	0	0	1	3	1	3	0
CO3	3	2	0	1	1	0	0	0	0	2	0	2	1	0
CO4	3	2	0	0	0	0	0	0	0	1	1	1	2	1
CO5	3	2	0	0	0	0	0	0	0	2	1	1	1	0
Avg	3	2	0	1	0	0	0	0	0	2	2	2	2	0

Course Code & Name: 16CS7301 C# and .NET Programming

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1	0	2	0	0	0	2	0	0	1	1	0
CO2	3	2	1	0	2	0	0	1	2	0	0	2	1	1
CO3	3	3	1	0	2	0	0	1	2	0	0	1	1	1
CO4	3	2	1	0	0	0	0	1	0	0	0	2	1	1
CO5	3	1	1	0	2	0	0	0	2	0	0	1	1	0
Avg	3	2	1	0	2	0	0	1	2	0	0	1	1	1

Course Code & Name: 16CS7302 Biometrics

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	1	0	0	0	0	0	0	2	3	3	2	1
CO2	3	2	1	2	1	0	0	0	0	1	3	1	3	0
CO3	3	2	1	1	1	0	0	0	0	2	0	2	1	0
CO4	3	2	1	0	0	0	0	0	0	1	1	1	2	1
CO5	3	2	1	0	0	0	0	0	0	2	1	1	1	0
Avg	3	2	1	1	0	0	0	0	0	2	2	2	2	0

Course Code & Name: 16CS7303 E-Commerce

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1	0	1	0	0	0	0	1	3	0	1	1
CO2	2	2	1	0	1	1	0	1	0	0	3	1	3	0
CO3	3	3	1	0	1	1	0	1	0	0	0	2	1	1
CO4	1	2	1	0	0	1	0	1	0	0	1	1	2	1
CO5	3	2	1	0	0	0	0	0	0	0	1	1	1	0
Avg	2	2	1	0	1	1	0	1	0	0	2	1	2	1

Course Code & Name: 16CS7304 Wireless Sensor Networks

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	3	2	0	0	0	3	0	3	0	1	0
CO2	3	1	2	2	2	3	0	1	2	0	3	2	1	0
CO3	3	3	2	2	2	3	0	1	2	0	2	2	1	0
CO4	3	1	2	2	0	3	0	1	0	0	2	2	1	0
CO5	3	1	2	1	2	0	0	0	0	0	2	3	1	0
Avg	3	2	2	2	2	2	0	1	1	0	2	2	1	0

Course Code & Name: 16CS7305 Data Mining and Warehousing

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	1	0	0	0	0	0	0	2	3	3	2	1
CO2	3	2	1	2	1	0	0	0	0	1	3	1	3	0
CO3	3	2	1	1	1	0	0	0	0	2	0	2	1	0
CO4	3	2	1	0	0	0	0	0	0	1	1	1	2	1
CO5	3	2	1	0	0	0	0	0	0	2	1	1	1	0
Avg	3	2	1	1	0	0	0	0	0	2	2	2	2	0

Course Code & Name: 16CS7306 Digital Signal Processing

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1	0	1	0	0	0	0	1	3	0	1	1
CO2	2	2	1	0	1	1	0	1	0	0	3	1	3	0
CO3	3	3	1	0	1	1	0	1	0	0	0	2	1	1
CO4	1	2	1	0	0	1	0	1	0	0	1	1	2	1
CO5	3	2	1	0	0	0	0	0	0	0	1	1	1	0
Avg	2	2	1	0	1	1	0	1	0	0	2	1	2	1

Course Code & Name: 16CS7307 Text Mining

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	2	3	1	1	-	1	-	2	3	1	1
CO2	3	3	2	2	1	1	1	-	1	-	2	2	1	1
CO3	3	3	2	-	2	1	1	-	1	-	1	2	1	1
CO4	3	2	-	1	3	1	1	-	1	-	1	2	1	1
CO5	3	2	3	1	2	1	1	-	1	-	2	2	1	1
Avg	3	3	3	2	2	1	1	-	1	-	2	2	1	1

Course Code & Name: 16CS7308 Soft Computing

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	0	0	0	0	1	0	0	2	3	3	2	1
CO2	3	2	0	0	1	0	1	0	0	1	3	1	3	0
CO3	3	2	0	0	1	0	1	0	0	2	0	2	1	0
CO4	3	2	0	0	0	0	1	0	0	1	1	1	2	1
CO5	3	2	0	0	0	0	1	0	0	2	1	1	1	0
Avg	3	2	0	0	0	0	1	0	0	2	2	2	2	0

Course Code & Name: 16CS7309 Human Interface System Design

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	1	0	0	0	0	0	0	2	3	3	2	1
CO2	3	2	1	2	1	0	0	0	0	1	3	1	3	0
CO3	3	2	1	1	1	0	0	0	0	2	0	2	1	0
CO4	3	2	1	0	0	0	0	0	0	1	1	1	2	1
CO5	3	2	1	0	0	0	0	0	0	2	1	1	1	0
Avg	3	2	1	1	0	0	0	0	0	2	2	2	2	0

Course Code & Name: 16CS7310 Artificial Intelligence

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	3	2	0	0	0	3	0	3	0	1	0
CO2	3	1	2	2	2	3	0	1	2	0	3	2	1	0
CO3	3	3	2	2	2	3	0	1	2	0	2	2	1	0
CO4	3	1	2	2	0	3	0	1	0	0	2	2	1	0
CO5	3	1	2	1	2	0	0	0	0	0	2	3	1	0
Avg	3	2	2	2	2	2	0	1	1	0	2	2	1	0

Course Code & Name: 16CS7311 High speed Networks

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1	0	2	0	0	0	2	0	0	1	1	0
CO2	3	2	1	0	2	0	0	1	2	0	0	2	1	1
CO3	3	3	1	0	2	0	0	1	2	0	0	1	1	1
CO4	3	2	1	0	0	0	0	1	0	0	0	2	1	1
CO5	3	1	1	0	2	0	0	0	2	0	0	1	1	0
Avg	3	2	1	0	2	0	0	1	2	0	0	1	1	1

Course Code & Name: 16CS7312 Semantic Web

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	1	0	0	0	0	0	0	2	3	3	2	1
CO2	3	2	1	2	1	0	0	0	0	1	3	1	3	0
CO3	3	2	1	1	1	0	0	0	0	2	0	2	1	0
CO4	3	2	1	0	0	0	0	0	0	1	1	1	2	1
CO5	3	2	1	0	0	0	0	0	0	2	1	1	1	0
Avg	3	2	1	1	0	0	0	0	0	2	2	2	2	0

Course Code & Name: 16CS7402 Optimization Techniques

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1	0	1	0	0	0	0	1	3	0	1	1
CO2	2	2	1	0	1	1	0	1	0	0	3	1	3	0
CO3	3	3	1	0	1	1	0	1	0	0	0	2	1	1
CO4	1	2	1	0	0	1	0	1	0	0	1	1	2	1
CO5	3	2	1	0	0	0	0	0	0	0	1	1	1	0
Avg	2	2	1	0	1	1	0	1	0	0	2	1	2	1

Semester – VIII

Course Code & Name: 16CS8301 Software Project Management

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	0	0	1	0	0	0	0	1	3	0	1	1
CO2	2	2	0	0	1	1	0	1	0	0	3	1	3	0
CO3	3	3	0	0	1	1	0	1	0	0	0	2	1	1
CO4	1	2	0	0	0	1	0	1	0	0	1	1	2	1

CO5	3	2	0	0	0	0	0	0	0	0	1	1	1	0
Avg	2	2	0	0	1	1	0	1	0	0	2	1	2	1

Course Code & Name: 16CS8302 Web Technology

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1	3	2	1	0	0	2	0	0	1	1	0
CO2	3	2	1	3	2	3	0	1	2	0	0	2	1	1
CO3	3	3	1	3	2	1	0	1	2	0	0	1	1	1
CO4	3	2	1	3	0	1	0	1	0	0	0	2	1	1
CO5	3	1	1	3	2	2	0	0	2	0	0	1	1	0
Avg	3	2	1	3	2	2	0	1	2	0	0	1	1	1

Course Code & Name: 16CS8303 Pervasive Computing

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	0	3	2	1	0	0	2	0	0	1	1	0
CO2	3	2	0	3	2	3	0	1	2	0	0	2	1	1
CO3	3	3	0	3	2	1	0	1	2	0	0	1	1	1
CO4	3	2	0	3	0	1	0	1	0	0	0	2	1	1
CO5	3	1	0	3	2	2	0	0	2	0	0	1	1	0
Avg	3	2	0	3	2	2	0	1	2	0	0	1	1	1

Course Code & Name: 16CS8304 Database Security and Privacy

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1	0	1	0	0	0	0	1	3	0	1	1
CO2	2	2	1	0	1	1	0	1	0	0	3	1	3	0
CO3	3	3	1	0	1	1	0	1	0	0	0	2	1	1
CO4	1	2	1	0	0	1	0	1	0	0	1	1	2	1
CO5	3	2	1	0	0	0	0	0	0	0	1	1	1	0
Avg	2	2	1	0	1	1	0	1	0	0	2	1	2	1

Course Code & Name: 16CS8305 R Programming

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1	3	2	1	0	0	2	0	0	1	1	0
CO2	3	2	1	3	2	3	0	1	2	0	0	2	1	1
CO3	3	3	1	3	2	1	0	1	2	0	0	1	1	1
CO4	3	2	1	3	0	1	0	1	0	0	0	2	1	1
CO5	3	1	1	3	2	2	0	0	2	0	0	1	1	0
Avg	3	2	1	3	2	2	0	1	2	0	0	1	1	1

Course Code & Name: 16CS8306 Database Tuning

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	3	2	0	0	0	3	0	3	0	1	0
CO2	3	1	2	2	2	3	0	1	2	0	3	2	1	0
CO3	3	3	2	2	2	3	0	1	2	0	2	2	1	0
CO4	3	1	2	2	0	3	0	1	0	0	2	2	1	0
CO5	3	1	2	1	2	0	0	0	0	0	2	3	1	0
Avg	3	2	2	2	2	2	0	1	1	0	2	2	1	0

Course Code & Name: 16CS8307 Visual Programming

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1	3	2	1	0	0	2	0	0	1	1	0
CO2	3	2	1	3	2	3	0	1	2	0	0	2	1	1
CO3	3	3	1	3	2	1	0	1	2	0	0	1	1	1
CO4	3	2	1	3	0	1	0	1	0	0	0	2	1	1
CO5	3	1	1	3	2	2	0	0	2	0	0	1	1	0
Avg	3	2	1	3	2	2	0	1	2	0	0	1	1	1

Course Code & Name: 16CS8308 Software Testing

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	3	2	0	0	0	3	0	3	0	1	0
CO2	3	1	2	2	2	3	0	1	2	0	3	2	1	0
CO3	3	3	2	2	2	3	0	1	2	0	2	2	1	0
CO4	3	1	2	2	0	3	0	1	0	0	2	2	1	0
CO5	3	1	2	1	2	0	0	0	0	0	2	3	1	0
Avg	3	2	2	2	2	2	0	1	1	0	2	2	1	0

Course Code & Name: 16CS8309 High Performance Computing

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1	3	2	1	0	0	2	0	0	1	1	0
CO2	3	2	1	3	2	3	0	1	2	0	0	2	1	1
CO3	3	3	1	3	2	1	0	1	2	0	0	1	1	1
CO4	3	2	1	3	0	1	0	1	0	0	0	2	1	1
CO5	3	1	1	3	2	2	0	0	2	0	0	1	1	0
Avg	3	2	1	3	2	2	0	1	2	0	0	1	1	1

Course Code & Name: 16CS8310 Management Information System

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	0	3	2	0	0	0	3	0	3	0	1	2
CO2	3	1	0	2	2	3	0	1	2	0	3	2	1	2
CO3	3	3	0	2	2	3	0	1	2	0	2	2	1	2
CO4	3	1	0	2	0	3	0	1	0	0	2	2	1	0

CO5	3	1	0	1	2	0	0	0	0	0	2	3	1	0
Avg	3	2	0	2	2	2	0	1	1	0	2	2	1	1

Course Code & Name: 16CS8311 Engineering Economics

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1	3	2	1	0	0	2	0	0	1	1	0
CO2	3	2	1	3	2	3	0	1	2	0	0	2	1	1
CO3	3	3	1	3	2	1	0	1	2	0	0	1	1	1
CO4	3	2	1	3	0	1	0	1	0	0	0	2	1	1
CO5	3	1	1	3	2	2	0	0	2	0	0	1	1	0
Avg	3	2	1	3	2	2	0	1	2	0	0	1	1	1

Course Code & Name: 16CS8312 Big data Analytics

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	3	2	0	0	0	3	0	3	0	1	0
CO2	3	1	2	2	2	3	0	1	2	0	3	2	1	0
CO3	3	3	2	2	2	3	0	1	2	0	2	2	1	0
CO4	3	1	2	2	0	3	0	1	0	0	2	2	1	0
CO5	3	1	2	1	2	0	0	0	0	0	2	3	1	0
Avg	3	2	2	2	2	2	0	1	1	0	2	2	1	0

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

REGULATIONS 2019

Mapping of Course Outcome and Programme Outcome:

Year	Sem	Course code & Name	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2		
I	I	19HE1101- Technical English	1	1.4	1	1.2	1	1.4	1.2	1.2	1.8	3	1	2.2	2.4	2.4		
		19MA1101- Calculus	3	3	3	2.6	2.8	-	-	-	-	-	-	-	2	1.8	2	
		19PH1151 - Applied Physics	3	2.2	2	1.6	2	1.33 3333	-	-	-	-	-	-	1	2.4	2.4	
		19CY1151 -Chemistry for Engineers	3	2	2	2	2	1	1	-	-	-	-	-	1	1	1	
		19CS1151 - Python Programming and Practices	2	3	3	-	2	-	-	-	-	2	-	-	2	2	2	
		19EC1154- Basics of Electron devices And Electric Circuits	3	2.8	2.8	2	2	1	1						1	2	2.8	2.2
		19HE1071 - Language Competency Enhancement Course-I																
		19MC1191 – Induction Program																
	II	19HE2101 - Business English for Engineers	1.6	1.6	1	1	1.2	2	1.8	1.8	2.2	3	1	2.8	1	1		
	19MA2104 – Differential Equations	3	3	3	2.6	2	-	-	-	-	-	-	-	2	2	2.2		

		And Linear Algebra															
		19PH2151 - Material Science	3	2.4	1.2	1.8	1.8	1	2	-	-	-	-	1	2	2.2	
		19CY2151 - Environmental Studies	2	1	1.7	-	-	1	2	3	2	-	-	2	-	-	
		19CS2152 - Essentials of C and C++ Programming	3	2.4	1.2	1.6	3	0	0	1	1	0	2	2	2.2	3	
		19ME2154 – Engineering Graphics	3	3	3	2	2	-	-	-	-	-	-	2.8	1.8	1.8	
		19ME2001 - Engineering Practices	3		3		3					1				1	2
		19HE2071 - Language Competency Enhancement Course-II															

REGULATIONS 2016

Mapping of Course Outcome and Programme Outcome:

Year	Sem	Course code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	
II	III	16MA3105	Discrete Mathematics and Graph Theory	3	3	2	2	2	2	0	1	0	1	1	2	0	1	
		16CS3201	Digital Principles And System Design	3	1	1	1	1	0	0	0	1	0	1	1	1	1	0
		16CS3202	Data Structures	3	2	0	0	1	0	0	0	0	0	0	1	2	1	0

	16CS3203	Software Analysis and Design	2	2	1	0	0	0	0	0	0	0	1	2	1	2
	16CS3204	Operating System	3	3	2	2	2	2	0	1	0	1	1	2	0	1
	16CS3001	Data Structures Laboratory	3	1	1	1	1	0	0	0	1	0	1	1	1	0
	16CS3002	Operating Systems Laboratory	3	2	0	0	1	0	0	0	0	0	1	2	1	0
	16CS3205	Professional Ethics	2	2	1	0	0	0	0	0	0	0	1	2	1	2
IV	16MA4108	Probability And Queuing Theory	2	2.6	2.4	1.4	1.4	-	-	-	-	-	1.6	2	2.4	2.4
	16CS4201	Java Programming	3	2	2	0	2	0	0	0	0	0	1	2	1	1
	16CS4202	Microprocessors and Microcontrollers	3	2	2	0	2	0	0	1	0	1	1	2	1	0
	16CS4203	Database Management Systems	3	2	2	2	2	2	0	1	1	0	2	2	1	0
	16CS4204	Computer Graphics	3	2	2	0	2	0	0	1	0	1	1	2	1	0
	16CS4205	Fundamental of Algorithms	3	1	2	0	2	0	0	0	0	0	1	2	1	1
	16CS4001	Java Programming Laboratory	3	1	1	1	1	0	0	0	1	0	1	1	1	0
	16CS4002	Database Management and Systems Laboratory	3	2	2	2	2	2	0	1	1	0	2	2	1	0
	16CS4003	Microprocessors and Microcontrollers Laboratory	3	0	2	0	0	2	0	1	1	0	2	0	1	0

III	V	16CS5201	Computer Networks	3	1	2	2	2	2	0	1	1	0	2	2	1	0		
		16CS5202	Free Open Source Software I	3	2	1	3	2	2	0	1	2	0	0	1	1	1	1	
		16CS5203	Computer Architecture	3	2	2	2	2	2	0	1	1	0	2	2	1	0	0	
		16CS5204	Theory of Computation	3	2	1	3	2	2	0	1	2	0	0	1	1	1	1	
		16CS53XX	Professional Elective-I																
		16CS5001	Network Laboratory	3	1	2	0	2	0	0	1	0	1	1	2	1	0	0	
		16CS5002	Open Source Programming Laboratory	3	2	2	2	2	2	0	1	1	0	2	2	1	0	0	
16CS53XX Professional Elective - I																			
III	V	16CS5301	Advanced Java Programming	3	2	1	3	2	2	0	1	2	0	0	1	1	1	1	
		16CS5302	Visualization Techniques	3	2	2	0	2	0	0	1	0	1	1	2	1	0	0	
		16CS5303	Service Oriented Architecture	3	1	2	0	2	0	0	0	0	0	1	2	1	1	1	
		16CS5304	Information Storage Management	3	2	2	0	2	0	0	0	0	0	1	2	1	1	1	
		16CS5305	TCP/IP Principles and Architecture	3	1	1	1	1	0	0	0	1	0	1	1	1	1	0	0
		16CS5306	System Software	3	2	1	1	0	0	0	0	0	2	2	2	2	2	0	0
III	VI	16CS6201	Free Open Source Software - II	3	1	1	0	2	0	0	1	0	1	1	2	1	0	0	
		16CS6202	Compiler Design	3	2	2	2	2	2	0	1	1	0	2	2	1	0	0	
		16CS6203	Internet of Things	3	2	1	1	0	0	0	0	0	2	2	2	2	0	0	

		16XX74XX	Open Elective – II														
		16CS7001	Cryptography and Network Security Laboratory	3	2	1	1	0	0	0	0	0	2	2	2	2	0
		16CS7002	Cloud Computing Laboratory	3	2	0	1	0	0	0	0	0	2	2	2	2	0
16CS73XX Professional Elective - III																	
IV	VII	16CS7301	C# and .NET Programming	3	2	1	0	2	0	0	1	2	0	0	1	1	1
		16CS7302	Biometrics	3	2	1	1	0	0	0	0	0	2	2	2	2	0
		16CS7303	E-Commerce	2	2	1	0	1	1	0	1	0	0	2	1	2	1
		16CS7304	Wireless Sensor Networks	3	2	2	2	2	2	0	1	1	0	2	2	1	0
		16CS7305	Data Mining and Warehousing	3	2	1	1	0	0	0	0	0	2	2	2	2	0
		16CS7306	Digital Signal Processing	2	2	1	0	1	1	0	1	0	0	2	1	2	1
16CS83XX Professional Elective - IV																	
IV	VII	16CS7307	Text Mining	3	3	3	2	2	1	1	-	1	-	2	2	1	1
		16CS7308	Soft Computing	3	2	0	0	0	0	1	0	0	2	2	2	2	0
		16CS7309	Human Interface System Design	3	2	1	1	0	0	0	0	0	2	2	2	2	0
		16CS7310	Artificial Intelligence	3	2	2	2	2	2	0	1	1	0	2	2	1	0
		16CS7311	High speed Networks	3	2	1	0	2	0	0	1	2	0	0	1	1	1
		16CS7312	Semantic Web	3	2	1	1	0	0	0	0	0	2	2	2	2	0
16CSXX74XX Open Elective - II																	
IV	VII	16CS7402	Optimization Techniques	2	2	1	0	1	1	0	1	0	0	2	1	2	1

IV	VII I	16CS83XX	Professional Elective V															
		16CS83XX	Professional Elective VI															
		16CS8901	Project Work	2	2	1	0	1	1	0	1	0	0	2	1	2	1	
16CS83XX Professional Elective - V																		
IV	VII I	16CS8301	Software Project Management	2	2	0	0	1	1	0	1	0	0	2	1	2	1	
		16CS8302	Web Technology	3	2	1	3	2	2	0	1	2	0	0	1	1	1	
		16CS8303	Pervasive Computing	3	2	0	3	2	2	0	1	2	0	0	1	1	1	
		16CS8304	Database Security and Privacy	2	2	1	0	1	1	0	1	0	0	2	1	2	1	
		16CS8305	R Programming	3	2	1	3	2	2	0	1	2	0	0	1	1	1	
		16CS8306	Database Tuning	3	2	2	2	2	2	0	1	1	0	2	2	1	0	
16CS83XX Professional Elective - VI																		
IV	VII I	16CS8307	Visual Programming	3	2	1	3	2	2	0	1	2	0	0	1	1	1	
		16CS8308	Software Testing	3	2	2	2	2	2	0	1	1	0	2	2	1	0	
		16CS8309	High Performance Computing	3	2	1	3	2	2	0	1	2	0	0	1	1	1	
		16CS8310	Management Information System	3	2	0	2	2	2	0	1	1	0	2	2	1	1	
		16CS8311	Engineering Economics	3	2	1	3	2	2	0	1	2	0	0	1	1	1	
		16CS8312	Big data Analytics	3	2	2	2	2	2	0	1	1	0	2	2	1	0	

1-Low, 2-Medium, 3-High, - No Correlation



Chairman, Board of Studies

**Chairman - BoS
CSE - HiCET**



Dean - Academics

**Dean (Academics)
HiCET**