## 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 2018-2019

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 Chairman Correct April 1975

## 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 Chairman Soll Chairman

## **PROGRAM OUTCOMES (POs)**

## Engineering Graduates will be able to:

	Graduate	Descriptions
	attributes	
PO1	Engineering	Apply the knowledge of mathematics, science, engineering
	knowledge	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	Design solutions for complex engineering problems and design
	of solutions	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	Use research-based knowledge and research methods including
	investigations of	design of experiments, analysis and interpretation of data, and
	complex problems	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	Apply reasoning informed by the contextual knowledge to assess
	society	societal, health, safety, legal and cultural issues and the
		consequent responsibilities relevant to the professional
		engineering practice
PO7	Environment and	Understand the impact of the professional engineering solutions
	sustainability	in societal and environmental contexts, and demonstrate the
		knowledge of, and need for sustainable development.
PO8	Ethics	Apply ethicate shows and commit to professional ethics and
		responsibilities and norms of the engineering practice.
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PO9	Individual and team	Function effectively as an individual, and as a member or leader
-	work	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	Demonstrate knowledge and understanding of the engineering
	and finance	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.
PSO <sub>2</sub>	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.

Dean (Academics)

# **CURRICULUM**



## Hindusthan College of Engineering and Technology (An Autonomous Institution, Affiliated to Anna University, Chennai

(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**

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

#### SEMESTER I

S.No.	Course Code	Course Title	L	T	P	C	CIA	ESE	TOTAL
1	16MA1101	Engineering Mathematics I		. 1	0	4	25	75	100
2	16PH1101	Engineering Physics	3	0	0	3	25	75	100
3	16CY1101	Engineering Chemistry	3	0	0	3	25	75	100
4	16HE1101R	Essential English for Engineers  – I	3	1 .	0	4	25	75	100
5	16GE1103	Problem Solving and Python Programming		0	0	3	25	75	100
6	16EC1202	Basics of Electronics Engineering		1	0	4	25	75	100
7	16PS1001	Physical Sciences Lab - I	0	0	2	1	50	50	100
8	16GE1004	Problem Solving and Python Programming Lab	0	0	4	2	50	50	100
9	16GE1002	Engineering Practices Laboratory	0	0	4	2	50	50	100
10	16GE1003	Value Added Course I: Language Competency Enhancement Course-I		0	2	1	0	100	100
		TOTAL CREDITS		3	12	27	300	700	1000

#### SEMESTER II

S.No.	Course Code	Course Title	L	Т	P	C	CIA	ESE	TOTAL
1	16MA2102	Engineering Mathematics-II	3	3 1 0 4 25		75	100		
2	16PH2102	Physics of Materials	3	0	0	3	25	75	100
3	16CY2102	Environmental Sciences	3	0	0	3	25	75	100
4	16HE2102R	Essential English for Engineers – II	3	1	0	4	25	75	100
5	16GE2102	Engineering Graphics	2	0	4	4	25	75	100
6	16CS2202	Programming in C and C++	3	0	0	3	25	75	100
7	16PS2001	Physical Sciences Lab - II	0	0	2	1	50	50	100
8	16CS2002	Programming in C and C++ Laboratory	0	0	4	2	50	50	100
9	16GE2001	Value Added Course- II:  Language Competency Enhancement Course-II		0	2	1	0	100	100
		TOTAL CREDITS	17	2	12	25	250	650	900

## For the students admitted during the academic year 2017-2018 and onwards SEMESTER III $\,$

S.No.	Course Code	Course Title	L	Т	P	C	CIA	ESE	TOTAL
1	16MA3105	Discrete Mathematics and Graph Theory		1	0	4	25	75	100
2	16CS3201	Digital Principles and System Design		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	Fundamental 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	4	2	50	50	100
		TOTAL CREDITS	18	1	12	25	300	600	900

## For the students admitted during the academic year 2016-2017 and onwards SEMESTER $\boldsymbol{V}$

S.No.	Course Code	Course Title	L	T	P	C	CIA	ESE	TOTAL
1	16CS5201	Computer Networks		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	4	2	50	50	100
8	16CS5701	Technical Presentation		0	4	2	0	100	100
		TOTAL CREDITS		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	Т	P	C	CIA	ESE	TOTAL	
1	16CS6401	Programming Languages	3	0	0	3	25	75	100	

Credit Distribution - R2016

Semester I II III IV  $\mathbf{V}$ VIVII VIII Total Credits 27 25 24 25 25 22 18 187

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PRINCIPAL
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COMBATORE - 641 032

PROGRAM	MME CO	URSE CODE		THE COURSE	Ι	4	T	P	C
B.E.	1	6MA1101		G MATHEMATICS I O ALL BRANCHES)	3	J	1	0	4
Cou Objec	rse 2.	applications. Find curvature, Solve ordinary Familiarize the	kill to use matrix alg evolutes and envelope differential equations functions of several va	es using the concept of diff of certain types using Wron ariables which are needed in the and triple integrals	erentiationskian teo	on. chnic	que.		
Unit			Descript	ion				J	Instructiona Hours
I	(without pr Diagonaliza	es and Eigen vectoroof) - Cayley -	- Hamilton Theorem by orthogonal transf	Properties of Eigen value (excluding proof) – Ortl formation–Reduction of a	hogonal	matr	rices	_	12
П	Curvature i		dinates – Radius and oola, ellipse, cycloid, a	Centre of curvature - Circ steroid) – Envelopes - sing					12
Ш	Second and of the form	higher order line $e^{ax}$ , $x^n$ , sinax or	$cosax$ , $e^{ax}f(x)$ and $xf($	ons with constant coeffice x) where f(x) is sinbx or countions with variable co	cosbx –	Metl	hod	of	12
IV	Total differ Taylor's se - Lagrange'	ries for functions	ing implicit functions) of two variables- Maxi termined multipliers –	- Partial derivatives of come and minima of functions.					12
V	Double inte	grals in Cartesian	coordinates – Change ng surface area) – T	of order of integration – A riple integrals in Cartesia					12
			TO	OTAL INSTRUCTIONA	L HOUF	<b>LS</b>			60
	free CC come en CC CC	equencies (or Eige O2: Apply the con O3: Develop soun gineering problem O4: Identify the m O5: Computation of	en frequencies) of vibra neept of differentiation and knowledge of techn as naximum and minimum of area of a region in sin	ectors for a matrix which ation and the shapes of thes to find the radius, centre are iques in solving ordinary an values of surfaces.  In the complex way by changing the correct dimensional solid structure.	se vibration nd circle of different order of in	onal of cu ial e	mode urvatu equati	es are of ions t	any curve that model

#### **TEXT BOOKS:**

T1- Ravish R Singh, Mukul Bhatt, "Engineeing Mathematics", McGraw Hill education (India) Private Ltd., Chennai, 2017.

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

#### **REFERENCE BOOKS:**

R1-Bali N.P & Manish Goyal, "A Text book of Engineering Mathematics", 8th Edition, Laxmi Pub. Pvt. Ltd. 2011.

R2- Grewal B.S, "Higher Engineering Mathematics", 42<sup>nd</sup> Edition, Khanna Publications, Delhi, 2012.

R3- Peter V. O'Neil, "Advanced Engineering Mathematics", 7th Edition, Cengage learning, 2012.

R4-Sivarama Krishna Das P and Rukmangadachari E., "Engineering Mathematics" Vol I, Second Edition, Pearson publishing, 2011.

R5-Wylie & Barett, "Advanced Engineering Mathematics", McGraw Hill Education, 6th edition, 2003

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PROGRAMME COURSE CODE

NAME OF THE COURSE

LTPC

B.E.

16PH1101

ENGINEERING PHYSICS (COMMON TO ALL BRANCHES)

3 0 0 3

1. Illustrate the fundamental knowledge in mechanical properties of matter and thermal physics.

2. Gain knowledge about laser and their applications.

Course Objective 3. Conversant with principles of optical fiber, types and applications of optical fiber.

4. Discuss the architectural acoustics and applications of Ultrasonics.

5. Extend dual nature of matter and the Necessity of quantum mechanics to explore the behavior of sub atomic particles

Unit	Description	Instructional
	•	Hours
I	PROPERTIES OF MATTER AND THERMAL PHYSICS  Elasticity – Hooke's law – Stress-strain diagram - Relation between three modulii of elasticity (qualitative) — Poisson's ratio – Bending moment – Depression of a cantilever – Derivation of Young's modulus of the material of the beam by Uniform bending – I-shaped girder. Modes of heat transfer – Thermal conductivity – Newton's law of cooling - Lee's disc method - Conduction through compound media (series and parallel).	9
П	LASER AND APPLICATIONS  Spontaneous emission and stimulated emission – Population inversion – Pumping methods – Derivation of Einstein's coefficients (A&B) – Types of lasers – Nd:YAG laser, CO2 laser, Semiconductor lasers:(homojunction and heterojunction) – Laser Applications – Industrial applications: laser welding, laser cutting, laser drilling – Holography – Construction and reconstruction of images.	9
ш	FIBER 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) — Crucible-crucible technique for fiber fabrication — Sources (LED and LASER) and detectors (p-i-n photodiode and avalanche photodiode) for fiber optics - Fiber optical communication link —Fiber optic sensors — Temperature and displacement sensors.	9
IV	ACOUSTICS AND ULTRASONICS  Classification of sound – Weber–Fechner law – Sabine's formula (no derivation) - Absorption coefficient and its determination –Factors affecting acoustics of buildings and their remedies. Production – Magnetostrictive generator – Piezoelectric generator – Determination of velocity using acoustic grating – Non destructive testing – Ultrasonic pulse echo system.	9
V	QUANTUM PHYSICS AND APPLICATIONS Black body radiation – Planck's theory (derivation) – Compton effect experimental verification only - Matter waves – Physical significance of wave function – Schroedinger's wave equations – Time independent and time dependent wave equations – Particle in a box (One dimensional) – Scanning electron microscope – Transmission electron microscope.	9

TOTAL INSTRUCTIONAL HOURS

CO1: Enhance the fundamental knowledge in Properties of Matter and Thermal Physics.

Course Outcome CO2: Understand the advanced technology of LASER in the field of Engineering and medicine.

CO3: Exposed the fundamental knowledge of Optical fiber in the field of communication Engineering.

CO4: Understand the production of ultrasonics and its applications in NDT.

CO5: Impart the fundamental knowledge on Quantum Physics.

#### **TEXT BOOKS:**

T1 - Rajendran V, Applied Physics, Tata McGraw Hill Publishing Company Limited, New Delhi, 2011.

T2- Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, Dhanpat Rai Publications(P) Ltd., New Delhi, 2013. REFERENCE BOOKS:

R1 - Arthur Beiser "Concepts of Modern Physics" Tata McGraw Hill, New Delhi – 2010

R2 - M.N Avadhanulu and PG Kshirsagar "A Text Book of Engineering physics" S. Chand

R3 - Dr. G. Senthilkumar "Engineering Physics – I" VRB publishers Pvt Ltd., 2013

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45

PR	OGRAMME B.E.	COURSE CODE 16CY1101	NAME OF THE COURSE ENGINEERING CHEMISTRY (COMMON TO ALL BRANCHES)	L 3	T 0	P 0	C 3
<ol> <li>The student should be conversant with boiler feed water requirements, related proble water treatment techniques.</li> <li>The student should be conversant with the principles of polymer chemistry and eng applications of polymers and composites</li> <li>The student should be conversant with the principles and generation of energy in banuclear reactors, solar cells, wind mills and fuel cells.</li> <li>To acquaint the student with important concepts of spectroscopy and its application</li> <li>To acquaint the students with the basics of nano materials, their properties and apple</li> </ol>						eering eries,	
Unit			Description		I	nstruc Ho	ctional ars
I	WATER TECHNOLOGY  Hard water and soft water- Disadvantages of hard water- Hardness: types of hardness, calculations, estimation of hardness of water – EDTA method - scales and sludges – boiler corrosion – priming and foaming – caustic embrittlement; Conditioning methods of hard water – External conditioning - demineralization process- Internal conditioning - domestic water treatment: screening, sedimentation, coagulation, filtration, disinfection – chlorine – UV method; desalination: definition, reverse osmosis.						
п	POLYMER & COMPOSITES  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, Teflon – moulding of plastics (extrusion and compression); rubber: vulcanization of rubber, synthetic rubber – butyl rubber, SBR; composites: definition, types of composites – polymer matrix composites – FRP.					9	
	ENERGY SOU	URCES AND STORAGE	DEVICES				
ш	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- solar energy conversion- solar cells- wind energy. Batteries and fuel cells: Types of batteries- alkaline battery lead storage battery-nickel-cadmium battery- lithium battery- fuel cell H <sub>2</sub> -O <sub>2</sub> fuel cell applications.						
	ANALYTICA	L TECHNIQUES					
IV	Beer-Lambert's law – UV-visible spectroscopy and IR spectroscopy – principles – instrumentation (block diagram only) – estimation of iron by colorimetry – flame photometry – principle – instrumentation (block diagram only) – estimation of sodium by flame photometry – atomic absorption spectroscopy – principles – instrumentation (block diagram only) – interferences - estimation of nickel by atomic absorption spectroscopy.						).
	NANOMATEI	RIALS					
V	Nanoparticles: multi walled ca ablation – arc-	definition, carbon nanotub urbon nanotubes — synthesi discharge method; proper lications of carbon nanotub	anoparticles and bulk materials; size-dependent ples (CNT), types of carbon nano tubes – single values of carbon nanotubes: chemical vapour deposition of CNT: mechanical, electrical, thermal arrows in chemical field, medicinal field, mechanical	valled an on – lase nd optica	id er al	9	Í

TOTAL INSTRUCTIONAL HOURS

CO1: Illustration of the basic parameters of water, different water softening processes and effect of hard water in industries.

CO2: Knowledge on basic properties and application of various polymers and composites as an engineering material.

Course Outcome

CO3: Summarize the various energy sources and energy storage devices

CO4: Analyze various analytical skills in handling various machines, instruments, apart from understanding the mechanism involved.

CO5: Describe the basic properties and application of nano materials.

#### **TEXT BOOKS**

T1 - P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co., New Delhi (2015).

T2 - O.G.Palanna, "Engineering chemistry" McGraw Hill Education India (2017).

#### REFERENCES

R1 - B.Sivasankar "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, New Delhi (2008).

R2 - B.K.Sharma "Engineering Chemistry" Krishna Prakasan Media (P) Ltd., Meerut (2005).

R3 - S.S.Dara "A Text book of Engineering Chemistry" S.Chand & Co.Ltd., New Delhi (2010).

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12

PRO	GRAMME	COURSE CODE	NAME OF THE COURSE	$\mathbf{L}$	T	P	C
	B.E.  16HE1101R  ESSENTIAL ENGLISH FOR ENGINEERS – I (COMMON TO ALL BRANCHES)  1. It fulfills the necessary skills needed in today's global workplaces. 2. Student will be able to interpret and illustrate formal communication. 3. It empowers students in choosing right lexical techniques for effective presentation 4. It equips the learner to analyze and list out things in logical order 5. The learner develops the ability to create and integrate ideas in a professional way.				0	4	
Unit			Description				tructional Hours
I	Getting to know people – Introduction – Talking about jobs (Present Simple) – Talking about working conditions (Adverb of Frequency) - Talking about company history and structure (Past simple, Prepositions of Time) – Talking about company activities (Connectors of addition and contrast, Present Continuous) – Focus on language – Parts of Speech – Gerund and Infinitives – Instruction-General Vocabulary.						12
ш	Vocabulary practice – (Telephoning Leaving and taking messages) – requests and obligation – Describing trends (Adjectives and Adverbs) – Talking about company performance (present perfect and past simple, Reasons and consequences) – Reading Test Practice Describing products Dimensions, (Comparatives and Superlatives, Question formation) – Talking about product development (Sequencing words, Present continuous and going to) – Articles – Prepositions- Synonyms – Antonyms- Recommendations-Interpretation of a chart.						12
Ш	Talking about business equipment (Giving Instruction) — Letter Phrases- Writing Test Practice-Talking about facilities (Asking for and giving direction)- Presentation on a general topic -Talking about traffic and transport (making predictions)- <b>Discussion on current affairs</b> — Tenses- Present — Past-Future-Forms of verbs- Word techniques- Formation-Prefixes-Suffixes.						12
IV	after, when, about quality	until etc. – Listenin y control Conditio riting- Essay writin	ement(checking and confirming) – Talking about a config Test Practice- talking about production process – pasnal 1 (real) (Making suggestions) – Itinery- Jumble g – Checklist- Letter to Inviting Dignitaries – Accepting	ssive- Tal ed senter	king ices-		12
V	Talking about call centers, insurance and changes in working practices (future possibility/probability)-Talking about banking- Speaking Test practice – Talking about delivery services (preposition of Time)- Talking about trading (Tense review)- Talking about recruitment conditional 2 (hypothetical) – talking about job applications (indirect questions) – Reading, Writing and Listening Test – Job application Letter and Resume Writing- Permission letters.						12
			TOTAL INSTRUCTION	IAL HO	URS		60
	come CO	<ul><li>2: Interpret and illu</li><li>3: Choosing right le</li><li>4: Analyze and list</li></ul>	ent parts of speech for better usage. strate formal communication exical techniques for effective presentation. out things in logical order. rate ideas in a professional way.				

#### **TEXT BOOKS:**

- T1 Norman Whitby, Cambridge English: Business BENCHMARK Pre-intermediate to Intermediate 2<sup>nd</sup> Edition. 2014.
- T2 Ian Wood and Anne Willams. "Pass Cambridge BEC Preliminary", Cengage Learning press 2013. REFERENCE BOOKS:
- R1 Meenakshi Raman and Sangeetha Sharma. "Technical Communication-Principles and Practice", Oxford University Press, 2009.
- R2 Rizvi, Ashraf. M. Effective Technical Communication. Tata McGraw-Hill, New Delhi.
- R3 Kamalesh Sadanan "A Foundation Course for the Speakers of Tamil-Part-I &II", Orient Blackswan, 2010.

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PROGRAMM B.E.	COURSE CODE  16GE1103	NAME OF THE COURSE PROBLEM SOLVING AND PYTHON PROGRAMMING (COMMON TO ALL BRANCHES)	1. 3	T 0	P 0	C 3
Course Objectiv	2. To read 3. To deve 4. To defin 5. To use F	w the basics of algorithmic problem solving and write simple Python programs. lop Python programs with conditionals and loops. le Python functions and call them. Python data structures – lists, tuples, dictionaries. put/output with files in Python.	040 041			
Unit		Description		Tota	l Insti Hou	ructional ırs
	ALGORITHMIC PROF	BLEM SOLVING				
· I	notation (pseudocode, flo simple strategies for deve find the greatest among the	cks of algorithms (statements, state, control flow, fu w chart, programming language), algorithmic problem loping algorithms (iteration, recursion). Illustrative prolumen numbers, prime numbers, find minimum in a list.	solving,		9	
п	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; Simple algorithms and programs: exchange the values of two variables, compute Simple interest for a given amount, Factorial of a given number.  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. Illustrative programs: square root, gcd, sum an array of numbers, linear search.					
III						
IV	LISTS, TUPLES, DICT Lists: list operations, list list parameters; Tuples: to and methods; advanced selection sort, insertion so	slices, list methods, list loop, mutability, aliasing, clon uple assignment, tuple as return value; Dictionaries: op list processing -list comprehension; Illustrative p ort.	perations		9	
$\mathbf{v}^{-1}$	FILES, MODULES, PA Files and exception: text arguments, errors and exception	CKAGES files, reading and writing files, format operator; commeptions, handling exceptions, modules, packages.	and line		9	
		TOTAL INSTRCTIONAL HO	OURS		45	5
Course Outcome	CO1:Develop algorithmic CO2:Structure simple Pyt CO3:Decompose a Pytho CO4:Represent compound	ourse, students will be able to e solutions to simple computational problems thon programs for solving problems. In program into functions. It data using Python lists, tuples, dictionaries. If from/to files in Python Programs.				

CO5:Read and write data from/to files in Python Programs.

#### **TEXT BOOKS:**

T1 -Ashok Namdev Kamthane ,Amit Ashok Kamthane ," Programming and Problem solving with Python" Mc Graw Hill Education

T2-Sheetal Taneja, "Python Programming A Modular Approach With Graphics, Database, Mobile and Web Applications, PEARSON .

#### REFERENCE BOOKS:

R1 - Reema Thareja "Python Programming Using Problem Solvimg Approach "OXFORD.

R2-E. Balagurus amy, "Problem solving and Python Programming" McGraw Hill Education.

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PROGR.		SE CODE C1202	NAME OF THE COURSE BASICS OF ELECTRONICS ENGINEERING (CSE & IT)	L 3	T 1	P 0	C 4
Cou Objec	3	To explain the To explain the	e basic electronic circuits and the different components. e fundamentals of semiconductor and applications. e fundamentals of power supply circuits. e principles of digital electronics. owledge of communication engineering		×		
Unit			Description			uction lours	al
	ELECTRIC CIR	RCUIT ANAL	LYSIS				
I	techniques - Mesl	h current and lorms and RMS	<ul> <li>Series and Parallel circuits –Voltage and Current division</li> <li>Node voltage method for DC Circuits – Introduction to A</li> <li>Value – Power and Power factor – Single Phase Circuits</li> </ul>	C		15	
п	Characteristics of	f PN Junction lation. Bipolar	ES AND APPLICATIONS  Diode – Zener Diode and its Characteristics – Zener Effedunction Transistor (BJT) – CB, CE, CC Configuration acteristics.			15	
ш	Halfwave and Fu	llwave Rectifio f SCR – FET – iagram Approa	D POWER SUPPLY CIRCUITS er - Filter Types - Capacitive Filter - Configurations and MOSFET - Linear Mode & Switched Mode Power ch only)			15	

CO1: Ability to identify the electronic components
CO2: Ability to explain the characteristics of electronic devices.
CO3: Ability to understand power transistors and design power supply circuits.
CO4: Understand the basic principles of digital electronics.

#### TEXT BOOKS:

Course

Outcome

IV

 $\mathbf{V}$ 

T1 - Muthusubramanian R, Salivahanan S and Muraleedharan K A, "Basic Electrical, Electronics and Computer Engineering", Tata McGraw Hill, Second Edition, 2006.

CO5: Understand the fundamentals of Communication Engineering.

Logic Gates - Boolean Algebra - Half and Full Adders - Flip-Flops: RS, JK, T & D FF -

Types of Signals: Analog and Digital Signals - Modulation and Demodulation: Principles

of Amplitude and Frequency Modulations - Satellite and Optical Fiber communication

A/D and D/A Conversion (Dual Slope, SAR, Binary-weighted and R-2R) **FUNDAMENTALS OF COMMUNICATION ENGINEERING** 

T2 - David A. Bell, "Electronic Devices and Circuits", Prentice Hall of India, 2004.

#### REFERENCE BOOKS:

- R1 Mehta V K, "Principles of Electronics", S.Chand& Company Ltd, 1994.
- R2 Donald A Neamen, "Electronic Circuit Analysis and Design", Tata McGraw Hill, 3rd Edition, 2003.
- R3 Floyd, "Electron Devices", Pearson Asia 5th Edition, 2001.

(Block Diagram Approach only).

- R4 MSedha R.S., "Applied Electronics", S. Chand & Co., 2006.
- R5 Wayne Tomasi, "Electronic Communication Systems", Pearson Education, 3rd Edition, 2001.

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Dean (Academics)

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15

60

**PROGRAMME** B.E.

**COURSE CODE** 

16PS1001

#### NAME OF THE COURSE PHYSICAL SCIENCES LAB - I (COMMON TO ALL BRANCHES) PHYSICS LAB - I

C

Course Objective

- 1. Evaluate the particle size of micro particles and acceptance angle of fibres.
- 2. Employ instrumental method to determine Young's modulus of a beam of metals.
- 3. Apply the concept of diffraction and getting ability to calculate the wavelength of the mercury spectrum

#### Expt. **Description of the Experiments** No.

- Determination of Wavelength, and particle size using Laser 1.
- Determination of acceptance angle and numerical aperature in an optical fiber. 2.
- Determination of velocity of sound and compressibility of liquid Ultrasonic 3.
- Interferometer.
- 4. Determination of wavelength of mercury spectrum – spectrometer grating
- 5 Determination of thermal conductivity of a bad conductor - Lee's Disc method
- 6. Determination of Young's modulus by Non uniform bending method
- 7. Determination of specific resistance of a given coil of wire - Carey Foster's Bridge.
- 8. Post office box Measurement of an unknown resistance

#### TOTAL PRACTICAL HOURS

30

CO1: Point out the particle size of micro particles and acceptance angle of fibres using diode laser.

CO2: Assess the Young's modulus of a beam using non uniform bending methods.

CO3: Illustrate the concept of diffraction and getting ability to calculate the wavelength of the mercury spectrum

Course Outcome

Using spectrometer. CO4: Identify the velocity of ultrasonic's in the given liquid.

CO5: Illustrate phenomena of thermal conductivity of a bad conductor.

#### **CHEMISTRY LAB-I**

- 1. Acquire practical skills in the determination of water quality parameters.
- Course **Objective**
- 2. Acquaint the students with the determination of molecular weight of a polymer by viscometry. 3. Acquaint the students with the estimation of chemical substances using instrumental analysis techniques.

#### Expt. **Description of the Experiments** No.

- 1. Preparation of molar and normal solutions and their standardization.
- 2. Estimation of total, permanent and temporary hardness of Water by EDTA
- 3. Determination of chloride content of water sample by argentometric method.
- 4. Determination of available chlorine in bleaching powder.
- 5 Conductometric titration of strong acid vs strong base (HCl vs NaOH).
- Conductometric titration (Mixture of weak and strong acids) 6.
- 7. Conductometric precipitation titration using BaCl2 and Na2SO4
- 8. Determination of molecular weight and degree of polymerization using viscometry.
- Estimation of iron content of the water sample using spectrophotometer. (1,10 phenanthroline 9.

/ thiocyanate method).

**Total Practical Hours** 

30

Course Outcome CO1: Estimate the different types of hardness in a water sample. CO2: Determine the chloride content of water sample.

CO3: Calculate the strength of acid using conductometric titrations.

CO4: Calculate the strength of strong and weak acid using conductometric titrations.

CO5: estimate the amount of salt using conductometric precipitation titrations.



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PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16GE1004	PROBLEM SOLVING AND PYTHON PROGRAMMING	0	0	4	2
		LAB				
		(COMMON TO ALL BRANCHES)				
Course	1. To write, te	st, and debug simple Python programs.				
Objective	2. To impleme	ent Python programs with conditionals and loops.				
	3. Use functio	ns for structuring Python programs.				
	4. Represent of	compound data using Python lists, tuples, and dictionaries.				
	5. Read and w	rite data from/to files in Python.				

Ex.No			Description	Total Instructional Hours
1	Find the s	sum of	n natural numbers.	3
2	Find the s	square r	oot of a number and Exponentiation (power of a number).	3
3	Find the f	factoria	of a given number and Fibonacci series.	3
4	Find the s	simple i	nterest and compound interest.	3
5	Simple ca	alculato	r using functions.	3
6	Compute	the GC	D and LCM of two numbers.	3
7	Find whe	ther it i	s a prime number or not and to print n prime numbers.	3
8	Find max	3		
9	Linear sea	3		
10	Given Str	3		
11	Multiply	two squ	are matrices.	3
12			l selection sort.	3
13			ce command line arguments(word count).	3
14			equent words in a text read from a file.	3
15	Simulate	bouncii	ng ball using Pygame.	3
			TOTAL INSTRCTIONAL HOURS	45
Cour	Course CO1:		Write, test, and debug simple Python programs.	
Outcome CO2:		O2:	Implement Python programs with conditionals and loops.	
	C	O3:	Develop Python programs step-wise by defining functions and calling the	nem.
	C	O4:	Use Python lists, tuples, dictionaries for representing compound data.	
	C	O5:	Read and write data from/to files in Python.	

PLATFORM NEEDED: Python 3 interpreter for Windows/Linux

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PRO	GRAMME B.E.	COURSE CODE 16GE1002	NAME OF THE COURSE ENGINEERING PRACTICES LABORATORY (COMMON TO ALL BRANCHES)	L 0	T 0	P 4	C 2
Cou Objec	rse To pro	ovide exposure to the stud ivil, Mechanical, Electrica	ents with hands on experience on various basi al and Electronics Engineering.	c engine	ering	g practic	es in
		<u>G</u>	ROUP A (CIVIL & MECHANICAL)		9	T I D	
S. No		Descript	tion Of The Experiments			Total Pi Hot	
Study o	of plumbing ar UMBING WO Study on pip	ORKS:	of Residential and Industrial buildings. functions: Valves, taps, couplings, unions, red	lucers,			
2	Study of pipe	e connection requirement	s for pumps.				
3	Preparation of	of plumbing line sketches	for water supply and sewage works.				
4	Hands-on-exercise:  Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.						N.
5	Demonstrati	ion of plumbing requirem	ents of high-rise buildings.				
(B) CA	RPENTRY U	ISING POWER TOOLS	SONLY:				
1		e joints in roofs, doors, wi					
2	Hands-on-ex	xercise in wood works by	sawing, planning and cutting.				
II MEG (A) We		ENGINEERING					
1	Preparation	of arc welding of Butt joi	nts, Lap joints and Tee joints				
(B) Ma	chining:						
1	Practice on	Simple step turning and t	aper turning				
2	Practice on	Drilling Practice	$\infty$				
(C) She	eet Metal Wor	rk:				13	3
1	Practice on 1	Models- Trays, cone and	cylinder.			1.	,
DEMO (D) Sm	NSTRATION ithy	N					
20 12	>	Smithy operations: Demonstration of –	Upsetting, swaging, setting down and bending Production of hexagonal headed bolt.	5.			
Gas wel	ding			i a			

G

Foundry Tools and operations.

#### GROUP B (ELECTRICAL & ELECTRONICS)

S.No.	Description Of The Experiments	Total Practical Hours
ELECTI	RICAL ENGINEERING PRACTICES	
1	Residential house wiring using switches, fuse, indicator, lamp and energy meter.	
2	Fluorescent lamp wiring	10
3	Stair case wiring.	10
4 5	Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.  Measurement of energy using single phase energy meter.	
	RONICS ENGINEERING PRACTICES	
1	Study of Electronic components and equipments – Resistors - colour coding	
2	Measurement of DC signal - AC signal parameters (peak-peak, RMS period, frequency) using CRO.	
3	Study of logic gates AND, OR, NOT and NAND.	13
4	Soldering practice - Components Devices and Circuits - Using general purpose PCB.	
5	Measurement of average and RMS value of Half wave and Full Wave rectifiers.	
	TOTAL INSTRUCTIONAL HOURS	45
	At the end of the course the students shall be able to  CO1: Fabricate wooden components and pipe connections including plumbing wo  CO2: Fabricate simple weld joints.  CO3: Fabricate electrical and electronics circuits.	rks.
	J. J. J.	

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PR	OGRAMN	COURSE CODE	NAME OF THE COURSE	L	T	P	C
	B.E.	16GE1003	VALUE ADDED COURSE I: LANGUAGE COMPETENCY ENHANCEMENT COURSE- I (COMMON TO ALL BRANCHES)	0	0	2	1
Course Object		<ul><li>✓ To identify indi</li><li>✓ To develop Eng</li></ul>	dent language competency vidual students level of communication skills clish Vocabulary and spoken communication skills. Indamentals of English Grammar.				
Unit			Description				ictional ours
I		of Communication-1	English listening- Hearing Vs Listening- ation – Listening strategies-Sounds of English.				3
III	Reading  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.						
Ш	Speaking  Common errors in Pronunciation – Signposts in English (Role play) – Public Speaking skills – Social Phobia – Eliminating fear – Common etiquette of speaking - Debate and Discuss.						
IV			asic English Vocabulary; Parts of Speech, Noun, Verbs, and ormation and completion.	Tense	s		3
V	Communi	mmunication cation process – Word be through online and offlin	ouilding and roleplay – Exercise on English Language for the activities.	variou	S		3
			Total Instructional	Hour	S		15
	urse come	CO2: Practiced to create CO3: Introduced to gain CO4: acquired various ty	and interpret descriptive communication. information of the professional world. pes of communication and etiquette. interprets and intrapersonal skills.				
]	REFEREN	CE BOOKS:					
	1.Verbal Ab	lity and Reading Compreh	ension by Arun Sharma,9th edition,Tata Mc graw Hill				
			Lewis, – Print, 1 June 2011.				
			ren and Martin,S.CHAND Publications, 1 January 2017.				
100	4.Practical o	ourse in Spoken English by	J.K. Gangal, PHI Learning, Second edition, 1 January 2018.				

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ROGRAI	MME	COURSE CODE	NAME OF THE COURSE		L	T	P	C
B.E.		16MA2102	ENGINEERING MATHEMATICS		3	1	0	4
Cou Objec		integrals. 2. Understand analy 3. Know the basics 4. Apply Laplace tr 5. Know the effect	(COMMON TO ALL BRANCHES of vector calculus comprising gradient, div ytic functions of complex variables and confro of residues, complex integration and contouransform techniques to solve linear differentiative mathematical tools for the solutions of problems in mathematical physics	vergence, Curl Cormal mappin or integration. ial equations.	gs.		ions	that model
Unit			Description					Instructional Hours
I	Gradie Vector	integration - Green's the	Directional derivative – Irrotational and sole orem in a plane, Gauss divergence theorem a lications involving cubes and rectangular par	and Stokes' th				12
п	Analyt - conju Confor	agate harmonic functions	nann equations - sufficient conditions (excluse Construction of analytic functions (Milez, 1/z and bilinear transformation without	ne-Thompson	meth	od) -		12
ш	Complex expans	PLEX INTEGRATION ex integration – Stateme tions - Singular points – ls as contour integrals aro	nts of Cauchy's integral theorem – Taylo Residues – Cauchy's residue theorem – E und unit circle.	r's and Laur valuation of i	ent's real de	series efinite	3	12
IV	Laplace of unit - Conv	step function and impulse	ties – Transforms of derivatives and integrals function – Transform of periodic functions. It proof) – Solution of linear ODE of secusformation techniques.	Inverse Lapla	ce trai	nsform	n	12
v	PART: Format Solutio type: z	IAL DIFFERENTIAL E tion of partial differential on of standard types of fir	equations by elimination of arbitrary constants order partial differential equations of the nge's linear equation-Linear homogeneous p	form $f(p,q) =$	0, Cl	airaut	's	12
			:	Total Instruc	tional	Hou	rs	60
Out	urse come	electricity and m CO2: Test the analytic plane to another CO3: Evaluate real and CO4: Know the applica equations using CO5: Solve the engine	ent, divergence and curl of vectors useful for nagnetism. ity to construct the analytic function and traplane graphically. d complex integrals over suitable closed patherions of Laplace transform and its properties Laplace transform technique. pering problems using Partial Differential Equations	ransform comp hs or contours and to solve o	plex f	unctic	ns fr	fluid flow, om one
T1- Ltd.	,Chenna	R Singh, Mukul Bha i,2017.	tt, "Engineeing Mathematics", McGraw					

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

#### **REFERENCE BOOKS:**

R1-Bali N.P & Manish Goyal, "A Text book of Engineering Mathematics", 8th Edition, Laxmi Pub. Pvt. Ltd.

R2- Grewal B.S, "Higher Engineering Mathematics", 42nd Edition, Khanna Publications, Delhi, 2012.

R3- Peter V. O'Neil, "Advanced Engineering Mathematics", 7<sup>th</sup> Edition, Cengage learning,2012.
R4-Sivarama Krishna Das P and Rukmangadachari E., "Engineering Mathematics" Vol II, Second Edition, Pearson publishing, 2011.

R5- Wylie & Barett, "Advanced Engineering Mathematics", McGraw Hill Education, 6th edition, 2003

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	<ol> <li>Gain knowledge about conducting materials.</li> <li>Provide fundamental knowledge of semiconducting materials which is related to the engi program.</li> <li>Extend the properties of magnetic materials, applications and super conducting materials.</li> <li>Defend the various types of dielectric materials and their uses.</li> <li>Expose the students to smart materials and the basis of nano technology.</li> </ol>	
Unit	Description	Instructional Hours
I	CONDUCTING MATERIALS  Introduction – Conductors – Classical free electron theory of metals – Electrical and thermal conductivities – Wiedemann–Franz law – Lorentz number – Draw backs of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi function – Density of energy states – Carrier concentration in metals.	9
II	SEMICONDUCTING MATERIALS Introduction – Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination – compound semiconductors –direct and indirect band gap of semiconductors- derivation of carrier concentration in n-type and p-type semiconductor – variation of Fermi level with temperature and impurity concentration — Hall effect –Determination of Hall coefficient – Applications	9
III	MAGNETIC & SUPERCONDUCTING MATERIALS  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.  Superconducting Materials: Superconductivity: properties(Messiner effect, effect of magnetic field, effect of current and isotope effects) – Type I and Type II superconductors – BCS theory of superconductivity(Qualitative) - High Tc superconductors – Applications of superconductors – SQUID, cryotron, magnetic levitation.	9
IV	DIELECTRIC & COMPOSITES MATERIALS  Introduction – Electrical susceptibility – dielectric constant – polarization - electronic, ionic, orientation and space charge polarization –internal field – Claussius – Mosotti relation (derivation) – dielectric loss and dielectric breakdown (qualitative)  Introduction to composites materials – types of composites materials – polymer, metallic and ceramic matrix composites (qualitative). Application in surgery, sports equipment.	9
V	SMART MATERIALS AND NANOTECHNOLOGY  New Engineering Materials: Metallic glasses – preparation, properties and applications – shape memory alloys (SMA) – characteristics, properties of NiTi alloy applications.  Nano Materials: Synthesis - plasma arcing – Chemical vapour deposition – properties of nanoparicles and applications. – Carbon nano tubes – fabrication – pulsed laser deposition - Chemical vapour deposition - properties & applications.	9
	TOTAL INSTRUCTIONAL HOURS	45

NAME OF THE COURSE

PHYSICS OF MATERIALS

(COMMON TO ALL BRANCHES)

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PROGRAMME COURSE CODE

16PH2102

B.E.

CO1: Illustrate the electrical / thermal conductivity of conducting materials.

CO2: Understand the purpose of the acceptor or donor levels and the band gap of a semiconductor.

CO3: Interpret the basic idea behind the process of magnetism and applications of magnetic materials in every day

Course Outcome

CO4: Identify and compare the various types of dielectric polarization and dielectric breakdown.

CO5: Evaluate the properties and applications of various advanced engineering materials and develop the new ideas to synthesis Nano materials.

#### **TEXT BOOKS:**

T1 - S.O.Pillai "Solid State Physics" New Age International Publishers, New Delhi – 2011 T2- Rajendran V "Materials Science" McGraw-Hill Education" New Delhi -2016.

#### **REFERENCE BOOKS:**

R1 - William D Callister, Jr "Material Science and Engineering" John wiley and Sons, New York, 2014.

R2 - Raghavan, V. "Materials Science and Engineering – A First Course" Prentice Hall of India, New Delhi 2016.

R3 -Dr. G. Senthilkumar "Engineering Physics - II" VRB publishers Pvt Ltd., 2013

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PROGRAMME		COURSE CODE	NAME OF THE COURSE	$\mathbf{L}$	T	P	C	
B.E.		16CY2102	ENVIRONMENTAL SCIENCES (AERO, AUTO, CSE, ECE, EEE, EIE, IT, MECH, MECT)	3	0	0	3	
Course Objective	2.	To acquire kn environmental	edge on the importance of environmental education, ecosys owledge about environmental pollution – sources, effects pollution.  plement scientific, technological, economic and political so	and co	ntrol	meas	ures of	

4. To study about the natural resources, exploitation and its conservation

5. To be aware of the national and international concern for environment and its protection.

9

9

9

Unit Description Instructional Hours

#### ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY

Importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers- energy flow in the ecosystem – ecological succession processes – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

#### ENVIRONMENTAL POLLUTION

Definition – causes, effects and control measures of: Air pollution – Air pollution standards – control methods- Water pollution – Water quality parameters- Soil pollution - Marine pollution - Noise pollution - Thermal pollution - Nuclear hazards-role of an individual in prevention of pollution – pollution case studies.

#### NATURAL RESOURCES

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Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and overutilization of surface and ground water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and Desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.

#### SOCIAL ISSUES AND THE ENVIRONMENT

From unsustainable to sustainable development – urban problems related to energy- energy conversion – electrical energy calculations- environmental ethics: Issues and possible solutions – 12 Principles of green chemistry- Current Environmental issues at Country level – management of municipal sewage, municipal solid waste, Hazardous waste and Bio-medical waste – Global issues –Climatic change, Acid rain, greenhouse effect and Ozone layer depletion. Disaster management: floods, earthquake, cyclone and landslides.

16

#### HUMAN POPULATION AND THE ENVIRONMENT

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – 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 – Case studies.

9

#### **Total Instructional Hours**

45

- CO1: Understand the natural environment and its relationships with human activities.
- CO2: Characterize and analyze human impacts on the environment
- CO3: Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes

Course Outcome

- CO4: Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
- CO5: Understand and implement scientific research strategies, including collection, management, evaluation, and interpretation of environmental data.

#### **TEXT BOOKS:**

- T1- Anubha Kaushik and C. P. Kaushik, "Environmental Science and Engineering", Fourth edition, New Age International Publishers, New Delhi, 2014.
- T2 Deeksha Dave and S.S.Katewa, "Textbook of Environmental Studies", Second Edition, Cengage Learning, 2012.

#### REFERENCES:

- R1 Trivedi R.K. "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media.
- R2 G.Tyler Miller, Jr and Scott E. Spoolman"Environmental Science" Thirteenth Edition, Cengage Learning, 2010.
- R3 Gilbert M. Masters, "Introduction to Environmental Engineering and Science", 2nd edition, Pearson Education, 2004

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<b>PROGRAMME</b>		COURSE CODE	NAME OF THE COURSE	$\mathbf{L}$	T	P	C	
B.E.		16HE2102R	ESSENTIAL ENGLISH FOR ENGINEERS – II (COMMON TO ALL BRANCHES)	3	1	0	4	
Course Objective	2.	It helps the students to The student will be a It trains the student to	e learner will be introduced to global corporate culture and professional communication. nelps the students to focus on organizing professional event and documentation. e student will be able to describe the events and process in an effective way. rains the student to analyze the problems and to find solution to it. e learner will be familiar with business communication.					

Unit	Description	Instructional Hours				
<b>I</b>	Introduction- talking about teamwork- Making arrangements- Improving Communication in spoken language – Taking and leaving Voice mail messages (present Tense, Past Tense and Present Perfect) Talking about Business Hotel- (Speaking Activity) Talking about Corporate Hospitality- Formal and Informal Language – Making accepting and declining invitations (Auxiliary Verb, Countable or Uncountable Nouns) – Focus on Language – Definitions and Extended Definitions-Reading comprehension.					
п	Talking about orders – Clarity Written Language – Phone and Letter Phrases – Talking about Company Finances – Conditional 1 and 2 – Managing Cash Flow (Intention and Arrangements Conditional 1 and 2) – Talking about Brands and Marketing – Ethical Banking- Talking about Public Relations – Organizing a PR Event – Describing Duties and Responsibilities – (Future Tense and Articles) – Reported Speech – Modal Verbs and Passive, Impersonal Passive Voice-interpretation of posters or advertisements.					
Ш	Talking about relocation – Report Phrases – Talking about Similarity and difference- Giving Directions- Asking for Information and Making Suggestions – Talking about Location (Comparatives and Superlatives, Participles) – Talking about Company Performances- Describing Trends – Describing Cause and Effect – Talking about Environmental Impact – Discussing Green Issues – Language of Presentations (Adjectives and Adverbs, Determiners)- Homophones – Homonyms-Acronyms-Abbreviations- British and American words.					
IV	Talking about Health and Safety — Expressing Obligation- Discussing Regulations- Talking about personnel Problems — Passives — Talking about Problem at Work (modal Verbs, Passives)- Talking about Expenses Claims- Talking about Air Travel (Relative Pronoun, Indirect Questions) — E-mail Writing - Note completion- Transcoding.					
v	Talking about staff Benefits- Talking about Appraisal Systems (gerunds and Infinitives, Reported Speech) – Talking about Marketing Disasters – Expressing hypothetical Situations- Talking about entering Foreign Market (Conditional 3, Grammar review) – Letter for calling quotations, Replying for quotations – Placing an order and Complaint and <b>reply to a complaint</b> .					
	TOTAL INSTRUCTIONAL HOURS	60				
	come  CO1: Introduced corporate culture and professional communication. CO2: It focused on organizing a professional event and its documentation. CO3: Improved the ability to describe the events and process in an effective way CO4: Trained to analyze the problems and to find solution to it. CO5: Practiced to make business communication.					

#### **TEXT BOOKS:**

- T1 Norman Whitby, Cambridge English: Business BENCHMARK Pre-intermediate to Intermediate  $2^{nd}$  Edition. 2014.
- T2 Ian Wood and Anne Willams. "Pass Cambridge BEC Preliminary", Cengage Learning press 2013. REFERENCE BOOKS:
- R1 Communication Skills for Engineers, Sunitha Misra & C.Murali Krishna, Pearson Publishers
- R2 Technical Communication, Daniel G. Riordan, Cengage learning publishers.

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	RAMME .E.	COURSE CODE	NAME OF THE COURSE ENGINEERING GRAPHICS (COMMON TO ALL BRANCHES)	L 2	T 0	P 4	C 4
	ourse jective		for communicating the Engineering conc rmational standards related to engineering				
UNIT			DESCRIPTION				TOTAL HOURS
I	PLANE CURVES Importance of engineering drawing, drafting instruments, drawing sheets – layout and folding, Lettering and dimensioning, BIS standards and scales. Geometrical constructions, 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.					15	
111	PROJECTIONS OF POINTS, LINES AND PLANE SURFACES 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. Projection of planes (polygonal and circular surfaces) inclined to both the planes by rotating object method (First angle projections only).						15
Ш	PROJECTIONS OF SOLIDS  Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is perpendicular and inclined to one plane and objects inclined to both the planes by rotating object method.						15
IV	SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES 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.  Development of lateral surfaces of simple and sectioned solids — Prisms, pyramids, cylinder and cone.  Development of lateral surfaces of truncated solids. Intersection of solids-cylinder vs cylinder.  ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS						15

cones- combination of two solid objects in simple vertical positions.

Course Outcome At the end of the course the students will be able to:

simple position using visual ray method.

CO1: Draw the orthographic and isometric views of regular solid objects including sectional views.

TOTAL INSTRUCTIONAL HOURS

CO2: Recognize the International Standards in Engineering Drawing practices.

#### **TEXT BOOKS:**

T1. K. Venugopal, V. Prabu Raja, "Engineering Drawing, AutoCAD, Building Drawings", 5th Edition New Age International Publishers, New delhi 2016.

Isometric views and projections of simple and truncated solids such as - Prisms, pyramids, cylinders,

Free hand sketching of multiple views from a pictorial drawing. Perspective projection of solids in

T2. K.V.Natarajan, "A textbook of Engineering Graphics", Dhanalaksmi Publishers, Chennai.

#### REFERENCE BOOKS:

R1. Basant Agrawal and C.M.Agrawal, "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi 2008.

R2. K. R. Gopalakrishnan, "Engineering Drawing" (Vol. I & II), Subhas Publications, Bangalore, 1998.

R3. M.B.Shah and B.C.Rana, "Engineering Drawing", Pearson Education, India, 2005.

R4. N.S. Parthasarathy, Vela Murali, "Engineering Drawing", Oxford University press, India 2015.

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PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS2202	PROGRAMMING IN C AND C++ (COMMON TO CSE & IT)	3	0	0	3

1. To Learn and develop basics of C programming

2. To understand Object Oriented Programming concepts and basic characteristics of C++.

Course Objective

- 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
I	BASICS OF 'C' PROGRAMMING  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.  BASICS OF 'C++' PROGRAMMING	9
П	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.	10
Ш	CONSTRUCTOR AND OPERATOR OVERLOADING  Constructors - Default, Copy, Parameterized, Dynamic constructors, Default argument - Destructor Function overloading- Operator overloading-Unary, Binary - Binary operators using friend function.  INHERITANCE AND POLYMORPHISM	9
IV	Inheritance – Public, Private and Protected derivations – Single – Multiple – Multiple – Hybrid – Hierarchical – Virtual base class – abstract class – composite objects – Runtime polymorphism – virtual functions – pure virtual functions.	9
	TEMPLATES AND EXCEPTION HANDLING	
V	$Function \ and \ class \ templates \ \textbf{-} \ Exception \ handling - try-catch-throw \ paradigm - exception \ specification - terminate \ and \ Unexpected \ functions - Uncaught \ exception.$	8
	Total Instructional Hours	45
Course Outcom	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 exceptions.	on handling.

#### TEXT BOOKS

T1:E.Balagurusamy, "Programming in ANSI C", 7th Edition, McGraw-HillPublication.

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

#### REFERENCE BOOKS

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

R2:RohitKhurana, "Object Oriented Programming with C++", Vikas Publishing, 2edition.

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

R4: Robert Lafore, "Object-Oriented Programming in C++", Sams Publishing; 4th Edition.

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**PROGRAMME COURSE CODE** 

NAME OF THE COURSE PHYSICAL SCIENCES LAB - II (COMMON TO ALL BRANCHES) Т P

B.E.

16PS2001

#### PHYSICS LAB-II

Course

- 1. Evaluate the band gap of a semiconductor.
- **Objective**
- 2. Apply the concept of interference and calculate the thickness of thin wire.
- 3. Acquire the practical skills in Young's modulus by uniform bending method.

Expt. No.	Description of the Experiments
1.	Determination of Young's modulus by uniform bending method
2.	Determination of band gap of a semiconductor
3.	Determination of Coefficient of viscosity of a liquid -Poiseuille's method
4.	Determination of Dispersive power of a prism – Spectrometer
5.	Determination of thickness of a thin wire - Air wedge method
6.	Determination of Rigidity modulus - Torsion pendulum
7.	Magnetic hysteresis experiment
8.	Calibration of ammeter using potentiometer
	TOTAL PRACTICAL HOURS
	CO1: Experiment involving the physical phenomena of the Rigidity modulus of wire.

30

- CO2: Determine the band gap of a semiconductor and variation of Energy Gap ( $E_g$ ) with temperature.
- CO3: Assess the Young's modulus of a beam using non uniform bending method.

Course Outcome

- CO4: Explain the concept of interference and calculate the thickness of thin wire and other fine objects.
- CO5: Experiment provides a unique opportunity to validate Dispersive power of a prism using Spectrometer.

#### CHEMISTRY LAB - II

Acquire practical skills in the quantitative analysis of water quality parameters.

Course Objective

- Acquire practical skills in the instrumental methods for quantitative estimation of metal ion content.
- Gain knowledge in determination of rate of corrosion.

## Expt.

#### No.

#### **Description of the Experiments**

- Determination of Dissolved Oxygen in water by Winkler's method. 1.
- Estimation of alkalinity of water sample by indicator method. 2.
- Estimation of hydrochloric acid by pH metry. 3.
- Estimation of ferrous iron by Potentiometry. 4.
- Estimation of Copper by EDTA 5.
- Determination of sodium by flame photometry 6.
- Determination of corrosion rate of mild steel by weight loss method. 7.

**Total Practical Hours** 

30

CO1: Determine the level of DO in a water sample.

Course Outcome

- CO2: Identify and estimate the different types of alkalinity in water sample.
- CO3: Estimate the acidity of water sample using pH metry. CO4: Estimate the amount of copper in a brass sample.
- CO5: Determine the metal ion content using instrumental methods.

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PROGR		NAME OF THE COURSE	L	T	P	C	
В.	CODE E. 16CS2002	PROGRAMMING IN C AND C++ LABORATORY (COMMON TO CSE & IT)	0	0	4	2	
Course Objectiv	2. Be exposed to S 3. Understand the 4. Gain knowledge	the concept of Array and functions. Structures and Unions. Concepts of constructors and Inheritance. E in polymorphism pts of Class and function templates.					
No.		Description of the Experiments					
	C Programming						
1	Write a C program using Express	sions, I/O statements, branching and looping statements.					
2	Write a program in C using Arra	ay.					
3	Write a program in C using Fund	ctions.					
4	Write a program in C using Structures and Union.						
	C++ Programming						
5	Write a C++ program to implem	ent primitive data members and arrays as data members in class.					
6	Write a C++ program to implem	ent Constructors and Destructor.					
7	Write a C++ program to implem	ent Friend function and friend class.					
8	Write a C++ program to implem	ent Inheritance.					
9	Write a C++ program to implem	ent Compile time and Runtime polymorphism.					
10	Write a C++ program to implem	ent Class templates and function templates.					
		Total Pract	ical F	lour	s 4	45	
Cours Outcon	e CO2: Able to explore the co	cepts of arrays and functions. concepts of Structures and Unions. c concepts of Constructors and Inheritance.					

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CO4: Able to explore the concepts of compile time and run time polymorphism.

CO5: Able to use the concepts of Class and function templates.

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PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16GE2001	VALUE ADDED COURSE – II: LANGUAGE COMPETENCY ENHANCEMENT COURSE- II	0	0	2	1
		(COMMON TO ALL BRANCHES)				
<ul> <li>Course</li> <li>Objective</li> <li>✓ To improve communication skills and Professional Grooming.</li> <li>✓ To impart deeper knowledge of English Language and its practical application in different factorized of life.</li> <li>✓ To equip the techniques of GD, Public Speaking, debate etc.</li> </ul>						

Unit	Description					
Ι	<b>Listening</b> 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.					
П	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.					
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.					
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.					
		TOTAL INSTRUCTIONAL HOURS	15			
	urse come	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:

- Verbal Ability and Reading Comprehension by Arun Sharma,9<sup>th</sup> edition,Tata Mc graw Hill
   Word Power Made Easy by Norman Lewis,— Print, 1 June 2011.
   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.

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# **SYLLABUS**

PROGRAMME		COURSE	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. 2. 3. 4. 5.	Generalize counting Study the Boolean Create the basic kr	I theory and proportional calculus techniques that will cr g problems using mathematical induction, inclusion and algebra which is used in the Boolean logics and circuits which is applied in Computer a cepts of trees in computer engineering.	exclus	ion pr		

Unit	Description	Instructional Hours
1	MATHEMATICAL LOGIC Propositional logic - Tautology and Contradiction - Propositional equivalences - Normal forms - Principal normal forms - Theory of Inference.	12
П	COMBINATORICS  Mathematical induction — Recurrence relations — Solving linear recurrence relations — generating functions — principle of inclusion and exclusion — applications.	12
III	LATTICES AND BOOLEAN ALGEBRA Lattices – Properties of lattices – Lattices as algebraic system – Sub lattices – some special lattices – Boolean algebra – Definition and simple properties.	12
IV	GRAPHS 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
V	TREES  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

## CO1: Study the notion of mathematical thinking, mathematical proofs, and algorithmic thinking

and be able to apply them in problem solving.

Course

CO2: Solve problems using counting techniques and recurrence relations.

Outcome

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, 15<sup>th</sup> reprint, 2012.

#### **REFERENCE BOOKS:**

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

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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		<ol> <li>To study com</li> <li>To learn sync</li> <li>To understand</li> </ol>	d different methods used for the simplification of Boolean fi binational circuits. hronous sequential circuits. d asynchronous sequential circuits. fundamentals of HDL.	unctio	ns.			
Unit			Description		]		uctional ours	
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	
п	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	
ш	Flip flops - D	YNCHRONOUS SEQUENTIAL CIRCUITS lip flops - Design of synchronous sequential circuits: State diagram - State table – State linimization - 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	Introduction Full adder, N	RE DESCRIPTION LANGUAGE n to Hardware Description Language (HDL)- HDL for combinational circuits- Half adder, Multiplexer, De-multiplexer, HDL for Sequential Circuits- Flip flops, Synchronous and ous Counters, Registers.					7	
		DIGIT	TOTAL INSTRUCTIONAL AL LABORATORY: LIST OF EXPERIMENTS	HOU	RS		45	
1. Veri	fication of Bo		g 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. Desi	ign and impler	nentation of Parity g	enerator/checker.					
5. Design and implementation of Multiplexers and Demultiplexers.								
6. Design and impler		ementation of Synchronous and Asynchronous Counters.						
7. Cod	ing Combinati	onal/Sequential circ	uits using HDL.					
			TOTAL INSTRUCTIONAL	HOUI	RS		15	
			Total	(45+15	5)		60	

CO1: Simplify boolean functions using different methods.

Course

CO2: Design and implement combinational logic circuits. CO3: Design and implement various sequential logic circuits.

Outcome CO3: Design and implem 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.

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PROGRAMME COURSE CODE			NAME OF THE COURSE		T	P	C
B.E.		16CS3202	DATA STRUCTURES (CSE & IT)	3	0	0	3
Course Objective	4.	To understand the vand Binary Heap Tro To build an applicat To understand the gr	and applications of ADTs and Linked List arious non-linear data structures like binary tree, lee ion using sorting and searching raph ADT and its applications us hashing techniques.	binary sea	arch tr	ee, A	.VL,

Unit	Description	Instructional Hours							
1	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							
П	STACK AND QUEUES  Stack ADT – Queue ADT – circular queue implementation – Applications of stacks and queues.	7							
Ш	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.								
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 Outcom	obs. Shadistand the concepts of different from Emedi Data Structures free and apply it to								

- 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, "Fundamentals of Data Structures in C++", Galgotia Publications, 2007.
- R3 Y. Langsam, M. J. Augenstein and A. M. Tenenbaum, "Data Structures using C and C++", 2<sup>nd</sup> ed, Prentice-Hall of India, 2009.



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PROGRAMME	(	COURSE CODE		NAM	E OF THE C	COURSE		I	T	P	C
B.E.		16CS3203	SO	FTWARE	E ANALYSIS	AND DESIG	GN	3	0	0	3
Course Objective	2. 3. 4.	To understand to management conductor of the basics of Learn the UML dearn to map design.	cepts. detail abo of OO ana esign diag	out the requirements and of the grams.	uirement anal						

Unit	Description	Instructional Hours								
I	SOFTWARE PROCESS AND PROJECT MANAGEMENT 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								
п	REQUIREMENTS ANALYSIS AND SPECIFICATION  Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document – Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management-Classical analysis: Structured system Analysis, Petri Nets-Data Dictionary.									
Ш	UML DIAGRAMS Introduction to OOAD – Unified Process – UML diagrams – Use Case – Class Diagrams – Interaction Diagrams – State Diagrams – Activity Diagrams – Package, component and Deployment Diagrams									
IV	DESIGN PATTERNS 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								
V	CASE STUDY Case study – the Next Gen POS system, Inception -Use case Modeling – Relating Use									
	TOTAL INSTRUCTIONAL HOURS	45								
Cours Outcon	CO3: Apply the UML diagrams to understand the conceptual classes and class hierarchi	es								

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.

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PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS3204	OPERATING SYSTEMS (CSE & IT)	3	0	0	3
Course Objective	<ol> <li>Learn about Proc</li> <li>Learn various me</li> <li>Study I/O manag</li> </ol>	oncepts and Understand the structure of opera esses, Scheduling algorithms and Deadlocks. emory management schemes. ement and File systems. uted operating systems	ting system	18		

Unit		Description	Instructional hours								
1	Intro Org Gen	ERATING SYSTEMS OVERVIEW oduction –operating systems overview- Evolution of Operating System Computer System anization-Operating System Structure and Operations- System Calls, System Programs, OS eration and System Boot.  OCESS MANAGEMENT	7								
Ш	Proc Ove Sect	resses-Process Concept, Process Scheduling, Inter-process Communication; Threads-rview, Multicore Programming, Multithreading Models. Process Synchronization - Critical ion Problem, Mutex Locks, Semaphores, Monitors; CPU Scheduling and Deadlocks DRAGE MANAGEMENT	11								
III	Mai	Main Memory-Contiguous Memory Allocation, Segmentation, Paging, Virtual Memory-Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory									
IV	FILE SYSTEM IMPLEMENTATION & MASS STORAGE STRUCTURE										
v	Linu Sche	SE STUDY: LINUX  Ex system — History- Design Principles — Kernel Modules — Process Management —  Eduling — Memory Management — File Systems — Input and output — Inter-process  Eduling — Memory Management — Security- Virtualization- Basic Concepts,  TOTAL INSTRUCTIONAL HOURS	9 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 vario management techniques.  CO3: Apply and analyze the page replacement elegations with various and analyze the page replacement elegations.									

- 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 ProblemsQuickly", 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

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	RAMME 3.E.		URSE CODE 16CS3205		OF THE COURSE SSIONAL ETHICS	_	T 0	P 0	C 3
Cour Objec		and the following of the state							
Unit				Description			Ins	struct Hou	
1	HUMAN VALUES  Morals, Values and Ethics –Integrity –Work Ethic –Service Learning –Civic Virtue –Respect for Others –Living Peacefully –caring –Sharing –Honesty –Courage –Valuing Time –Cooperation –Commitment –Empathy –Self-Confidence –Character –Spirituality							9	
II	ENGINEERING ETHICS Senses of Engineering Ethics' -variety of moral issued -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							9	

Safety and risk -assessment of safety and risk -risk benefit analysis and reducing risk -the IV Three Mile Island and Chernobyl case studies. Collegiality and loyalty - respect for authority -collective bargaining -confidentiality -conflicts of interest -occupational crime -professional

**ENGINEERING AS SOCIAL EXPERIMENTATION** 

balanced outlook on law -the challenger case study SAFETY, RESPONSIBILITIES AND RIGHTS

rights -employee rights -Intellectual Property Rights (IPR) -discrimination. **GLOBAL ISSUES** 

ethical theories.

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

Engineering as experimentation -engineers as responsible experimenters -codes of ethics -a

TOTAL INSTRUCTIONAL HOURS 45

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.

Course Outcome

Ш

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 Ethics, 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 Cases|, 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.

CSE - HICET

9

PROGRAM	MME COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS3001	DATA STRUCTURES LABORATORY (CSE & IT)	0	0	4	2
Course Objectiv	ve 2. To comprehend the d	cal way of solving problem lifferent methods of organizing large amount of data nent the different data structures.				
Expt. No.	DESCRI	IPTION OF THE EXPERIMENTS				
1.	Write a C++ progra a) Create a singly linked list of integ b) Delete a given integer from the a c) Display the contents of the above list af	bove linked list.				
2.	Write a C++ progra a) Create a doubly linked list of inte b) Delete a given integer from the a c). Display the contents of the above	bove doubly linked list.				
3.	Write a C++ program that uses stack Equivalent, Implement the stack usin	operations to convert a given infix expression into its pg an array.	postfix			
4.	Write C++ programs to imit ii) doubly linked list respectively	aplement a double ended queue ADT using i) array and				
5.	Write a C++ progra a) Create a binary search tree of cha Traverse the above Binary search					
6.	Write a C++ progra a) Create a binary search tree of inte Traverse the above Binary search					
7.	a) Insertion sort b) Merge sort	ting the following sorting methods to arrange a list of in ascending order:	integer	s		
8.		iting the following sorting methods to arrange a list of in ascending order:	integer	S		
9.		ograms to perform the following searching y Search				
10	i) write a C++ p	orogram to perform the following operation:  A) Insertion into a B-tree enting Heap sort algorithm for sorting a given list of interest ascending order	tegers i	n		
11		all the functions of a dictionary (ADT) using hashing.				
12	Write C++ programs for implementing traversal b)Breadth first traversal	ng the following graph traversal algorithms: a)Depth fin	st			

CO1: Understand the appropriate data structure for a given problem.

CO2: Understand different data structures for implementing solutions to practical problems.

Course

CO3: Understand various tree operations.

Outcome

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

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PR	OGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C				
	B.E.	16002002	OPERATING SYSTEMS LABORATORY								
		16CS3002	(CSE & IT)	0	0	4	2				
	1. 2. jective 3. 4. 5.	Be familiar with im Gain knowledge in Acquire the knowle	ming and the use of filters in the UNIX environment plementation of CPU Scheduling Algorithms and fit page replacement algorithms. dge about Deadlock detection and avoidance algoriting techniques in memory management.	ile allocatio	n strat	tegies	i.				
Expt. No.		De	scription of the Experiments								
1	Basics of UNIX	X commands									
2	Shell Program										
3		e following CPU sched									
4	Implement all a.	Implement all file allocation strategies									
5	Implement Se	maphores									
6	Implement all a.	File Organization Tec Single level directo	chniques ory b. Two level c. Hierarchical d. DAG								
7	Implement Ba	nkers Algorithm for D	Pead Lock Avoidance								
8	Implement an	Algorithm for Dead L	ock Detection								
9	Implement e a a.	ll page replacement al FIFO b. LRU o									
10	Implement IPO	C using Shared memor	y.								
11	Experiments o	n fork		*							
12	Implement Pag	ging Technique of men	mory management.								
		1	<u>~</u>	AL HOUD	ıc.	840	_				
	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										
C	Cos: Co	1	hniques of memory management	Dean Aca	demic	des					

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PR	OGRAMME	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	
	1. Construct a well defined knowledge of probability and random variables. 2. Understand the concept of standard distributions which can describe the real life phenor 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 analy models.							
Unit			Description		I		ctional urs	
I	<b>PROBABILITY AND RANDOM VARIABLE</b> Definition – Axioms of Probability – Conditional Probability – Total Probability – Bayes Theorem (with out proof) -Random variable –Discrete and continuous random variables – Moment generating functions.							
П	STANDARD DISTRIBUTIONS  Discrete Distributions - Binomial, Poisson, Geometric distributions - Continuous Distributions - 12							

# RANDOM PROCESSES

distributions - covariance - correlation.

Uniform, Exponential and Normal distributions.

TWO DIMENSIONAL RANDOM VARIABLES

IV Classification - Stationary process - Markov process - Markov chains - Transition probabilities
 Limiting distributions - Poisson process - Birth and death process.

Joint distributions - discrete and continuous random variables - marginal and conditional probability

#### **QUEUEING THEORY**

Markovian models – Birth and death queueing models – Steady state results – Single and Multiple server queueing models – (M/M/1):(\omega/FCFS), (M/M/1):(N/FCFS), (M/M/C):(\omega/FCFS) and (M/M/C):(N/FCFS) – Little's formula. (Derivations excluded).

TOTAL INSTRUCTIONAL HOURS 60

12

12

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.

Course Outcome

III

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, 2<sup>nd</sup> 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.

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PROGRAMME		E	COURSE CODE		NAME OF THE COURSE				T	P	C
	B.E.		16CS4201			OGRAMMING E & IT)		3	0	0	3
4. 5.			Discuss the pact Learn input and Understand the	ckages and in d output strea e event handli	gramming langu terfaces in java p ims in java ng classes in jav in java and its ap	orogramming					
Unit					Description						uctional ours
I	Review of Language classes an	of Object, JVM	-The Java En	orogramming vironment-Pr ifier-methods	Introduction to imitive Data type- s-constructor-fine	java programming pes-variables-arrays- alize method-strings d – abstract classes.	control sta	temen	ts-		9
п	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
Ш	I/O basi fundamen	cs-read itals-Ap	plet Basics-A	input-writing n Applet Sl	g console out keleton-Simple -using instanceo	put-reading and v Applet Display Moreoff- f-native method	vriting file ethods-The	es-app HTN	let ⁄IL		9
IV	Compone Interface- Interface-	gation I entEven The Ac Using t	Event Model-Ext Class-The Class-The Class-The Delegation	ontainerEver er Interface-	nt Class-Event	t Class-The Adjustm Listener Interfaces- Listener Interface-Th ner classes.	The Action	Lister	ner	er F	9
V	FRAMES AND WINDOWS 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 INSTRUC	CTIONAL	HOUI	RS		45
	urse come	CO2: Ir CO3: D CO4: A	mplementation Develop applica Apply event han	of user define tions using ap dling classes	of Java Program ed packages and oplet class in jave to create different using frames and	interfaces a nt events in java				40	

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.

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PROGRAMME		ME	COURSE CODE	NAME OF THE COURSE	L	T	P	C		
	B.E.		16CS4202	MICROPROCESSORS AND MICROCONTROLLERS	3	0	0	3		
	ourse ective	1. 2. 3. 4. 5.	Learn the design a Study about comm Study the Archite	cture of 8086 microprocessor.  aspects of I/O and Memory Interfacing circuits.  nunication and bus interfacing.  ecture of 8051 microcontroller as of microcontroller interfacing						
Unit				Description		I	Instructional Hours			
1	Relocation - Stacks - Procedures - Macros - Interrupts and interrupt service routines - Byte and String Manipulation.									
п	8086 SYSTEM BUS STRUCTURE  8086 signals — Basic configurations — System bus timing —System design using 8086 — IO  II programming — Introduction to Multiprogramming — System Bus Structure - Multiprocessor configurations — Coprocessor, Closely coupled and loosely Coupled configurations — Introduction to advanced processors.  I/O INTERFACING									
Ш	interface - controller	– D/A ar r – Prog	nd A/D Interface - Tramming and application	cing - Parallel communication interface — Serial continuer — Keyboard /display controller — Interrupt controcations Case studies: Traffic Light control, LED distributed Alarm Controller.	oller – DMA	١	9			
IV	MICROC Architectu - Address	ure of 80		ion Registers(SFRs) - I/O Pins Ports and Circuits - In uage programming	struction se	t	9			
v	INTERFACING MICROCONTROLLER Programming 8051 Timers - Serial Port Programming - Interrupts Programming - LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor and Waveform generation									
				TOTAL INSTRUCTIONA	AL HOURS	3	4	5		
	urse come	CO2: De CO3 De CO4: De	esign I/O circuits. sign Memory Interf esign and implemen	acing circuits.  t 8051 microcontroller based systems.  acing and its programming methodologies						

- 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 - Doughlas V.Hall, "Microprocessors and Interfacing, Programming and Hardware", TMH, 2012

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PROGRAMME		COURSE CODE	NAME OF THE COURSE	L	T	P	С	
B.E.		16CS4203	DATABASE MANAGEMENT SYSTEMS	3	0	0	3	
Course Objective	2. 3.	To learn SQL at To understand to To understand to	a models, conceptualize and depict a database system using relational database design.  Tarious normal forms  The internal storage structures using different file and indencepts of transaction processing, concurrency control techniques.	xing tec	chniqi and r	ues. ecove		
***			D		Ir	stru	ctional	I

Unit	Description	Instruction: Hours
Ι	INTRODUCTION 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
II	RELATIONAL MODEL AND DATABASE DESIGN 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
Ш	DATABASE DESIGN AND NORMAL FORMS 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
IV	DATA STORAGE AND QUERY PROCESSING  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
V	TRANSACTION MANAGEMENT  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
	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	

T1- Abraham Silberschatz, Henry F. Korth and S. Sudharshan, "Database System Concepts", Sixth Edition, Tata Mc Graw Hill, 2011.

CO5: Apply various protocols and algorithms to manage the transactions and concurrency control

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.

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	RAMME	COURSE CODE		NAME OF THE COURSE	- <b>L</b>	T	P	C
ŀ	3.E.	16CS4204		COMPUTER GRAPHICS	3	0	0	3
Course Objectiv	1. 2. 3. 4. 5.	Understand the two dir Understand the three di Gain knowledge about	nensional gra imensional g illumination	devices, software and basic algo- aphics with their transformation raphics with their transformation methods, rendering and color n s and its realistic features.	s and clipping t ns and clipping	echniq	ues. iques.	
UNIT			DESCRI	PTION		INS	TOT TRUC HOU	TIONAL
I	Basic of C and Raster conversion algorithm, scan-line boundary	r scan systems, Graphic n: Points & lines, Line Circle generation algo- polygon filling, inside-	lications of ones input development develo	computer graphics, Display devices, Graphics software and st gorithms; DDA algorithm, Bre se generating algorithm; Fill ar Scan-Line fill of Curved Bo attributes, character attributes.	andards. Scan senham's line rea primitives:		9	
TII T	Basic trancoordinate viewing 1 dimension	nsformations: translations, composite transformations, pipeline and coordina	n, rotation, sations, reflectes system, llipping: poi	scaling, matrix representation, ction and shearing transformat window-to-viewport transfo nt clipping, line clipping (coh lipping & text clipping.	ion. Viewing: rmation, two		9	
ш	THREE D Three dim surfaces- l Quadratic Spline cur transforma methods.	DIMENSIONAL CONC nensional display metho Polygon tables- Plane ed surfaces, Blobby object eves and surfaces. 3D tra- tation, viewing pipeline	CEPTS  ds, Three di quations – P s, spline rep ansformation and coordi	imensional object representation Polygon meshes; Curved Lines presentations, Bezier curves and the translation, scaling and rotation mates, projection, visible surface.	and surfaces, d surfaces -B- on, composite		11	L
IV	Basic illum model, war shading, C	rn model, Surface-render	ient, diffuse ing- gouraur of light, XYZ	& COLOR MODELS reflection, specular reflection a d shading, phong shading, con f, RGB, YIQ and CMY color me	stant intensity		7	
V	ANIMATI frame syste curves – K	ON: Design of Animatic ems – motion specification	on sequences on –morphing Dragons – s	- animation function - raster ar g-tweening. REALISM: Recur space filling curves —fractals-M y tracing.	sively defined		9	
				TOTAL INSTRCTIONAL H	OURS		45	E.
Course Outcome	CO: CO: CO:	<ol> <li>To apply and understa</li> <li>To understand and dead</li> <li>To understand and rer</li> <li>To understand and dead</li> </ol>	and two dime sign three dir nember the c	nipulate graphical objects.  consional transformations and clip mensional graphics and apply the concepts for Illumination, shadir on sequences and various curves	ree dimensionang and colors to	l trans	formati	ions.
T1 T2 an R1 R2 R3 A1 R4	2. James D. d practice, 3 EFERENC 1. Jeffrey M 2. Hill F S J 3. Peter Shir K Peters, Fu	learn and Pauline Baker I. Foley, Andries Van E. Second Edition in C, Pe E BOOKS: IcConnell, "Computer Gr., "Computer Graphics" cley, Michael Ashikhmin and Robert F.S.	Dam, Steven arson Educat raphics: Theo , Maxwell M. , Michael Glo Graphics, C.	ory into Practice", Jones and Ba Jacmillan", 1990. eicher, Stephen R Marschner, Er	Computer Grap rtlett Publishers rik Reinhard, K	s, 2006 elvin S	5. Sung, ai	nd
	ر. Chair	man-Bos - HiCET	A. C.	hairman +5	Dean	(Ac	ead	mics

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PROGRAMME		COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	E. 16CS4205		FUNDAMENTALS OF ALGORITHMS		0	0	3
Course Objective	2. 3.	Become familiar v Learn greedy tech Understand backtr	m analysis techniques.  vith the different algorithm design techniques nique to solve problems acking and iterative development of algorithms nitations of Algorithm power				

Unit	Description	Instructional Hours				
I	ANALYSIS OF ALGORITHM 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				
п	BRUTE FORCE AND DIVIDE-AND-CONQUER  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					
Ш	DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE  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					
IV	BACKTRACKING AND ITERATIVE IMPROVEMENT  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				
v	P AND NP COMPLETENESS  Decision Trees -Polynomial time - Nondeterministic Algorithms and NP - Reducibility and NP completeness - NP complete Problems - Approximation Algorithms for NP- More on NP completeness					
	TOTAL INSTRUCTIONAL HOURS	45				
	come  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					

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.

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PROGRAMME COURSE CODE

16CS4001

## NAME OF THE COURSE JAVA PROGRAMMING LABORATORY (CSE & IT)

LTPC

B.E.

- 1. Be familiarized with good programming design methods
- 2. Study the basic object oriented concepts of Java

Course Objective

- 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**

- Develop Rational number class in Java. Use JavaDoc comments for documentation. Your 1. implementation should use efficient representation for a rational number, i.e. (500 / 1000) should be represented as (½).
- Develop Date class in Java similar to the one available in java.util package. Use JavaDoc comments.
- Implement Lisp-like list in Java. Write basic operations such as 'car', 'cdr', and 'cons'. If L is a 3. list [3, 0, 2, 5], L.car() returns 3, while L.cdr() returns [0,2,5].
- 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
  - 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
- 6. 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.
  - 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
- 8. 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
  - [Mini-Project] Develop a programmer's editor in Java that supports syntax highlighting,
- 11. compilation support, debugging support, etc.
- 12. Write a java program that prints the meta-data of a given table.

TOTAL PRACTICAL HOURS

45

CO1: Apply good programming design methods for program development.

CO2: Apply the different event driven programming for implementing solutions to practical problems.

Course Outcome

- 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

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**PROGRAMME** 

COURSE CODE

NAME OF THE COURSE DATABASE MANAGEMENT AND SYSTEMS LABORATORY

L T P C

B.E.

16CS4002

0 0 4 2

- 1. To learn the fundamental concepts of SQL queries.
- 2. To understand the concept of designing a database with the necessary attributes.

Course Objective

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

CO1: Design and implement a database schema for a given problem-domain. CO2: Populate and query a database

Course Outcome

CO3: Create and maintain tables using PL/SQL.

CO4: Prepare reports for maintaining databases

CO5: Utilize various constraints for managing database

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PROGI	RAMME	CO	URSECODE	NAME OF THE COURSE	L	T	P
В	B.E.		CS4003	MICROPROCESSORS AND MICROCONTROLLERS LABORATORY	0	0	4
Cour Object		1. 2. 3. 4. 5.	Write ALP for Differentiate S	concepts and features arithmetic and logical operations in 8086 and 8051 erial and Parallel Interface ent I/Os with Microprocessors th MASM			
Expt. No.			Desc	cription of the Experiments			
1.			tic and Logical				
2.				hmetic and Matrix operations.			
3.	Floating	g poin	t operations, str	ing manipulations, sorting and searching			
4.	Counters	s and '	Time Delay				
5.	Traffic li	ight c		oherals and Interfacing Experiments			
6.	Stepper						
7.	Key boar	rd and	l Display				
8.	Serial in	terfac	e and Parallel ir	aterface			
9.	A/D and	D/A i	nterface and W	aveform Generation			
10.	Basic ari	ithmet	8051	Experiments using kits and MASM operations.			
11.	Square at	nd Cu	be program, Fin	d 2"s complement of a number			
12.	Unpacke	d BCI	O to ASCII				
				TOTAL PRACTICAL HOURS		45	
Course Outcome	CO2: CO3: CO4:	Interfa Gener Execu	ace different I/C rate waveforms ite Programs in	nes for fixed and Floating Point and Arithmetic Os with processor using Microprocessors. 8051 e between simulator and Emulator			

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# **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	2. 3. 4.	Be familiar with the Be expose to the red Learn the flow contr	sion of network functionalities into layers. components required to build different types of net- quired functionality at each layer rol and congestion control algorithms different applications that use computer networks	works			

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
Ш	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
<u>(,0</u>	CO1: Understand the components required to build different types of networks a media access control  Course Outcome  CO2: Understand the data communication system and the purpose of layered are CO3: Understand the concepts of Routing methods and Subnetting	

T1: Larry L. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach", Fifth Kaufmann Publishers, 2011.

CO4: Apply the Congestion control mechanism and Connection methods

CO5: Understand protocols such as SMTP, HTTP, POP3, DNS for various application

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.

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PROGRAM	<b>IME</b>	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. 2. 3. 4. 5.	source software (FOSS) The practical objective of project in order to contri Students will learn some set up their own FOSS p Students will learn some	overview of the historical and modern context and ocommunities and associated software projects. of the course is to teach students how they can begin bute to and improve aspects of the software that they important FOSS tools and techniques for contribut rojects.  Important FOSS versions and its working in real time important FOSS programming language.	n to par feel ar ing to p	rticipate re wron projects	e in a Fo	OSS
Unit			Description	Ins	tructio	nal Ho	urs
T	Introducti Sources— hardware Kernel Me	Application of Open Source -Open source operating sy ode and user mode – Pro-	leed of Open Sources – Advantages of Open ces. List of open source software and open source setems: LINUX: Introduction – General Overview – cess – Advanced Concepts – Scheduling – Development with Linux.		:	8	
П	OPEN SO MySQL: I SQL prog Sorting Q	DURCE DATABASE Introduction – Setting up a grams – Record selection T	account – Starting, terminating and writing your own echnology – Working with strings – Date and Time- Summary – Working with metadata – Using		1	0	
Ш	PHP: Intro types - or regular ex LDAP - F	perators – Statements – Fu pression – File handling a PHP Connectivity – Sendi – Security – Templates. ca	n web environment – variables – constants – data inctions – Arrays – OOP – String Manipulation and nd data storage – PHP and SQL database – PHP and ng and receiving E-mails – Debugging and error		.1	.0	
IV	Syntax ar Tuples – Exception	nd Style – Python Objects Dictionaries – Conditional	s – Numbers – Sequences – Strings – Lists and is and Loops – Files – Input and Output – Errors and – Classes and OOP – Execution Environment.	N 10 10 10 10 10 10 10 10 10 10 10 10 10	1	10	
V	Persistence Object- O	ce options in python-DBM	A Files-Pickled Objects-Shelve Files-The ZODB tabase Interfaces- ORMs: Object Relational		N	7	
		TOTAL I	NSTRCTIONAL HOURS		4	15	
Course Outcome	CC	of software.  O2: Understand and apply to in connection with reconstand the scripts with various dynamic od: Understand the notions	ts of open-source software and apply the procedure to it the concepts of SQL/MYSQL to gather information using cord sequences and basics of PHP, SQL database and apply in connection webpage development. It is of python programming and apply the knowledge of the environment development.	ng own jing the o	program database mming i	es n	

T1.Remy Card, Eric Dumas and Frank Mevel, "The Linux Kernel Book", Wiley Publications, 2003 T2.Steve Suchring, "MySQL Bible", John Wiley, 2002

CO5: Understand the concepts of various python databases, objects and apply them in managing files

T3.Mark Lutz, "Programming Python 4<sup>th</sup> Edition", O'Reilly Publication, 2010

# REFERENCE BOOKS:

- R1- Rasmus Lerdorf and Levin Tatroe, "Programming PHP", O'Reilly, 2002
- R2- Wesley J. Chun, "Core Phython Programming", Prentice Hall, 2001

and object viewers

R3- Steven Holzner, "PHP: The Complete Reference", 2nd Edition, Tata McGraw-Hill

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PROGRAMME	COURSE CODE	NAME OF THE COURSE	$\mathbf{L}$	T	P	C	
B.E.	16CS5203	COMPUTER ARCHITECTURE	3	0	0	3	
	techniques.	d deep knowledge of contemporary compute of advanced hardware-based techniques for sm.			sues and		
Objective	<ol><li>Give students ability to apply the learned knowledge to conduct computer architecture research using performance simulators.</li></ol>						
	4. Give the students ability t	to learned knowledge to work in various com	puter cor	nponen	ts.		

Give the student about the wide knowledge about the current system working with the existing mechanisms.

Unit	Description	Total Instructional
	INTEROPLICATION & INCREMENTATIONS	Hours
1	INTRODUCTION & INSTRUCTIONS  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
П	COMPUTER ARITHMETIC  The Arithmetic and Logic Unit (ALU) - Integer Representation - Integer Arithmetic - Floating-Point Representation - Floating-Point Arithmetic	8
Ш	PROCESSOR AND CONTROL UNIT  Basic MIPS implementation – Building datapath – Control Implementation scheme – Pipelining –Pipelined datapath and control – Handling Data hazards & Control hazards – Exceptions	10
IV	PARALLELISM Instruction-level-parallelism – Parallel processing challenges – Flynn's classification – Hardwaremultithreading – Multicore processors MEMORY AND I/O SYSTEMS	9
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 INSTRCTIONAL 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	73

# **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. Varanesic 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.

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PROGRAMME B.E.	COURSE CODE 16CS5204	NAME OF THE COURSE THEORY OF COMPUTATION (CSE & IT)	L 3	T 0	P 0	C 3
Course Objective	<ol> <li>Understand about Fi</li> <li>Learn Regular express</li> <li>Understand the varied</li> <li>Expose the Turing M</li> </ol>	essions ous types of Grammars and Pushdown Automata				

5. Understand about Decidability and Un-decidability of various problems.

Unit		Description	Instructional Hours						
1	Introduc – Finite	AUTOMATA  tion- Basic Mathematical Notation and techniques- Finite State systems – Basic Definitions Automaton – DFA & NDFA – Finite Automaton with €- moves- Equivalence of DFA and FA to DFA conversion-Applications of finite automata.	9						
П	Regular Regular DFA	LAR EXPRESSIONS  Languages- Regular Expression- Converting Regular Expression to FA- Converting FA to Expression - Equivalence of finite Automaton and regular expressions – Minimization of Pumping Lemma for Regular sets – Problems based on Pumping Lemma.  MARS AND PUSHDOWN AUTOMATA	9						
Ш	Chomsk gramma Automa Normal	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.							
IV	TURIN Definition Turing 1 - Partial	TURING MACHINE  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.							
V	Undecid Recursi Definiti	COMPUTATIONAL COMPLEXITY 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							
		TOTAL INSTRUCTIONAL HOURS	45						
	urse come	CO1: Understand the finite state machine and to check given regular expression is regular of 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

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PROGRAMME		COURSE CODE	NAME OF THE COURSE	L	$\mathbf{T}$	P			
F	3.E.	16CS5001	NETWORKS LABORATORY (CSE & IT)	0	0	4			
Course Outcome	2. 3. 4.	Use simulation tools. Implement the various protocols. Analyse the performance of the panalyze various routing algorithm. Analyze various real time proble	protocols in different layers. ms.						
Expt. No.		Description	of the Experiments						
1.	Implemen	tation of Stop and Wait Protocol	and Sliding Window Protocol						
2.	Study of	Socket Programming and Client -	- Server model						
3.	Write a co	rite a code simulating ARP /RARP protocols							
4.	Write a co	ode simulating PING and TRACE	EROUTE commands						
5.	Create a s	ocket for HTTP for web page up	load and download						
6.	Write a pr	ogram to implement RPC (Remo	te Procedure Call)						
7.	Implemen	ntation of Subnetting							
8.	a. Echo cl b. Chat c. File Tra								
9.	d. DNS e. SNMP f. File Tra								
10.	optimum a	case study about the different rot and economical during data transf . Link State routing b. Flooding c. Distance vector	uting algorithms to select the network p fer.	ath with its	3.0				
			Total Pract	ical Hours	3	45			
Course Outcom	CO2: CO3: CO4:	Use simulation tools Implement the various protocols Analyze the performance of the p Analyze various routing algorith	protocols in different layers ms						

# LAB EQUIPMENT FOR A BATCH OF 30 STUDENTS:

CO5: Learn about the network simulation

# **SOFTWARE**

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

**HARDWARE** 

Standalone desktops:

30 Nos

REFERENCE: spoken-tutorial.org

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

Course Objective

- Common open source software licenses, open source project structure, distributed team software development, and current events in the open source world
- 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

File handling **Exception handling** 

Database connectivity

- nning Python: some simple exercise e.g. control flow statement, string manipulation and function
- To implement Python's data structures lists, dictionaries, and tuples in detail.

To implement the following the concept using PYTHON

File handling **Exception handling** Database connectivity

To implement PYTHON GUI program using Django

#### TOTAL INSTRCTIONAL HOURS

45

CO1: Understand the concepts of open-source software and learn to install the kernel and microkernel 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

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**PROGRAMME COURSE CODE** NAME OF THE COURSE B.E. 16CS5701 TECHNICAL PRESENTATION

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To encourage the students to study advanced engineering developments.

To prepare and present technical reports.

Course Objective To encourage the students to use various teaching aids such as over head projectors, power point presentation and demonstrative model.

To promote and develop presentation skills and import a knowledgeable society.

5. To set the stage for future recruitment by potential employers.

Expt. No.

1.

## 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.

**Total Practical Hours** 

45

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

CO1: Ability to review, prepare and present technological developments

Course Outcome

CO2: Ability to face the placement interviews CO3: Develops Communication Confidence skills

CO4: Builds Confidence

CO5: Utilize Technical Resources

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PROGRAM	<b>IME</b>	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.		16CS6201	FREE OPEN SOURCE SOFTWARE - II	3	0	0	3
Course Objective		(FOSS) 2. Gain Kno 3. To learn 4. Study im	an overview of the historical and modern context of free owledge about Web server and Web Services about NS2 Simulator portant FOSS tools and techniques knowledge about Python Programming	and ope	n soui		
Unit Description						99	Instructional Hours
I	WEB SERVICE 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						
ш	NS2						9
<b>m</b>	Introducing	N REGULAR E ng Regular Exp nce of Regular E	pressions-Regular Expressions with Python-Grouping	-Look 1	Aroun	ıd-	9
IV		Processing and	Python - Accessing Text Corpora and Lexical Resources- rograms-Categorizing and Tagging Words	Process	ing Ra	aw	9
$\mathbf{v}$		to Classify To	ext-Extracting Information from Text-Analyzing Sent ture-Analyzing the Meaning of Sentences-Managing Lin			re-	9
			TOTAL INSTRUCTION	ONAL I	IOUI	RS	45
Cours Outcor	CO2 se CO2 me CO4	Understand to 2: Understand to 3: Understand ro 4: Understand Incategorization	ext classification and information extraction to analyze the	e Spark imulator ng of reg ss raw te	for pagular e	acket expres	forwarding ssions.

- 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"

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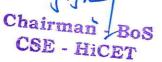
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GRAMME	COURSE CODE	NAME OF THE COURSE	L T	P	C				
B.E.	16CS6202	COMPILER DESIGN	3 0	0	3				
Course Objective	<ol> <li>Learn the design principles of a Compiler.</li> <li>To introduce the various techniques involved in the translation of source programs into object programs by a compiler</li> <li>Learn the various parsing techniques and different levels of translation</li> <li>To understand the inner working of a compiler using the various data structures used in the translation process</li> <li>Learn how to optimize and effectively generate machine codes</li> </ol>								
Unit		Description			istructiona Hours				
INTD	NTRODUCTION TO COMPILERS								
I Introd Langu Group	uction - Analysis of the s tage processors -The Phase sing of Phases-Compiler Cor	ource program -Translators-Compilations of Compiler-Errors Encountered in	n and Interpretation Different Phases-Th	1- e	5				
LEXICAL ANALYSIS  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									
SYNT Synta: Gener LR Pa	SYNTAX ANALYSIS  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								
SYNT Syntax Syntax IV transla Expre Organ	AX DIRECTED TRANSL directed Definitions-S-attr Tree- Bottom-up and To ator - Type Systems-Spec ssions-Type Conversions.RU ization-Storage Allocation-A	ATION & RUN TIME ENVIRONME ibuted definitions - L-attributed definition p-down translation - type checking - ification of a simple type checker-EUN-TIME ENVIRONMENT: Source Landaccess to non-local names-Parameter Pas	ons -Construction of Design of predictive quivalence of Type guage Issues-Storage	e e e	12				
Dynamic Storage Allocation  CODE OPTIMIZATION AND CODE GENERATION  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									
		Total	Instructional Hour	S	45				
Course Outcome	CO2: Able to design and CO3: Able to apply various	various techniques involved in translation implement a prototype compiler us code optimization techniques us code generation techniques	í						

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.
- 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, Ceriel J.H Jacobs, Koen G Langendoen, Modern Compiler design, Dreamtech.





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PROGRAMME		COURSE CODE	NAME OF THE COURSE	$\mathbf{L}$	T	M	P	C		
B.E.		16CS6203	INTERNET OF THINGS	3	0		0	3		
Cou Objec		4. Understand the va								
Unit			Description					Instructional Hours		
I	Definit commu Networ	FRODUCTION TO INTERNET OF THINGS finition and Characteristics of IoT, Physical Design of IoT-n IoT Protocols, IoT munication models, Iot Communication APIs IoT enabled Technologies-Wireless Sensor tworks, Cloud Computing, Big data analytics, Communication protocols, Embedded stems, IoT Levels and Templates.								
п	Overvi and wo board-l	ROTOTYPING 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 oard-Programming for IOT-Reading from Sensors, Communication: Connecting microcontroller with mobile devices-communication through bluetooth, wifi, Ethernet.								
Ш	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.									
IV	Device Techno		Registering a device, De-register a device, Qu Foundation Device Management Service, Inte					8		
v	Introdu	OUD SERVICES FOR IOT  oduction to Cloud Storage models and communication APIs Web server -Web server for IoT, and for IoT- Create a unmanned supermarket for a common man to procure items using IoT cepts.								
			TOTAL INSTRUC	CTIONAI	НО	UR	S	45		
Out	ourse come	CO3: Explore the IOT CO4: Develop schemes	e IOT using appropriate boards architecture and protocols							

# **REFERENCE BOOKS:**

1.Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, From 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 da Costa, 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, Wiley, 2012

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

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PROGRAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
B.E.	16CS6204	SOFTWARE QUALITY ASSURANCE	3	0	0	3
Course Objective	<ol> <li>Understand com</li> <li>Study the relation</li> <li>Learn the quality</li> </ol>	quality management framework and related quality mercial standards and the impact on quality assurantionship of process and product quality assurance (PP y management in information technology as for software quality assurance	nce		epts	

Unit	Description	Instructiona Hours
I	ORGANIZING QUALITY MANAGEMENT  Quality management framework - Quality program concepts - Organizational aspects of quality program -Quality Program organizational relationship-Mapping quality program functions to project organizational entities	7
ш	SOFTWARE QUALITY ASSURANCE STANDARDS 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
ш	SOFTWARE QUALITY ASSURANCE 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
IV	QUALITY MANAGEMENT IN IT 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
$\mathbf{v}$	SQA METRICS 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

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PROGRAMMI	E COURSE CODE	NAME OF THE COURSE	L	T	P	С		
B.E.	16CS6001	OPEN SOURCE PROGRAMMING LABORATORY - II	0	0	4	2		
Course Objective	2. To introduce the	ents to FOSS environment ne use of open source packages. ctical experience in software development using open source tools like	Perl	, Pytl	ıon,			
Expt. No.		<b>Description of the Experiments</b>						
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.	<ul><li>a. Remove du</li><li>b. Find a phor</li><li>c. Validate E-</li></ul>	mail address						
5.	<ul><li>a. Extracting l</li><li>b. Learning to</li></ul>	tage and implement the following concept Information from Text Classify Text Evature Based Grammars						
6.	Mini project (Application a. Inventory b. Material F. C. Hospital M. Railway F. C. Personal I. G. Web Base g. Timetable	cation Development using PYTHON / MYSQL) Control System. Requirement Processing. Management System. Reservation System. Information System. Ind User Identification System. Management System. Management System. Inagement System. Inagement System.						

TOTAL PRACTICAL HOURS

45

CO1: Understand, analyze and apply the role of languages like HTML, DHTML, CSS, JavaScript and PHP

Course Outcome

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

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**PROGRAMME** COURSE CODE NAME OF THE COURSE T P B.E. 16CS6002 COMPILER DESIGN LABORATORY 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** Design a lexical analyzer for given language and the lexical analyzer should ignore redundant spaces, 1. 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 Implementation of Lexical Analyzer using JLex, flex or other lexical analyser generating tools 2. Generate YACC specification for a few syntactic categories. Program to recognize a valid arithmetic expression that uses operator +, -, \* and /.

c. Implementation of Calculator using LEX and YACC4. 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

of letters or digits.

- 9. Implement any one storage allocation strategies(Heap, Stack, Static)
- 10. Construction of DAG
- 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

C

2

Course Outcome

3.

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.

Program to recognize a valid variable which starts with a letter followed by any number

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 complier:

30 Nos.

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.

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# **ELECTIVE-I**

PROGRAMME			COURSE CODE	NAME OF THE COURSE	L	T	P	C		
	B.E.		16CS5301	ADVANCED JAVA PROGRAMMING	3	0	0	3		
Course 2. To develop 3. To underst 4. To underst			To develop network prog To understand concepts to To understand issues in e	programming concepts like interface, threads, swings etc. grams in java needed for distributed and multi-tier applications enterprise application development ness for performance and effective coding						
Unit				Description	Instructional hours					
JAVA FUNDAMENTALS  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  NETWORK PROGRAMMING IN JAVA										
п	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.									
III	- RMI- Hop implementation -CORBA - IDL technologies - Naming services - CORBA programming model - JAR file creation - Case studies.									
MULTI-TIER APPLICATION DEVELOPMENT  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.										
V	Serve	er side	RISE APPLICATIONS component architecture - entity beans - case studies	Introduction to J2EE - session beans - entity beans -			9			
				Total Instructional Hours			45			
Course  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 applica CO4. To develop web pages using advanced server-side programming through servlets and pages.  CO5. Develop program using javax.servlet package								server		
T	EXT B			S Javanisor vior paokago						
	T2. T3.	Ed Re	oman,"Mastering Enterpris	work programming", o'Reilly publishers, 2000 (unit II) se Java Beans", John Wiley & sons Inc., 1999. (unit III and a 2 Advanced Feauture, Vol II", pearson Education, 2002. (Unit III)			Uni	t		

# REFERENCE BOOKS:

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

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PROC	GRAMN	1E	COURSE CODE	SE CODE NAME OF THE COURSE					C		
	B.E.		16CS5302	VISUALIZATION T	TECHNIQUES	3	0	0	3		
Cour Objec	tive	<ol> <li>To</li> <li>To</li> <li>To</li> </ol>		iques in information visuali on visualization Techniques tion mechanisms							
Unit				Description		In	ıstru	iction	nal		
1	Introd Gibson proces	uction t n's affor sing, Co	rdance theory, Limitation	ATION ion stages, Experimental so of Gibson's affordance theo tion, Type of data, Abstract	ry, Model of perceptual	n, 9 al					
П	inform for 3I Abstra	nation sp O data, action in	xploring the complex ye Views, Fisheye views of information space,	ws 9							
Ш	Single	dimens	ENSIONAL VISUALIZ	ee dimension, Trees, Web	works, Data Mapping,			9			
IV	TEXT From g image Techn	TUAL M graphics and tex ique for	t, Consistency of rendering	s in visual interfaces, Interact, Images and its textual lab active handling of images an	els, Architecture, Zoom	n n 9					
V	Anima Suppo Illustra	cilities and High Level es, Interactive Medical imulation, Tactile Maps , Integrating Spatial and	ical aps 9								
				Tot	al Instructional Hours		4	5			
Cou		CO1. CO2. CO3. CO4. CO5.	Ability to understand n Ability to understand v Ability to understand v	e data visualization concept odern visualization technique rious interaction techniques rious textual methods of ab- tive visual interface applica	ies straction				2000		

- 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.

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PROG	RAMME	COURSE CODE	NAME OF THE COURSE	L	T	P	C
В	5.E.	16CS5303	SERVICE ORIENTED ARCHITECTURE	3	0	0	3
Course Objectiv	2.		ring the service design such as service composition, orchestration and Choreogo Service specification standards	raphy	7		
Unit	INTRODUCTION Roots of SOA, Characteristics of SOA, Comparing SOA to client-server and distributed			Ir	nstru Ho	ictio ours	
I	Roots of internet	f SOA ,Characteristics of So	OA, Comparing SOA to client-server and distributed OA, How components in an SOA interrelate, Principles			9	
II	Web ser exchang Choreog	vices, Service descriptions, Me Pattern, Coordination, Ato	CTURE IN WEB SERVICES Messaging with SOAP, Message omic Transactions, Business activities, Orchestration, ion, Application Service Layer, Business Service Layer,			9	
ш	Service modelin guidelin	g, Service Oriented Desig	ss-centric SOA, Deriving business services, service n, WSDL basics, SOAP basics, SOA composition ervice design, Application service design, Task centric			9	
IV	SOA pla WS), Ja Java AI (WSIT)	va architecture for XML bir PI for XML based RPC (JA	in J2EE, Java API for XML-based web services (JAXI-ading (JAXB), Java API for XML Registries (JAXR), X-RPC), Web Services Interoperability Technologies Common Language Runtime, ASP.NET web forms, es Enhancements (WSE).			9	
v	SOA DI Web Se	ESIGN rvice, BPEL- process, elem	ents, functions, Web Service, Coordination, overview,			0	

CO1.	Ability to understand service oriented architecture
CO2.	Ability to build service oriented architecture applications
CO3.	Ability to understand various service oriented architecture technique
CO4.	Ability to understand service oriented architecture platforms
CO5.	Ability to understand service oriented architecture design

elements, web service business activity & atomic transaction coordination type, Business process design Web Service, Choreography, Web Service, Policy-elements, Web Service

#### **TEXT BOOKS:**

Course Outcome

- 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:

Security, XML, Signature element

- 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.

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45

**Total Instructional Hours** 

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PROGRAMME	COURSE CODE	NAME OF THE COURSE	$\mathbf{L}$	T	P	C
B.E.	16CS5304	INFORMATION STORAGE MANAGEMENT	3	0	0	3
Course Objective	<ol> <li>Learn the storage</li> <li>Describe the core</li> <li>Learn the Cloud of</li> </ol>	Learn the Cloud computing characteristics and benefits				

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 dive & flash drive components and performance, RAID, Intelligent storage system and storage provisioning (including virtual provisioning)	9
п	STORAGE NETWORKING TECHNOLOGIES AND VIRTUALIZATION Fibre Channel SAN components, FC protocol and operations, Block level storage virtualization, iSCL 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
ш	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

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.

Course Outcome

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 Educations 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 Haustein, "Storage Networks Explained: Basics and Application of Fibre Channel SAN, NAS, iSCSI, InfiniBand and FCoE, 2nd Edition, Wiley, July 2009

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PROGRAMME		COURSE CODE	NAME OF THE COURSE	$\mathbf{L}$	T	P	C
B.E.		16CS5305	TCP/IP PRINCIPLES AND ARCHITECTURE	3	0	0	3
Cour Objec		To understand the basic To enhance the knowled To provide knowledge	of TCP / IP and its Architecture. c concepts of TCP/IP Architecture edge to UDP and its applications on TCP features and SMTP eepts on Transport layer				
Unit		Description			truct hou	iona rs	1
1	INTRODUCTION 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 & Gratitions ARP –ARP command – RARP- Structure TCP/IP s/w in operating system.				9	* 13° *	
п	unreachable errors - ICMP redirect errors - ICPM router discovery messages- Dynamic routing - UNIX routing daemons- routing information protocol (RIP)-OSPF-CIDR - Case study: Voice over IP for two way Communication.				9		
ш	UDP AND APPLICATIONS 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		
IV	TCP 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				9		
V	mode TRANSPORT LAYER RELIABILITY AND APPLICATION CP/IP time out – Retransmission – Roundtrip time measurement – Congestion avoidance algorithms – Fast retransmit and fast recover algorithm – Repacaketization - ICMP errors-TCP persistent – TCP features and performance – Telnet and rhogin - SMTP – TCP dump				9		
		TOTAL INSTI	RUCTIONAL HOURS		45		
Course Outcom	cO2. CO3. CO4.	Able to understand the batch Able to understand UD Able to understand the	s of TCP / IP and its Architecture. sic concepts of TCP/IP Architecture P and its applications. sliding window and delayed acknowledgement methodolo owledge on broadcasting and multi casting in UDP.	gies.			

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

## REFERENCE BOOKS:

- R1. Behrouz A. Forouzam, "TCP/IP Protocol Suite", Tata McGraw Hill, 2000
- $R2. \label{eq:michael Santifaller} R2. \label{eq:michael Santifaller} Michael Santifaller, ``TCP/IP ONC/NFS, Internetworking in UNIX Environment", Addison Wesley Professional, <math>2^{nd}$  Edition, 1994.

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PROG	GRAMM	Œ	COURSE CODE	NAME OF THE COURSE	I		T	P	C
]	B.E.		16CS5306	SYSTEM SOFTWARE	3	i.	0	0	3
Course Objectiv		1. 2. 3. 4. 5.	To know the design and in To know the design and im	hip between system software and machine architemplementation of assemblers plementation of loaders and linkers of compilers, interpreters, and macro processors. of system software tools.	cture.				
					,	TC	TΑ	L	
UNIT			DES	SCRIPTION	INSTI	RU	CT	ION.	AL
I	Langua process Instruct	age sing- tion	- System software and	occessing activities—fundamentals of language machine architecture — The Simplified ne architecture - Data and instruction formats -		HC	OUR 8	S	
п	structur modes Symbo	asser res - - P l-de	mbler functions - A simple Machine dependent assemb Program relocation - Machin	SIC assembler – Assembler algorithm and data ler features - Instruction formats and addressing ne independent assembler features - Literals – sions - One pass assemblers and Multi pass MASM assembler.			10		
ш	Basic le Machin and Da Automa	oade ne d ata atic	lependent loader features - Structures for Linking Loa Library Search – Loader Op	Absolute Loader – A Simple Bootstrap Loader - Relocation – Program Linking – Algorithm ader - Machine-independent loader features - stions - Loader design options - Linkage Editors s - Implementation example - MSDOS linker.			9		
IV	Compil express definiti	lers sions on a	s-compilation of control str	S - MACROS compilation-memory allocation-compilation of ucture code optimization-interpreters. Macro nested macro calls-advanced macro facilities-			9		
V	Text ed Interact	ditor tive		g Process - User Interface – Editor Structure gging functions and capabilities – Relationship terface Criteria.			9		
			TOTAL INSTRUC	TIONAL HOURS			45		
Cours Outcor	ne C	O2. O3. O4.	Understands the language p Understands How to implen Understands the concept of Understands how to implem Understands the system soft	nent the assemblers loaders and linkers ent compilers, interpreters and macros					

## **TEXT BOOKS:**

T1..D.M. Dhamdhere–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", 3<sup>rd</sup> 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.

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## **ELECTIVE-II**

PROG	RAM		COURSE C	ODE	NAME O	F THE C	OURSE	L	T	P	C
B.E.			16CS630	1	ENTERPRI	SE COM	IPUTING	3	0	0	3
Cour Object		1. 2. 3. 4. 5.	Learn the inc Understand h Construct and	epting enter low to desig d roll out the	of enterprise of prise Applicat n an enterprise e designed arc n the enterpris	ions architect hitecture a	ure. as application.				
Unit					Description					Instruc Hou	
I	Enterp	orise					gies-Life Cycl ul Enterprise A			9	)
П	INCE Entern Elicita	PTIN prise ation	NG ENTERPI Analysis-Bu	RISE APPL siness Mo s-Actors a	ICATIONS deling-EM nd Use Cas	Bank-A	-	-Require	ement	9	)
ш	ARCI Archit Perspe	HITE tectur ective	CTING AND e, Views and	DESIGNII Viewpoint itecture-Tec	NG ENTERP s-Enterprise A chnical Archite	Application	PLICATIONS on-An Enterpr Design -Data A	ise Arch			)
IV	Const	ructio		Introduction	to Software	Construc	ction Map-Cor			9	)
V	Testin	g E	AND ROLLI Interprise Apstem Testing-U	plications-E	Enterprise A <sub>1</sub>		CATIONS Environmen	ıts-Integi	ration	9	)
Cours	se C	CO2.A	analyze the inte	egrated info age large-sc	ns used in the rmation system ale computing	functiona ns used th systems	STRUCTION I units of an en roughout an er for an organiza nent.	terprise. nterprise.		4:	5

#### 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.

CO5. Analyze the applications of testing on the enterprise environment..

R3. Tom Valesky -"Enterprise Java Beans"-Addison Wesley Longman Inc. New Delhi, 2000.

R4. Ed Roman-"Mastering EJB"-John Wiley & Sons, New Delhi, 2001.

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PROGRAI	MME	COURSE CODE	NAME OF THE COURSE	$^{\circ}$ L	T	P	C
B.E.		16CS6302	SOCIAL NETWORK ANALYSIS	3	0	0	3
Cou Objec		<ol> <li>To mo</li> <li>To min</li> <li>To uno</li> </ol>	derstand the components of web based social networks del and visualize the social networks in various aspects he the users community in social networks. Derstand the evolution of social networks through various made the opinions of the users in social networks	odels			
Unit			Description				uctional lours
Ĭ.,	Introduct Emergene Developm	ce of the Social nent of Social N	Limitations of current Web – Development of Semant Web – Statistical Properties of Social Networks -Network Analysis - Key concepts and measures in network ogs and online communities - Web-based networks	analys	is -		9
щ	Visualizin Centrality Represen social net	y- Clustering - N tations- Node-L twork data – Rar	UALIZATION  l Networks - A Taxonomy of Visualizations - Graph Represode-Edge Diagrams - Visualizing Social Networks with Makink Diagrams - Hybrid Representations - Modelling and andom Walks and their Applications —Use of Hadoop and Moton of social individuals and relationships.	trix-Ba ggrega	sed ing		9
ш	Aggregat evolution Networks	of Web Commus  - Evaluating Cons of Commun	IES  ng with social network data, Advanced Representations — unity from a Series of Web Archive - Detecting Communities  Communities — Core Methods for Community Detection & ity Mining Algorithms - Node Classification in Social Network	s in So Minir	cial		9
IV	Evolution Models a Similarity for Expension Score Pro	n in Social Net and Algorithms y and Influence - rt Location in S opagation – Exp	works — Framework - Tracing Smoothly Evolving Comfor Social Influence Analysis - Influence Related Statistic Influence Maximization in Viral Marketing - Algorithms at ocial Networks - Expert Location without Graph Constraert Team Formation - Link Prediction in Social Networks Bayesian Probabilistic Models	cs - So nd Syste ints - v	cial ems vith		9
V	Text Min Temporal	l sentiment anal	MINING tworks -Opinion extraction – Sentiment classification and classification extraction in opinion mining - Wish analysis Classification – Tracking sentiments towards topics over ti	- Proc	ng - luct		9
			TOTAL INSTRUCTIONAL	LHOU	RS		45
	urse come	CO2 : Model and CO3 : Mine the CO4 : Predict th	he internals components of social networks d visualize social networks behavior of the users in social networks e possible next outcome of social networks 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

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	RAMM B.E.	E COURSE CODE 16CS6303	NAME OF THE COURSE EMBEDDED SYSTEMS	L 3	T 0	P 0
Cour Objec	rse	<ol> <li>To be familiar with 8051 mi</li> <li>Understand the basic Memo</li> <li>Learn about the Process and</li> <li>Learn the embedded softwar</li> <li>Design and develop embedded</li> </ol>	ry and I/O managements. OS re.			
Unit		D	escription	Total in	struct ours	ional
Ι	design	_	es of Embedded Systems - Embedded system - 8051 Microcontroller, ARM processor - ramming.		9	
II	Progra	ORY AND I/O MANAGEME mming Input and Output - Men s and interfacing- Interrupts har	nory system mechanisms - Memory and I/O		9	
ш	Multip	TESSES AND OPERATING S le tasks and processes - Contex- unication mechanisms - Perform	t switching - Scheduling policies - Interprocess		9	
IV	Progra Multi-		ssembly and C - Meeting real time constraints - tences. Embedded software development tools -		9	
v		5	MENT tudies - Complete design of example embedded		9	
			<b>Total Instructional Hours</b>		45	
		CO1: Explore the concepts of e	embedded computing with 8051 microcontroller.			
		CO2: Illustrate the memory and	1 I/O operations.			
Cou		CO3: Explain the processes and	d operating system concepts.			
		CO4: Elucidate the embedded s	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.

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PROG	RAMME	COURSE CODE	NAME OF THE COUR	RSE J	Ĺ	Т	P	C
1	B.E.	16CS6304	TOTAL QUALITY MANAG	EMENT :	3	0	0	3
Cou Obje	irse 3 ctive 4	<ul><li>Study principles and p</li><li>Understand the difference</li><li>Learn the tools and ten</li></ul>	concepts of Total Quality Management obtilosophies of quality management. ent quality systems. chniques for management. Quality systems and its implementate					
Unit			Description		]		uctio ours	
1	Definition and policy	statements. Customer I	TY MANAGEMENT enefits, awareness and obstacles. Que Focus -customer perception of qualit cion. Dimensions of product and serv	y, Translating needs			9	
П	Overview Ishikawa,	of the contributions o Taguchi techniques - int	PHIES OF QUALITY MANAGEM of Deming, Juran Crosby, Masaaki troduction, loss function, parameter a Quality circle, Japanese 5S principles	Imai, Feigenbaum, and tolerance design,			9	
ш	Meaning a for variabl Six sigma	and significance of statist les and attributed. Proce concepts of process ca	NTROL AND PROCESS CAPABI tical process control (SPC) -construct ss capability - meaning, significance apability. Reliability concepts -defin ife characteristics curve. Total proc	tion of control charts e and measurement - nitions, reliability in			9	

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.

QUALITY SYSTEMS ORGANIZING AND IMPLEMENTATION

TOOLS AND TECHNIQUES FOR QUALITY MANAGEMENT

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

#### TOTAL INSTRUCTIONAL HOURS

45

9

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.

Course Outcome

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:**

(TMP)

- 1. Dale H. Besterfiled, et al, Total Quality Management, Pearson Education Asia, Third Edition
- 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.
- 4. Suganthi, L and Anand Samuel, Total Quality Management, Prentice Hall (India) Pvt. Ltd., 200



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PROGR. B.I		10	RSE CODE 6CS6305		WORK A	ME OF T			OCOLS	L 3	T 0	P 0	3	
Cour Object		1. 2. 3. 4. 5.	Learn the bas Understand the Understand a Learn the Roy Learn about I	ne Ethern bout subs uting Pro	et Techno netting tocols.	ologies.								
UNIT				DE	SCRIPT	TION					INS'		CTION URS	NAL
I	Explorir Network Operation Protocol	ng the cas a lang System Syste	NG FUNDAM Network: Gl Platform- The stem: IOS Bo Communication Communica	obally C Changin ootcamp- ons: Ru	Connected g Networ Getting les of C	rk Enviro Basic A Communi	onment-0 .ddressin cation-N	Configur g Scher	ing a Netw nes -Netw	vork vork		9	, )	
П	Ethernet Multiple	- Netwexing- T	vork Layer-Tra Transport Laye Addresses-IPv	er Reliab	ility - Inti	roducing	TCP and	d UDP-	P Address	tion ing:		9	)	
Ш	Subnetti Consider Applicat Introduc	ng IP rations tion La tion to	Networks: Su for IPv6-App ayer Protocols Switched Netward	lication land Se	Layer: Ap	oplication	Layer	Protocol	s-Well-Kno	own		9	)	
IV	VLANs- Troubles Impleme	Routing hooting the state of th	ng Concepts-Ir ng Inter-VLAN n-Configure S nmary and Floa	Routing tatic and	-Layer 3 S Default	Switching Routes-	g-Static I Review	Routing: of CIDE	Static Roule and VLS	ting SM-		9	)	
V	Routing area OS Operatio ACLs-Tr Configur	Dynar SPFv2- on-Stan roubles ration I	ROTOCOLS A mically-Single- Configure S dard IPv4 AC shoot ACLs-O Protocol v4-Dy IPv4: NAT Op	Area OS Single-are Ls Exter Contextua rnamic H	SP: Chara ea OSPF nded IPval al Unit- ost Confi	v3-F-Ac 4 ACLSs IPv6 A guration	cess Co s-Contex ACLs-DI Protocol	ontrol Litual Uni HCP: D	ists: IP A t: Debug v ynamic H twork Add	ACL with Host		9	)	

## TOTAL INSTRUCTIONAL HOURS

CO1: Explain the basics of networks and cable media. CO2: Demonstrate the TCP/IP layer.

Course

Outcome

- 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,
- 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.

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PROGRAM	ME CO	OUF	RSE CODE		NAM	E OF TH	E COURS	SE	L	T	P	C	
B.E.		16	CS6306		SIGN	ALS ANI	O SYSTEM	<b>I</b> S	3	0	0	3	
Course Objective		1. 2. 3. 4. 5.	classification. To learn Lap To know Z tra	lace Tran ansform ze LTI sy	nsform and DTFT ystems in the Fourier	d Fourier Γ and thei the Time r and Z tra	transform or propertie domain an ansform.	l systems and and their prope s. d various Tran	erties.			ds of	al
Unit					De	escription	n					Hours	
I	Continuo Impulse, signals, l systems	ous , Sir Dete - Cl	cation of stime signals (unusoidal, Expoerministic & assification of ant, Causal & N	CT signa nential, ( Random systems	als) - Disc Classifica signals, s – Static	erete time ation of C Energy & Dynar	signals (I T and DT & Powe mic, Linea	signals - Peri r signals -CT	iodic &	& Apo	eriodic d DT	9	
п	Fourier	seri	S OF CONTING tes analysis - in CT Signal A	spectrun	n of Con	tinuous 7	Γime (CT)	signals - Fo	urier a	and L	aplace	9	
a IIII	Differen	tial	IME INVARIA Equation - Blo Laplace transfo	ck diagr	am repres	sentation	- impulse		olutio	n inte	grals –	9	
IV			S OF DISCRE ampling – DTF				Transforn	n – Properties o	of Z Tr	ansfo	rm.	9	
v	Differen	ice I	IME INVARI Equations - Bl urier and Z Tra	ock diag	gram repr	esentation	n – Impuls	e response - (		ution	sum -	9	
						TOTAL	INSTRUC	TIONAL HO	URS			45	
	urse	CC	O1: Analyze the O2: Apply Lapl O3: Analyze co: O4: Analyze dis O5: Apply the f	ace trans ntinuous crete tin	sform, Fou time LTI ne LTI sys	urier trans systems usir stems usir	sform, Z trausing Four ng Z transf	ier and Laplace orm and DTFT	e Trans	sform		sis.	

### **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.

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### **OPEN ELECTIVE**

PROGRAMME	COURSE CODE	NAME OF THE COURSE	$\mathbf{L}$	T	P	C
B.E.	16CS6401	PROGRAMMING LANGUAGES	3	0	0	3
Course Objective	<ol> <li>Build an un</li> <li>Introduce the</li> <li>Understand</li> </ol>	the concepts of programming languages. derstanding of the fundamental concepts of C program concepts of object oriented programming language the concepts of web development language – java products to gain expertise in the basic features of .Net	ge orogramming	; the ap	oplica	tion using

Unit	Description	Instructional Hours
I	PROGRAMMING LANGUAGES OVERVIEW 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 languages – Software development languages – Web development languages – Debugger	8
П	C PROGRAMMING 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
Ш	OBJECT ORIENTED PROGRAMMING FUNDAMENTALS  C++ Programming Features – Polymorphism: Compile Time Polymorphism and Run Time Polymorphism – Inheritance: Virtual functions – File handling concepts	9
IV	JAVA PROGRAMMING 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
v	C# AND .NET FRAMEWORK .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
	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.

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# CO'S, PO'S & PSO'S MAPPING

### Semester – I

Course Code & Name: 16MA1101 Engineering Mathematics-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	3	2	2	-	-	-	-	-	-	2	2	2
CO2	3	3	3	2	2	-	-	-	-	-	-	2	2	2
CO3	3	3	3	2	2	-	-	-	-	-	-	2	2	2
CO4	3	3	3	2	2	-	-	-	-	-	-	2	2	2
CO5	3	3	3	2	2	-	-	-	-	-	-	2	2	2
Avg	3	3	3	2	2	-	-	-	-	-	-	2	2	2

Course Code & Name: 16PH1101 Engineering 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	3	2	3	3							1	1
CO2	3	2	3	3	3								1	1
CO3	3	2	3	3	3	3							1	2
CO4	3	2	3	1	2		2						1	1
CO5	3	2		1	2								2	1
Avg	3	2	3	2	2.6		2						1.2	1.2

Course Code & Name: 16CY1101 Engineering Chemistry

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

Course Code & Name: 16HE1101 Essential English for Engineers– I

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			3		1		
CO2	1	1		2		2	1		2	3		2		1
CO3	1		1			3			2	3		1		1
CO4	1	1	1	1		1	1		2	3		2		
CO5	1		1	1		2	1			3		2	1	1
Avg	1	1	1	1.3		1.8	1		2	3		1.6	1	1

Course Code & Name: 16GE1103 Problem Solving and Python Programming

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

Course Code & Name: 16EC1202 Basics of Electronics Engineering

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

Course Code & Name: 16PS1001 Physical Sciences Laboratory - I

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	2	3	2	3	3							1	1
CO2	3	2	3	3	3								1	1
CO3	3	2	3	3	3	3							1	2
CO4	3	2	3	1	2		2						1	1
CO5	3	2		1	2								2	1
Avg	3	2	3	2	2.6		2						1.2	1.2

Course Code & Name: 16GE1004 Problem Solving and Python Programming Lab

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

Course Code & Name: 16GE1002 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	2	1	1			1	3	3	2		2	2	2	1
CO2	2	1	1			1	3	3	2		2	2	2	1
CO3	2	1	1			1	3	3	2		2	2	2	1
CO4	2	1	2			1	3	3	2		2	2	2	2
CO5	2	1	2			1	3	3	2		2	2	2	2
Avg	2	1	1			1	3	3	2		2	2	2	1

<u>Semester – II</u>

Course Code & Name: 16MA2102 Engineering Mathematics-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	2	2	-	-	-	-	-	-	2	1	2
CO2	3	3	3	2	2	-	-	-	-	-	-	2	1	2
CO3	3	3	3	2	2	-	-	-	-	-	-	2	1	2
CO4	3	3	3	2	2	-	-	-	-	-	-	2	1	2
CO5	3	3	3	2	2	-	-	-	-	-	-	2	1	2
Avg	3	3	3	2	2	-	-	-	-	-	-	2	1	2

Course Code & Name: 16PH2102 Physics of Materials

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	1
CO2	3	3	1	1	2								2	1
CO3	3	2	1	2	2								3	2
CO4	3	3	1	2	2	1							1	1
CO5	3	2	2	3	2	1	2						2	2
Avg	3	2.4	1.2	1.8	1.8	1	2						1.8	1.4

Course Code & Name: 16CY2102 Environmental Sciences

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

# Course Code & Name: 16HE2102 Essential English for Engineers – II

PO& PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1									1	3			1	
CO2	2	2				2			3	3		2		1
CO3	2		2						2	3			1	
CO4		1		1					1	2		2	1	1
CO5	2	1	2		1				1	3			2	1
Avg	2	1.3	2	1	1	2			1.6	2.8		2	1.25	1

Course Code & Name: 16GE2102 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	2	3	2	3	3							1	1
CO2	3	2	3	3	3								1	1
CO3	3	2	3	3	3	3							1	2
CO4	3	2	3	1	2		2						1	1
CO5	3	2		1	2								2	1
Avg	3	2	3	2	2.6		2						1.2	1.2

Course Code & Name: 16CS2202 Programming in C and C++

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: 16PS2001 Physical Sciences 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	2	1	1	1	1							1	1
CO2	3	3	1	1	2								2	1
CO3	3	2	1	2	2								3	2
CO4	3	3	1	2	2	1							1	1
CO5	3	2	2	3	2	1	2						2	2
Avg	3	2.4	1.2	1.8	1.8	1	2						1.8	1.4

Course Code & Name: 16CS2002 Programming in C and C++ Laboratory

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

# <u>Semester – III</u>

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 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: 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 1	PSO 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 1	PSO 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
~	~	1.00												

Course Code & Name: 16CS5203 Computer Architecture

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: 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 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: 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 1	PSO 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 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

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 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: 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 1	PSO 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

# **Mapping of Course Outcome and Programme Outcome:**

Yea r	Sem	Course code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
		16MA1101	Engineering Mathematics-I	3	3	3	2	2	-	-	-	-	-	-	2	2	2
		16PH1101	Engineering Physics	3	2	3	2	2.6		2						1.2	1.2
		16CY1101	Engineering Chemistry	3	2	2	2	2	1	1	-	-	1	-	1	1	1
		16HE1101	English for Engineers -I	1	1	1	1.3		1.8	1		2	3		1.6	1	1
	_	16GE1103	Problem Solving and Python Programming	2	3	2	2	2	-	-	-	-	-	-	1	1	1
	I	16EC1202	Basics of Electronics Engineering	2	0	0	0	0	2	3	3	2		2	2	2	1
I		16PS1001	Physical Sciences Laboratory - I	3	2	3	2	2.6		2						1.2	1.2
		16GE1004	Problem Solving and Python Programming Lab	3	2	3	1	2	-	-	-	-	-	-	2	3	1
		16GE1002	Engineering Practices Laboratory	2	1	1			1	3	3	2		2	2	2	1
		16MA2102	Engineering Mathematics-II	3	3	3	2	2	-	-	-	-	-	-	2	1	2
		16PH2102	Physics of Materials	3	2.4	1.2	1.8	1.8	1	2						1.8	1.4
	II	16CY2102	Environmental Sciences	2		1	1		2	3	3	2		2	2	2	1
	11	16HE2102	Essential English for Engineers - II	2	1.3	2	1	1	2			1.6	2.8		2	1.25	1
		16GE2102	Engineering Graphics	3	2	3	2	2.6		2						1.2	1.2

		16CS2202	Programming in C and C++	3	3	2	2	2	2	0	1	0	1	1	2	0	1
		16PS2001	Physical Sciences Laboratory - II	3	2.4	1.2	1.8	1.8	1	2						1.8	1.4
		16CS2002	Programming in C and C++ Laboratory	2	3	1	0	2	2	0	1	0	1	1	2	0	1
		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	0
		16CS3202	Data Structures	3	2	0	0	1	0	0	0	0	0	1	2	1	0
	ш	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
II		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
		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
	IV	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
		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
		16CS5203	Computer Architecture	3	2	2	2	2	2	0	1	1	0	2	2	1	0
III	V	16CS5204	Theory of Computation	3	2	1	3	2	2	0	1	2	0	0	1	1	1
		16CS53XX	Professional Elective-I														
		16CS5001	Network Laboratory	3	1	2	0	2	0	0	1	0	1	1	2	1	0
			Network Laboratory  Open Source Programming Laboratory	3	1 2	2 2	0 2	2	0 2	0	1	0	0	2	2 2	1	0
		16CS5001	Open Source	3	2		2	2	2				-				
		16CS5001	Open Source	3	2	2	2	2	2				-				
		16CS5001 16CS5002	Open Source Programming Laboratory  Advanced Java	3 16	2 CS53X	2 <b>X Prof</b> e	2 essional	2 Electi	2 <b>ve - I</b>	0	1	1	0	2	2		0
ııı	V	16CS5001 16CS5002 16CS5301	Open Source Programming Laboratory  Advanced Java Programming	3 16	2 CS53X	2 <b>X Profe</b>	2 essional	2 Elective 2	2 ve - I	0	1	2	0	2	2	1	0
III	V	16CS5001 16CS5002 16CS5301 16CS5302	Open Source Programming Laboratory  Advanced Java Programming  Visualization Techniques Service Oriented	3 3 3	2 CS53X 2 2	2 X Profe	2 essional 3 0	2 <b>Electiv</b> 2 2	2 ve - I 2 0	0 0	1 1 1	2 0	0 0 1	0	1 2	1 1 1	1 0

		16CS5306	System Software	3	2	1	1	0	0	0	0	0	2	2	2	2	0
Ш	VI	16CS6201	Free Open Source Software - II	3	1	1	0	2	0	0	1	0	1	1	2	1	0
		16CS6202	Compiler Design	3	2	2	2	2	2	0	1	1	0	2	2	1	0
		16CS6203	Internet of Things	3	2	1	1	0	0	0	0	0	2	2	2	2	0
		16CS6204	Software Quality Assurance	3	2	1	0	2	0	0	1	0	1	1	2	1	0
		16CS63XX	Professional Elective II														
		16XX64XX	Open Elective I														
		16CS6001	Embedded Systems Laboratory	3	2	2	2	2	2	0	1	1	0	2	2	1	0
		16CS6002	Open Source Software Laboratory	3	3	1	1	0	0	0	0	0	2	2	2	2	0
16CS63XX Professional Elective - II																	
Ш	VI	16CS6301	Enterprise Computing	3	2	1	3	2	2	0	1	2	0	0	1	1	1
		16CS6302	Social Network Analysis	3	2	2	0	2	0	0	1	0	1	1	2	1	0
		16CS6303	Embedded Systems	3	2	2	2	2	2	0	1	1	0	2	2	1	0
		16CS6304	Total Quality Management	3	2	1	1	0	0	0	0	0	2	2	2	2	0
		16CS6305	Network and Routing Protocols	3	2	2	2	2	2	0	1	1	0	2	2	1	0
		16CS6306	Signals and Systems	3	2	1	3	2	2	0	1	2	0	0	1	1	1
				1	6CSXX	X64XX	Open 1	Elective	: - I								
III	VI	16CS6401	Programming Languages	3	1	0	1	0	0	0	0	0	2	2	2	2	0

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