

# **KONGU ENGINEERING COLLEGE**

(Autonomous Institution Affiliated to Anna University, Chennai)

**PERUNDURAI ERODE – 638 060**

**TAMILNADU INDIA**



## **REGULATIONS, CURRICULUM & SYLLABI – 2024**

**(CHOICE BASED CREDIT SYSTEM AND  
OUTCOME BASED EDUCATION)**

**(For the students admitted from 2024 - 2025 onwards)**

**MASTER OF SCIENCE**

**IN**


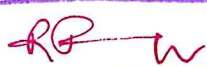
**SOFTWARE SYSTEMS**

**DEPARTMENT OF COMPUTER TECHNOLOGY-PG**



**M.Sc SOFTWARE SYSTEMS CURRICULUM – R2024**  
(for the students admitted in the academic year 2024-25)

SEMESTER – I										
Course Code	Course Title	Hours / Week				Credit	Maximum Marks			Category
		L	T	P	MP		CA	ESE	Total	
Theory/Theory with Practical										
24IST11	Communicative English - I	3	0	0	NE	3	40	60	100	HS
24IST12	Applied Mathematics	3	0	0	NE	3	40	60	100	BS
24IST13	Programming in C	3	0	0	NE	3	100	0	100	PC
24IST14	Digital Principles and Logic Design	3	0	0	NE	3	40	60	100	ES
24ISC11	Foundations of IT	3	0	2	NE	4	50	50	100	PC
Practical / Employability Enhancement										
24ISL11	Communicative English - I Laboratory	0	0	2	NE	1	60	40	100	HS
24ISL12	Programming in C Laboratory	0	0	4	NE	2	100	0	100	PC
24ISL13	Digital Principles and Logic Design Laboratory	0	0	2	NE	1	60	40	100	ES
24VEC12	Yoga and Values for Holistic Development	1	0	1	NE	1	100	0	100	HS
Mandatory Non-Credit Courses										
24MNT15	Student Induction Program	2	0	0	NE	0	100	0	100	MC
24MNT13	Quantitative Aptitude-I	2	0	0	NE	0	100	0	100	BS
Total Credits to be earned						21				


  
 Signature of the Chairman  
 Board of Studies - CSE & IT

  
 (T. Rajagopal)

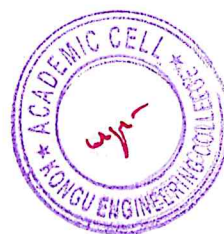


**M.Sc SOFTWARE SYSTEMS CURRICULUM – R2024**  
**(for the students admitted in the academic year 2024-25)**

SEMESTER – II										
Course Code	Course Title	Hours / Week				Credit	Maximum Marks			Category
		L	T	P	MP		CA	ESE	Total	
Theory/Theory with Practical										
24IST21	Communicative English -II	3	0	0	NE	3	40	60	100	HS
24ISC21	Probability and Statistics	3	0	2	NE	4	50	50	100	BS
24IST22	Programming and Linear Data Structures	3	0	0	NE	3	40	60	100	PC
24IST23	Object Oriented Programming using C++	3	0	0	NE	3	40	60	100	PC
24ISC22	Web Programming	3	0	2	NE	4	50	50	100	PC
Practical / Employability Enhancement										
24ISL21	Communicative English - II Laboratory	0	0	2	NE	1	60	40	100	HS
24ISL22	Programming and Linear Data Structures Laboratory	0	0	2	NE	1	100	0	100	PC
24ISL23	Object Oriented Programming using C++ Laboratory	0	0	4	NE	2	100	0	100	PC
Mandatory Non-Credit Courses										
24MNT22	Quantitative Aptitude-II	2	0	0	NE	0	100	0	100	BS
Total Credits to be earned						21				


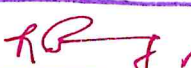
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 Signature of the Chairman  
 Board of Studies - CSE & IT

*T. R. Arjun Kumar*  
*T. R. Arjun Kumar*

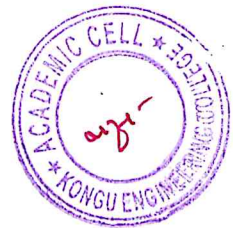


**M.Sc SOFTWARE SYSTEMS CURRICULUM – R2024**  
(for the students admitted in the academic year 2024-25)

SEMESTER – III										
Course Code	Course Title	Hours / Week				Credit	Maximum Marks			Category
		L	T	P	MP		CA	ESE	Total	
Theory/Theory with Practical										
24IST31	Java Programming	3	0	0	ES	3	40	60	100	PC
24IST32	Data Structures	3	0	0	NE	3	40	60	100	PC
24ISC31	UNIX and Shell Programming	3	0	2	NE	4	50	50	100	PC
24IST33	Operating Systems	3	0	0	NE	3	40	60	100	PC
24IST34	Design Thinking	3	0	0	ES	3	100	0	100	PC
24IST35	Computer Organization	3	0	0	NE	3	40	60	100	PC
Practical / Employability Enhancement										
24ISL31	Java Programming Laboratory	0	0	4	NE	2	100	0	100	PC
24ISL32	Data Structures Laboratory	0	0	2	NE	1	60	40	100	PC
24ISP31	Mini Project - I	0	0	2	NE	1	100	0	100	EC
Total Credits to be earned						23				


  
 Signature of the Chairman  
 Board of Studies - CSE & IT

  
 T. R. Pragasam

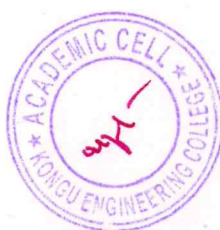




**M.Sc SOFTWARE SYSTEMS CURRICULUM – R2024**  
(for the students admitted in the academic year 2024-25)


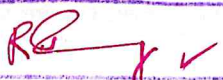
SEMESTER – IV										
Course Code	Course Title	Hours / Week				Credit	Maximum Marks			Category
		L	T	P	MP		CA	ESE	Total	
Theory/Theory with Practical										
24IST41	Python Programming	3	0	0	NE	3	40	60	100	PC
24IST42	Database Management Systems	3	0	0	ES	3	40	60	100	PC
24ISC41	Design and Analysis of Algorithms	3	0	2	NE	4	50	50	100	PC
24IST43	Software Engineering	3	0	0	ES	3	40	60	100	PC
24ISC42	Computer Networks	3	0	2	NE	4	50	50	100	PC
Practical / Employability Enhancement										
24ISL41	Python Programming Laboratory	0	0	4	NE	2	60	40	100	PC
24ISL42	Database Management Systems Laboratory	0	0	2	NE	1	60	40	100	PC
24EGL42	Communication Skills Development Laboratory	0	0	2	NE	1	60	40	100	HS
24ISP41	Mini Project - II	0	0	2	NE	1	100	0	100	EC
Total Credits to be earned						22				

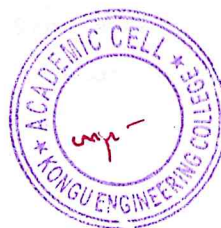
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Board of Studies - CSE+IT



24IST11 - COMMUNICATIVE ENGLISH I							
Programme& Branch	M.Sc Software Systems	Sem.	Category	L	T	P	Credit
Prerequisites	Nil	1	HS	3	0	0	3
Preamble	To employ techniques of active reading, effective speaking and integrate ideas through writing skills						
Unit – I	<b>Grammar and Vocabulary:</b>						9
Parts of speech –Sentence formation and Sentence completion - Finite and non-finite verbs -Tenses- Reading: Prediction and Surveying - Writing: Essays- Dialogue writing - Activities: Listening: Types of listening - Speaking: Talking about oneself, one's family, friends and favorite persons.							
Unit – II	<b>Grammar and Vocabulary:</b>						9
Cause and effect expressions - Prefixes and Suffixes - Synonyms and Antonyms – Spellings- Reading: Types: Skimming, Scanning, Word-by-word and Speed - Writing: Describing persons, places and products and processes - Activities: Listening: Process of listening - Speaking: Non-technical Presentation.							
Unit – III	<b>Grammar and Vocabulary:</b>						9
Active and Passive voice - Impersonal Passive - Reported Speech – Reading: Reading Comprehension – Summarizing and Paraphrasing - Writing: Warnings and Instructions - Activities: Listening: Effective listening strategies - Speaking: short talks.							
Unit – IV	<b>Grammar and Vocabulary:</b>						9
Abbreviations and Acronyms – Idioms and Phrases-Structure of captions / slogans - Prepositions –Selecting words- Reading: Intensive reading and Note-making - Writing: Informal and Formal Letters: Enquiry and placing order - Activities: Listening: Gap filling activity while listening - Speaking: Narrating an event/story							
Unit – V	<b>Grammar and Vocabulary:</b>						9
Connectives and Discourse Markers-Text organization - Sentence Patterns – Punctuations - Reading: Tongue twisters –Cloze test- Rearranging jumbled words and sentences - Writing: E-mail Writing - Preparing the transcript for a speech - Activities: Listening: Listening to a lecture and taking notes – Speaking: Describing an image/picture.							
							<b>Total:45</b>
<b>TEXT BOOK:</b>							
1.	Sanjay Kumar and PushpLata, "Communication Skills", 2 <sup>nd</sup> Edition, New Delhi: Oxford University Press, 2015.						
<b>REFERENCES:</b>							
1.	Raymond Murphy, "Essential English Grammar: Reference and Practice for South Asian Students", 2 <sup>nd</sup> Edition, Cambridge: Cambridge University Press, 2012.						
2.	GlennisPye, "Vocabulary in Practice, Parts 1 and 2", 1stEdition, Cambridge: Cambridge University Press, 2011.						
3.	DVD, podcasts, Authentic Videos, and Laboratory Manual						

COURSE OUTCOMES: On completion of the course, the students will be able to												BT Mapped (Highest Level)	
CO1	identify and use content words which carry more meaning											Understanding (K2)	
CO2	construct sentences in English											Applying (K3)	
CO3	read short, simple messages and texts with complete understanding											Analyzing (K4)	
CO4	write at the sentence and paragraph level and beyond											Applying (K3)	
CO5	speak in a given context											Applying (K3)	
Mapping of COs with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1				1		2		2	3	1	3	1	1
CO2				1		2		2	3	1	3	1	1
CO3				1		2		2	3	1	3	1	1
CO4				1		2		2	3	1	3	1	1
CO5				1		2		2	3	1	3	1	1
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy													
ASSESSMENT PATTERN - THEORY													
Test / Bloom's Category*	Remembering (K1) %		Understanding (K2) %		Applying (K3) %		Analyzing (K4) %		Evaluating (K5) %		Creating (K6) %		Total %
CAT1	-		26.33		57		16.67		-		-		100
CAT2	-		23.33		60		16.67		-		-		100
CAT3	-		26.33		57		16.67		-		-		100
ESE	-		22.22		60		17.78		-		-		100
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)													


  
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 Board of Studies - CSE & IT



  
 Dr. S. Chandramathi

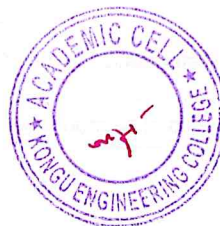


## 24IST12-APPLIED MATHEMATICS

24IST12-APPLIED MATHEMATICS								
<b>Programme &amp; Branch</b>	<b>M.Sc &amp; Software Systems</b>	<b>Sem.</b>	<b>Category</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>	
<b>Prerequisites</b>	<b>Nil</b>	<b>1</b>	<b>BS</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b>Preamble</b>	The course aims to deal with mathematical logic, counting techniques, finding best fitting curve to the given data, and to solve equations of certain types, interpolate polynomials for given data and perform integration and differentiation of numerical data.							
<b>Unit – I</b>	<b>Mathematical Logic:</b>							<b>9</b>
Logic – Propositional Calculus– Truth Table – Tautology and Contradiction –Equivalences and Implications – Normal Forms – Proofs in Propositional Calculus – Predicates and Quantifiers – Nested Quantifiers – Proofs in Predicate Calculus.								
<b>Unit – II</b>	<b>Counting Techniques:</b>							<b>9</b>
Principle of Inclusion and Exclusion – Recurrence Relations – Formation – Solution of Non-Homogeneous Linear Recurrence Relations when the RHS is a Constant, a Linear Polynomial, an Exponential Function – Generating Functions – Solution of Recurrence Relations by using Generating Functions.								
<b>Unit – III</b>	<b>Curve Fitting:</b>							<b>9</b>
Method of Least Squares: Fitting of Straight Line of the Form $y = ax + b$ - Fitting a Parabola of the Form $y = ax^2 + bx + c$ – Fitting of an Exponential Curve of the Form $y = ax^b$ , $y = ae^{bx}$ , $y = ab^x$ – Calculation of the Sum of Squares of Residuals in the Cases of Straight Line Fit and Parabola Fit.								
<b>Unit – IV</b>	<b>Solution of Algebraic and Transcendental Equations:</b>							<b>9</b>
Bisection Method – Newton-Raphson Method – Regula-Falsi Method – Solution of Simultaneous Linear Equations: Gauss Elimination Method – Gauss Jordan Method – Gauss-Jacobi and Gauss-Seidel Iterative Methods.								
<b>Unit – V</b>	<b>Interpolation:</b>							<b>9</b>
Newton – Gregory Forward Interpolation Formula – Newton – Gregory Backward Interpolation Formula for Equally Distributed Data – Newton's Divided Difference Method for Unequally Distributed Data – Lagrange Interpolation Formula – Numerical Integration – Numerical Integration using Simpson's 1/3rd Rule – Simpson's 3/8th Rule – Trapezoidal Rule.								
								<b>Total: 45</b>
<b>TEXT BOOK:</b>								
1.	Veerarajan T., "Discrete Mathematics with Graph Theory and Combinatorics", 18 <sup>th</sup> Reprint, Tata McGraw Hill, New Delhi, 2017. for Units I,II.							
2.	Kandasamy P., Thilagavathy K. and Gunavathi K., "Numerical Methods", 2 <sup>nd</sup> Edition, S.Chand& Company, Reprint, Tamil Nadu, 2013. for Units III,IV,V.							
<b>REFERENCES:</b>								
1.	Kenneth H. Rosen, "Discrete Mathematics and its Applications", 7 <sup>th</sup> Edition, Tata McGraw - Hill Pub. Co. Ltd., New Delhi, 2017.							
2.	Sastry S.S., "Introductory Methods of Numerical Analysis", 5 <sup>th</sup> Edition, PHI Learning Pvt. Ltd., New Delhi, 2012.							

COURSE OUTCOMES: On completion of the course, the students will be able to												BT Mapped (Highest Level)	
CO1	derive the inferences from Propositions and Predicates.											Applying (K3)	
CO2	make use of the counting techniques to some situations.											Applying (K3)	
CO3	determine the best fitting curve to the given data.											Applying (K3)	
CO4	solve the algebraic and transcendental equations and simultaneous linear equations.											Applying (K3)	
CO5	perform interpolation, extrapolation, numerical differentiation and numerical integration.											Applying (K3)	
Mapping of COs with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2									3	3
CO2	3	2	1									3	3
CO3	3	2	1									3	3
CO4	3	2	1									3	3
CO5	3	2	1									3	3
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy													
ASSESSMENT PATTERN - THEORY													
Test / Bloom's Category*	Remembering (K1) %		Understanding (K2) %		Applying (K3) %		Analyzing (K4) %		Evaluating (K5) %		Creating (K6) %		Total %
CAT1	-		20		80								100
CAT2	-		20		80								100
CAT3	-		20		80								100
ESE	-		20		80								100
* ±3% may be varied (CAT 1,2 &3 – 50 marks & ESE – 100 marks)													

  
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 Board of Studies - CSE & IT



P. D. D...  
 21/11/25



24IST13 -PROGRAMMING IN C							
Programme& Branch	M.Sc & Software Systems	Sem.	Category	L	T	P	Credit
Prerequisites	Nil	1	PC	3	0	0	3
Preamble	To focus on developing programming skills using C language.						
UNIT –I	<b>Introduction to C and Preprocessor Directives:</b>						<b>9</b>
Introduction - Structure of a C program – Compiling and Executing C programs – Comments – C Tokens – Character Set – Keywords – Identifiers – Data Types – Variables – Constants – Input/Output Statements – Operators – Type Conversion and Typecasting. Preprocessor Directives: Introduction – Types of Preprocessor Directives.							
Unit–II	<b>Decision Control and Looping Statements:</b>						<b>9</b>
Introduction to Decision Control Statements – Conditional Branching Statements – Iterative Statements – Nested Loops – Break and Continue Statement – goto statement. Case Studies: Roman number representation – day of the week.							
Unit–III	<b>Arrays and Strings:</b>						<b>9</b>
One-dimensional Arrays: Declaring, Initializing and Accessing Arrays – Operations – Two-dimensional Arrays : Declaring, Initializing and Accessing Arrays - Operations – Multidimensional Arrays – Sparse Matrices – Applications of Arrays. Strings: Introduction – Operations on Strings – Arrays of Strings.							
Unit–IV	<b>Functions:</b>						<b>9</b>
Introduction – Function Declaration/Function Prototype – Function Definition – Function Call – Return Statement – Passing Parameters to Functions – Scope of Variables – Storage Classes – Recursive Functions – Types of Recursion – Passing One-dimensional Arrays and Two-dimensional Arrays to Functions - Recursion versus Iteration.							
Unit–V	<b>User-Defined Data Types and Pointers:</b>						<b>9</b>
User-Defined Data Types: Introduction to Structures – Nested Structures – Arrays of Structures – Structures and Functions – Self-referential Structures – Unions – Arrays of Union Variables – Unions Inside Structures – Structure Inside Union – Enumerated Data Type. Pointers: Introduction – Declaring Pointer Variables – Pointer Expressions and Pointer Arithmetic – Null Pointers – Generic Pointers – Passing Arguments to Function Using Pointers.							
<b>Total: 45</b>							
<b>TEXT BOOK:</b>							
1.	ReemaThareja., "Programming in C ", 2 <sup>nd</sup> Edition, Oxford University Press, New Delhi, 2018.						
<b>REFERENCES:</b>							
1.	Sumitabha Das, "Computer Fundamentals and C Programming", 1 <sup>st</sup> Edition, McGraw Hill Education (India) Private Limited, 2018						
2.	YashavantKanetkar, "Let us C", 16 <sup>th</sup> Edition, BPB publications, New Delhi, 2018.						
3.	Balagurusamy. E., "Programming in ANSI C", 7 <sup>th</sup> Edition, McGraw Hill Education (India) Private Limited, 2017.						

<b>COURSE OUTCOMES:</b> On completion of the course, the students will be able to		<b>BT Mapped (Highest Level)</b>
CO1	outline the basic concepts of C programming and write simple programs	Applying (K3)
CO2	identify the appropriate decision control and looping statements in C and develop simple applications	Applying (K3)
CO3	develop simple C programs using the concepts of arrays and strings	Applying (K3)
CO4	develop simple applications using functions	Applying (K3)
CO5	make use of user defined data types and pointers to solve given problems	Applying (K3)

**Mapping of COs with POs and PSOs**

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1		1							3	3
CO2	3	2	1		1							3	3
CO3	3	2	1		1							3	3
CO4	3	2	1		1							3	3
CO5	3	2	1		1							3	3

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

**ASSESSMENT PATTERN – THEORY**

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	-	20	80				100
CAT2	-	20	80				100
CAT3	-	20	80				100
ESE	-	20	80				100

\* ±3% may be varied (CAT 1,2&3 – 50 marks & ESE – 100 marks)

*[Signature]*  
Signature of the Chairman  
Board of Studies - CSE & IT


*T. N. Srinivasan*  
*T. N. Srinivasan*



24IST14 -DIGITAL PRINCIPLES AND LOGIC DESIGN							
Programme & Branch	M.Sc & Software Systems	Sem.	Category	L	T	P	Credit
Prerequisites	Nil	1	ES	3	0	0	3
Preamble	To emphasize the fundamental concepts and overview of Electrical and Electronics Engineering for beginners.						
Unit – I	<b>Binary Systems and Logic Gates:</b>						<b>9</b>
Digital Systems – Binary Numbers – Number Base Conversions – Octal Numbers – Hexadecimal Numbers – Complements (1's Complement, 2's Complement) – Binary Codes – Binary Storage and Registers – Binary Logic – Digital Logic Gates.							
Unit – II	<b>Minimization and Boolean Algebra:</b>						<b>9</b>
Basic Theorems and Properties of Boolean Algebra – Boolean Functions – Canonical and Standard Forms – K-Map Method: Two-Variables - Three-Variables - Four-Variables – Don't Care Conditions – NAND and NOR Implementation.							
Unit – III	<b>Combinational Logic:</b>						<b>9</b>
Combinational Circuits – Analysis Procedure – Design Procedure – Binary Adder: Half Adder – Full Adder – Binary Subtractor: Half Subtractor – Full Subtractor – Decoders – Encoders – Multiplexers - Demultiplexers.							
Unit – IV	<b>Synchronous Sequential Logic:</b>						<b>9</b>
Introduction – Sequential Circuits – Latches: SR, D Latches – Flip-Flops: SR Flip-Flop – D Flip-Flop – JK Flip-Flop – T Flip-Flop – Characteristic Table – Characteristic Equation. Analysis of Clocked Sequential Circuits: Analysis of D Flip-Flops – Analysis of T Flip-Flops – Analysis of JK Flip-Flops.							
Unit – V	<b>Registers and Counters:</b>						<b>9</b>
Registers – Types of Shift Registers: SISO – SIPO – PISO – PIPO – Universal Shift Registers – Ripple Counters: Binary Ripple Counters – BCD Ripple Counters – Ring Counters – Johnson Counter.							
							<b>Total: 45</b>
<b>TEXT BOOK:</b>							
1.	Morris R. Mano M., Michael D. Ciletti., "Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilog", 6 <sup>th</sup> Edition, Pearson, India, 2022						
<b>REFERENCES:</b>							
1.	Ghoshal Subrata, "Digital Electronics", 2 <sup>nd</sup> Edition, Cengage Learning, New Delhi, 2018						
2.	Alam Mansaf, Alam Bashir Abhijit., Debnath Sudipta., "Digital Logic Design", 1 <sup>st</sup> Edition, PHI Learning Pvt. Ltd., New Delhi, 2016.						



COURSE OUTCOMES: On completion of the course, the students will be able to												BT Mapped (Highest Level)	
CO1	solve problems related to number base conversions , binary codes and know about registers and gates											Applying (K3)	
CO2	apply the concept of Boolean Algebra and implement minimization techniques.											Applying (K3)	
CO3	design the basic combinational circuits using adders, subtractors and multiplexers											Applying (K3)	
CO4	demonstrate the functions of synchronous sequential logic using flip flop.											Applying (K3)	
CO5	practice the concepts of registers and counters.											Applying (K3)	
Mapping of COs with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1									3	3
CO2	3	2	1									3	3
CO3	3	2	1									3	3
CO4	3	2	1									3	3
CO5	3	2	1									3	3
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy													
ASSESSMENT PATTERN - THEORY													
Test / Bloom's Category*	Remembering (K1) %		Understanding (K2) %		Applying (K3) %		Analyzing (K4) %		Evaluating (K5) %		Creating (K6) %		Total %
CAT1	-		35		65								100
CAT2	-		35		65								100
CAT3	-		35		65								100
ESE	-		35		65								100
* ±3% may be varied (CAT 1,2&3 – 50 marks & ESE – 100 marks)													

  
 Signature of the Chairman  
 Board of Studies -

C. Sub  
 [C. SAMUNADEVI]



24ISC11 –FOUNDATIONS OF IT							
Programme & Branch	M.Sc & Software Systems	Sem.	Category	L	T	P	Credit
Prerequisites	Nil	1	PC	3	0	2	4
Preamble	To provide the basic knowledge about the components of computer, software classifications, problem solving techniques and Github.						
Unit – I	<b>Programming Concepts</b>						<b>9</b>
Interaction of user and computer: Types – System and Application software. Computer Programming fundamentals: Program Development Life Cycle – Algorithm – Control Structures – Flowcharts – Pseudocode – Programming paradigms. Case study on problem solving in sequential, selection and repetitive structure.							
Unit – II	<b>Computers and Memory</b>						<b>9</b>
Introduction: Characteristics of computer-Classification of Computers- Applications of Computer –Computer System Hardware: Central Processing and Memory unit – Instruction format, Set and Cycle – Interconnecting the units. Computer Memory: Representation – Hierarchy – Registers – Cache, Primary and Secondary memory – Input Devices – Output Devices.							
Unit – III	<b>Operating systems and Internet</b>						<b>9</b>
Operating systems: Introduction – Objectives – Types – Functions – Process, Memory, File, Device Management – Protection and Security – User interface. Internet: Introduction – History – Protocol – Architecture – Managing and connecting to Internet – Connections – Address – Services – Uses.							
Unit – IV	<b>Information systems and Security</b>						<b>9</b>
Information systems: Characteristics – IS – CBIS – Need – Categories – Operations and Management Support System – Specialized IS. Security: Threat and Attack – Malicious software – Hacking – Services – Mechanisms – Cryptography – DS – Firewall – User identification and authentication.							
Unit – V	<b>Github</b>						<b>9</b>
Introduction – installing Git: Installing Git on Windows – Installing the Cygwin Git package – Installing standalone Git – Getting Started: Git Command Line – Basic Git Concepts: Repositories – Object types – Index – Object Store Pictures – Git Concepts at Work. File management and the Index.							
<b>LIST OF EXPERIMENTS / EXERCISES:</b>							
1.	Write an algorithm, pseudocode and flowchart using selection and repetitive structures in raptor						
2.	Installation of Operating System ( Windows, Linux)						
3.	Write letter using Mail Merge						
4.	Create a worksheet and perform mathematical functions.						
5.	Create a presentation with minum of 5 slides.						
6.	Create a repo and deploy the web page using github and also manage source code with multiple branches						
7.	Create a scenario for merge conflicts and resolve it using github						
<b>Lecture:45, Practical:30, Total:75</b>							
<b>TEXT BOOK:</b>							
1.	Anita Goel, "Computer Fundamentals", 1 <sup>st</sup> Edition, Pearson Education India, 2010 . for Units I,II,III,IV						
2.	Jon Loeliger and Matthew Mccullough, "Version control with Git", 2 <sup>nd</sup> Edition, Shroff Publishers & Distributors, 2012. for Unit V.						
<b>REFERENCES/ MANUAL / SOFTWARE:</b>							
1.	Dromey R.G., "How to Solve it by Computer", Pearson Education, 2009						
2.	Balagurusamy E., "Fundamentals of Computing and Programming", Tata McGrawHill Education Pvt. Ltd., 2017						



<b>COURSE OUTCOMES:</b> On completion of the course, the students will be able to		<b>BT Mapped (Highest Level)</b>
CO1	acquire knowledge on different problem-solving techniques and express the solution for structuring logic in terms of algorithm, flowchart and pseudocode.	Applying (K3), Precision (S3)
CO2	outline the computer components, working principles and its applications.	Understanding (K2), Precision (S3)
CO3	explore the concepts and functionalities of operating systems with comprehensive knowledge of the Internet.	Understanding (K2), Precision (S3)
CO4	interpret the characteristics and categories of information systems with the acquaintance on security and its mechanisms.	Understanding (K2), Precision (S3)
CO5	create a repository and manage the repository file functions using Github.	Applying (K3), Precision (S3)

**Mapping of COs with POs and PSOs**


COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1		3							3	2
CO2	3	2	1									2	1
CO3	3	2	1									3	2
CO4	3	2	1									3	2
CO5	3	2	1		3							3	2

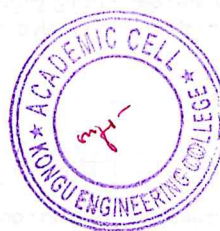
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

**ASSESSMENT PATTERN - THEORY**

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	-	50	50				100
CAT2	-	100	-				100
CAT3	-	50	50				100
ESE	-	50	50				100


\* ±3% may be varied (CAT 1, 2, 3 – 50 marks & ESE – 100 marks)

  
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24ISL11 - COMMUNICATIVE ENGLISH – I LABORATORY														
Programme & Branch		M.Sc & SOFTWARE SYSTEMS					Sem.	Category	L	T	P	Credit		
Prerequisites		NIL					1	HS	0	0	2	1		
Preamble		To communicate in a formal forum effectively and write long passages independently.												
LIST OF EXPERIMENTS / EXERCISES:														
1.	Self-Introduction													
2.	News reading													
3.	Making a non-technical presentation													
4.	Situational dialogues													
5.	Speaking about a dream job/company													
6.	Reading newspaper articles/magazines													
7.	Listening comprehension													
8.	Preparing review of a book/movie													
9.	Writing about a recent scientific invention/technology													
10.	Creative writing: writing apoem/short story/ personal happenings – unforgettable moment in one's life													
													Total: 30	
REFERENCES/ MANUAL /SOFTWARE:														
1.	DVD, Podcasts and Authentic Videos													
2.	Laboratory Manual													
COURSE OUTCOMES: On completion of the course, the students will be able to												BT Mapped (Highest Level)		
CO1	acquire proficiency through effective listening and reading												Understanding (K2), Manipulation (S2)	
CO2	write coherently without grammatical errors												Applying (K3) Precision(S3)	
CO3	take part in various professional and academic events												Analyzing (K4), Manipulation (S2)	
Mapping of Cos with POs and PSOs														
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	
CO1				1		2		2	3	1	3	1	1	
CO2				1		2		2	3	1	3	1	1	
CO3				1		2		2	3	1	3	1	1	
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy														



  
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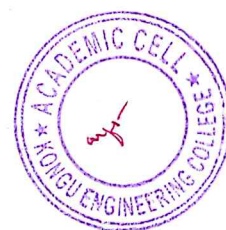
  
 Dr. D. Chandramani

24ISL12- PROGRAMMING IN C LABORATORY								
Programme & Branch	M.Sc & SOFTWARE SYSTEMS	Sem.	Category	L	T	P	Credit	
Prerequisites	NIL	1	PC	0	0	4	2	
Preamble		To introduce the field of programming using C language.						
LIST OF EXPERIMENTS / EXERCISES:								
1.	Programs for demonstrating the use of different types of operators like arithmetic, logical, relational and ternary operators (Sequential structures).							
2.	Programs to illustrate the different formatting options for input and output.							
3.	Programs using decision making statements like 'if', 'else if', 'switch', conditional and unconditional 'goto' (Selective structures).							
4.	Programs for demonstrating repetitive control statements like 'for', 'while' and 'do-while' (Iterative structures).							
5.	Programs for demonstrating one-dimensional and two-dimensional numeric array.							
6.	Programs to implement various character and string operations with and without built-in library functions.							
7.	Programs to demonstrate modular programming concepts using functions (Using built-in and user-defined functions).							
8.	Programs for demonstrating passing one-dimensional and two-dimensional arrays to functions.							
9.	Programs to illustrate the use of user-defined data types.							
10.	Programs to demonstrate the use of pointers.							
								Total: 60
REFERENCES/ MANUAL /SOFTWARE:								
1.	Laboratory Manual							
COURSE OUTCOMES:								
On completion of the course, the students will be able to							BT Mapped (Highest Level)	
CO1	demonstrate the application of sequential, selective and repetitive control structures.						Applying (K3) Precision (S3)	
CO2	develop simple C programs using the concepts of arrays, strings and functions						Applying (K3) Precision (S3)	
CO3	implement solutions to the given problem using user defined data types and pointers.						Applying (K3) Precision (S3)	

Mapping of Cos with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	1	2			1		1		3	3
CO2	3	2	1	1	2			1		1		3	3
CO3	3	2	1	1	2			1		1		3	3
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy													


  
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T. Paragammai  
 P. R. Rajkumar





24ISL13

24ISL13 - DIGITAL PRINCIPLES AND LOGIC DESIGN LABORATORY													
Programme & Branch		M.Sc & Software Systems					Sem.	Category	L	T	P	Credit	
Prerequisites		NIL					1	ES	0	0	2	1	
Preamble		To provide the knowledge in the basic concepts of Combinational and Sequential Circuits. It emphasizes on providing fundamental concepts related to electronics engineering.											
LIST OF EXPERIMENTS / EXERCISES:													
1.	Verification of AND, OR, NOT, NAND, NOR, XOR Logic Gates												
2.	Verification of Code Convertor												
3.	Verification of Parity Generator												
4.	Verification of Half Adder and Full Adder												
5.	Verification of Half Subtractor and Full Subtractor												
6.	Verification of Decoder and Encoder												
7.	Verification of Multiplexer and Demultiplexer												
8.	Verification of SR and D Flipflops												
9.	Verification of Binary and BCD counter												
10.	Verification of Up / Down 4 bit Binary Counter												
													Total: 30
REFERENCES/ MANUAL /SOFTWARE:													
1.	Laboratory Manual												
COURSE OUTCOMES: On completion of the course, the students will be able to												BT Mapped (Highest Level)	
CO1	perform the operation of identifying various digital ICs and understand their functionalities.											Applying (K3), Precision (S3)	
CO2	demonstrate basic combinational circuits and verify their functionalities.											Applying (K3), Precision (S3)	
CO3	master the design procedures to design basic sequential circuits.											Applying (K3), Precision (S3)	
Mapping of Cos with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	1								3	3
CO2	3	2	1	1								3	3
CO3	3	2	1	1								3	3
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy													

  
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 Board of Studies -

C. Sol  
 C. JAMUNADEVI



24VEC12 –YOGA AND VALUES FOR HOLISTIC DEVELOPMENT							
<b>Programme &amp; Branch</b>	<b>M.Sc &amp; Software Systems</b>	<b>Sem.</b>	<b>Category</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>
<b>Prerequisites</b>	<b>Nil</b>	<b>1</b>	<b>HS</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>1</b>
<b>Preamble</b>	Yoga or yogasanas are considered as art and science of healthy living by our ancient gurus. It is method to bring harmony of body and mind for general wellbeing. Yoga is considered as one of the greatest gifts to the world by Indians for healthy living. Students in particular are benefitted by learning yoga.						
<b>Unit –I</b>	<b>Introduction:</b>					<b>2</b>	
The Origins of Yoga – Definitions - Concepts - Aims and objectives of Yoga – Yoga is a Science and Art – Rules and Regulations of Asanas – Classifications of Yogasanas – Patanjali's Ashtanga Yoga – Pranayama – Mudras & Bandhas - Shatkarma (Cleansing Practice) – Streams of Yoga–Modern Trends in yoga.							
<b>Unit –II</b>	<b>Yoga and Mind:</b>					<b>2</b>	
The Nature of Mind- Five Elements and the Mind – Meditation and the Mind – Functions of the Mind Role of Yoga in Psychological problems: Mood Disorders, Major Depressive Disorder, Cyclothymic Disorder.							
<b>Unit –III</b>	<b>Yoga and Values, Diet:</b>					<b>2</b>	
Human Values – Social Values – Role of Yoga in Personality Integration - Concepts of Natural Diet - Naturopathy Diet – Eliminative Diet – Soothing Diet – Constructive Diet.							
<b>Unit –IV</b>	<b>Asanas:</b>					<b>2</b>	
Prayer - Starting & Closing - Preparatory practices – Loosening Practices – Meaning, Definitions and Objectives of Asanas - Principles of Practicing Asanas. Asanas: Standing – Sitting – Prone – Supine – Suryanamaskar.							
<b>Unit –V</b>	<b>Pranayama and Meditation:</b>					<b>2</b>	
Breathing Practices for awareness - Definitions and Objectives of Pranayama - Principles of Practicing Pranayama. Pranayama: Nadi Shuddhi - Kapalabathi – Sitali – Sitkari – Bhranari – Ujjayi – Relaxation Techniques – Meditation.							
<b>Lecture:10,Practical:10,Total:20</b>							
<b>TEXTBOOK:</b>							
1.	Swami satyananda saraswathi, "Asana pranayama mudra bandha", Bihar school of yoga, 4 <sup>th</sup> Edition, 1969.						
2.	Swami mukthi Bodhanandha, "Hatha yoga pradipika", Bihar school of yoga, 4 <sup>th</sup> Edition, 1985.						
<b>REFERENCES:</b>							
1.	B.K.S. Iyengar, "Yoga the path of holistic health", DK Limited, 2 <sup>nd</sup> Edition, 1969.						
2.	Selvarasu, "Kriya cleansing in yoga", Aruvi yoga, 3 <sup>rd</sup> Edition, 2002.						



COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped(Highest Level)
CO1	realize the importance of yoga in physical health.	Applying(K3)
CO2	realize the importance of yoga in mental health.	Applying(K3)
CO3	realize the role of yoga in personality development and diet.	Applying(K3)
CO4	do the loosening practices, Asanas and realize its benefits.	Applying(K3)
CO5	do the practice of Pranayama, meditation and realize its benefits	Applying(K3)

**Mapping of Cos with Pos and PSOs**

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1						3		2	1		
CO2						3		2			
CO3						3		3			
CO4						3		2	3		
CO5						3		3			

1–Slight,2 –Moderate,3–Substantial,BT-Bloom's Taxonomy

**ASSESSMENT PATTERN– THEORY**

Test /Bloom's Category*	Remembering (K1)%	Understanding (K2)%	Applying (K3)%	Analyzing (K4)%	Evaluating (K5)%	Creating (K6)%	Total %
CAT1	-	-	-	-	-	-	-
CAT2	-	-	-	-	-	-	-
CAT3	-	50	50	-	-	-	100
ESE	-	-	-	-	-	-	-


\*±3% maybe varied(CAT3–100marks)


  
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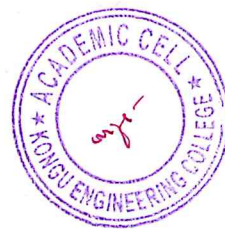
*T. Karagaiah*  
(T. Karagaiah)



24MNT15–STUDENTINDUCTION PROGRAM													
Programme & Branch	M.Sc & Software Systems	Sem.	Category	L	T	P	Credit						
Prerequisites	Nil	1	MC	2	0	0	0						
Preamble	To make the student to understand the meaning of happiness and prosperity for a human being. Also, to facilitate the students to understand the harmony of human living and importance of physical and mental strength through yoga and meditation.												
Unit – I	Overview of College and Department:						9						
General facilities - Autonomous System - Curriculum Overview & Assessment - Outcome Based Education – Placement and Higher Education Opportunities-Entrepreneurship-Value Added Course-Online Course.													
Unit – II	Universal Human Values:						9						
Holistic Development & Role of Education - Understanding Happiness - Understanding the Human Being – Self & Body - Understanding the Human Being – Activities of Self - Prosperity - Understanding Relationship Trust - Understanding Relationship Respect - Understanding Relationship Other Feelings - Understanding Society - Understanding Nature Existence.													
Unit – III	Yoga and Meditation:						9						
Introduction to Yoga – Objective – Physical Exercises: Need and Objectives of Simplified Physical Exercise – Types of Physical Exercises – Meditation: Qualities acquired through Meditation – Mental Health – Simple Meditation – Stress Management – Human Values: Self-control - Self-confidence – Honesty – Contentment – Humility – Modesty Tolerance – Adjustment – Sacrifice – Forgiveness – Importance of Thought Process – Self Realization.													
Total: 20													
COURSE OUTCOMES: On completion of the course, the students will be able to							BT Mapped (Highest Level)						
CO1	interpret the values and culture of the Institution.						Understanding (K2)						
CO2	enhance the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human–human relationships and explore their role in ensuring a harmonious society.						Understanding (K2)						
CO3	know the value holistic vision of life and take steps to develop physical and mental health.						Applying (K3)						
Mapping of COs with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1						3	3			1		2	3
CO2						3	3			1		2	3
CO3						3	3			1		3	3
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy													
ASSESSMENT PATTERN - THEORY													
Test / Bloom's Category*	Remembering (K1) %		Understanding (K2) %		Applying (K3) %		Analyzing (K4) %		Evaluating (K5) %		Creating (K6) %		Total %
CAT1	25		75										100
* ±3% may be varied (CAT – 100 marks)													

  
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 F. Rajan  
 (T. Rajan)





# 24MNT13 - QUANTITATIVE APTITUDE - I

(Common to BSc and MSc branches)

Programme & Branch	M.Sc – SS & B.Sc – CSD , IS, SS	Sem.	Category	L	T	P	Credit
Prerequisites	Basic Mathematical skills	1	MC	2	0	0	0

**Preamble** To Impart the skills for assessing the numerical ability and problem solving.

**Unit – I** **Number system and Equations:** 6

**Number systems:** Classification of numbers – Rules of divisibility – BODMAS Rule – HCF and LCM – Decimal fractions – Simplification – Problems.

**Equations:** Solving equations with one variable – Solving simultaneous linear equations with two variables – Applications of simultaneous linear equations – Problems on ages – Simple problems.

**Unit – II** **Ratio, Proportion and Percentage:** 6

**Ratio and Proportion:** Third, Fourth and mean proportional – Comparison of ratios – Compound ratio – Duplicate ratio – Sub duplicate ratio – Triplicate ratio – Sub triplicate ratio – Chain rule – Simple problems.

**Percentages:** Basic Concepts – Problems on percentages – Problems on population – Problems on depreciation.

**Unit – III** **Profit and Loss, Interest:** 8

**Profit and Loss:** Basic concepts – Cost price – Selling price – Profit and Loss – Simple problems.

**Simple and Compound interest:** Concepts – Percentage of interest – Difference between simple interest and compound interest – Simple problems.

**Total:20**

## TEXT BOOK:

1. Dr R.S.Agarwal, "Quantitative Aptitude for Competitive Examinations", Revised Edition, S.Chand and company limited, 2022.

## REFERENCES/ MANUAL / SOFTWARE:

1. Abhijit Guha, "Quantitative Aptitude for Competitive Examination", 7<sup>th</sup> Edition, McGraw Hill Education, India, 2020.
2. <https://www.indiabix.com/aptitude/questions-and-answers>
3. <https://www.geeksforgeeks.org/aptitude-questions-and-answers>

## COURSE OUTCOMES:

On completion of the course, the students will be able to

**BT Mapped (Highest Level)**

CO1	solve equations with one variable and two variable.	Applying (K3)
CO2	solve ratio proportion and percentage problems.	Applying (K3)
CO3	solve profit and loss ,simple interest and compound interest problems	Applying (K3)

## Mapping of COs with POs and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2											
CO2	2	2											
CO3	3	3											

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

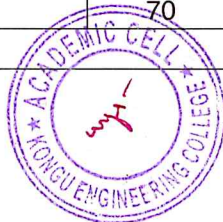
## ASSESSMENT PATTERN - THEORY

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	-	30	70				100
CAT2	-	30	70				100
CAT3	-	30	70				100

\* ±3% may be varied (CAT 1, 2 & 3 – 50 marks)

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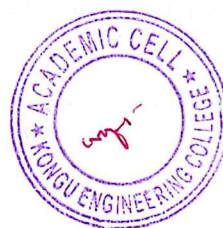
24IST21 - COMMUNICATIVE ENGLISH - II							
Programme& Branch	M.Sc Software Systems	Sem.	Category	L	T	P	Credit
Prerequisites	Nil	2	HS	3	0	0	3
Preamble	To construct sentences effectively and facilitate to improve interpersonal skills of the learners						
Unit – I	<b>Grammar and Vocabulary:</b>						<b>9</b>
Analogy –Coding and Decoding- Types of sentences - Assertive, Imperative, Interrogative and Exclamatory and Positive, Negative - Reading: Passages focusing on factual details, and features of text organization as well as gist, opinions and attitudes - Writing: Letter Writing: inviting guests, Job application with resume, seeking permission for Industrial Visit. Activities: Listening: Social Conversations - Speaking: Technical Presentation							
Unit – II	<b>Grammar and Vocabulary:</b>						<b>9</b>
Homonyms and Homophones – Odd words- Subject-verb agreement - Reading: Gapped-text exercises - Writing: Transcoding - Preparing proposals - Activities: Listening: Telephone conversations - Speaking: Role Play							
Unit – III	<b>Grammar and Vocabulary:</b>						<b>9</b>
Articles and determiners - Simple, compound and complex - Reading: Reading Comprehension-Multiple matching - Writing: Checklist – Memorandum – Designing brochures. Activities: Listening: Telephonic conversation - Mock Group Discussions - Speaking: Group Discussion							
Unit – IV	<b>Grammar and Vocabulary:</b>						<b>9</b>
Error detection and correction– Sentence selection and Improvement- Gerunds & Infinitives - Reading: Business English Certificate (BEC) type exercises - Writing: Recommendations - Activities: Listening: Motivational Talks - Speaking: Speaking with native accent.							
Unit – V	<b>Grammar and Vocabulary:</b>						<b>9</b>
Single word substitution - Definitions – Purpose and function – Interpreting news / advertisement - Reading: International English Language Testing System (IELTS) type exercises - Writing: Report Writing: special and technical reports - Activities: Listening: TED Talks - Speaking: Mock Interviews.							
							<b>Total:45</b>
<b>TEXT BOOK:</b>							
1.	Sanjay Kumar and PushpLata, "Communication Skills", 2 <sup>nd</sup> Edition, New Delhi: Oxford University Press, 2015.						
<b>REFERENCES/ MANUAL / SOFTWARE:</b>							
1.	Raymond Murphy, "Essential English Grammar: Reference and Practice for South Asian Students", 2 <sup>nd</sup> Edition, Cambridge: Cambridge University Press, 2012.						
2.	GlennisPye, "Vocabulary in Practice, Parts 1 and 2", 1 <sup>st</sup> Edition, Cambridge: Cambridge University Press, 2011.						
3.	Tense buster, DVD, podcasts, Authentic Videos, and Laboratory Manual						
* ±3% may be varied (CAT 1, 2& 3 – 50 marks)							




COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	use structural words appropriately in spoken and written texts	Understanding (K2)
CO2	construct different types of sentences	Applying (K3)
CO3	read longer academic and business English texts with maximum understanding	Analyzing (K4)
CO4	write beyond the sentence level	Applying (K3)
CO5	communicate effectively in a vast range of personal, professional, academic and cultural situations	Applying (K3)

Mapping of COs with POs and PSOs														
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	
CO1				1		2		2	3	1	3	1	1	
CO2				1		2		2	3	1	3	1	1	
CO3				1		2		2	3	1	3	1	1	
CO4				1		2		2	3	1	3	1	1	
CO5				1		2		2	3	1	3	1	1	
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy														
ASSESSMENT PATTERN - THEORY														
Test / Bloom's Category*		Remembering (K1) %		Understanding (K2) %		Applying (K3) %		Analyzing (K4) %		Evaluating (K5) %		Creating (K6) %		Total %
CAT1		-		21.33		62		16.67		-		-		100
CAT2		-		20.33		63		16.67		-		-		100
CAT3		-		27.33		56		16.67		-		-		100
ESE		-		28.22		54		17.78		-		-		100
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)														

  
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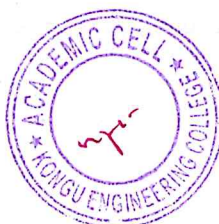
  
 S. Chandramathi



24ISC21- PROBABILITY AND STATISTICS							
Programme & Branch	M.Sc & Software Systems	Sem.	Category	L	T	P	Credit
Prerequisites	Nil	2	BS	3	0	2	4
Preamble	The introductory course which inculcates the knowledge of Probability, Statistics and its application in the field of business and also it gives adequate exposure in the basic concepts of test of hypothesis and control charts.						
Unit – I	Probability:						9
Basic Terminology - Mathematical Probability - Axiomatic Approach to Probability - Addition Theorem on Probability - Conditional Probability - Multiplication Theorem on Probability - Independence of Events - Total Probability - Baye's Theorem.							
Unit – II	Statistical Measures:						9
Measures of central tendency: Mean, Median, Mode. Measures of dispersion: Range - Quartile deviation - Mean deviation - Standard deviation.							
Unit – III	Correlation and Linear Regression:						9
Karl Pearson's Coefficient of Correlation - Rank Correlation - Spearman's Rank Correlation Coefficient - Repeated Ranks - Regression Line of Y on X - Regression Line of X on Y.							
Unit – IV	Test of Significance for Small Samples:						9
Introduction to sampling distributions - Types of sampling - Standard Error - Student's t-test: Test of significance between the sample mean and population mean – Test for difference between two sample means - F-test for difference between two population variances - Chi-square Test for Goodness of Fit - Chi-square Test for Independence of Attributes.							
Unit – V	Statistical Quality Control:						9
Control Charts - Control charts for variables: Mean Chart, R-Chart. Control Charts for attributes: c-Chart, p-Chart and np- chart.							
LIST OF EXPERIMENTS / EXERCISES:							
1.	Determination of the probability						
2.	Compute the measures of central tendency and dispersion						
3.	Determine the correlation coefficients and covariance						
4.	Compute the linear regression lines for the given data						
5.	Testing significance of means using student's t-test						
6.	Testing the independence of attributes using Chi-square test						
7.	Plot a control chart for variables						
8.	Plot a control chart for attributes						
Lecture: 45, Practical: 30, Total: 75							
TEXT BOOK:							
1.	Veerarajan T, "Probability and Statistics, Random process with Queueing Theory and Queueing Networks", 4 <sup>th</sup> Edition, McGraw-Hill Education (India), New Delhi, 2017 for Units I, III, IV, V.						
2.	S C Gupta & V K Kapoor, Fundamental of Mathematical Statistics, 12 <sup>th</sup> Edition, Sultan Chand and Sons, Educational Publishers, New Delhi, 2022 for Unit II.						
REFERENCES/ MANUAL / SOFTWARE:							
1.	Kandasamy P, Thilagavathy K, Gunavathy K, "Probability Statistics and Queueing Theory", S.Chand & Co, New Delhi, 2016.						
2.	Douglas C. Montgomery, George C. Runger, "Applied Statistics and Probability for Engineers" - 6 <sup>th</sup> Edition, New Delhi Wiley, 2020.						
3.	MATLAB Manual.						

COURSE OUTCOMES: On completion of the course, the students will be able to											BT Mapped (Highest Level)		
CO1	make use of the concept of probability to real life scenarios										Applying (K3) Precision (S3)		
CO2	determine the mean, median and mode for ungrouped and grouped data										Applying (K3) Precision (S3)		
CO3	identify the relation between two variables understand the concepts of two-dimensional regression										Applying (K3) Precision (S3)		
CO4	apply statistical tests for solving problems involving small sample tests										Applying (K3) Precision (S3)		
CO5	compute the statistical analysis and visualization of the variables and attributes using MATLAB										Applying (K3) Precision (S3)		
Mapping of COs with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3											2
CO2	3	3											2
CO3	3	2	2									1	2
CO4	3	2	3									2	2
CO5	3	2	3									2	2
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy													
ASSESSMENT PATTERN - THEORY													
Test / Bloom's Category*	Remembering (K1) %		Understanding (K2) %		Applying (K3) %		Analyzing (K4) %		Evaluating (K5) %		Creating (K6) %		Total %
CAT1	-		20		80								100
CAT2	-		20		80								100
CAT3	-		20		80								100
ESE	-		20		80								100
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)													

  
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 P. Balasubramanian



24IST22 - PROGRAMMING AND LINEAR DATA STRUCTURES

<b>Programme &amp; Branch</b>	<b>M.Sc &amp; Software Systems</b>	<b>Sem.</b>	<b>Category</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>
<b>Prerequisites</b>	<b>Programming in C</b>	<b>2</b>	<b>PC</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

Preamble	To articulate the advanced concepts of C language, basic concepts and applications of linear data structures such as linked list, stack and queue.
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<b>Unit – I</b>	<b>Pointers and Arrays, Pointers and Strings :</b>	<b>9</b>
Pointers and Arrays – Passing an Array to a Function – Returning an Array from Function - Arrays of Pointers – Pointers and 2D array - Using Pointers for string manipulation – Two dimensional array of strings - array of pointers to strings – Pointers to Pointers – Dynamic Memory Allocation - Drawbacks of Pointers.		

<b>Unit – II</b>	<b>Files:</b>	<b>9</b>
Introduction – Using Files in C – Reading and Writing Data to Files – Detecting the End-of-File – Error Handling During File Operations – Accepting Command Line Arguments – Functions for Selecting a Record Randomly – remove() – Renaming the File.		

<b>Unit – III</b>	<b>SinglyLinked List:</b>	<b>9</b>
Introduction to Data Structures – Linked List Versus Arrays – Memory Allocation and Deallocation for a Linked List – Types of Linked Lists – Singly Linked Lists – Traversing – Searching – Inserting a New Node – Deleting a Node – Sorting a list- Destroying a list-Printing linked list in reverse order.		

<b>Unit – IV</b>	<b>Doubly and Circular Linked List:</b>	<b>9</b>
Doubly Linked Lists: Structure – Inserting a New Node – Deleting a Node. Circular Linked Lists: Inserting a New Node - Deleting a Node – Sorting and Reversing a List– Introduction to Circular Doubly Linked Lists.		

<b>Unit – V</b>	<b>Stacks and Queues:</b>	<b>9</b>
Stacks: Array Representation – Operations – Applications - Infix to Postfix Expression Conversion – Postfix Evaluation – Queues: Array Representation – Operations – Circular Queue: Introduction and Operations.		

**Total: 45**

**TEXT BOOK:**


1.	Reema Thareja., "Programming in C", 2 <sup>nd</sup> Edition, Oxford University Press, New Delhi, 2018 for Units I,II,III,V.
2.	Reema Thareja., "Data Structures using C", 2 <sup>nd</sup> Edition, Oxford University Press, New Delhi, 2018 for Unit IV.

**REFERENCES:**

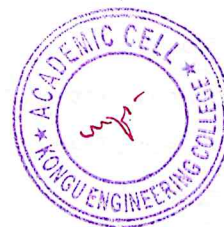
1.	Sumitabha Das, "Computer Fundamentals & C Programming", 1 <sup>st</sup> Edition, McGraw Hill Education (India) Private Limited, 2018.
2.	Yashavant Kanetkar, "Pointers in C", 4 <sup>th</sup> Edition, BPP Publications, New Delhi, 2017.
3.	Weiss M. A., "Data Structures and Algorithm Analysis in C", 2 <sup>nd</sup> Edition, Pearson Education, 2016



COURSE OUTCOMES: On completion of the course, the students will be able to											BT Mapped (Highest Level)		
CO1	make use of pointers to perform array and string operations.										Applying (K3)		
CO2	implement file operations with command line arguments.										Applying (K3)		
CO3	demonstrate various operation with singly linked list.										Applying (K3)		
CO4	develop simple applications using doubly linked list.										Applying (K3)		
CO5	perform the operations on stacks and queues.										Applying (K3)		
Mapping of COs with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1		1							3	3
CO2	3	2	1		1							3	3
CO3	3	2	1		1							3	3
CO4	3	2	1		1							3	3
CO5	3	2	1		1							3	3
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy													
ASSESSMENT PATTERN - THEORY													
Test / Bloom's Category*	Remembering (K1) %		Understanding (K2) %		Applying (K3) %		Analyzing (K4) %		Evaluating (K5) %		Creating (K6) %		Total %
CAT1	-		20		80								100
CAT2	-		20		80								100
CAT3	-		20		80								100
ESE	-		20		80								100
* ±3% may be varied (CAT 1,2,3 – 50 marks & ESE – 100 marks)													

  
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T. Nagarajan  
 T. Paragatham



24IST23 - OBJECT ORIENTED PROGRAMMING USING C++							
Programme & Branch	M.Sc & Software Systems	Sem.	Category	L	T	P	Credit
Prerequisites	Programming in C	2	PC	3	0	0	3
Preamble	To acquire acquaintance in object oriented programming and develop solutions for real time applications in C++.						
Unit – I	<b>Introduction to C++ and Functions:</b>						<b>9</b>
The Object-Oriented Approach –Characteristics of Object-Oriented Languages –Basics of C++: Structure of a C++ Program –Branching and Looping –Streams in C++ and Stream Classes - Unformatted Console I/O Operations- Functions: Passing Arguments & Returning Values from Functions –Reference Arguments –Overloaded Functions – Recursion –Inline Functions –Default Arguments –Scope and Storage Class.							
Unit – II	<b>Classes and Objects, Constructors and Destructors:</b>						<b>9</b>
A Simple Class –Objects as Physical Objects –Objects as Data Types –Constructors –Destructor –Objects as Function Arguments –Default Copy Constructor –Returning Objects from Functions –Static Class Data –Arrays and Strings – Array Fundamentals –Array of Objects –Standard C++ String Class							
Unit – III	<b>Compile Time Polymorphism and Inheritance:</b>						<b>9</b>
Overloading Unary Operator –Overloading Binary Operator –Date Conversion –Inheritance –Derived and Base Class – Derived Class Constructors –Overriding Member Functions –Class Hierarchies –Public and Private Inheritance –Levels of Inheritance							
Unit – IV	<b>Pointers, Virtual Functions:</b>						<b>9</b>
Pointers: Addresses and Pointers –The Address - of Operator (&) –Pointers and Arrays –Pointers and Functions – Pointers and C Type Strings –Pointer to Objects –Pointer to Pointer –Virtual Functions –Normal Member Function Accessed with Pointers –Virtual Member Functions Accessed with Pointers –Pure Virtual Functions-Friend Functions and Friend Class –Static Functions –this Pointer							
Unit – V	<b>Streams and Files:</b>						<b>9</b>
Stream Classes –Disk File I/O with Streams – File Pointers - Opening and Closing Files - Reading from Files–Writing to Files : Text and Binary - Error handling in File I/O –Sequential and Random Access files - Object serialization and Deserialization : Serialization - Writing Objects to files - Overloading extraction and insertion Operators – Deserialization - Reading objects from files – Advanced File I/O : Working with multiple files							
							<b>Total:45</b>
<b>TEXT BOOK:</b>							
1.	Robert Lafore, "Object-Oriented Programming in C++" , 4 <sup>th</sup> Edition, SAMS Publishers, USA, 2016.						
<b>REFERENCES:</b>							
1.	Bjarne Stroustrup, "The C++ programming language" , Addison Wesley, 2013.						
2.	Ashok N. Kamthane, "Programming in C++" , Pearson, 2 <sup>nd</sup> Edition, 2016						
3.	Venugopal K.R., Rajkumar Buyya, " Mastering C++" , 2 <sup>nd</sup> Edition, McGraw-Hill Education, 2013.						

COURSE OUTCOMES: On completion of the course, the students will be able to												BT Mapped (Highest Level)	
CO1	implement the basic concepts of object oriented programming with C++ to solve simple problems											Applying (K3)	
CO2	apply the concepts of classes objects, constructors and destructors to solve simple problems.											Applying (K3)	
CO3	develop programs using operator overloading, overriding and inheritance.											Applying (K3)	
CO4	make use of pointers, virtual and friend functions and create simple applications.											Applying (K3)	
CO5	apply the concepts of files, template and exceptions handling to solve real time problems.											Applying (K3)	
Mapping of COs with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	3		1				2		2	3	3
CO2	3	2	3		1				2		2	3	3
CO3	2	2	3		1				2		2	3	3
CO4	2	2	3		1				2		2	3	3
CO5	3	2	3		1				2		2	3	3
1 – Slight, 2 – Moderate, 3 – Substantial, BT– Bloom's Taxonomy													
ASSESSMENT PATTERN – THEORY													
Test / Bloom's Category*	Remembering (K1) %		Understanding (K2) %		Applying (K3) %		Analyzing (K4) %		Evaluating (K5) %		Creating (K6) %		Total %
CAT1	-		20		80								100
CAT2	-		20		80								100
CAT3	-		20		80								100
ESE	-		20		80								100
* ±3% may be varied (CAT 1,2&3 – 50 marks & ESE – 100 marks)													

*[Signature]*  
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T.ERP.  
(T.ERAMYA)





24ISC22 WEB PROGRAMMING							
<b>Programme&amp; Branch</b>	<b>M.Sc &amp; Software Systems</b>	<b>Sem.</b>	<b>Category</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>
<b>Prerequisites</b>	<b>Nil</b>	<b>2</b>	<b>PC</b>	<b>3</b>	<b>0</b>	<b>2</b>	<b>4</b>
<b>Preamble</b>	To design interactive web applications using HTML, CSS, Java script and PHP.						
<b>Unit – I</b>	<b>HTML 5.0 and CSS:</b>						<b>9</b>
Introduction to HTML5: Headings – Linking – Images –Lists – Tables– Forms -Frames- Media elements. Introduction to Cascading Style Sheets – Inline Styles – Embedded Style Sheets – Linking External Style Sheets – Positioning Elements- Backgrounds-Box Model and Text Flow-Text Shadows-Box Shadows-Animation.							
<b>Unit – II</b>	<b>UI Design &amp; BOOTSTRAP5 (BS5):</b>						<b>9</b>
Introduction to BS5 – Containers– Tables – Images – Alerts – Buttons - Button Groups - List Groups – Dropdowns – Collapse – Navs – Navbar – Carousel – Offcanvas - BS5 Forms: Select - Menus - Checks and Radios – Range – Input Groups – Floating Labels – Form Validation.							
<b>Unit – III</b>	<b>Java script:</b>						<b>9</b>
Java Script: Introduction to Scripting – Control Statements–Looping statements–Logical Operators. Java script Functions: Introduction – Function Definitions – Scope Rules – JavaScript Global Functions – Recursion – Recursion vs. Iteration. - Java Script Arrays.							
<b>Unit – IV</b>	<b>Java script Object and DOM:</b>						<b>9</b>
Java script Object – Document Object Model (DOM) Objects and Collections: Modeling a Document: DOM Nodes and Trees – Traversing and Modifying a DOM Tree – DOM Collections – Dynamic Styles.							
<b>Unit – V</b>	<b>PHP:</b>						<b>9</b>
PHP's Syntax – Comments – Variables – Types in PHP –Output –Expressions – Branching – Looping – Using Functions – User Defined Functions – Functions and Variable Scope -Strings in PHP: String Functions – PHP Arrays: Creating Arrays – Retrieving Arrays – Multidimensional Arrays – Inspecting Arrays – Deleting Arrays.							
<b>LIST OF EXPERIMENTS / EXERCISES:</b>							
1.	Develop a HTML document using the following tags: Heading, Anchor, Link, Paragraph and Image Lists.						
2.	Create a web page using Table tag.						
3.	Design a web form using HTML form elements.						
4.	Design a responsive website using Bootstrap5.						
5.	Design a registration form using Bootstrap5 and perform form validation.						
6.	Design an attractive webpage using style sheets and do form validation using java Script.						
7.	Develop a web page using PHP functions.						
<b>Lecture:45, Practical:30, Total:75</b>							
<b>TEXT BOOK:</b>							
1.	Paul Deitel, Harvey Deitel and Abbey Deitel, "Internet and World Wide Web – How To Program", 5 <sup>th</sup> Edition, Pearson Education, New Delhi, 2018 for Units I, III, IV..						
2.	Daniel Charles Foreman, "Bootstrap 5 Foundations", 1st Edition, Amazon Digital Services LLC - KDP Print US, 2021 for Unit II						
3.	Steve Suehring, Tim Converse and Joyce Park, "PHP 6 and MySQL", 2 <sup>nd</sup> Edition, Wiley Publication, New Delhi, 2017 for Unit V						
<b>REFERENCES/ MANUAL / SOFTWARE:</b>							
1.	Laboratory Manual						
2.	Visual Studio code, Browser, xampp server						

<b>COURSE OUTCOMES:</b> On completion of the course, the students will be able to	<b>BT Mapped (Highest Level)</b>
develop interactive web pages using HTML tags.	Applying (K3) Precision (S3)
design responsive web pages using Bootstrap5.	Applying (K3) Precision (S3)
implement java script control structures and functions.	Applying (K3) Precision (S3)
deploy Document Object Model and java script object.	Applying (K3) Precision (S3)
apply PHP looping structures, branching structures, functions, string functions and arrays.	Applying (K3) Precision (S3)

**Mapping of COs with POs and PSOs**


COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	1			1		2	2	2	1	2	3	3
CO2	3	2	1	1	1		2	2	2	1	2	3	3
CO3	3	2	1	1	1		2	2	2	1	2	3	3
CO4	3	2	1	1	1		2	2	2	1	2	3	3
CO5	3	2	1	1	1		2	2	2	1	2	3	3


1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

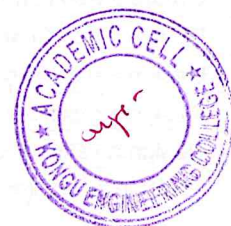
**ASSESSMENT PATTERN - THEORY**

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	-	20	80				100
CAT2	-	20	80				100
CAT3	-	20	80				100
ESE	-	20	80				100

\* ±3% may be varied (CAT 1, 2, 3 – 50 marks & ESE – 100 marks)

  
Signature of the Chairman  
Board of Studies -

  
[C. SAMVADEVI]





**24ISL21 - COMMUNICATIVE ENGLISH - II LABORATORY**

<b>Programme &amp; Branch</b>	<b>M.Sc &amp; Software Systems</b>	<b>Sem.</b>	<b>Category</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>
<b>Prerequisites</b>	<b>NIL</b>	<b>2</b>	<b>HS</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**Preamble** To provide good exposure in the field of communication

**LIST OF EXPERIMENTS / EXERCISES:**

1.	Mock interview
2.	Job application with resume
3.	Making a presentation on a technical topic/case study
4.	Group discussion
5.	Reading aloud
6.	Listening to native speakers' talks and imitating them
7.	Writing about a social issue
8.	Writing for blogs/social media
9.	Writing company profiles
10.	Pronunciation test

**Total: 30**

**REFERENCES/ MANUAL /SOFTWARE:**

1.	Globarena, Study Skill Success, Tense Buster, Issues in English
2.	Laboratory Manual, DVD, Podcasts and Authentic Videos

**COURSE OUTCOMES:**

**On completion of the course, the students will be able to**

**BT Mapped  
(Highest Level)**

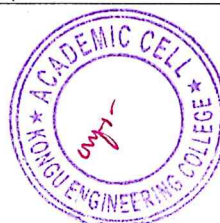
CO1	understand the pronunciation of the native speakers (English) about their real time experience after listening to the videos	Understanding (K2), Manipulation (S2)
CO2	write coherently without grammatical errors	Applying (K3) Precision(S3)
CO3	take part in group discussion, paper or project presentation and mock interview	Analyzing (K4), Manipulation (S2)

**Mapping of Cos with POs and PSOs**

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1				1		2		2	3	1	3	1	1
CO2				1		2		2	3	1	3	1	1
CO3				1		2		2	3	1	3	1	1

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

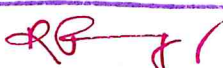
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[Dr. S. GANESHANATHAN]




24ISL22 - PROGRAMMING AND LINEAR DATA STRUCTURES LABORATORY													
Programme & Branch		M.Sc & Software Systems					Sem.	Category	L	T	P	Credit	
Prerequisites		Programming in C					2	PC	0	0	2	1	
Preamble		To develop an in-depth knowledge in C language and implement linear data structures using C											
LIST OF EXPERIMENTS / EXERCISES:													
1.	Program to access an array (1D and 2D) using pointers												
2.	Program to manipulate strings using pointers												
3.	Program to implement command line arguments.												
4.	Program to implement singly linked list.												
5.	Program to sort and display linked list elements in reverse order.												
6.	Program to implement doubly linked list.												
7.	Program to implement circular doubly linked list.												
8.	Program to implement stack using array.												
9.	Infix to Postfix conversion, postfix evaluation using stack												
10.	Program to implement queue using array.												
												Total: 30	
REFERENCES/ MANUAL /SOFTWARE:													
1.	Laboratory Manual												
COURSE OUTCOMES: On completion of the course, the students will be able to											BT Mapped (Highest Level)		
CO1	implement programs to solve problems using pointers to arrays and strings.											Applying (K3), Precision (S3)	
CO2	develop programs using files with command line arguments.											Applying (K3), Precision (S3)	
CO3	use appropriate linear data structure for solving given problems.											Applying (K3), Precision (S3)	
Mapping of Cos with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	1	1				1		1	3	3
CO2	3	2	1	1	1				1		1	3	3
CO3	3	2	1	1	1				1		1	3	3
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy													



  
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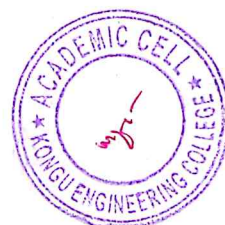
  
 P. Paragatham



24ISL23 - OBJECT ORIENTED PROGRAMMING WITH C++ LABORATORY													
Programme & Branch		M.Sc & Software Systems					Sem.	Category	L	T	P	Credit	
Prerequisites		Programming in C					2	PC	0	0	4	2	
Preamble		To introduce object oriented programming concepts and develop solutions for real time applications in C++.											
LIST OF EXPERIMENTS / EXERCISES:													
1.	Construct a C++ program to manage the input and output operations using stream classes.												
2.	Programs to implement the concept of Call by Value, Call by Reference and Call by Address												
3.	Design a C++ program to implement the concept of class and objects with data members and member functions.												
4.	Develop a C++ program to initialize the class members using constructors and destroy the objects by using destructor.												
5.	Develop C++ program to carry out compile time polymorphism using unary and binary operator overloading.												
6.	Implement different types of inheritance.												
7.	Develop a C++ program to implement runtime polymorphism.												
8.	Develop a C++ program to allow functions and classes to operate with generic types using templates.												
9.	Implement programs with sequential access and random access file.												
10.	Construct a class in C++ to handle predefined and user defined exceptions												
												Total: 60	
REFERENCES/ MANUAL /SOFTWARE:													
1.	Laboratory Manual												
COURSE OUTCOMES: On completion of the course, the students will be able to													
CO1	develop C++ programs using classes and objects and demonstrate operator overloading and inheritance.											BT Mapped (Highest Level) Applying (K3), Precision (S3)	
CO2	implement the concepts of pointers, virtual and friend functions.											Applying (K3), Precision (S3)	
CO3	demonstrate the usage of Files, Template and Exceptions.											Applying (K3), Precision (S3)	
Mapping of Cos with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	3	1	2	2			1		1	3	3
CO2	3	2	3	1	2	2			1		1	3	3
CO3	3	2	3	1	2	2			1		1	3	3
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy													

  
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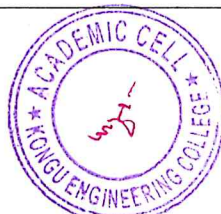
  
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24MNT22 - QUANTITATIVE APTITUDE - II													
(Common to MSc and BSc branches)													
Programme & Branch	M.Sc – SS & B.Sc – CSD, IS, SS					Sem.	Category	L	T	P	Credit		
Prerequisites	Basic Mathematical skills					2	MC	2	0	0	0		
Preamble													
To Impart the skills for assessing the numerical ability and problem solving.													
Unit – I												6	
Averages, Alligations, Time and Work:													
Averages, Alligations or Mixtures: Concepts – Definition – Formula –Simple problems on averages – Alligation or Mixture rule – Applications – Problems.													
Time and Work: Concepts – Work andwages –Pipes and Cisterns – Simple problems.													
Unit – II												6	
Time and Distance:													
Time and Distance: Time speed and distance – Speed, time, and distance conversions – Average speed – Relative speed – Problems on boats and streams – Upstream and downstream – Simple problems.													
Unit – III												8	
Permutation and Combination, Probability:													
Permutation and Combination: Concepts – Simple problems.													
Probability: Basic Concepts – Applications – Simple problems.													
Total:20													
TEXT BOOK:													
1.	Dr R.S.Agarwal, “Quantitative Aptitude for Competitive Examinations”, Revised Edition, S.Chand and company limited, 2022.												
REFERENCES/ MANUAL / SOFTWARE:													
1.	Abhijit Guha, "Quantitative Aptitude for Competitive Examination", 7 <sup>th</sup> Edition, McGraw Hill Education, India, 2020.												
2.	<a href="https://www.indiabix.com/aptitude/questions-and-answers">https://www.indiabix.com/aptitude/questions-and-answers</a>												
3.	<a href="https://www.geeksforgeeks.org/aptitude-questions-and-answers">https://www.geeksforgeeks.org/aptitude-questions-and-answers</a>												
COURSE OUTCOMES:											BT Mapped (Highest Level)		
On completion of the course, the students will be able to													
CO1	solve averages, alligations or mixtures, time and work problems.										Applying (K3)		
CO2	solve the problems on time and distance, upstream and downstream applications oriented simple problems.										Applying (K3)		
CO3	solve permutation and combination and probability problems.										Applying (K3)		
Mapping of COs with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2											
CO2	2	3											
CO3	3	2											
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom’s Taxonomy													
ASSESSMENT PATTERN - THEORY													
Test / Bloom’s Category*	Remembering (K1) %		Understanding (K2) %		Applying (K3) %		Analyzing (K4) %		Evaluating (K5) %		Creating (K6) %		Total %
CAT1	-		30		70								100
CAT2	-		30		70								100
CAT3	-		30		70								100
* ±3% may be varied (CAT 1, 2 & 3 – 50 marks)													

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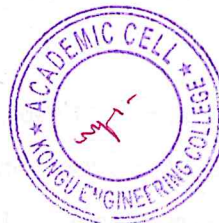
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24IST31- JAVA PROGRAMMING							
Programme & Branch	M.Sc & Software Systems	Sem.	Category	L	T	P	Credit
Prerequisites	Object Oriented Programming with C++	3	PC	3	0	0	3
Preamble	To articulate the object-oriented programming concepts in Java.						
Unit – I	Class, Objects and Interface:						9
An overview of Java – Arrays – String – String Buffer – String Builder. Class Fundamentals – Declaring Objects and Methods – Constructor – this Keyword – Garbage Collection – Overloading methods and Constructors – Inheritance – Method Overriding – Abstract Class – final with Inheritance – Interfaces – Using static methods in an Interface.							
Unit – II	Packages and Collections:						9
Packages – Predefined Packages – User defined packages. Collections: List – Array List – Linked List – Stack – Vector – Set – Hash Set – Linked Hash Set – Tree Set – Queue – Priority Queue – Dequeue – Map – Legacy Classes and Interfaces							
Unit – III	Exceptions, Multithreading and Java Networking:						9
Exception Handling – Fundamentals – types – try and catch – Multiple Catch – throw, throws and finally – Creating own Exceptions. Multi threading - Java Thread model – Main thread – Creating Thread – Creating Multiple Thread – Thread Priority – Synchronization. Java Networking: RMI – Client Server Application using RMI.							
Unit – IV	Regex and Streams:						9
Regular Expression: Pattern class – Matcher Class Exploring Regular Expressions. Streams: Stream Interfaces – Reduction Operations – Parallel Streams – Mapping – Collecting Iterator and Streams.							
Unit – V	Springboot:						9
Spring Boot: Introduction - Microservices - 12-factor app - Spring Initializr - Spring Boot Starter Dependencies - Spring and Spring Boot Annotations- Building application using Maven and Gradle.							
							Total:45
TEXT BOOK:							
1.	Schildt Herbert, “Java – The Complete Reference”, 12 <sup>th</sup> Edition, Tata McGraw Hill Publishing Company, New Delhi, 2022., for Units I,II,III,IV.						
2.	Shagun Bakliwal, “Hands-on Application Development using Spring Boot: Building Modern Cloud Native Applications by Learning RESTFul API, Microservices, CRUD Operations, Unit Testing, and Deployment”, BPB Publications, 1 <sup>st</sup> Edition, 2021 for Unit V.						
REFERENCES:							
1.	Deitel and Deitel, “Java How to Program”, 11 <sup>th</sup> Edition, Pearson, New Delhi, 2019						
2.	Claudio and Greg, “Developing Java Applications with Spring and Spring Boot”, Packt Publishing Ltd, 2018.						
2.	M. Heckler, “JavaFX 8: Introduction by Example”, 2 <sup>nd</sup> Edition, Apress						
3.	<a href="https://docs.oracle.com/javase/tutorial/">https://docs.oracle.com/javase/tutorial/</a>						

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COURSE OUTCOMES: On completion of the course, the students will be able to											BT Mapped (Highest Level)			
CO1	implement the basic concepts, class, objects and constructors in java programming.											Applying (K3)		
CO2	develop programs using packages and collections.											Applying (K3)		
CO3	make use of exception handling, threads and RMI to solve logical building problems.											Applying (K3)		
CO4	implement the concept of regular expression and streams.											Applying (K3)		
CO5	build real world applications using spring boot and its capabilities.											Applying (K3)		
Mapping of COs with POs and PSOs														
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	
CO1	3	2	1		2		2	2	2			3	3	
CO2	3	2	1		2		2	2	2			3	3	
CO3	3	2	1		2		2	2	2			3	3	
CO4	3	2	1		2		2	2	2			3	3	
CO5	3	2	1		2		2	2	2			3	3	
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy														
ASSESSMENT PATTERN - THEORY														
Test / Bloom's Category*	Remembering (K1) %		Understanding (K2) %		Applying (K3) %		Analyzing (K4) %		Evaluating (K5) %		Creating (K6) %		Total %	
CAT1	-		20		80								100	
CAT2	-		20		80								100	
CAT3	-		20		80								100	
ESE	-		20		80								100	
* ±3% may be varied (CAT 1, 2 & 3 – 50 marks & ESE – 100 marks)														
MICRO PROJECT:														
<ul style="list-style-type: none"><li>Develop a small-scale Java application for any real-time use case by applying core OOP principles.</li><li>Implement a real-time application using Java Collections to solve a practical problem in any domain of your choice</li></ul>														

  
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24IST32 - DATA STRUCTURES							
Programme & Branch	M.Sc & Software Systems	Sem.	Category	L	T	P	Credit
Prerequisites	Programming and Linear Data Structures	3	PC	3	0	0	3
Preamble	The course focuses on the basic concepts and applications of linear structures and non-linear data structures.						
Unit- I	Stacks and Queues:						9
Introduction – Singly Linked List – Doubly Linked List – Stacks: Linked Representation – Operations – Multiple Stacks – Applications: Reversing a List – Sorting a List – Queues: Linked Representation – Priority Queue – Applications.							
Unit- II	Trees:						9
Introduction – Types – Creating a Binary Tree from a General Tree – Traversing a Binary Tree – Applications – Binary Search Trees (BST) – Operations: Searching – Insertion – Deletion – Finding the Smallest Node in BST – Finding the Largest Node in a BST – Threaded Binary Trees – AVL Trees: Operations							
Unit- III	Graphs:						9
Introduction – Graph Terminology - Directed Graphs – Bi-connected Components – Representations: Adjacency Matrix – Adjacency List – Adjacency Multi-List – Graph Traversal Algorithms: Breadth First Search – Depth First Search – Topological Sort – Applications of Graphs.							
Unit- IV	Searching and Sorting:						9
Searching: Introduction – Linear Search – Binary Search– Interpolation Search.Sorting: Introduction – Bubble Sort – Insertion Sort – Selection Sort – Merge Sort – Quick Sort — Heap Sort – Tree Sort.							
Unit- V	Advanced Trees, Hashing and Collision:						9
Red-Black Trees – Splay Trees – B-Trees – Heap – Hashing: Introduction – Hash Tables – Hash Functions – Different Hash Functions – Collisions: Collision Resolution by Open Addressing – Collision Resolution by Chaining – Pros and Cons of Hashing – Applications of Hashing.							
Total:45							
TEXT BOOK:							
1.	Reema Thareja., “Data Structures using C”, 3 <sup>rd</sup> Edition, Oxford University Press, New Delhi, 2023.						
REFERENCES:							
1.	Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, 2nd Edition, Pearson Education, New York, 2016.						
2.	Jean Paul Tremblay and Paul G. Sorensen, “An Introduction to Data Structures with Applications”, 2nd Edition, Tata McGraw Hill, New Delhi, 2017.						

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COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	solve the computational problems using linear data structures.	Applying(K3)
CO2	determine the structure and operations on trees.	Applying(K3)
CO3	apply appropriate graph algorithms for solving computing problems.	Applying(K3)
CO4	demonstrate the concept of searching and sorting techniques.	Applying(K3)
CO5	Implement the operations of special trees and demonstrate hashing and collision resolution techniques.	Applying(K3)

**Mapping of COs with POs and PSOs**

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	1				1		2		3	3
CO2	3	2	1	1				1		2		3	3
CO3	3	2	1	1				1		2		3	3
CO4	3	2	1	1				1		2		3	3
CO5	3	2	1	1				1		2		3	3

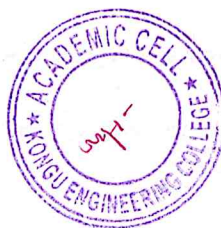
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

**ASSESSMENT PATTERN - THEORY**

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	-	20	80				100
CAT2	-	20	80				100
CAT3	-	20	80				100
ESE	-	20	80				100

\* ±3% may be varied (CAT 1, 2 & 3 – 50 marks & ESE – 100 marks)


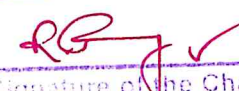
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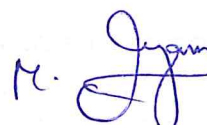
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24ISC31- UNIX AND SHELL PROGRAMMING							
<b>Programme&amp; Branch</b>	<b>M.Sc &amp; Software Systems</b>	<b>Sem.</b>	<b>Category</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>
<b>Prerequisites</b>	<b>Nil</b>	<b>3</b>	<b>PC</b>	<b>3</b>	<b>0</b>	<b>2</b>	<b>4</b>
<b>Preamble</b>	To impart the knowledge in basic concepts of Unix Operating System ,File organization and Process Management and provides knowledge in writing shell scripts in UNIX						
<b>Unit – I</b>	<b>Introduction to Unix:</b>						<b>9</b>
Brief History – Salient Features – Components – Kernel – Shell – File System – Using Unix – Shell Prompt – Commands in Unix – Types of Unix Commands – Basic Commands – Getting Help – The manual and the man Command – The info Utility – Command Substitution – Giving Multiple Commands – Aliases							
<b>Unit – II</b>	<b>File Organization, Attributes and Permissions:</b>						<b>9</b>
File organization – Unix files – Categories of files – Hidden files – File system – Path Names – Home Directory Commands – Dot (.) and (..) File names – File commands – Displaying and Printing Files – Comparing Files. File Attributes and Permissions: File Ownership – Attributes – ls, file, chmod, chown, chgrp, umask Commands							
<b>Unit – III</b>	<b>Standard I/O, Redirection Pipes, Filters and vi Editor:</b>						<b>9</b>
Standard I/O – Redirection – Pipes and Pipeline – Mixing input – Filter – tee command – Terminal and Trash Files – Database File – Handling Columns and Fields – sort, uniq, tr Commands. The vi Editor: Editing – Moving Cursor – Copying and Moving Text – Pattern Searching – Repeating the Last Editor Command – Undoing Commands – Joining and Writing Lines – Using shell from vi – Configuring vi Environment							
<b>Unit – IV</b>	<b>Regular Expressions and Process:</b>						<b>9</b>
Regular Expressions – grep, egrep, fgrep Commands – Stream Editor. The Process: Meaning – Parent and Child Processes – Types – Foreground and Background – Internal and External Commands – ps Command – Process Creation – nohup, nice, time, signals, trap, kill, wait Commands – Job Control – Command History – Scheduling Job Execution							
<b>Unit – V</b>	<b>Shell Programming:</b>						<b>9</b>
Shell Variables – export Command - .profile File – read Command – Positioning Parameters - \$ Variables – set, exit Commands – Branching and Control – Loop Control – continue and break Statements – expr Command – Real Arithmetic – here Document – sleep Command – Debugging Scripts – script, eval, exec Commands							
<b>LIST OF EXPERIMENTS / EXERCISES:</b>							
1.	Practice some basic UNIX commands and do file operations.						
2.	Implement decision making and looping statements using shell script.						
3.	Write a program using the system calls of UNIX operating system process management.						
4.	Implement interprocess communication using pipes and message queues.						
5.	Write a program using file system related system calls to create, open, read, write, seek into, close files and open, write, search, close directories.						
6.	Given the list of processes, their CPU burst times and arrival times, compute and print the average waiting time and average turnaround time using FCFS scheduling.						
7.	Implement the page replacement algorithm using LRU and also Bankers algorithm.						
<b>Lecture:45, Practical:30, Total:75</b>							
<b>TEXT BOOK:</b>							
1.	Venkateshmurthy M.G., "Introduction to UNIX & SHELL programming", 1 <sup>st</sup> Edition, Pearson Education, 2015.						
<b>REFERENCES/ MANUAL / SOFTWARE:</b>							
1.	Linux.						
2.	C/C++ Compiler.						
3.	Lab Manual						

COURSE OUTCOMES: On completion of the course, the students will be able to											BT Mapped (Highest Level)		
CO1	implement basic unix commands										Applying (K3) Precision (S3)		
CO2	examine unix file organization, attributes and permissions										Applying (K3) Precision (S3)		
CO3	inspect standard i/o, redirection pipes, filters and vi editor										Applying (K3) Precision (S3)		
CO4	Male use of regular expressions and implement scheduling.										Applying (K3) Precision (S3)		
CO5	Perform shell programming using shell scripts.										Applying (K3) Precision (S3)		
Mapping of COs with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1		2							3	3
CO2	3	2	1		2							3	3
CO3	3	2	1		2							3	3
CO4	3	2	1		2							3	3
CO5	3	2	1		2							3	3
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy													
ASSESSMENT PATTERN – THEORY													
Test / Bloom's Category*	Remembering (K1) %		Understanding (K2) %		Applying (K3) %		Analyzing (K4) %		Evaluating (K5) %		Creating (K6) %		Total %
CAT1	-		35		65								100
CAT2	-		35		65								100
CAT3	-		35		65								100
ESE	-		35		65								100
* ±3% may be varied (CAT 1,2 & 3– 50 marks & ESE – 100 marks)													



  
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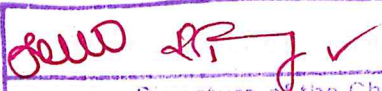
# 24IST33- OPERATING SYSTEMS

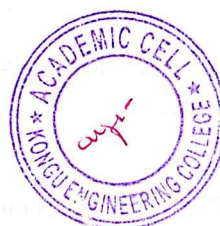
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Programme & Branch	MSc - SOFTWARE SYSTEMS	Sem.	Category	L	T	P	Credit
Prerequisites	Nil	3	PC	3	0	0	3
Preamble	To provide background knowledge in operating system and its functionalities. It exemplifies the classical internal algorithms and memory management strategies of operating systems.						
Unit – I	Overview:						9
Introduction: Roles of Operating System – Operating System Operations – Process Management – Memory Management – Storage Management - Protection and Security. System Structures: Operating Systems Services – User and Operating System Interface – System Calls –Types of System Calls – System Programs.							
Unit – II	Process Management:						9
Process Concept: Process Scheduling – Operation on Processes – Inter Process Communication. Process Scheduling: Scheduling Criteria – Scheduling algorithms. Multithreaded Programming: Overview – Multicore Programming - Multithreading models – Threading issues.							
Unit – III	Synchronization and Deadlock:						9
Synchronization: Background – The Critical-Section Problem – Peterson's Solution – Synchronization Hardware – Mutex Locks – Semaphores – Classic Problems of Synchronization. Deadlocks: System Model – Deadlock Characterization - Methods for Handling Deadlock – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery from Deadlock.							
Unit – IV	Memory Management:						9
Memory Management Strategies: Swapping – Contiguous Memory Allocation – Segmentation – Paging – Structure of the Page Table. Virtual Memory Management: Demand Paging – Copy-on Write – Page Replacement – Allocation of Frames – Thrashing.							
Unit – V	Storage Management:						9
File System: File Concept – Access Methods – File System Structure – File System Implementation – Directory Implementation – Allocation Methods – Free-space Management. Mass Storage Structure: Overview – Disk Structure – Disk Attachment – Disk Scheduling.							
Total:45							
TEXT BOOK:							
1.	Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 10 <sup>th</sup> Edition, John Wiley & Sons, New Jersey, 2021 .						
REFERENCES:							
1.	Andrew S. Tanenbaum, Herbert Bos, " Modern Operating Systems", 4 <sup>th</sup> Edition, Pearson Education, New Jersey, 2015.						
2.	William Stallings, "Operating System Internals and Design", 9 <sup>th</sup> Edition, Pearson, 2018.						

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COURSE OUTCOMES: On completion of the course, the students will be able to											BT Mapped (Highest Level)		
CO1	identify the role of operating system, operations and system calls										Applying(K3)		
CO2	demonstrate the process scheduling algorithms and multithreading models										Applying(K3)		
CO3	determine deadlock handling methods , synchronization techniques and solve the problems										Applying(K3)		
CO4	employ the memory management strategies and page replacement algorithms to solve the problems										Applying(K3)		
CO5	infer storage management concepts and make use of various algorithms in disk scheduling										Applying(K3)		
Mapping of COs with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1								2	3	3
CO2	3	2	1								2	3	3
CO3	3	2	1								2	3	3
CO4	3	2	1								2	3	3
CO5	3	2	1								2	3	3
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy													
ASSESSMENT PATTERN - THEORY													
Test / Bloom's Category*	Remembering (K1) %		Understanding (K2) %		Applying (K3) %		Analyzing (K4) %		Evaluating (K5) %		Creating (K6) %		Total %
CAT1	-		20		80								100
CAT2	-		20		80								100
CAT3	-		20		80								100
ESE	-		20		80								100
* ±3% may be varied (CAT 1,2 & 3– 50 marks & ESE – 100 marks)													

  
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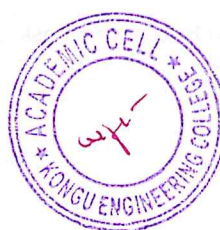
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24IST34- DESIGNTHINKING								
Programme & Branch	M.Sc – Software Systems	Sem.	Category	L	T	P	Credit	
Prerequisites	Nil	3	PC	3	0	0	3	
Preamble	Design Thinking is human-centered problem solving tool which emphasize on empathy, collaboration, co-creation and stakeholder feedback to unlock creativity and innovation, to devise feasible and viable idea/solutions.							
Unit – I	Design Thinking and Explore:						9	
Design Thinking: Key Principles and Mindset – Five Phases, Methods and Tools of Design Thinking – User Guide – Foundation Building for Design Thinking – Explore: Methods & Tools – STEEP Analysis – Strategic Priorities – Activity System – Stakeholder Mapping – Opportunity Framing.								
Unit – II	Empathize:						9	
Empathize: Methods & Tools – Field Observation – Deep User Interview – Empathy Map – User Journey Map - Need Finding – User Insights - User Persona Development.								
Unit – III	Experiment:						9	
Experiment: Methods & Tools – Ideation – SCAMPER – Analogous Inspiration – Deconstruct & Reconstruct – User Experience Journey – Prototyping– Idea Refinement.								
Unit – IV	Engage:						9	
Engage: Methods & Tools – Story Telling – Art of Story Telling – Storyboarding – Co-Creation with Users – Collect Feedback from Users.								
Unit – V	Evolve:						9	
Evolve: Methods & Tools – Concept Synthesis – Strategic Requirements – Evolved Activity Systems – Activity System Integration – Viability Analysis – Innovation Tools using User Needs, CAP, 4S – Change Management - Quick Wins.								
								Total: 45
TEXT BOOK:								
1.	Lee Chong Hwa, "Design Thinking The Guidebook", Design Thinking Master Trainers of Bhutan, 2017. (E-Book)							
REFERENCES:								
1.	Jeanne Liedtka and Tim Ogilvie, "Designing for Growth: A Design Thinking Tool Kit for Managers", Columbia University Press, 2011.							
2.	Jeanne Liedtka, Tim Ogilvie, and Rachel Brozenske, "The Designing for Growth FieldBook: A Step-by-Step Project Guide", Columbia University Press, 2014.							



COURSE OUTCOMES: On completion of the course, the students will be able to												BT Mapped (Highest Level)		
CO1	construct design challenge and reframe the design challenge into design opportunity.											Applying (K3)		
CO2	interview the user, and know the feelings of users to foster deep user understanding and be able to uncover the deep user insights and needs.											Applying (K3)		
CO3	develop ideas and prototypes by brain storming using the ideation tools.											Applying (K3)		
CO4	organize the user walkthrough experience using ideal user experience journey.											Applying (K3)		
CO5	develop smart strategies & implementation plan that will deliver/achieve the idea/solution deduced from earlier phases.											Applying (K3)		
Mapping of COs with POs and PSOs														
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	
CO1	3	3	3	1	1	1	1	3	3	2	1	3	1	
CO2	3	3	3	1	1	1	1	3	3	2	1	3	1	
CO3	3	3	3	1	1	1	1	3	3	2	1	3	1	
CO4	3	3	3	1	1	1	1	3	3	2	1	3	1	
CO5	3	3	3	1	1	1	1	3	3	3	1	3	1	
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy														
ASSESSMENT PATTERN – THEORY														
Test / Bloom's Category*		Remembering (K1) %		Understanding (K2) %		Applying (K3) %		Analyzing (K4) %		Evaluating (K5) %		Creating (K6) %		Total %
CAT1		-		30		70								100
CAT2		-		25		75								100
CAT3		-		25		75								100
Final Assessment		-		20		80								100
* ±3% may be varied (CAT 1,2 & 3 – 50 marks & Final Assessment – 100 marks)														

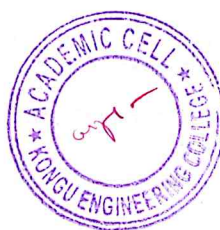
  
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 Board of Studies -



24IST35- COMPUTER ORGANIZATION							
<b>Programme&amp; Branch</b>	<b>M.Sc &amp; Software Systems</b>	<b>Sem.</b>	<b>Category</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>
<b>Prerequisites</b>	<b>Nil</b>	<b>3</b>	<b>PC</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>Preamble</b>	To provide basic knowledge on the hardware architecture of the computer and exemplify the execution of complete instruction in it.						
<b>Unit – I</b>	<b>Basic Structure and Instruction Set Architecture:</b>						<b>9</b>
Basic Structure of Computers: Computer Types - Functional Units – Operational Concepts – Number Representation and Arithmetic Operations – Character Representation – Performance. Instruction Set Architecture: Memory Locations and Addresses – Memory Operations – Instructions and Instruction Sequencing – Addressing Modes.							
<b>Unit – II</b>	<b>Arithmetic Operations:</b>						<b>9</b>
Addition and Subtraction of Signed Numbers – Design of Fast Adders – Multiplication of Unsigned Numbers – Multiplication of Signed Numbers - Fast Multiplication – Integer Division –Floating Point Numbers and Operations.							
<b>Unit – III</b>	<b>Basic Processing Unit and Pipelining:</b>						<b>9</b>
Fundamental Concepts – Instruction Execution – Hardware Components – Instruction Fetch and Execution Steps – Control Signals – Hardwired Control. Pipelining: Basic Concepts – Pipeline Organization – Pipeline Issues - Data Dependencies – Memory Delays – Branch Delays- Resource Limitations - Performance Evaluation.							
<b>Unit – IV</b>	<b>Memory Systems:</b>						<b>9</b>
Basic Concepts – Semiconductor RAM Memories – Read Only Memories – Direct Memory Access – Memory Hierarchy – Cache Memories – Performance Considerations – Virtual Memory – Memory Management Requirements.							
<b>Unit – V</b>	<b>Input/Output Organization:</b>						<b>9</b>
Basic Input / Output: Accessing I/O Devices – Interrupts–Input/Output Organization: Bus Structure – Bus Operation – Arbitration – Interface Circuits – Parallel and Serial Interfaces.							
<b>Total:45</b>							
<b>TEXT BOOK:</b>							
1.	Hamacher Carl, Vranesic Zvonko,ZakyS afwat and Manjikian Naraig “Computer Organization and Embedded Systems”, 6 <sup>th</sup> Edition, 2023 McGraw Hill; Standard Edition (9 January); McGraw Hill Education (India) Private Limited.						
<b>REFERENCES:</b>							
1.	Patterson David A. and Hennessy John L., “Computer Organization and Design: The Hardware / Software Interface”, 5 <sup>th</sup> Edition, Harcourt Asia, Morgan Kaufmann, Singapore, 2014.						
2.	Hayes John P., “Computer Architecture and Organization”, 3 <sup>rd</sup> Edition, Tata McGraw Hill, New Delhi, 2014.						

COURSE OUTCOMES: On completion of the course, the students will be able to											BT Mapped (Highest Level)			
CO1	infer computer components and employ the various addressing modes for the instruction set.										Applying (K3)			
CO2	compute arithmetic operations on signed and unsigned numbers.										Applying (K3)			
CO3	demonstrate the execution of instructions and apply pipelining to handle hazards.										Applying (K3)			
CO4	interpret the basic storage concepts and make use of mapping functions in cache memory.										Applying (K3)			
CO5	utilize the interrupts in I/O transfer and examine the role of bus in I/O operations.										Applying (K3)			
Mapping of COs with POs and PSOs														
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	
CO1	3	2	1									3	3	
CO2	3	2	1									3	3	
CO3	3	2	1									3	3	
CO4	3	2	1									3	3	
CO5	3	2	1									3	3	
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy														
ASSESSMENT PATTERN – THEORY														
Test / Bloom's Category*		Remembering (K1) %		Understanding (K2) %		Applying (K3) %		Analyzing (K4) %		Evaluating (K5) %		Creating (K6) %		Total %
CAT1		-		35		65								100
CAT2		-		35		65								100
CAT3		-		35		65								100
ESE		-		35		65								100
* ±3% may be varied (CAT 1,2 & 3 – 50 marks & ESE – 100 marks)														


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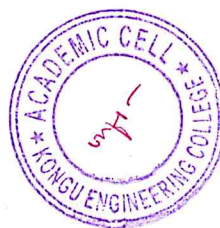


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24ISL31- JAVA PROGRAMMING LABORATORY													
Programme & Branch		M.Sc & Software Systems					Sem.	Category		L	T	P	Credit
Prerequisites		Object Oriented Programming with C++					3	PC		0	0	4	2
Preamble		To provide knowledge on object oriented programming concepts and core Java Programming.											
LIST OF EXPERIMENTS / EXERCISES:													
1.	Implement Simple Java Programs using Arrays.												
2.	Implement different operations using string and string buffer.												
3.	Implement Inheritance and interface using class and objects.												
4.	Create and implement user – defined packages.												
5.	Develop Java Program using List, Vector and Set.												
6.	Develop Java Program using Queue and Map.												
7.	Develop various applications by handling exceptions.												
8.	Implement multi-tasking concepts using threads.												
9.	Implement RMI to access Remote methods.												
10.	Building application using Maven/ Gradle.												
													Total:60
REFERENCES/ MANUAL /SOFTWARE:													
1.	Laboratory Manual												
2.	<a href="https://docs.oracle.com/javase/tutorial/">https://docs.oracle.com/javase/tutorial/</a>												
COURSE OUTCOMES: On completion of the course, the students will be able to												BT Mapped (Highest Level)	
CO1	execute simple Java applications using classes and objects, inheritance, interfaces.											Applying (K3), Precision (S3)	
CO2	demonstrate the execution of Java programs using packages, exception handling, multithreading, and RMI.											Applying (K3), Precision (S3)	
CO3	develop springboot application using maven/gradle.											Applying (K3), Precision (S3)	
Mapping of Cos with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	2	2							3	3
CO2	3	2	2	1	2							3	3
CO3	3	2	2	2	2							3	3
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy													

  
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**24ISL32- DATA STRUCTURES LABORATORY**

<b>Programme &amp; Branch</b>	<b>M.Sc &amp; Software Systems</b>	<b>Sem.</b>	<b>Category</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>
<b>Prerequisites</b>	<b>Programming and Linear Data Structures</b>	<b>3</b>	<b>PC</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**Preamble** This course provides knowledge to develop applications using the concepts of Linear and Non-linear data structures.

**LIST OF EXPERIMENTS / EXERCISES:**

1.	Program to implement stack operations using linked list
2.	Program to implement queue operations using linked list.
3.	Linked list implementation of priority queue.
4.	Program to implement binary tree traversal.
5.	Implement binary search tree operations.
6.	Traverse a graph using DFS and BFS techniques.
7.	Write a code to perform topological sorting on a graph.
8.	Perform the various searching operations.
9.	Develop code to sort the given data using various sorting methods.
10.	Program to implement hash tables.

**Total: 30**

**REFERENCES/ MANUAL /SOFTWARE:**

1.	Lab Manual
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**COURSE OUTCOMES:**

On completion of the course, the students will be able to

**BT Mapped  
(Highest Level)**

CO1	adapt the appropriate data structure for solving the given problem	Applying (K3), Precision (S3)
CO2	use a data structure to implement another data structure.	Applying (K3), Precision (S3)
CO3	synthesize operations like searching, insertion, deletion and traversing on various data structures.	Applying (K3), Precision (S3)

**Mapping of Cos with POs and PSOs**

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	1	2			1	1		1	3	3
CO2	3	2	1	1	2			1	1		1	3	3
CO3	3	2	1	1	2			1	1		1	3	3

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

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24ISP31 - MINI PROJECT - I													
Programme& Branch	M.Sc & Software Systems						Sem.	Category	L	T	P	Credit	
Prerequisites	Programming Languages						3	EC	0	0	2	1	
Preamble		It provides practical exposure to the students and an opportunity to apply the computational mathematics concepts to solve the real world problems.											
<b>Total : 30</b>													
COURSE OUTCOMES: On completion of the course, the students will be able to											BT Mapped (Highest Level)		
CO1	formulate specific problem statements for ill-defined real life problems with reasonable assumptions and constraints.										Creating (K6), Precision (S3)		
CO2	perform literature search in the area of interest.										Evaluating (K5), Precision (S3)		
CO3	conduct experiments, design and analysis, solution iterations and document the results.										Evaluating (K5), Precision (S3)		
CO4	perform error analysis and arrive at scientific conclusions.										Evaluating (K5), Precision (S3)		
CO5	document the results in the form of technical report and give oral presentation										Creating (K6), Precision (S3)		
<b>Mapping of COs with POs and PSOs</b>													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	2	2	3	3	3	3	3	3	3	3
CO3	3	3	3	2	2	3	3	3	3	3	3	3	3
CO4	3	3	3	2	2	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3	3	3
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy													

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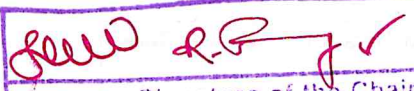
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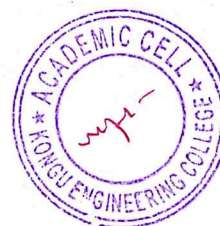


24IST41- PYTHON PROGRAMMING							
Programme& Branch	M.Sc & Software Systems	Sem.	Category	L	T	P	Credit
Prerequisites	Nil	4	PC	3	0	0	3
Preamble	This course provides an fundamental knowledge on Python programming and skills to develop solutions for different real world problems using Python concepts. It also explores various packages for data manipulation and analysis.						
Unit – I	<b>Basic Concepts:</b>						9
Introduction – Variables, Expressions and Statements – Functions – Conditionals and recursion – Fruitful Functions – return values, parameters, local and global scope, function composition, recursion – Iteration Statements – Mutable vs Immutable data types – Strings – String slices – Searching – Looping and Counting – String methods – String Comparison.							
Unit – II	<b>Data Structures:</b>						9
Lists – List operations – slices and methods – Dictionaries – Dictionaries as set of Counters – Looping and Dictionaries – Dictionaries and Lists – Tuples – Tuples Basics – Lists and Tuples – Dictionaries and Tuples – Sequences of sequences – Sets – Sets Basics – Set Operations – Modules – Packages - Case Study							
Unit – III	<b>Object Oriented Programming:</b>						9
Classes and Objects – Classes and Functions – Classes and methods – Object-oriented features – Private and public members - __init__() method – __str__() method – Operator Overloading – Type-based dispatch – Inheritance – Types of Inheritance - Polymorphism and method overriding — Containers - Interface and Abstract classes.							
Unit – IV	<b>Data Manipulation with NumPy Arrays:</b>						9
Python Environment & Frameworks: Anaconda – Jupyter notebook – NumPy: The Basics of NumPy Arrays – Computation on NumPy Arrays – Aggregations – Computation on Arrays: Broadcasting – Comparisons – Masks and Boolean Logic – Fancy Indexing - Sorting Arrays – Structured Data.							
Unit – V	<b>Data Manipulation with Pandas and Visualization:</b>						9
Data Manipulation with Pandas: Pandas Objects – Data Indexing and Selection – Operating on data – Handling missing data – Hierarchical Indexing – Concat and Append – Merge and Join – Aggregation and Grouping – Data Visualization with Matplotlib: Line plots: Line Colors and Styles – Axes Limits – Labeling Plots.							
<b>Total:45</b>							
<b>TEXT BOOK:</b>							
1.	Reema Thareja, “Python Programming: using Problem Solving Approach” , 2 <sup>nd</sup> Edition, Oxford University Press Publishers, India, 2023, for Units I, II, III.						
2.	Jake Vander Plas, “Python Data Science Handbook Essential Tools for Working with Data”, 1 <sup>st</sup> Edition, O’Reilly Publishers, India, 2016, for Units IV , V.						
<b>REFERENCES :</b>							
1.	Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, 2nd Edition, O’Reilly Publishers, 2016						
2.	Martin Brown, Python: The Complete Referencell, 4th Edition, Tata McGraw Hill Education, India, 2018.						

COURSE OUTCOMES: On completion of the course, the students will be able to												BT Mapped (Highest Level)	
CO1	make use of basic concepts, functions and strings of Python Programming											Applying (K3)	
CO2	demonstrate List, Dictionaries, Tuples and Strings data structures											Applying (K3)	
CO3	implement Object Oriented Programming concepts.											Applying (K3)	
CO4	perform data manipulation with NumPy Arrays											Applying (K3)	
CO5	perform data manipulation with Pandas and data visualization using Matplotlib											Applying (K3)	
Mapping of COs with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1						2	2	2	3	3
CO2	3	2	1						2	2	2	3	3
CO3	3	2	1						2	2	2	3	3
CO4	3	2	1						2	2	2	3	3
CO5	3	2	1						2	2	2	3	3
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy													
ASSESSMENT PATTERN – THEORY													
Test / Bloom's Category*	Remembering (K1) %		Understanding (K2) %		Applying (K3) %		Analyzing (K4) %		Evaluating (K5) %		Creating (K6) %		Total %
CAT1	-		20		80								100
CAT2	-		20		80								100
CAT3	-		20		80								100
ESE	-		20		80								100
* ±3% may be varied (CAT 1,2 & 3– 50 marks & ESE – 100 marks)													

  
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 Board of Studies - CSE & IT


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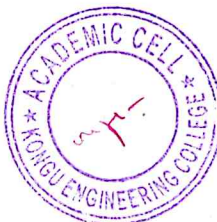


24IST42-DATABASE MANAGEMENT SYSTEMS							
Programme & Branch	M.Sc & Software Systems	Sem	Category	L	T	P	Credit
Prerequisites	Nil	4	PC	3	0	0	3
Preamble	To focus on database fundamentals, database designing and implementation of queries						
UNIT –I	<b>Introduction:</b>						<b>9</b>
Database System Applications – Purpose – View of Data – Data Models – Database Design and Database Engine – Database Architecture – Users and Administrators – Relational Model: Structure of Relational Databases- Database Schema – Keys – Schema Diagrams –Relational Query Languages –Relational Algebra.							
UNIT –II	<b>SQL:</b>						<b>9</b>
Introduction to SQL: SQL – Data Definition – Basic Structure – Basic Operations – Set Operations – Null Values and Aggregate Functions – Nested Sub Queries – Modification of Databases.							
UNIT –III	<b>Intermediate SQL and ER modeling:</b>						<b>9</b>
Join Expressions – Views – Transactions – Integrity Constraints – Triggers – SQL – Data Types and Schemas – Authorization –Database Design and ER Model – ER Diagrams – Complex Attributes – Mapping Cardinalities – Primary Key – Extended ER Features.							
UNIT –IV	<b>Relational Database Design:</b>						<b>9</b>
Features of Good Relational Designs – 1NF- Functional Dependencies – Decomposition Using Functional Dependencies – 2NF- Boyce Codd Normal Form – 3NF- Functional Dependency theory–Closure Set–Canonical Cover –Dependency Preservation.							
UNIT –V	<b>Indexing and Hashing:</b>						<b>9</b>
Physical Storage– Overview – RAID–Tertiary storage – File organization – Data dictionary – Indexing and Hashing – Basics – Ordered indices– B+ tree index files–Hash Indices.							
<b>Total:45</b>							
<b>TEXTBOOK:</b>							
1.	Abraham Silberschatz, Henry F. Korth.,S. Sudarshan, " Database System Concepts",7th Edition,McGrawHill,2023.						
<b>REFERENCES:</b>							
1.	Ramez Elmasri, Shamkanth B.Navathe, "Fundamentals of Database Systems",7 <sup>th</sup> Edition, Pearson Education, 2016.						
2.	C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems",8 <sup>th</sup> Edition, Pearson Education, 2012.						



COURSE OUTCOMES: On completion of the course, the students will be able to												BT Mapped( Highest Level)	
CO1	demonstrate the design and modeling of relational databases											Applying(K3)	
CO2	implement SQL Queries and its operations for relational databases											Applying(K3)	
CO3	design entity relationship modeling for real world problems											Applying(K3)	
CO4	apply normalization techniques during database design											Applying(K3)	
CO5	apply various indexing methods to sort files											Applying(K3)	
Mapping of Cos with Pos and PSOs													
Cos/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1		1			2	2	2	2	3	3
CO2	3	2	1		1			2	2	2	2	3	3
CO3	3	2	1		1			2	2	2	2	3	3
CO4	3	2	1		1			2	2	2	2	3	3
CO5	3	2	1		1			2	2	2	2	2	3
1–Slight,2 –Moderate,3–Substantial,BT-Bloom’sTaxonomy													
ASSESSMENT PATTERN– THEORY													
Test / Bloom’s Category*	Remembering (K1)%		Understanding (K2)%		Applying( K3)%		Analyzing (K4)%		Evaluating(K 5)%		Creating (K6)%		Total %
CAT1	-		25		75								100
CAT2	-		25		75								100
CAT3	-		25		75								100
ESE	-		25		75								100
* ±3% may be varied (CAT 1,2 & 3– 50 marks & ESE – 100 marks)													
MICRO PROJECT:													
Design ER models for the following applications and implement database design using SQL.													
<ul style="list-style-type: none"><li>Library management system</li><li>Banking system</li><li>Ticket reservation system</li></ul>													

  
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24ISC41-DESIGN AND ANALYSIS OFALGORITHMS							
Programme & Branch	M.Sc & SOFTWARE SYSTEMS	Sem.	Category	L	T	P	Credit
Prerequisites	Data Structures	4	PC	3	0	2	4
Preamble	This course offers formal introduction to common algorithm design techniques and methods for analyzing the performance of algorithms.						
Unit – I	Introduction:						9
Algorithm - Fundamentals of Algorithmic Problem Solving - Important Problem Types. Fundamentals of the Analysis of Algorithm Efficiency: Analysis Framework - Asymptotic Notations and Basic Efficiency Classes - Mathematical Analysis for Recursive and Non- recursive Algorithms - Empirical Analysis of Algorithms - Algorithm Visualization.							
Unit – II	Brute Force and Divide & Conquer:						9
Brute Force: Selection Sort and Bubble Sort, Sequential Search and Brute Force String Matching – Closest-Pair and Convex-Hull Problems by Brute Force - Divide and Conquer: Merge Sort - Quick Sort - Binary Tree Traversals and Related Properties - Multiplication of Large Integers and Strassen's Matrix Multiplication – The Closest-Pair and Convex-Hull Problems by Divide and Conquer.							
Unit – III	Decrease & Conquer and Transform & Conquer:						9
Decrease and Conquer: Insertion sort -Topological Sorting – Binary Search - Fake Coin Problem - Computing a Median and the Selection Problem. Transform-and-conquer: Presorting - Balanced search trees - AVL trees -2-3Trees- Heaps and Heapsort.							
Unit – IV	Dynamic Programming and Greedy Technique:						9
Dynamic Programming: Warshall's and Floyd's algorithm - Optimal Binary Search Trees - Knapsack Problem and Memory functions. Greedy Technique: Prim's Algorithm - Kruskal's Algorithm - Dijkstra's Algorithm - Huffman Trees and Codes.							
Unit – V	Backtracking and Branch & Bound:						9
Backtracking: n-Queens Problem - Hamiltonian Circuit Problem – Subset-Sum Problem – Branch-and-Bound: Assignment problem - Knapsack Problem - Traveling Salesman Problem - Overview of P, NP and NP-Complete Problems.							
LIST OF EXPERIMENTS / EXERCISES:							
1.	Find the order of growth of the given problems. Identify the essential operation and count the times in which it is carried out.						
2.	Analyze the different sorting algorithms and find out the best algorithm with respect to space and time						
3.	Make use of transform and conquer approach to sort 'n' numbers.						
4.	Implement minimum spanning tree algorithm using greedy method.						
5.	Construct the huffman code for the given data. Also perform encoding and decoding (use Greedy technique).						
6.	Apply backtracking to solve the given instance of subset sum problem						
7.	Solve the travelling salesman problem of the given graph using branch and bound technique						
Lecture:45, Practical:30, Total:75							
TEXT BOOK:							
1.	Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Edition, 3 <sup>rd</sup> Pearson Education, 2012.						
REFERENCES/MANUAL/SOFTWARE:							
1.	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", 3 <sup>rd</sup> Edition, Prentice Hall of India, 2009.						
2.	Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Reprint Edition, Pearson Education, 2006.						
3.	Operating System : Windows / Linux						
4.	Software : C, JAVA						
5.	Laboratory Manual						

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COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	analyse the efficiency of algorithms using various frameworks	Analyzing (K4) Precision (K3)
CO2	apply brute force and divide-and-conquer techniques to solve various problems	Applying (K3) Precision (K3)
CO3	demonstrate decrease-and-conquer and transform-and-conquer problem-solving strategies	Applying (K3) Precision (K3)
CO4	compute solutions for various problems using dynamic programming and greedy techniques	Applying (K3) Precision (K3)
CO5	utilize backtracking and branch & bound techniques to solve real world problems	Applying (K3) Precision (K3)

**Mapping of COs with POs and PSOs**

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2		2			2				3	2
CO2	3	3	2		2			2				3	2
CO3	3	2	1		2			2				3	2
CO4	3	2	1		2			2				3	2
CO5	3	2	1		2			2				3	2

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

**ASSESSMENT PATTERN - THEORY**

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	-	20	60	20			100
CAT2	-	20	80				100
CAT3	-	20	80				100
ESE	-	20	70	10			100

\* ±3% may be varied (CAT 1,2 & 3– 50 marks & ESE – 100 marks)

*[Signature]*  
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Board of Studies - CSEs II



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## 24IST43- SOFTWARE ENGINEERING

<b>Programme &amp; Branch</b>	<b>M.Sc &amp; Software Systems</b>	<b>Sem.</b>	<b>Category</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>
<b>Prerequisites</b>	<b>Nil</b>	<b>4</b>	<b>PC</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

Preamble	To determine specific software process model and also to gather requirements, design, implement and test the software to a real world problem.	
Unit – I	Process Models	9
The Nature of Software – Software Engineering – The Software Process – Software Engineering Practice – Software Myths – Process Models: A Generic Process Model – Process Assessment and Improvement – Prescriptive Process Models – Specialized Process Models – The Unified Process – Personal and Team Process Models – Process Technology – Product and Process.		
Unit – II	Requirements Engineering and Modeling	9
Requirements Engineering – Establishing the Ground Work – Eliciting Requirements – Developing Use Cases – Building the Requirement Model – Negotiating Requirements – Validating Requirements – Requirement Modeling: Requirement Analysis – Scenario Based Modeling – UML Models – Data Modelling Concepts – Class Based Modeling.		
Unit – III	Design Concepts and Architectural Design	9
Design within the Context of Software Engineering – The Design Process – Design Concepts – The Design Model – Architectural Design: Software Architecture – Architectural Genres – Architectural Styles – Architectural Design – Assessing Alternative Architectural Designs.		
Unit – IV	Software Testing Strategies	9
A Strategic Approach to Software Testing – Strategic Issues – Test Strategies for Conventional Software – Test Strategies for Object Oriented Software – Validation Testing – System Testing – The Art of Debugging – Testing Conventional Applications: Software Testing Fundamentals – Internal and External Views of Testing – White-Box Testing – Basis Path Testing – Control Structure Testing – Black-Box Testing.		
Unit – V	Software Configuration Management	9
Software Configuration Management – SCM Repository – SCM Process – Reengineering–Business Process Reengineering – Software Reengineering – Reverse Engineering – Restructuring – Forward Engineering – Economics of Reengineering.		
		Total:45


### TEXT BOOK:

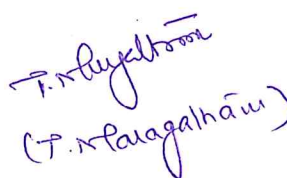
1. Roger S.Pressman, Bruce R Maxim, "Software Engineering - A Practitioner's Approach", 9<sup>th</sup> Edition, Tata McGraw-Hill, New Delhi, 2020.

### REFERENCES/ MANUAL / SOFTWARE:

1. Sommerville Ian., "Software Engineering", 10<sup>th</sup> Edition, Pearson Education, New Delhi, 2017.
2. Rajib Mall., "Fundamentals of Software Engineering", 5<sup>th</sup> Edition, Prentice Hall of India, New Delhi, 2018

COURSE OUTCOMES: On completion of the course, the students will be able to											BT Mapped (Highest Level)		
CO1	determine proper software engineering process model to develop application.										Applying(K3)		
CO2	prepare software requirements specification.										Applying(K3)		
CO3	translate requirements specification into an implementable design.										Applying(K3)		
CO4	perform various testing techniques.										Applying(K3)		
CO5	demonstrate SCM process and reengineering process.										Applying(K3)		
Mapping of COs with POs and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1		2			2				3	3
CO2	3	2	1		2			2				3	3
CO3	3	2	1		2			2				3	3
CO4	3	2	1		2			2				3	3
CO5	3	2	1		2			2				3	3
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy													
ASSESSMENT PATTERN - THEORY													
Test / Bloom's Category*	Remembering (K1) %		Understanding (K2) %		Applying (K3) %		Analyzing (K4) %		Evaluating (K5) %		Creating (K6) %		Total %
CAT1	-		35		65								100
CAT2	-		35		65								100
CAT3	-		35		65								100
ESE	-		35		65								100
* ±3% may be varied (CAT 1, 2, 3 – 50 marks & ESE – 100 marks)													
MICRO PROJECT:													
<ul style="list-style-type: none"><li>Develop SRS and DFD for any one application.</li><li>Perform form validation and write test cases for the components in the form.</li></ul>													

  
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 Board of Studies - CSE & IT

  
 T. N. Paragathani





PA

24ISC42-COMPUTER NETWORKS							
Programme& Branch	M.Sc &Software Systems	Sem.	Category	L	T	P	Credit
Prerequisites	Nil	4	PC	3	0	2	4
Preamble	To provide an overview of the basics of data communications and networking. The course presents the top-down approach of layers and also the functionalities and protocols of different layers						
Unit – I	Introduction to the Internet:						9
Internet – Network edge: Access networks – Physical media –Network core: Packet switching – Circuit switching – Network of networks - Delay, loss and throughput in packet-switched networks – Protocol layers and their service models.							
Unit – II	Application Layer:						9
Principles of Network applications – The web and HTTP – Electronic mail in the internet – DNS-Internet's directory service – Peer-to-Peer File Distribution – Video Streaming and Content Distribution Networks.							
Unit – III	Transport Layer:						9
Introduction and transport layer services – Multiplexing and Demultiplexing – Connectionless transport: UDP – Principles of reliable data transfer – Connection-oriented transport: TCP – Principles of congestion control –TCP congestion control							
Unit – IV	Network Layer:						9
Overview – Inside a router – Internet Protocol (IP): IPv4, Addressing, IPv6 –Routing algorithms: Link-State and Distance-Vector – Intra-AS routing in the Internet: OSPF – Routing among the ISPs: BGP – The SDN control plane– ICMP							
Unit – V	Link Layer and LAN:						9
Introduction to Link layer – Error detection and correction – Multiple access links and protocols: Channel partition protocols – Random access protocols– Switched LAN – Link Virtualization: A Network as a Link Layer - Data Center Networking							
<b>List of Exercises / Experiments</b>							
1.	Capture HTTP packets by retrieving different HTML files and experiment HTTP GET/POST connections and HTTP authentication using Wireshark						
2.	Capture the DNS packets produce the details of DNS query and response messages using Wireshark						
3.	Capture and analyze UDP and TCP packets as well as explore the connection establishment between hosts using Wireshark						
4.	Capture IP packets from the execution of traceroute and analyze using Wireshark						
5.	Capture packet traces by retrieving an HTML file and investigate the operations of Ethernet protocol and the ARP protocol using Wireshark						
6.	Installation of Network Simulator (NS) and implement any one routing protocol.						
7.	Create network topologies like bus, star and simulate stop and wait protocol using NS						
<b>Lecture: 45, Practical: 30, Total: 75</b>							
<b>TEXT BOOK:</b>							
1.	Kurose James F. and Ross Keith W., "Computer Networking: A Top-Down Approach", 8 <sup>th</sup> Edition, Pearson Education, NewDelhi, 2021.						
<b>REFERENCES/MANUAL/SOFTWARE:</b>							
1.	Andrew S. Tanenbaum, David J. Wetherall, "Computer Networks", 6 <sup>th</sup> Edition, Pearson Education, 2021.						
2.	Behrouz A. Forouzan, "Data Communications and Networking", 5 <sup>th</sup> Edition, McGraw Hill Education, 2017.						
3.	Network stimulator 3						
4.	Wireshark						
5.	Lab manual						



COURSE OUTCOMES: On completion of the course, the students will be able to		BT Mapped (Highest Level)
CO1	explain the fundamentals of internetworking and evaluate network QoS parameters	Applying (K3), Precision (S3)
CO2	utilize application layer protocols for communication between peers.	Applying (K3), Precision (S3)
CO3	apply congestion control techniques and explain transport layer services	Applying (K3), Precision (S3)
CO4	make use of the knowledge of Internet Protocol, addressing schemes and apply various routing protocols for a given network scenario	Applying (K3), Precision (S3)
CO5	determine suitable data link layer techniques and protocols	Applying (K3), Precision (S3)

**Mapping of COs with POs and PSOs**

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1		2			2				3	3
CO2	3	2	1		2			2				3	3
CO3	3	2	1		2			2				3	3
CO4	3	2	1		2			2				3	3
CO5	3	2	1		2			2				3	3

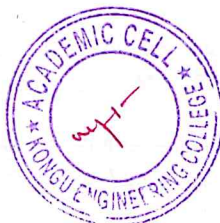
1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

**ASSESSMENT PATTERN - THEORY**

Test / Bloom's Category*	Remembering (K1) %	Understanding (K2) %	Applying (K3) %	Analyzing (K4) %	Evaluating (K5) %	Creating (K6) %	Total %
CAT1	-	35	65				100
CAT2	-	35	65				100
CAT3	-	35	65				100
ESE	-	35	65				100

\* ±3% may be varied (CAT 1,2 & 3 – 50 marks & ESE – 100 marks)

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*(P. Ananthi)*

# 24ISL41- PYTHON PROGRAMMING LABORATORY

Programme & Branch	M.Sc & Software Systems	Sem.	Category	L	T	P	Credit
Prerequisites	Nil	4	PC	0	0	4	2

**Preamble** This course provides knowledge to solve real time problems using OOP concepts in python and to perform data manipulation and visualization using python packages.

## LIST OF EXPERIMENTS / EXERCISES:

1.	Develop programs using control structures and looping statements.
2.	Explore string manipulation functions with slicing and striding
3.	Demonstrate the various operations on List, Tuple, Dictionary, and Sets
4.	Demonstrate the concept of Modules and packages
5.	Write a python script using class and object
6.	Implement the concept of constructors and different types of inheritance
7.	Implement the concept of Encapsulation and Polymorphism
8.	Implement the concept of Containers, Interface and Abstract classes.
9.	Perform data manipulation using NumPy in Anaconda framework
10.	Demonstrate Data Visualization using Pandas and Matplotlib in Anaconda framework
Total:30	

## REFERENCES/MANUAL/SOFTWARE:

1.	Operating System : Windows / Linux
2.	Software : Anaconda Framework
3.	Laboratory Manual

## COURSE OUTCOMES:

On completion of the course, the students will be able to

BT Mapped  
(Highest Level)

CO1	develop applications using control structures and functions.	Applying (K3), Precision(S3)
CO2	develop real time applications using Object Oriented Programming concepts.	Applying (K3), Precision(S3)
CO3	demonstrate data manipulation and data visualization using Numpy, Pandas and Matplotlib	Applying (K3), Precision(S3)

## Mapping of Cos with Pos and PSOs

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	1	3				2	2	2	3	1
CO2	3	2	1	1	3				2	2	2	3	1
CO3	3	2	1	1	3				2	2	2	3	1


1-Slight, 2-Moderate, 3-Substantial, BT-Bloom's Taxonomy


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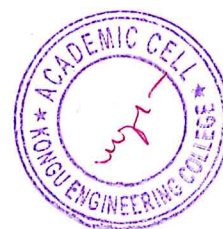
T.E.R.P.  
(T. E. RAMYA)



24ISL42-DATABASE MANAGEMENT SYSTEMS LABORATORY													
Programme &Branch		M.Sc & Software Systems					Sem.	Category	L	T	P	Credit	
Prerequisites		Nil					4	PC	0	0	2	1	
Preamble		To focus on implementation of database queries											
LISTOF EXPERIMENTS /EXERCISES:													
1.	Implementation of Data Definition statements and keys												
2.	Implementation of Data Manipulation statements.												
3.	Implementation of Data Control Statements and TCL statements.												
4.	Implementation of aggregate function, group by and string functions.												
5.	Perform Set and Join Operations												
6.	Perform the Nested sub queries												
7.	Creating Views, index and foreign key.												
8.	Creating triggers in PL/SQL												
9.	Apply cursors in PL/SQL												
10.	Implementation of Exception Handling												
													Total:30
REFERENCES/MANUAL/SOFTWARE:													
1.	Laboratory Manual												
COURSEOUTCOMES: On completion of the course, the students will be able to												BT Mapped (Highest Level)	
CO1	create tables with key and constraints											Applying (K3), Precision(S3)	
CO2	use queries for data manipulation											Applying (K3), Precision(S3)	
CO3	implement triggers and cursors											Applying (K3), Precision(S3)	
Mapping of Cos with Pos and PSOs													
COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	3	1	2	2		2	2	2	2	3	3
CO2	3	2	3	1	2	2		2	2	2	2	3	3
CO3	3	2	3	1	2	2		2	2	2	2	3	3
1–Slight,2–Moderate,3–Substantial,BT-Bloom’sTaxonomy													

  
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 (CP. Ananthi)





## 24EGL42 - COMMUNICATION SKILLS LABORATORY

Programme & Branch	MSc – Software Systems	Sem.	Category	L	T	P	MP	Credit
Prerequisites	Nil	4	HS	0	0	2	NE	1

**Preamble** This course is designed to impart necessary skills to listen, speak, read and write in order to acquire better professional communication skills, soft skills and verbal aptitude skills.

### LIST OF EXPERIMENTS / EXERCISES:

1.	Self Introduction & Mock Interviews
2.	Resume Writing – One Page Resumes and Conventional Resumes
3.	Reading Aloud: Techniques and Practices
4.	Presentation: Technical Topics/Case Studies
5.	Situational Dialogues/Conversational Practices
6.	Group Discussions
7.	Book/Movie Reviews
8.	Soft Skills (Computer Based Test)
9.	Listening Test (Computer Based Test)
10.	Verbal Aptitude (Computer Based Test)

**Total:30**

### REFERENCES/MANUAL/SOFTWARE:

1.	Lab Manual
2.	Orell Talk Corporate Language Lab Software

### COURSE OUTCOMES:


On completion of the course, the students will be able to

		BT Mapped (Highest Level)
CO1	acquire career-related soft skills and verbal skills	Understanding (K2), Imitation (S1)
CO2	enhance essential professional and workplace communication skills	Applying (K3), Naturalization (S5)
CO3	communicate effectively in English in different contexts	Applying (K3), Articulation (S4)

### Mapping of COs with POs and PSOs

COs/ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1								2	3		1		
CO2								2	3		2		
CO3								2	3		2		

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

  
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**24ISP41 - MINI PROJECT - II**

<b>Programme &amp; Branch</b>	<b>M.Sc &amp; Software Systems</b>	<b>Sem.</b>	<b>Category</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credit</b>
<b>Prerequisites</b>	<b>Programming Languages</b>	<b>4</b>	<b>EC</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>

**Preamble** It provides practical exposure to the students and an opportunity to apply the computational mathematics concepts to solve the real world problems.

**Total : 30**

**COURSE OUTCOMES:**

**On completion of the course, the students will be able to**

**BT Mapped  
(Highest Level)**

CO1	formulate specific problem statements for ill-defined real life problems with reasonable assumptions and constraints.	Creating (K6), Precision (S3)
CO2	perform literature search in the area of interest.	Evaluating (K5), Precision (S3)
CO3	conduct experiments, design and analysis, solution iterations and document the results.	Evaluating (K5), Precision (S3)
CO4	perform error analysis and arrive at scientific conclusions.	Evaluating (K5), Precision (S3)
CO5	document the results in the form of technical report and give oral presentation	Creating (K6), Precision (S3)

**Mapping of COs with POs and PSOs**

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	2	2	3	3	3	3	3	3	3	3
CO3	3	3	3	2	2	3	3	3	3	3	3	3	3
CO4	3	3	3	2	2	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3	3	3

1 – Slight, 2 – Moderate, 3 – Substantial, BT- Bloom's Taxonomy

*[Signature]*  
Signature of the Chairman,  
Board of Studies - CSE & IT

*[Signature]*  
(T. Malagatham)

