<b>COL</b>	JRSE CODE : CC-1	.01			
Tota	ll marks : 100		Total credits : 04		
		F	PROBLEM SOLVING AND PRO	GRAMMING CONCEPTS	
Cou	rse Objective: To s	stud	ly the concepts of solving pro	blems using a computer by designing programs	
as so	olutions				
	Unit	Т	opic		
#	Title	#	Content	Learning Objectives	
I	Evolution of	А	Evolution of programming	To become familiar with the evolution of	
	programming		languages - Introduction to	programming languages and know the strengths	
	languages		Assembly language and	and weakness of each generation of language	
			Higher level languages.		
П	Computer	Α	Programing Life Cycle –	To understand the importance of each step in the	
	Problem Solving		Understanding the Problem	programing life cycle and thereby learn to write	
			Statement, Planning Program	structured and well documented modular	
			design using Hierarchy	programs.	
			charts, Expressing Program		
			Pseudocode Coding using a		
			programing language such as		
			'C', Documenting, Compiling,		
			Debugging and Executing		
		В	Structured / Goto Less		
			Programming concept,		
			Modular Programming - Ton-		
			Down Design. Bottom –up		
			design, Stepwise Refinement		
ш	Computing	Α	Data	To study the basic entity in computing	
	concepts	В	Instruction	To know what is an instruction and the types of	
				instructions	
		С	Types of data : Integer,	To learn the different types	
			Floating-point, Character,	of data that can be represented in programming	
			String	To loorn about the data container	
		U	the scope of variable	To learn about the data container	
		E	Constant	To know the difference between varying and fixed	
				data	
		F	Arithmetic operators	To study the different operators available to write	
				instructions	
		G	Assignment operator	To know left hand and right hand evaluation of an instruction	
		Н	Flow of Control :Sequential	To understand the execution sequence of a group of	
			flow and branching	instructions	
		I	Evaluation of expressions	To know the arithmetic behind evaluation of	
			Relational operators	expressions	
		1		entities	
IV	Algorithm	Α	Definition	To know what an algorithm is and its origins	
	Development	В	Algorithm: a solution to a	To learn to use pseudo-code to design solutions	
			problem	-	
		C	Input-Output Statements		

		D	Decision Making Statements	
		Ε	Looping Statements	
		F	Examples	To get a practical hands on for writing pseudo-code
v	Flowcharting	Α	Definition	To study how to write the graphical representation
		В	Symbols	of an algorithm to check flow of control
		C	Input-Output Statements	
		D	Decision Making Statements	
		F	Looping Statements	
		F	Module representation	-
		G	Drawing conventions and	-
			standards	
		н	Examples	To thorough the nitty-gritties of flowcharting
VI	Debugging	Δ	Bug : Definition	To learn error detection and correction skills
••	2000808	R	Types of errors : syntax	
			semantics and runtime	
		C	Program debugging	
VII	Documentation	Δ	Definition	To understand the nurnose of documentation and
VII	Documentation		Demitton	naming of files and variables
		В	Comments and need for	
			commenting	
		С	Documentation styles	
VI	Programming	А	Structure of a C Program,	To understand the conversion of algorithms
			library functions,	expressed using psuedocode / flowchart into
			Preprocessor directives.	computer program using C as the programing
				language.
		В	Constants, variables and	To learn the programming language specific
			keywords in C.	constructs
		С	Type of arithmetic	To learn the programming specific data types and
			instruction, integer and float	their usage.
			conversion. Data types in C.	
		D	Decision control structure- if	To know the various decision control statements
			statement, if –else	and compound conditional statements.
			statement, nested if-else,	
			switch case, use of logical	
		-	operators.	
		E	The loop structure- while	To use the different looping structures and to
			hoop, for, do while. Use of	combine decision and looping structures
			statements Manu driven	
			programs using switch –case	
		F	Functions: passing values	To use the concept of modular programming
		1	between functions. Scope of	
			functions, function	
			declaration and prototype.	
			call by Value and Call by	
			reference. Storage classes in	
			C.	
			Recursive functions.	
		G	Arrays: one dimensional	To know static memory allocation for multiple data
			array, two dimensional	storage and its usage for string manipulation
			arrays. Algorithm for String	
			functions (strlen,	
			strcpy,strcat, strcmp, strcmpi	

	etc) using arrays.	
	Functions and Arrays	

References:

- 1. A Structured Programming Approach Using C, Behrouz A. Forouzan, RichardF. Gilberg ISBN:9788131500941, Cengage Learning India
- 2. Introduction to algorithms Cormen, Leiserson, Rivest, Stein
- 3. The C Programming Language, Brian W. Kernighan, Dennis M. Ritchie, ISBN:9788120305960, PHI Learning
- 4. How to Solve it by Computer, R.G. Dromey, ISBN: 9788131705629, Pearson Education
- 5. Programming in ANSI C, E. Balaguruswamy, ISBN: 9781259004612, Tata Mc-Graw Hill Publishing Co Ltd.-New Delhi
- 6. Let us C : Yashwant Kanetkar

# MOOCs:

NPTEL: http://nptel.ac.in/courses/106104128/

Tota	JRSE CODE : CC-1	UZ	Total cradita : 04			
TOLA						
Cour	rsa abiactiva: Tha	ohi	COMPUTER ORGANISATIO	vide a broad everyiew of architecture and		
func	tioning of comput	obj or (	systems and to learn the basi	c concents behind the architecture and		
orga	nization of comput	tor	e	concepts behind the architecture and		
Uiga	Init		s. anic			
#	Titlo	#	Content	Learning outcomes		
<del>л</del> 1	Introduction to	π	Computer-Definition and	To study the block diagram of the computer system		
•	Computer	A	Block Diagram	To study the block diagram of the computer system		
	Organization and		Organization and	To study the underlying structure and functioning of		
	Architecture	В	architecture	a computer		
		С	Structure and Function			
		D	Computer Evolution and	To learn the evolution of the computer with focus on		
			performance-History of	the present day generation		
			computers, Von Neumann			
			Architecture, Designing for			
			performance, Pentium &			
		С	PowerPC Evolution.	To study the different components of the computer		
			Computer Function	with emphasis on their functioning		
		F	Interconnection Structures.	The study the bus architectures and other different		
			Bus Interconnection	interconnection structures		
П	The Central	Α	Computer Arithmetic – ALU,	To study the representation of data and operations		
	Processing Unit		Integer representation,			
			Integer Representation –			
			Addition, subtraction.			
			- Addition subtraction			
		R	Instruction sets –	To study the different Instruction sets addressing		
			characteristics & Functions.	modes and the data formats		
			Addressing modes and			
			formats.			
		С	CPU structure and function	To study the structure of the CPU		
		D	Processor Generation –	To understand the key features of the Processor		
			8086,Pentium I-IV,i1-i7	Generations		
	The	•		To study the different 1/0 perioderal devices		
111	Ine Input/Output	A	1/O external devices	To study the different i/O peripheral devices		
	and File					
	Subsystem					
	•	В	I/O modules	To learn the functioning of the I/O modules		
		С	I/O techniques (programmed,	To study the different types of I/O techniques		
			interrupt driven and DMA)			
		D	I/O Channels and processors	To learn about the different channels of I/O and its		
		-		processors		
		Ē	External interface	To study the external interfacing of I/O devices		
			Operating system support	IO KNOW THE RELATIONSHIP OF I/O DEVICES WITH OS		
11/	The Memory	^	Memory system overview	To study the storage systems		
	The menuly		INICITIONY SYSTEM OVELVIEW	i o stady the stolage systems		

	Subsystem	В	Cache memory – Principle, elements of cache design, Pentium 4 and PowerPC cache organization	To know the functioning of the cache memory with emphasis on Pentium 4 and PowerPC architecture
		C	Internal Memory- Semiconductor main memory, Advanced DRAM organization	To learn the primary memory system
		D	External Memory- Magnetic Disk, RAID, Optical memory, Magnetic Tape	To study the secondary storage medium in detail with emphasis on features of each
V	The Control Unit	Α	Structure of the Control Unit	To study the structure of the Control Unit
		В	Functioning of the Control	To learn the functioning of the control unit
			Unit	
		С	Micro programmed control	To study micro programmed control unit

# References –

- 1. Computer Organization and Architecture (7<sup>th</sup> Edition): William Stalling, Prentice-Hall.
- 2. Computer System Architecture: Morris Mano, Prentice-Hall.

#### E- Books:

- 1. Computer Organization: TMH, Ace series.
- 2. Computer Organization and Architecture by William Stallings, 5<sup>th</sup> Edition, Prentice-Hall

# MOOCs:

1.NPTEL:http://nptel.ac.in/courses/106106092/

2. http://freevideolectures.com/Course/2277/Computer-Organization

<b>COL</b>	JRSE CODE : CC-1	03		
Tota	l marks : 100		Total credits : 04	
			BASIC MATHE	MATICS
Cou	rse objectives : To	int	roduce basic fundamentals o	f mathematics
	Unit	Т	opic	
#	Title	#	Content	Learning Objectives
I	Fundamentals of		Number Systems	To study the properties of numbers with focus on
	Mathematics		Properties of integers	operations to be performed
			and types	
		A	<ul> <li>Divisor – proper &amp;</li> </ul>	
			Testing of primes	
			LCM and GCD	
		В	Factorization	
		С	Ratio and Proportion	To represent ratio and proportion
			Quadratic Equations	To evaluate quadratic equations and find its roots
			Definition	
		D	Types	
			<ul> <li>Roots and its</li> </ul>	
			nature	
П	Logarithm and	А	Logarithm	To learn to use logarithms and perform operations
	Indices		Common Logarithm	on logarithms
			Characteristics and	
			mantissa	
			<ul> <li>Antilogarithm</li> </ul>	
		В	Indices	To study indices and its properties
			<ul> <li>Concepts</li> </ul>	
			<ul> <li>Properties</li> </ul>	
			Laws	
ш	Mensuration	A	Two dimensional	To study mensuration with respect to 2D and 3D
			• Area	
		_	Perimeter	
		В	I hree dimensional	
			• Volume	
11/	Canada	^	Surface Area	To study conceptation of complay numbers and
IV	Complex	А	Introduction	operations on complex numbers
	Numbers		numbers	
			subtraction	
			<ul> <li>subtraction</li> <li>multiplication</li> </ul>	
		R	Representation	
			granhical	
			• nolar	

		1		
			vector	
		С	De Moiveor's Theorem	
		D	Nth roots of complex	
			number	
			<ul> <li>Basic properties</li> </ul>	
			Square roots	
			<ul> <li>Cube roots of unity</li> </ul>	
V	Matrices and	^	Definition	To study matrices, its properties and solving
v	Natifices and Determinants		Types of matrices	equations
	Determinants		Bow	equations
			Indi	
		Р	upper and lower	
		в	Algebra of matrices	
			Algebra of matrices	
			• fregative	
			<ul> <li>equality</li> <li>addition and</li> </ul>	
			Subtraction	
			Scalar multiplication,	
			Matrix multiplication	
		-	Inverse     Solving non-homogonoous	
		C	Solving non nomogeneous	
			equations by Matrix inverse method $X = A^{-1}P$	
				To loarn fundamental concents of determinants
		U	Determinants	and its proportios
			Definition and order     Types	and its properties
			• Types	
			Iunuamentai     conconts	
			<ul> <li>co-factors</li> </ul>	
			<ul> <li>expansion value,</li> <li>proportios</li> </ul>	
			<ul> <li>properties,</li> <li>cramor's rulo</li> </ul>	
VI	Sequence and	^	Arithmetic Drogression	
VI	Series		Competitio Progression	To study sequences and progressions
	Series		Geometric Progression	to study sequences and progressions
\ <i></i>	Canadianta	-		The large second of the second s
VII	Coordinate	A	Cartesian System	I o learn concepts of coordinate geometry with
	Geometry		<ul> <li>Coordinate of a</li> </ul>	respect to straight lines and circle
			point	
			<ul> <li>Distance between</li> </ul>	
			points	
			<ul> <li>Section formula</li> </ul>	
			• Area of triangle	

		в	Straight Lines	
			<ul> <li>Slope of a line</li> </ul>	
			<ul> <li>Parallel and</li> </ul>	
			Perpendicular lines	
			<ul> <li>Angle between two</li> </ul>	
			intersecting lines	
			Equation of a	
			straight	
			linos/Through	
			arigin Doint clono	
			from two point	
			from, two point	
			torm)	
		C	Circle	
			<ul> <li>Standard form of a</li> </ul>	
			circle	
			<ul> <li>circle with given</li> </ul>	
			radius and center	
VIII	Trigonometry	A	Introduction	To learn trigonometric functions and identities
			<ul> <li>Relation between</li> </ul>	
			degree and radian	
			Unit Circle	
			definition	
		В	Trigonometric function	
			Periodicity of	
			trigonometric function	
		С	Trigonometric identities	
IX	Limits &	А	Introduction	To study limits, continuity and evaluation of limits
	Continuity		<ul> <li>Ordered pairs</li> </ul>	
			Cartesian product	
			Relation	
			<ul> <li>Function</li> </ul>	
		В	Real function and types	
			Domain and Range of	
			function	
			Composition of function	
		С	limit of a function	
			Algebra of limits	
		D	Continuity of a function	
х	Vectors	A	Vectors in plane Cartesian	To study the concept of vectors. cross and dot
	-	.	coordinates	products
		1	Vectors in space	•
		В	Dot products	
			Cross products	

References:

- Elementary Engineering Mathematics -B S Grewal
   Calculus Thomas Finney
   Mathematical Techniques Maria Ester Rebelo Abranches
   Mathematics for computer- Neeta Mazumdar

Total credits : 02         Total credits : 02         PROBLEM SOLVING AND PROGRAMMING LABORATORY         Course objective: To learn the process of computer problem solving and concepts through some programming language         Unit         #       Title       #       Content       Learning Objectives         #       Title       #       Content       Learning Objectives         #       Title       #       Content       Learning Objectives         #       Programming Environment       A       Integrated Development Environment       To understand some programming IDE and the different utilities         B       Writing well documented programs that are easy understandable and modifiable.       To vrite well documented programs         C       Program Life Cycle       To learn the phases of program development and execution         D       Compilation/Interpretation       To learn the phases of program development and execution         II       Basic       Programming       A       Programs to understand basic         Programming       Constructs       Programs to understand the different data Types       To learn the programming specific data types and their usage.         II       Basic       Programming constructs: Variables and Constants       To learn to declare variables and const	CO	COURSE CODE : CC-104				
PROBLEM SOLVING AND PROGRAMMING LABORATORY           Course objective: To learn the process of computer problem solving and concepts through some programming language           Unit         Topic           #         Title         #         Content         Learning Objectives           I         Programming Environment         A         Integrated Development Environment         To understand some programming IDE and the different utilities           I         Programming Environment         A         Integrated Development Environment         To understand some programming IDE and the different utilities           B         Writing well documented programs that are easy understandable and modifiable.         To vrite well documented programs           I         B asic         C         Program Life Cycle         To learn the phases of program development and execution           II         Basic         A         Programs to understand basic input/Output Statements         To learn the basic programming constructs by implementing them in a programming language           Constructs         B         Programs to understand the different data Types         To learn the programming specific data types and their usage.           II         Basic         Programming constructs: Variables and Constants         To learn the declare variables and constants           D         Understanding basic Programming constructs: Variables	Tota	al marks : 50		Total credits : 02		
Course objective: To learn the process of computer problem solving and concepts through some programming language         Unit       Topic         #       Title       #       Content       Learning Objectives         I       Programming Environment       A       Integrated Development Environment       To understand some programming IDE and the different utilities         I       Programming Environment       A       Integrated Development and modifiable.       To understand some programming IDE and the different utilities         I       B       Writing well documented programs that are easy understandable and modifiable.       To learn the phases of program development and execution         II       Basic Programming Comprised Constructs       A       Programs to understand basic Input/Output Statements       To learn the phases of programming constructs by implementing them in a programming language         II       Basic Programming Constructs       A       Programs to understand basic Input/Output Statements       To learn the programming specific data types and their usage.         C       Understanding basic Programming constructs: Variables and Constants       To learn Arithmetic, Relational, Logical, and other relational Operators			P	ROBLEM SOLVING AND PROC	GRAMMING LABORATORY	
Init         Topic           #         Title         #         Content         Learning Objectives           #         Title         #         Content         Learning Objectives           I         Programming Environment         A         Integrated Development Environment         To understand some programming IDE and the different utilities           B         Writing well documented programs that are easy understandable and modifiable.         To virte well documented programs           C         Program Life Cycle         To learn the phases of program development and execution           D         Compilation/Interpretation         To learn program translation as applicable in the programming language           III         Basic Programming Constructs         A         Programs to understand basic Input/Output Statements         To learn the basic programming constructs by implementing them in a programming language           III         Basic Programming Constructs         A         Programs to understand the different data Types         To learn the programming specific data types and their usage.           C         Understanding basic Programming constructs: Variables and Constants         To learn Arithmetic, Relational, Logical, and other operators	Cou	rse objective: To l	learr	the process of computer pr	oblem solving and concepts through some	
Unit         Topic           #         Title         #         Content         Learning Objectives           I         Programming Environment         A         Integrated Development Environment         To understand some programming IDE and the different utilities           B         Writing well documented programs that are easy understandable and modifiable.         To learn the phases of program development and execution           C         Program Life Cycle         To learn the phases of program development and execution           D         Compilation/Interpretation         To learn program translation as applicable in the programming language           II         Basic Programming Constructs         A         Programs to understand basic Input/Output Statements         To learn the programming specific data types and their usage.           C         Understanding basic Programming constructs: Variables and Constants         To learn Arithmetic, Relational, Logical, and other operators           D         Using different logical and relational Operators         To learn Arithmetic, Relational, Logical, and other operators	pro	gramming langua	ge			
#       Title       #       Content       Learning Objectives         I       Programming Environment       A       Integrated Development Environment       To understand some programming IDE and the different utilities         B       Writing well documented programs that are easy understandable and modifiable.       To write well documented programs         C       Program Life Cycle       To learn the phases of program development and execution         D       Compilation/Interpretation Programming Constructs       A       Programs to understand basic Input/Output Statements       To learn the basic programming constructs by implementing them in a programming language         C       Understanding basic Programming constructs: Variables and Constants       To learn to declare variables and constants         D       Using different logical and relational Operators       To learn Arithmetic, Relational, Logical, and other operators		Unit	Тс	opic		
Image: Second	#	Title	#	Content	Learning Objectives	
I       Programming Environment       A       Integrated Development Environment       To understand some programming IDE and the different utilities         B       Writing well documented programs that are easy understandable and modifiable.       To write well documented programs         C       Program Life Cycle       To learn the phases of program development and execution         D       Compilation/Interpretation       To learn program translation as applicable in the programming language         II       Basic Programming Constructs       A       Programs to understand basic Input/Output Statements       To learn the basic programming constructs by implementing them in a programming language         Z       Understanding basic Programming constructs: Variables and Constants       To learn to declare variables and constants         D       Understanding basic Programming constructs: Variables and Constants       To learn Arithmetic, Relational, Logical, and other operators						
Environment       Environment       different utilities         B       Writing well documented programs that are easy understandable and modifiable.       To write well documented programs         C       Program Life Cycle       To learn the phases of program development and execution         D       Compilation/Interpretation       To learn program translation as applicable in the programming language         II       Basic Programming Constructs       A       Programs to understand basic Input/Output Statements       To learn the basic programming constructs by implementing them in a programming language         B       Programs to understand the different data Types       To learn the programming specific data types and their usage.         C       Understanding basic Programming constructs: Variables and Constants       To learn Arithmetic, Relational, Logical, and other operators         D       Using different logical and relational Operators       To learn Arithmetic, Relational, Logical, and other	T	Programming	А	Integrated Development	To understand some programming IDE and the	
B       Writing well documented programs that are easy understandable and modifiable.       To write well documented programs         C       Program Life Cycle       To learn the phases of program development and execution         D       Compilation/Interpretation       To learn program translation as applicable in the programming language         II       Basic       A       Programs to understand basic Input/Output Statements       To learn the basic programming constructs by implementing them in a programming language         C       Understanding basic Programming constructs       To learn to declare variables and constants         C       Understanding basic Programming constructs: Variables and Constants       To learn Arithmetic, Relational, Logical, and other operators		Environment		Environment	different utilities	
Image: series of programs that are easy understandable and modifiable.       To learn the phases of program development and execution         Image: series of program constructs of program development and execution       D         Image: series of program constructs of program development and execution       To learn the phases of program development and execution         Image: series of programming complexity of programming constructs of programming language       To learn programming language         Image: series of programming constructs of programming constructs on the programming language       To learn the basic programming constructs by implementing them in a programming language         Image: series of programs to understand the different data Types       To learn the programming specific data types and their usage.         C       Understanding basic Programming constructs: Variables and Constants       To learn to declare variables and constants         D       Using different logical and relational Operators       To learn Arithmetic, Relational, Logical, and other operators			В	Writing well documented	To write well documented programs	
Impersionation of the extention of the extending of the extention of the exte				programs that are easy		
Image: Instance:       Instance:         Image: Instance:       Image: Instance:         C       Program Life Cycle       To learn the phases of program development and execution         D       Compilation/Interpretation       To learn program translation as applicable in the programming language         II       Basic       A       Programs to understand basic Input/Output Statements       To learn the basic programming constructs by implementing them in a programming language         B       Programs to understand the different data Types       To learn the programming specific data types and their usage.         C       Understanding basic       To learn to declare variables and constants         D       Using different logical and relational Operators       To learn Arithmetic, Relational, Logical, and other operators         E       Understanding if if else       To learn if/if else and switch statements				modifiable		
Image: Constructs       Program Life Cycle       To learn the phases of program development and execution         Image: Constructs       D       Compilation/Interpretation       To learn program translation as applicable in the programming language         Image: Constructs       A       Programs to understand basic Input/Output Statements       To learn the basic programming constructs by implementing them in a programming language         B       Programs to understand the different data Types       To learn the programming specific data types and their usage.         C       Understanding basic Programming constructs: Variables and Constants       To learn to declare variables and constants         D       Using different logical and relational Operators       To learn Arithmetic, Relational, Logical, and other operators				moundsie.		
Image: Programming Constructs       A       Programs to understand basic Input/Output Statements       To learn the basic programming constructs by implementing them in a programming language         Image: Programming Constructs       B       Programs to understand basic Input/Output Statements       To learn the basic programming constructs by implementing them in a programming language         Constructs       C       Understanding basic Programming constructs: Variables and Constants       To learn to declare variables and constants         C       Understanding basic Programming constructs: Variables and Constants       To learn Arithmetic, Relational, Logical, and other operators         D       Using different logical and relational Operators       To learn program from the programming specific data types			С	Program Life Cycle	To learn the phases of program development and	
Image: Section of the section of th					execution	
II       Basic       A       Programs to understand basic       To learn the basic programming constructs by implementing them in a programming language         Constructs       B       Programs to understand the different data Types       To learn the programming specific data types and their usage.         C       Understanding basic       To learn to declare variables and constants         Programming constructs:       Variables and Constants       To learn Arithmetic, Relational, Logical, and other operators         D       Using different logical and relational Operators       To learn if/if else and switch statements			D	Compilation/Interpretation	To learn program translation as applicable in the	
II       Basic       A       Programs to understand basic       To learn the basic programming constructs by implementing them in a programming language         Constructs       B       Programs to understand the different data Types       To learn the programming specific data types and their usage.         C       Understanding basic       To learn to declare variables and constants         Programming constructs:       Variables and Constants       To learn Arithmetic, Relational, Logical, and other operators         D       Using different logical and relational Operators       To learn if/if, else and switch statements					programming language	
Programming Constructs       Input/Output Statements       Implementing them in a programming language         B       Programs to understand the different data Types       To learn the programming specific data types and their usage.         C       Understanding basic Programming constructs: Variables and Constants       To learn to declare variables and constants         D       Using different logical and relational Operators       To learn Arithmetic, Relational, Logical, and other operators         E       Understanding if if-else       To learn if/if else and switch statements	11	Basic	Α	Programs to understand basic	To learn the basic programming constructs by	
Constructs       B       Programs to understand the different data Types       To learn the programming specific data types and their usage.         C       Understanding basic Programming constructs: Variables and Constants       To learn to declare variables and constants         D       Using different logical and relational Operators       To learn Arithmetic, Relational, Logical, and other operators         E       Understanding if if else       To learn if (if else and switch statements)		Programming		Input/Output Statements	Implementing them in a programming language	
C       Understanding basic       To learn to declare variables and constants         Programming constructs:       Variables and Constants         D       Using different logical and relational Operators       To learn Arithmetic, Relational, Logical, and other operators         E       Understanding if if-else       To learn if/if else and switch statements		Constructs	в	different data Types	to learn the programming specific data types and	
CUnderstanding basic Programming constructs: Variables and ConstantsTo learn to declare variables and constantsDUsing different logical and relational OperatorsTo learn Arithmetic, Relational, Logical, and other operatorsEUnderstanding if if-elseTo learn if/if else and switch statements				unerent data types	their usage.	
Programming constructs:       Variables and Constants         D       Using different logical and relational Operators         E       Understanding if if-else         To learn if/if else and switch statements			С	Understanding basic	To learn to declare variables and constants	
Variables and Constants         D       Using different logical and relational Operators       To learn Arithmetic, Relational, Logical, and other operators         E       Understanding if if-else       To learn if /if else and switch statements				Programming constructs:		
D       Using different logical and relational Operators       To learn Arithmetic, Relational, Logical, and other         E       Understanding if if-alse       To learn if / if alse and switch statements				Variables and Constants		
relational Operators     operators       E     Understanding if if-else     To learn if/if else and switch statements			D	Using different logical and	To learn Arithmetic, Relational, Logical, and other	
			_	relational Operators	operators	
nosted if else, switch			E	Understanding if, if-else,	To learn it/itelse and switch statements	
statements				statements		
F Understanding for, while, do To understand the different looping structures and to			F	Understanding for, while, do	To understand the different looping structures and to	
while - looping statements. combine decision and looping structures				while - looping statements.	combine decision and looping structures	
Also programs using break				Also programs using break		
and continue statements				and continue statements		
G Understanding use of To understand the concept of modular programming.			G	Understanding use of	To understand the concept of modular programming.	
function with and without				function with and without		
functions				functions		
H Writing menu driven To implement simple algorithms as executable			н	Writing menu driven	To implement simple algorithms as executable	
programs using loops and computer programs				programs using loops and	computer programs	
conditional statements				conditional statements		
VI         Advanced         A         Programs using Arrays. 1-D         To know static memory allocation for multiple data	VI	Advanced	Α	Programs using Arrays. 1-D	To know static memory allocation for multiple data	
Programmingand 2-D arrays. Stringstorage and it's usage for string manipulation		Programming		and 2-D arrays. String	storage and it's usage for string manipulation	
Constructs manipulation functions,		Constructs		manipulation functions,		
string manipulation using	1			string manipulation using		
using Functions and arrays				character arrays Brograms		

- 1. A Structured Programming Approach Using C, Behrouz A. Forouzan, RichardF. Gilberg ISBN:9788131500941, Cengage Learning India
- 2. Introduction to algorithms Cormen, Leiserson, Rivest, Stein
- 3. The C Programming Language, Brian W. Kernighan, Dennis M. Ritchie, ISBN:9788120305960, PHI Learning
- 4. How to Solve it by Computer, R.G. Dromey, ISBN: 9788131705629, Pearson Education
- 5. Programming in ANSI C, E. Balaguruswamy, ISBN: 9781259004612, Tata Mc-Graw Hill Publishing Co Ltd.-New Delhi
- 6. Let us C : Yashwant Kanetkar

# **MOOCs:**

NPTEL: http://nptel.ac.in/courses/106104128/

		201		
Tota	l marks : 100		lotal credits : 04	
-			DATA STR	RUCTURES
Cour	rse objectives :	-		
To ir	ntroduce concepts	s of	data storage organization or	computer, study the access mechanisms of data
stru	ctures and their a	ppli	cations	
	Unit	Т	opic	1
#	Title	#	Content	Learning Objectives
I	Introduction to	Α	Concept of a data structure	To understand the philosophy of a data structure
	Data Structures	В	Data type and data structure	To know the difference between the two
		С	Characteristics of data	To learn the properties such as access mechanism,
			structures	complexity
		D	Space-Time trade offs	To study the efficiency considerations w.r.t. space
		Ε	Linear and non-linear data	To know differences between linear and non-linear
			structures	structures
II	Arrays	Α	Multi-dimensional arrays	To learn creation, operations on matrices
111	Sorting and	Α	Insertion Sort	To study the simple sorting algorithms
	Searching	В	Selection sort	
	Techniques	С	Bubble Sort	
		D	Merge Sort	To study the advanced sorting algorithms advanced and
		Ε	Quick Sort	their efficiency considerations
		F	Heap Sort	
		G	Shell Sort	
		Н	Linear Search	To study algorithms for searching data from a set
			Binary Search	
IV	Stacks	A	Concept of a LIFO	To study concept of a LIFO
		В	Stack operations	To learn operations and the abnormal conditions of a Stack
		С	Applications of Stacks in	To apply the Stack data structure in implementing a LIFO
			Computer Science	
V	Queues	A	Concept of a FIFO	To study concept of a LIFO
		В	Queue operations	To learn operations and the abnormal conditions of a Queue
		С	Circular Queue	To study the concept and advantages of a circular queue
		D	Applications of Queue in	To apply the Queue data structure in implementing a
			computer science	FIFO
	Linked Lists	Α	Concept of a linear list	To study the concept of a list
		В	Singly linked list	To study the concept of a singly linked list with focus on
				its node structure and operations
		С	Doubly linked list	To study the concept of a singly linked list with focus on
				Its node structure and operations
		D	Implementation of a stack	I o learn to implement a stack using a singly linked list and
	Troop	•	and queue as a linked list	a queue using a doubly linked list
	rrees	A		ro study non-imear data structures
		P	Binary tree	To study hinary trees, node structure and creation of
		D		TO Study bindly trees, node structure and treation of

			hinary trees
	C	Ripary tree Traversals	To study inorder /preorder /postorder traversals on a
	J	billary tree fraversais	binary tree
	D	Binary Search Tree(BST)	To study concept of BST and its construction
	Ε	Construction of BST	
	F	Expression tree	To learn to represent an expression in a binary tree
	G	Construction of expression	
		tree	
	Н	Conversion of infix to	To learn to convert expressions from infix to prefix and
		pre/post fix	postfix
		<ul> <li>Manual method</li> </ul>	
		<ul> <li>Expression tree</li> </ul>	
		method	
	-	Hean tree	To study the concent of a bean and its construction
 Granhs	Δ	Granhs	To study the concept of a granh and its terminology
Graphs	R	Graphs Graph Terminologies	To study the concept of a graph and its terminology
	0	Vertex	
		<ul> <li>Edge</li> </ul>	
		<ul> <li>Degree of a vertex</li> </ul>	
	6	Types of Graphs	To study the different types of graphs
	C	Directed/Undirected	To study the unrelent types of graphs
		Graphs	
		Directed Acyclic	
		Granh	
		Weighted Granhs	
	D	Graph Representation	To learn to represent a graph using different
		Adjacency matrix	representations
		Adjacency List	
	F	Graph Traversals	To study the graph traversal methods
	-	DES Traversal	To study the graph traversal methods
		BES Traversal	
Hashing	Δ	Concent of Hashing	To study the concent of bashing data storage
ilasiilig	R	Benefits & Limitations of	To learn the advantages and disadvantages of hashing in
	U	Hashing	comparison to other methods
		i iusi iii b	

References:-

- 1. Behrouz A. Forouzan, RichardF. Gilberg, Data Structures A Pseudocode Approach Using C, Cengage Learning India
- 2. Deepali Srivastava, Data Structures through C in Depth, BPB Publication
- 3. Tremblay .1 P, and Sorenson P G, Introduction to Data Structures and Applications, Tata McGraw-Hill,

# **MOOCs:**

NPTEL: http://nptel.ac.in/courses/106102064/

<b>COL</b>	COURSE CODE : CC-202					
Tota	Total marks : 100 Total credits : 04					
	OPERATING SYSTEMS CONCEPTS					
Cou	rse objectives : To	stu	၊dy the modern day operating	g systems with emphasis on its functions and		
stru	cture so as to enal	ble	students to decide the suitab	le operating system for specific job		
	Unit	T	opic			
#	Title	#	Content	Learning Objectives		
1	Introduction to Operating System	А	<ul> <li>Basic elements of a computer system</li> <li>Processor</li> <li>Main Memory</li> <li>I/O Modules</li> </ul>	operating systems		
			System Bus			
		В	Operating Systems <ul> <li>Definition</li> <li>Evolution</li> <li>Introduction to Major Functions/Services</li> <li>OS Structure</li> <li>Rolationship between</li> </ul>	To study the characteristics, functions and examples of operating systems with focus on its structure and organization		
			<ul> <li>Relationship between Kernel, OS, Hardware</li> <li>Examples( For students to see and get a feel of OS)</li> </ul>			
"	Processes & Process Management	A	<ul> <li>Process</li> <li>Definition</li> <li>Process Control Block</li> <li>Process States</li> <li>Operations on Process</li> </ul>	lo understand the states and structure of a program in execution		
		В	<ul><li>Threads and Microkernels</li><li>Definition</li><li>Multithreading Model</li></ul>	To study the concept of light weight processes and their execution		
		С	<ul> <li>Process Scheduling <ul> <li>Introduction to the Concept</li> <li>Scheduling Criteria</li> <li>Scheduling Algorithms</li> <li>Multi-Processor Scheduling</li> </ul> </li> </ul>	To study allocation of resources for efficient throughput and maximum resource utilisation		

		D	Concurrency/ Process Coordination Synchronization Principles Mutual Exclusion The Critical-Section Problem Peterson's Solution Semaphores Monitors Readers/Writers Problem	To learn process coordination and synchronization required in an operating system
		E	Deadlock <ul> <li>Principles</li> <li>Deadlock Handling Methods</li> <li>Prevention</li> <li>Avoidance</li> <li>Detection</li> <li>Recovery From Deadlock</li> </ul>	To familiarize the concept of a deadlock, its causes, prevention, avoidance and handling mechanisms
Ш	Memory Management	A	Memory Management Concepts <ul> <li>Introduction</li> <li>Swapping</li> <li>Contiguous Memory Allocation</li> <li>Paging</li> <li>Page Table</li> <li>Segmentation</li> </ul>	To study the basic issues in memory management as one of the function of an operating system
		В	Virtual Memory <ul> <li>Introduction</li> <li>Demand Paging</li> <li>Page Replacement</li> <li>Frames</li> <li>Thrashing</li> </ul>	To study the virtual memory concepts implemented in modern day operating systems
IV	Input/ Output & File System	A	<ul> <li>File System</li> <li>Concepts</li> <li>File Organization and Access Methods</li> <li>Directory Structure</li> <li>File Sharing</li> </ul>	To know the directory structuring and file access mechanisms
		В	<ul> <li>I/O Management <ul> <li>I/O devices</li> <li>I/O Hardware</li> <li>Organization of I/O</li> <li>I/O Buffering</li> <li>Disk Structure, Attachment,</li> </ul> </li> </ul>	To study about the I/O devices and the way operating system manages them

			Scheduling and Management • RAID	
V	Security	A	System Protection Goals Principles Access Matrix	To know the reasons for security concerns and implementations
		В	Security <ul> <li>Types of Threats</li> <li>Intruders</li> <li>Cryptography</li> <li>User Authentication</li> <li>Trusted Systems</li> </ul>	To study the different methods of implementing security in operating systems

#### **References-**

1. Modern Operating System by Andrew S. Tanenbaum, Prentice Hall, 3rd Edition, 2007.

2. Abraham Silberschatz and Peter Baer Galvin, "Operating System Concepts", 7th Edition, Pearson Education, 2002.

3. William Stallings, "Operating Systems", 6th Edition, Pearson Education, 2010.

4. Stuart, "Operating systems: Principles, Design and Implementation", 1st Edition 2008, Cengage Learning India

5. Schaum's Outline of Operating Systems (Schaum's Outline Series), by J. Archer Harris, Publisher: McGraw-Hill, 2001.

# **E-Books:**

1. Operating Systems Guide :by Tim Bower

2. Operating Systems Course Notes: by Dr. John T.Bell

3. Schaum's Outline of Operating Systems (Schaum's Outline Series) [Kindle Edition] by J. Archer Harris.

# **MOOCs:**

1. http://onlinevideolecture.com/?course=computer-science&subject=operating-systems

2. http://www.nptel.ac.in/courses/106108101/

COURSE CODE : CC - 203				
Total marks : 100 Total credits : 04			Total credits : 04	
APPLIED MATH				HEMATICS
Obje	ctive: To introduc	e b	asic fundamentals of applied	mathematics and understand its applications to
solve	e real world probl	em	S	
	Unit	Т	opic	
#	Title	#	Content	Learning Objectives
I	Number System	Α	Decimal Number System	To identify the different number systems used and be
		В	Binary Number System	able to perform its various conversions from system to
		С	Octal Number System	the other
		D	Hexadecimal Number System	
П	Mathematical	Α	Introduction to Logic	To learn the basic concepts of logic
	Logic	В	Logical Connectives	To study the various connectives used in logic reasoning
		С	Well formed formulas (WFF)	To design WFF using the logical connectives
		D	Tautology and Contradiction	To learn how to identify the tautology and
			statements	contradictory statements in logic
		Ε	Converse and Contra positive	To identify the converse and contra positive
		-	statements	statements in logic
		F	Equivalence Formulas	nature through proofs
111	Mathematical	Α	Principle of Induction	To learn the principle of mathematical induction used
	Induction	•		in computer science
IV	Boolean Algebra	A	Boolean Algebra	lo be able to represent the logic variable in various
	and Circuits		Introduction     Depresentation of	IOFITIS
			Representation of     Logic Variables: 0 and	
			1. Low and High: Off	
			and On: No and Yes:	
			Closed and Open	
			Switch	
				To study various operations that be used along with
		В	Truth table	the Boolean variables and will also be able construct
			<ul> <li>Unary Operations:</li> </ul>	truth tables for the same
			Logical Identity,	
			Logical Negation	
			Binary Operations:	
			Conjunction,	
			Disjunction,	
			Implication, Equality,	
			NOR	
			Applications: Logical	
			Equivalences	
		С	Boolean functions	To learn the various laws associated to the Boolean
			Commutative Law	operations
			Associative Law	
			Distributive Law	
			Identity Law	
			<ul> <li>Negation Law</li> </ul>	

		r –		
		_	De Mennenle the energy	
			De-Morgan's theorem	
		E	AND, OR, NOT, NAND, NOR, XOR, XNOR	i.e. using logic gates and will be able to construct circuit diagrams from the same
			and Truth Table	
			Circuit Diagrams	
v	Set Theory	A	Introduction to Sets	To learn to represent real world concepts using the basic concept of Sets
		В	Set Operations <ul> <li>Union</li> <li>Intersection</li> <li>Complement</li> <li>Differences</li> </ul>	To learn to use the various Set operations
		С	Algebraic Properties of Sets and De Morgan's Laws	To study the fundamental laws used in Set theory
		D	Venn diagrams	To learn to graphically represent the Sets used in problem solving
VI	Relations	Α	Cartesian Product	To learn to implement Cartesian product
		В	Introduction to Relations	To learn concept of Relati
		С	<ul> <li>Properties of Relations</li> <li>Reflexive</li> <li>Symmetric</li> <li>Asymmetric</li> <li>Anti-symmetric</li> </ul>	To learn various properties of Relation
			Transitive	
		D	Equivalence Relation	To learn the Equivalence Relation
VII	Functions	A	Introduction to functions	To learn concept of functions
		B	<ul> <li>Types of Functions</li> <li>Identity function</li> <li>Composite function</li> <li>Injection (One-to- One)</li> <li>Surjection (Onto)</li> <li>Bijection (One-to- One and Onto)</li> <li>Invertible</li> <li>Composition of functions (fog, gof)</li> </ul>	To learn the different types of functions
	Permutations	А	Principle of counting	To learn the principle of counting
VIII	and	В	Factorial Notation	To learn the concept of factorial
	Combinations	С	Permutations i) Permutations with and without repetition ii) Circular Permutations	To learn to use permutations using its factorial form and in solving problems
		D	Combinations	To learn the concept of using combinations using its factorial form and in solving problems

IX	Binomial	Α	Binomial Theorem	To learn the concept of using the Binomial theorem
	Theorem			
Х	Principles of	Α	The Pigeonhole Principle	To understand the Pigeonhole Principle and
	Counting	В	The Inclusion-Exclusion Principle	the Inclusion-Exclusion principle and apply it to real life situations in computer

ςοι	COURSE CODE : CC-204				
Tota	al marks : 50		Total credits : 02		
	DATA STRUCTURES LABORATORY				
Cou	rse objectives				
:To l	earn different way	/s c	of organizing data encounter	ed in real life applications.	
Unit Topic			opic		
#	Title	#	Content	Learning Objectives	
I.	Arrays	В	Multi-dimensional Arrays	To implement programs using multi-dimensional arrays	
			Matrices	especially matrices	
н	Searching	А	Linear Search	To implement searching algorithms over a list	
		В	Binary Search		
ш	Sorting	Α	Bubble Sort	To implement simple sorting algorithms over an array of data	
		В	Insertion Sort	elements	
		С	Selection Sort		
		D	Merge Sort	To implement advanced sorting algorithms over an array of	
		Ε	Quick Sort	data elements	
		F	Shell Sort		
IV	Stacks	А	Stack Operations	To implement push , pop operations on a Stack by handling	
		В	Handling Stack	abnormal conditions of overflow and underflow	
			Overflow/Underflow		
v	Queues	Α	Queue Operations	To implement insert , delete operations on a Queue by	
		В	Handling Queue	handling the abnormal conditions of overflow and underflow	
			Overflow/Underflow		
		С	Circular Queue	To implement a circular queue	
VI	Linked Lists	А	Singly Linked List	To implement insert/delete operations at front end, rear end	
				and in-between the singly linked list	
		В	Doubly Linked List	To implement insert/delete operations at front end, rear end	
				and in-between the doubly linked list	
		С	Stack/Queue as Linked List	To implement a Stack as a singly linked list and a queue as a	
				doubly linked list	
VII	Binary trees	А	Construction of a Binary	To create a BST and perform the traversals	
			Search Tree		
		В	In/Pre/Post order Traversals		
VII	Graphs	А	Adjacency Matrix	To construct a graph and representing it using the adjacency	
			Representation and	matrix representation	
			applications of graph		

#### **References:-**

- 1. Behrouz A. Forouzan, RichardF. Gilberg, Data Structures A Pseudocode Approach Using C, Cengage Learning India
- 2. Deepali Srivastava, Data Structures through C in Depth, BPB Publication
- 3. Tremblay .1 P, and Sorenson P G, Introduction to Data Structures and Applications, Tata McGraw-Hill,

# **MOOCs:**

NPTEL: http://nptel.ac.in/courses/106102064/