# NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR (AN AUTONOMOUS INSTITUTE)



#### Affiliated to

### DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY, LUCKNOW



**Evaluation Scheme & Syllabus**For

Bachelor of Technology Computer Science and Business Systems

**Second Year** 

(Effective from the Session: 2025-26)

# NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR (AN AUTONOMOUS INSTITUTE)

### Bachelor of Technology Computer Science and Business Systems

## **Evaluation Scheme SEMESTER-III**

Sl.	Subject	Subject	Types of	Per	iods		Eva	luatio	n Schemes		Er Semo		Total	Credit
No.	Codes	S. d. Z. Je o o	Subjects	L	T	P	CT	TA	TOTAL	PS	TE	PE		
1	BCSBS0306Z	Formal Language and Automata Theory	Mandatory	3	1	0	30	20	50		100		150	4
2	BCSBS0303	Computer Organization & Architecture	Mandatory	3	0	0	30	20	50		100		150	3
3	BCSBS0301	Computational Statistic	Mandatory	3	0	0	30	20	50		100		150	3
4	BCSBS0302Z	Object Oriented Programming	Mandatory	2	0	0	30	20	50		50		100	2
5	BCSBS0304Z	Software Engineering	Mandatory	2	0	0	30	20	50		50		100	2
6	BCSBS0353	Computer Organization & Architecture Lab	Mandatory	0	0	2				25		25	50	1
7	BCSBS0352	Object Oriented Programming Lab	Mandatory	0	0	4				50		50	100	2
8	BCSBS0351	Computational Statistic Lab	Mandatory	0	0	2				25		25	50	1
9	BCSBS0354Z	Software Engineering Lab	Mandatory	0	0	4				50		50	100	2
10	BNC0303	Indian Constitution	Compulsory Audit	2	0	0	30	20	50		50		100	
		Massive Open Online Courses (For B.Tech. Hons. Degree)	MOOCs											
		TOTAL		15	1	12	180	120	300	150	400	200	950	20

#### \* List of MOOCs Based Recommended Courses for Second year (Semester-III) B. Tech Students

Sr. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	BMC0052	Computational Problem Solving	Infosys Wingspan (Infosys Springboard)	27h 26m	2
2	BMC0051	Software Defined Networking	Infosys Wingspan (Infosys Springboard)	32h 28m	2.5
3	BMC0053	TechA Linux Programming Foundation Certification	Infosys Wingspan (Infosys Springboard)	19h	1.5

#### PLEASE NOTE: -

- A 3-4-week Internship shall be conducted during summer break after semester-II and will be assessed during semester-III.
- Compulsory Audit (CA) Courses (Non-Credit BNC0303)
- All Compulsory Audit Courses (a qualifying exam) do not require any credit.
- The total and obtained marks are not added to the grand total.

#### **Abbreviation Used:**

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam., PE: Practical End Semester Exam, CE: Core Elective, OE: Open Elective, DE: Departmental Elective, CA: Compulsory Audit, MOOCs: Massive Open Online Courses.

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### Bachelor of Technology Computer Science and Business Systems

### **Evaluation Scheme**

#### SEMESTER-IV

Sl. No.	Subject	Subject	Types of	P	erio	ds	E	valuat	ion Schem	es	End Semester		Total	Credit
<b>51.</b> 1 (0.	Codes	Subject	Subjects	L	T	P	CT	TA	TOTAL	PS	TE	PE	10001	
1	BCSBS0403	Operating Systems	Mandatory	3	0	0	30	20	50		100		150	3
2	BCSBS0404	Database Management Systems	Mandatory	3	0	0	30	20	50		100		150	3
3	BCSBS0402Z	Software Design with UML	Mandatory	3	0	0	30	20	50		100		150	3
4	BCSBS0405Z	Introduction to Innovation, IP Management & Entrepreneurship	Mandatory	3	0	0	30	20	50		100		150	3
5	BCSBS0401	Operations Research	Mandatory	2	0	0	30	20	50		50		100	2
6	BCSBS0408	Design Thinking	Mandatory	2	0	0	30	20	50		50		100	2
7	BCSBS0453	Operating Systems Lab (Unix)	Mandatory	0	0	2				25		25	50	1
8	BCSBS0454	Database Management Systems Lab	Mandatory	0	0	2				25		25	50	1
9	BCSBS0452	Software Design with UML Lab	Mandatory	0	0	2				25		25	50	1
10	BCSBS0451	Operations Research Lab	Mandatory	0	0	2				25		25	50	1
11	BCSBS458	Design Thinking Lab	Mandatory	0	0	2				25		25	50	1
12	BNC0404	Essence of Indian Traditional Knowledge	Compulsory Audit	2	0	0	30	20	50		50		100	NA
		Massive Open Online Courses (For B.Tech. Hons. Degree)	MOOCs											
		TOTAL		18	0	10	210	140	350	125	550	125	1050	21

#### \* List of MOOCs Based Recommended Courses for Second year (Semester-IV) B. Tech Students

S. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	BMC0010	Comprehensive Training on Unix and Linux OS Fundamentals	Infosys Wingspan (Infosys Springboard)	29h 53m	2
2	BMC0058	Implementing Database Using SQL Server 2012	Infosys Wingspan (Infosys Springboard)	26h 29m	2
3	BMC0059	TechA Build and Deploy Projects Certification	Infosys Wingspan (Infosys Springboard)	14h	1

#### PLEASE NOTE: -

- Compulsory Audit (CA) Courses (Non-Credit BNC0404)
- All Compulsory Audit Courses (a qualifying exam) do not require any credit.
- The total and obtained marks are not added to the grand total.

#### **Abbreviation Used:**

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam., PE: Practical End Semester Exam, CE: Core Elective, OE: Open Elective, DE: Departmental Elective, CA: Compulsory Audit, MOOCs: Massive Open Online Courses.

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A student will be eligible to get Undergraduate degree with Honours only, if he/she completes the additional MOOCs courses such as Coursera certifications, or any other online courses recommended by the Institute (Equivalent to 20 credits). During Complete B.Tech. Program Guidelines for credit calculations are as follows.

- 1. For 6 to 12 Hours = 0.5 Credit
- 2. For 13 to 18 = 1 Credit
- 3. For 19 to 24 = 1.5 Credit
- 4. For 25 to 30 = 2 Credit
- 5. For 31 to 35 = 2.5 Credit
- 6. For 36 to 41 = 3 Credit
- 7. For 42 to 47 = 3.5 Credit
- 8. For 48 and above =4 Credit

For registration to MOOCs Courses, the students shall follow Coursera registration details as per the assigned login and password by the Institute these courses may be cleared during the B. Tech degree program (as per the list provided). After successful completion of these MOOCs courses, the students shall provide their successful completion status/certificates to the Controller of Examination (COE) of the Institute through their coordinators/Mentors only.

The students shall be awarded Honours Degree as per following criterion.

- i. If he / she secures 7.50 as above CGPA.
- ii. Passed each subject of that degree program in the single attempt without any grace.
- iii. Successful completion of MOOCs based 20 credits



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Course (			Cour	se Na	me: l	F <mark>orma</mark>	l Lar	guage	e and A	Automa	ata The	ory	L	Т	P	C
BCSBS0													_			
Course (	Offer	ed in:	B. Teo	ch (C	SBS)								3	1	0	4
Pre-requ Compute			studen	t sho	uld ha	ve bas	sic kn	owled	ge of	discret	e mathe	ematics ar	nd	Func	damen	tal of
computat	ion in	ncludir h dowi	ng auto n autoi	mata mata a	theory	, provi	de the	e desig	n conc	epts of	abstract	mathemat t computa ns of algor	tio	n mo	del of	finite
Course	Outco	ome: A	After c	omple	etion o	f the co	ourse,	, the st	udent	will be	able to				Blo Knov e Lev (KL)	_
CO1							-				and aut	omata and ation.	d		` /	2, K4
CO2	U1	ndersta chniqu	and cor	ntext- xamiı	free an ne lang	d cont guage a	ext-se ımbig	ensitiv Juity ai	e langu nd equi	uages a ivalenc	nd apply e	y formal			1	Х3
CO3		npleme inguag		analy	ze Tu	ring M	achin	e for I	Recursi	ive and	Recurs	ive Enum	era	able	I	Κ4
CO4	A	nalyze									iguages				I	Κ4
CO5	ba		-hard	Proble				reduction and proving NP-Completeness of							I	K5
	O-P	) Map	ping (	Scale	1: Lo	w, 2: I	Medi	um, 3:	High)	)	Т	<u>,                                      </u>			1	
CO-PO Mappin g	PO 1	PO2	PO3	PO 4	PO5	PO6	<b>PO</b> 7	PO8	PO9	PO10	PO11	PSO1	P	SO2	PS	03
CO1	3	3	-	2	2	-	-	-	-	-	-	3	2		-	
CO2	3	3	-	2	-	-	-	-	-	-	-	3	2		2	
CO3	3	2	-	-	3	-	-	-	-	-	-	3	2		2	
CO4	2	3	-	3	-	-	-	-	-	-	2	2	2		2	
CO5	2	2	-	-	3	-	-	-	-	2	2	3	2		2	
C	ours	e Cont	tents /	Sylla	bus											
N	Iodul	e 1						Introduction of Regular Languages and Finite Automata					10 hours			ours

Alphabet, languages and grammars, productions and derivation, Chomsky hierarchy of languages. Regular expressions and languages, deterministic finite automata (DFA) and equivalence with regular expressions, nondeterministic finite automata (NFA) and equivalence with DFA, regular grammars and equivalence with finite automata, properties of regular languages, Kleene's theorem, pumping lemma for regular languages, Myhill-Nerode theorem and its uses, minimization of finite automata.

#### Module 2 Context-free Languages and Pushdown Automata 10 hours

Context-free grammars (CFG) and languages (CFL), Chomsky and Greibach Normal Forms, Equivalence with CFG, Parse trees, Ambiguity in CFG, Pumping lemma for Context-free languages, Deterministic Pushdown Automata, Nondeterministic Pushdown Automata (PDA), Closure Properties of CFLs.

**Context-sensitive languages**: Context-sensitive grammars (CSG) and languages, Linear Bounded Automata and Equivalence with CSG.

#### Module 3 Turing machines

10 hours

The basic model for Turing machines (TM), Turing recognizable (Recursively Enumerable) and Turing-decidable (recursive) Languages and their closure properties, Variants of Turing machines, Non deterministic TMs and Equivalence with Deterministic TMs, Unrestricted Grammars and Equivalence with Turing machines, TM as Enumerators.

#### Module 4 Undecidability

10 hours

Church-Turing thesis, Universal Turing machine, Universal and diagonalization languages, Reduction between languages and Rice's theorem, Undecidable problems about languages

#### Module 5 Basic Introduction to Complexity

Introduction to Automata Theory, Languages, and Computation

08 hours

John E. Hopcroft,

Introductory ideas on Time complexity of deterministic and nondeterministic Turing machines, P and NP, NP- completeness, Cook's Theorem, other NP -Complete problems.

Total Lecture Hours 48 hours

**Textbook:** 

	Rajeev Motwani and Jeffrey D. Ullman.
erence Books:	
Elements of the Theory of Computation	Harry R. Lewis and Christos H.Papadimitriou.
Automata and Computability	The state of the s
Introduction to the Theory of Computation	Dexter C. Kozen.
Introduction to Languages and the Theory of Computation	
Computers and Intractability: A Guide to the Theory of NP Completeness	Michael Sipser
	Elements of the Theory of Computation  Automata and Computability  Introduction to the Theory of Computation  Introduction to Languages and the Theory of Computation

		John Martin.	
		M. R. Garey and	
NID/		D. S. Johnson.	
	ΓΕL/ Youtube/ Faculty Video Link:		
1.	https://www.youtube.com/playlist?list=PLbRMhDVUMi AUM (Lecture 1 to 32)	ngcwWkzVTm_kFH6J\	<u>W4JCt</u>
	https://www.youtube.com/results?search_query=%23Au	omataTheory	
2.	https://www.youtube.com/playlist?list=PLbRMhDVUMnAUM (Lecture 36 to 58)  https://www.youtube.com/results?search_query=%23Au		W4JCt
3.	https://www.youtube.com/playlist?list=PLbRMhDVUMnAUM(Lecture 59 & 60)  https://www.youtube.com/results?search_query=%23Au	-	W4JCt
4.	https://www.youtube.com/watch?v=yIim-rT7jKY&list=Iv4V62bCygAVYGluaijyo (Lecture 37 to 47)  https://www.youtube.com/results?search_query=%23Au		
5.	https://www.youtube.com/watch?v=yIim-rT7jKY&list=Iv4V62bCygAVYGluaijyo (Lecture 49 to 63)  https://www.youtube.com/results?search_query=%23Au		



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	03		rse N hitect		Com	ipute	r Orga	anizatio	on &		L	T	P	C
Course Offered in: B. T	ech. (	CSBS	5)								3	0	0	3
Pre-requisite: Basics of	Boole	an lo	gic, I	nstru	ction	set, I	Memoi	ry Man	agemen	t, Pipel	ining	and		
Parallel Processing														
C <b>ourse Objectives:</b> Stud	ent w	ill lea	rn dif	ferent	type	s of o	rganiz	ation, s	tructures	s and fur	nction	s of		
computer, to understand t	he dat	a rep	resent	ation	and c	compi	ıter ari	thmetic	c. They v	will und	erstan	d the		
concept of control unit, m	emor	y orga	anizat	ion, p	eriph	eral d	levices	and pi	pelining	•				
Course Outcome: After	compl	letion	of the	e cou	rse, th	e stu	dent w	ill be al	ole to			Blo	om's	3
													owle	_
		1										Lev	el (F	(L)
C <b>O</b> 1			•		-		dware	and ho	w softw	vare inte	racts		K1	
			comp				and mi	ıltinly i	ntegers	and floa	ting			
CO2									nt and I			К3		
			t repr				5 6011	.p.o	it und i		wiii.g		110	
CO3					-	_			implen				K2	
									x86 ins			IXZ		
CO4			•		-		_	-	t-output	system	s and		K5	
								nory sy	hared r	nemory	and			
CO5					-	-	-		nd cach	•			K3	
			ocols.		•									
CO-PO Mapping (Scale	1: Lo	w, 2:	Med	ium,	3: Hi	gh)								
CO-PO Mapping PO1 PO2 PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2		PSO3	3	
CO1 3 2		2						1	2	2	2			
CO2 3 2		2						1	2	3	2			
CO3 3 2 2		3			1	2		2	3	3	3			
CO4 3 2		3						1	2	3	3			
CO5 2 2 2	1	2				1		2	3	3	3			
Course Contents / Sylla	bus	1										-		
Module 1		Boo	lean l	ogic,	Func	ctiona	l bloc	ks, Inst	truction	Set		0	8 ho	urs
Revision of basics in Bo	olean	logic	and (	Comł	—— oinati	onal/	Seaue	ntial C	ircuits.					
Functional blocks of a c		O					-				4			

Instruction set architecture of a CPU: Registers, instruction execution cycle, RTL interpretation of

**Data representation, Computer arithmetic** 

10 hours

instructions, addressing modes, instruction set. Outlining instruction sets of some common CPUs.

Module 2

**Data representation:** Signed number representation, fixed and floating point representations, character representation.

**Computer arithmetic:** Integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. multiplication – shift-and-add, Booth multiplier, carry save multiplier, etc. Division restoring and non-restoring techniques, floating point arithmetic, IEEE 754 format.

Module 3	x86 architecture, control unit design, Memory system	08 hours
	design	

#### Introduction to x86 architecture.

**CPU control unit design:** Hardwired and micro-programmed design approaches, design of a simple hypothetical CPU.

**Memory system design:** Semiconductor memory technologies, memory organization.

Module 4 Peripheral devices, Pipelining 10 hours

**Peripheral devices and their characteristics:** Input-output subsystems, I/O device interface, I/O transfers – program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes – role of interrupts in process state transitions, I/O device interfaces – SCII, USB

**Pipelining:** Basic concepts of pipelining, throughput and speedup, pipeline hazards.

Module 5 Parallel Processors, Memory organization 10 hours

**Parallel Processors:** Introduction to parallel processors, Concurrent access to memory and cache coherency

**Memory organization:** Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. block size, mapping functions, replacement algorithms, write policies.

	Total Lec	cture Hours 44 hours
Tex	xtbook:	·
1.	Computer System Architecture	M. Mano
2.	Computer Organization, McGraw-Hill	Carl Hamacher,
		Zvonko Vranesic
Re	ference Books:	·
1.	Computer Organization and Architecture- Pearson Education	William Stallings
2.	"Computer Architecture", Oxford University Press, Eighth Impression	Behrooz Parahami
NP	TEL/ YouTube/ Faculty Video Link:	
1.	https://www.youtube.com/watch?v=nQnS8YAQcDY	
2.	https://www.youtube.com/watch?v=DsK35f8wyUw	
3.	https://onlinecourses.nptel.ac.in/noc25_cs154/preview	
4.	https://www.youtube.com/watch?v=IYbGMJkqKak	
5.	https://www.youtube.com/watch?v=xzNrZ_X_200	



**Course Code: BCSBS0301** 

Course Offered in: B. Tech (CSBS)

**Pre-requisite:** Statistics & Probability, Basics of Python

## NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY

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**Course Name: Computational Statistic** 

Course Ob computer in	jectiv	es: Co	ourse (	Objecti	ives: T	he ob	jective	of the							
conduct sta								_		_		~, F			
Course Ou	tcom	e: Afte	er com	pletio	n of th	e cour	se, the	e stude	nt wil	l be abl	e to		Bloom's		
													Knowled	lge Level	
													(KL)		
CO1			n	nultiva	riate n	ormal	distri	bution		olicatio			K2		
CO2			fe	Jnders or clas upervi	K2										
CO3			Α	Apply I nalysis	ŀ	Κ3									
CO4	es in te	erms o	f facto	r anal	ysis	l correla				Κ3					
CO5			n	nining	and m	achine	e learn	ing.	ng tecl	hniques	in data	·	ŀ	Κ3	
CO-PO M	appin	g (Sca	le 1: l	Low, 2	2: Med	lium,	3: Hig	gh)					T		
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	2	2	-	-	2	-	-	_	-	-	-	2	2	-	
CO2	3	3	1	-	2	-	-	_	-	-	-	3	2	-	
CO3	3	2	1	-	2	-	-	-	-	-	-	3	2	-	
CO4	3	2	-	-	2	-	-	-	-	-	-	3	2	-	
CO5	3	2	1	-	2	-	-	-	-	-	-	3	2	-	
Course Co	ntent	s / Syl	labus												
Module 1		Mu	ltivar	iate N	ormal	Distr	ibutio	n						10 hours	
Multivariat	e Nor	mal D	istribu	ition F	unctio	ns, Co	nditio	nal D	istribu	tion and	d its rel	ation to	o regressi	on model	
Estimation						•							J		
Module 2		Dis	crimi	nant A	nalys	is								10 hours	
Statistical between their proper		ound,	linear	discri	minan	t func	tion a	nalysis	s, Esti	mating	linear d	liscrim	inant fun	ctions and	
Module 3		Pri	ncipal	Com	ponen	t Ana	lysis							10 hours	
Principal co	_		_		or con	ductin	g prin	cipal c	compo	nent an	alysis, o	decidin	g on how	many	

Module 4	Factor Analysis		10 hours					
•	rsis model, Extracting common factors, determining number	er of factors, Transformati	on of factor					
	itions, Factor scores.							
Module 5	Cluster Analysis		08 hours					
Introduction	, Types of clustering, Correlations and distances, c.	lustering by partitioning	g methods,					
hierarchical	clustering, overlapping clustering, K-Means Clustering-Pr	ofiling and Interpreting (	Clusters					
		<b>Total Lecture Hours</b>	48 hours					
Textbook:								
1.	An Introduction to Multivariate Statistical Analysis,	T.W. Anderson.						
Reference B	Books:							
1.	Cluster Analysis for Applications M.R. Anderberg							
2.	Applied Multivariate Data Analysis, Vol I & II.	J.D. Jobson						
3.	Statistical Tests for Multivariate Analysis	H. Kris						
NPTEL/ Yo	utube/ Faculty Video Link:							
1.	https://www.youtube.com/watch?v=YgExEVji7xs							
2.	https://www.youtube.com/watch?v=ImKKekAyFls							
3.	https://www.youtube.com/watch?v=hkCT-6KJAK0							
4.	https://www.youtube.com/watch?v=n3y3xLNoPk4							
5.	https://www.youtube.com/watch?v=NhimXdFenrg https://www.youtube.com/watch?v=CwjLMV52tzI https://www.youtube.com/watch?v=qg_M37WGKG8							



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Course Code: BCSBS0302Z	Course Name: Object Oriented	L	T	P	C
	Programming				
Course Offered in: B. Tech. CS	BS	2	0	0	2

**Pre-requisite:** Understand basic programming, data structures, and logic; grasp OOP concepts like classes, objects, and inheritance; and practice debugging

**Course Objectives:** Students are able to gain a comprehensive understanding of procedural programming in C and object-oriented programming in C++ and Java. They will grasp fundamental OOP concepts, design and develop models using UML tools, and demonstrate standard techniques such as modularity and I/O operations, essential for effective software development.

<b>Course Outcome:</b> After completion of the	<b>Course Outcome:</b> After completion of the course, the student will be able to						
		Knowledge Level					
		(KL)					
CO1	Identify the concepts of procedural programming ,C++ , and its features	K1					
CO2	Apply object-oriented principles and C++ features to build modular programs using classes and objects.	К3					
СОЗ	Apply object-oriented programs using inheritance, polymorphism, operator overloading, and generic programming with templates.	K3					
CO4	Analyze and evaluate the object- oriented model by using UML diagrams.	K5					

#### CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	1	1	2	1	-	1	1	1	1	3	1	1
CO2	3	3	2	1	2	1	-	2	1	1	1	3	2	1
CO3	3	3	3	2	3	1	1	2	2	2	2	3	2	2
CO4	2	2	3	2	2	1	1	3	2	2	1	3	2	1
CO5	3	2	1	1	2	1	-	1	1	1	1	3	1	1

**Course Contents / Syllabus** 

Module 1 C Foundations & C++ Evolution 10 hours

**Procedural programming, An Overview of C:** Types Operator and Expressions, Scope and Lifetime, Constants, Pointers, Arrays, and References, Control Flow, Functions and Program Structure, Namespaces, error handling, Input and Output (*C*-way), Library Functions (*string*, *math*, *stdlib*), Command line arguments, Pre-processor directive

**Some difference between C and C++:** Single line comments, Local variable declaration within function scope, function declaration, function overloading, stronger type checking, Reference variable, parameter

passing – value vs reference, passing pointer by value or reference, #define constant vs const, Operator new and delete, the typecasting operator, Inline Functions in contrast to macro, default arguments

Module 2 The Fundamentals of OOP and OOP Facilities 10 hours

**The Fundamentals of Object Oriented Programming:** Necessity for OOP, Data Hiding, Data Abstraction, Encapsulation, Procedural Abstraction, Class and Object.

More extensions to C in C++ to provide OOP Facilities: Scope of Class and Scope Resolution Operator, Member Function of a Class, private, protected and public Access Specifier, this Keyword, Constructors and Destructors, friend class, error handling (exception)

Module 3 Essentials of Object Oriented Programming and Generic Programming 10 hours

Essentials of Object Oriented Programming: Operator overloading, Inheritance – Single and Multiple, Class Hierarchy, Pointers to Objects, Assignment of an Object to another Object, Polymorphism through dynamic binding, Virtual Functions, Overloading, overriding and hiding, Error Handling

Generic Programming: Template concept, class template, function template, template specialization.

Module 4 Object Oriented Design and Modeling 8 hours

Input and Output: Streams, Files, Library functions, formatted output

**Object Oriented Design and Modelling:** UML concept, Use case for requirement capturing, Class diagram, Activity diagram and Sequence Diagram for design, Corresponding C++ code from design

		Total Lecture Hours	48 hours	
Textbook:		·		
1.	"Object Oriented Modeling and	James Rumbaugh et. Al		
2.	Design", PHI	E Balagurusamy, TMH		
	Object Oriented Programming			
	with C++,			
Reference Books:				
1.	Programming – Principles and	Bjarne Stroustrup, Addison We	esley	
	Practice Using ++ 2nd Edition			
2.		Bjarne Stroustrup, Addison W	<sup>'</sup> esley	
	The Design and Evolution of			
	C++, 1st Edition			
NPTEL/ YouTube/ Facu	lty Video Link:			
1.	https://www.youtube.com/watch?v=	bIzTKJzs92w		
2.	https://www.youtube.com/watch?v=	pRC09Tz9iVE		
3.	https://www.youtube.com/watch?v=.	A38y7OO8OK4		
4.	https://www.youtube.com/watch?v=	rr7HVs4d1Qo		
5.	https://www.youtube.com/watch?v=te3CuRb7F3zKh_sqUp	t5SuR0rbAxA&list=PLrgz73xxh	ıUkPBK2d	



#### **GREATER NOIDA-201306**

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Cours	e Co	de: BC	CSBS0	304Z		Cour	se Nai	ne: So	oftwar	e Eng	ineerin	g		L	T	P	C
Cours	e Of	fered i	n: Cor	nputer	Scien	ce and	l Busir	ness S	ystems	S				3	0	0	3
Pre-re	quis	ite: Ba	sic kn	owledg	ge abo	ut soft	ware a	and its	types,	, and k	nowled	ge of a	ıy Obje	ct-O	rient	ed	
progra	mmi	ng lang	guage														
Cours	e Ob	jective	es: To	enable	stude	nts to	develo	p met	hods a	nd pro	cedure	s for so	ftware c	level	opm	ent t	hat
can sca	ale u	p for la	rge sy	stems	and th	at can	be use	ed con	sistent	ly to p	roduce	high-գւ	iality so	oftwa	re a	t low	7
cost and with a small cycle of time.																	
Course Outcome: After completion of the course, the student will be able to  Bloom's																	
												Kno	wle	lge			
														Leve	el (K	L)	
Understand the foundational concepts and evolution of software engineering,																	
CO1													K2				
	importance of engineering approaches in large-scale software development																
CO <sub>2</sub>	Apply techniques for software project planning, cost estimation, risk analysis, configuration management, and software quality assurance using standard model																
	_										method						
CO3		-		_			_			_	rics, an			K4			
	rob	oust and	l main	tainab	le soft	ware s	ystem	S									
		•				_	_				e-box to	_					
CO <sub>4</sub>				•		are thr	ough 1	metho	ds targ	eting 1	function	al and	non-		K	4	
CO D		octional apping				Modi	2	. Uiak	.)								
		apping	(Scar	e 1: L	uw, ⊿:	Mear	um, S	High	l) 					1			
CO-P Mapp		PO1	PO2	PO3	PO4	PO5	<b>PO6</b>	<b>PO7</b>	PO8	PO9	PO10	PO11	PSO1	PS	02	PS	<b>D3</b>
CO1	niig	3	2	1	1	1					1		3	2	)	2	
				1		1	-	-	-	-		-					
CO2		3	2	2	1	2	1	-	-	-	2	1	3	3 3			
CO3		3	3	3	2	2	-	-	-	-	2	1	3	3 3			
CO4		3	2	3	2	2	1	-	-	-	2	-	3	3	;	3	1
Cours	e Co	ntents	/ Sylla	abus													
Modul	le 1	Int	roduc	tion											8 ho	iirs	

Module 1 Introduction 8 hours

Programming in the small vs. programming in the large; software project failures and importance of software quality and timely availability; engineering approach to software development; role of software engineering towards successful execution of large software projects; emergence of software engineering as a discipline.

Module 2	Software Project Management & Software Quality and Reliability	12 hours

Basic concepts of life cycle models – different models and milestones; software project planning – identification of activities and resources; concepts of feasibility study; techniques for estimation of schedule and effort; software cost estimation models and concepts of software engineering economics; techniques of

software project control and reporting; introduction to measurement of software size; introduction to the concepts of risk and its mitigation; configuration management.

Internal and external qualities; process and product quality; principles to achieve software quality; introduction to different software quality models like McCall, Boehm, FURPS / FURPS+, Dromey, ISO – 9126; introduction to Capability Maturity Models (CMM and CMMI); introduction to software reliability, reliability models and estimation.

#### Module 3 Software Requirements Analysis, Design and Construction

8 hours

Introduction to Software Requirements Specifications (SRS) and requirement elicitation techniques; techniques for requirement modeling – decision tables, event tables, state transition tables, Petri nets; requirements documentation through use cases; introduction to UML, introduction to software metrics and metrics based control methods; measures of code and design quality.

#### Module 4 Object Oriented Analysis, Design and Construction & Software Testing | 12 hours

Concepts -- the principles of abstraction, modularity, specification, encapsulation and information hiding; concepts of abstract data type; Class Responsibility Collaborator (CRC) model; quality of design; design measurements; concepts of design patterns; Refactoring; object oriented construction principles; object oriented metrics.

Introduction to faults and failures; basic testing concepts; concepts of verification and validation; black box and white box tests; white box test coverage – code coverage, condition coverage, branch coverage; basic concepts of black-box tests – equivalence classes, boundary value tests, usage of state tables; testing use cases; transaction based testing; testing for non-functional requirements – volume, performance and efficiency; concepts of inspection.

	П	Total Lecture Hours 40 hours
Textbo	ook:	
1.	Software Engineering, , Edition 9, Pearson	Author Ian Sommerville
Ref	Perence Books:	
S.No	<ol> <li>Fundamentals of Software Engineering,</li> <li>Software Requirements and Specification: A Lexicon of Practice, Principles and Prejudices</li> </ol>	Carlo Ghezzi, Jazayeri Mehdi, Mandrioli Dino Michael Jackson
	3. The Unified Development Process	Ivar Jacobson, Grady Booch, James Rumbaugh
	4. Design Patterns: Elements of Object-Oriented Reusable Software	Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides
	5. Software Metrics: A Rigorous and Practical Approach	Norman E Fenton, Shari Lawrence Pfleeger
	6. Software Engineering: Theory and Practice	Shari Lawrence Pfleeger and Joanne M. Atlee
	7. Object-Oriented Software Construction, Bertrand Meyer	Bertrand Meyer  Ivar Jacobson

	<ol> <li>Object Oriented Software Engineering: A Use Case Driven Approach</li> <li>Touch of Class: Learning to Program Well with Objects and Contracts UML Distilled: A Brief Guide to the</li> </ol>	Bertrand Meyer
	Standard	
	10. Object Modeling Language Martin Fowler	
NPTEL	Youtube/ Faculty Video Link:	
Unit 1	https://youtu.be/x-jqSXYE4S	
Unit 2	https://youtu.be/mGkkZoFc-4I	
Unit 3	https://youtu.be/sGxgZxwuHzc	
Unit 4	https://youtu.be/BNk7vni-1Bo	
Unit 5	https://youtu.be/8swQr0kckZI	



10. Design of an arithmetic and logic unit

11. Design of an 8-bit input/output system with four 8-bit internal register.12. Design the data path of a computer from its registers transfer language

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						<mark>ganiza</mark>	tion 8	<mark>k Arcl</mark>	<mark>itectu</mark>	<mark>ire Lab</mark>	)					<u> </u>
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to understar																
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Course Ou	tcome	: Afte	r com	oletion	of the	e cours	se, the	stude	nt will	be able	e to	Bloc	m'	s Kno	wled	dge
												Leve	el (l	KL)		
CO1										circuit				K3		
CO2 Implement shift registers, Arithmetic Logic Units K3																
(ALUs), and control units.																
CO3  Analyze and implement input/output systems with internal registers.  K4																
CO-PO Ma	apping	y (Scal					3: Hig	h)								
СО-РО									200	2010	2011	<b>D</b> 004			DC	102
Mapping	POI	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	POIO	PO11	PSO1	ŀ	PSO2	PS	803
CO1	3	2	3	2	3	-	-	-	-	-	2	2		3		2
CO2	3	2	3	2	3	-	-	-	-	-	2	2		3		3
CO3	3	3	3	3	3	-	-	-	-	-	2	3		3		2
CO4	-	-	-	-	-	-	-	-	-	-	-	-		-		2
CO5	-	-	-	•	-	•	-	-	-	-	-	-		-		2
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		lay dig														
		tation														
		tation					III subt	ractor								
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		tation				ıa Asy	ncnro	nous c	ounter	-						
9. Imp	iemen	tation	01 2111	it regi	sters.											

- 13. Write an assembly or C program to read data from a keyboard or another input device using program-controlled I/O.
- 14. Write a program that configures a microprocessor or microcontroller to use interrupts for I/O operations. The program should demonstrate the handling of an interrupt when data is received from an input device.
- 15. Write a program to communicate with a USB device, such as a flash drive or keyboard, to read or write data.
- 16. Write a program to simulate a basic instruction pipeline with 4 stages: Fetch, Decode, Execute, and Write Back.
- 17. Write a program that simulates a pipeline processor and introduces various hazards like data hazards, control hazards, and structural hazards. Implement techniques such as forwarding, stalling, and branch prediction to resolve these hazards.
- 18. Write a program in a parallel programming language (e.g., OpenMP or MPI) to perform matrix multiplication using multiple processors.
- 19. Write a simulation program to model a multi-processor system where each processor has its own cache.
- 20. Implement a cache coherence protocol (e.g., MESI) to ensure data consistency across all caches when multiple processors access shared memory.
- 21. Write a program that simulates a multi-core processor system where multiple cores try to access and modify shared memory simultaneously. Implement synchronization techniques such as locks or semaphores to prevent race conditions.

Total Hours: 20 hrs.



constructor and assignment operators

constructor and assignment operators

6.

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ool of Computer Science in Emerging Technologies

	School of Computer Science in Emerging Technologies															
LAB Co	urse Coo	le: BC	CSBSO	352			se Nar		bject (	Oriente	ed	L	T	P	Credits	
Course (	Offered i	n: : B	. Tech	ı. CSE	S		Ŭ					0	0	4	2	
Pre-requ					_	_			es, and	d logic;	grasp (	OOP co	once	epts lik	te	
classes, c			eritan	ce; and	d pract	ice de	buggii	ng								
Course	-		•	1 .	1 .	•.•	1 1		•	•					•	
			-						-		-		_		-oriented	
emphasiz	_	_	_									eropin	ga	ррпса	ions that	
Course (												Bloo	m's	Know	ledge	
Course	outcome	. 1110	r com	pictioi	i or un	Cour	se, the	stude	11t W111	oc doic	, 10	Leve			leage	
					Imple	ement	ŀ	oasic	O	bject-or	iented					
CO1					-			ncepts		n as c				K3		
COI					3			ce, an	d poly	ymorphi	sm in			KS		
						and Ja		_			_					
G04		Design and develop small-scale sof														
CO <sub>2</sub>					projects using UML diagrams and object- oriented principles							K6				
									rionto	d nroam	oma to					
CO3					Debug and test object-oriented programs to ensure proper functionality and adherence									K4		
005					to design specifications.											
CO-PO	Mapping	g (Scal	le 1: I	low, 2								I				
CO-PC	,								DOG	DO10	DO11	DCO	.1	DCO2	DCO2	
Mappi	ng									PO10			'1	PSO2	PSO3	
CO1	3	2	3	2	3	1	1	1	2	2	2	3		2	2	
CO2	3	3	3	2	3	1	2	1	3	3	2	3		3	3	
CO3	2	3	2	3	2	1	1	2	2	2	2	2		2	2	
List Of I	Practical	's (Inc	dicativ	ve & N	Not Liv	mited	To)									
Sr. No.	Progra		uicati	, t & 1	TOT LI	ıııııu	10)									
1.			ssing	nassin	o nara	meter	hy val	ne ve l	ov refe	erence 1	nassina	arrav	as c	onstan	t pointer.	
2.															trncpy as	
<b>~</b> .	overloa				iiiiig	Sumg	, oper		iike s	acut un	a banc	, 511	гру	and 5	incpy as	
3.					enace	for a	noint	ar dan	endin	a on ir	mut an	d doi:	na f	hic ro	peatedly,	
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1	-											mioto-	0.0	<b>n</b> v. cc:	notmictor	
4.			_			_	_						, co	py co	nstructor,	
	assignn												1	4	4	
5.	Define	class	vector	of 1n	itegers	with	all po	ssible	opera	itions li	ke con	structo	or, d	estruc	tor, copy	

Define class matrix of integers with all possible operations like constructor, destructor, copy

7.	Define class matrix of integers using vector, with all possible operations like constructor, destructor, copy constructor and assignment operators
8.	Define class stack, queue, linked-list, array, set using some data-type (int) with data members kept as private and functions kept in both protected and public sections
9.	Define class complex with all possible operators: constructor, destructor, copy constructor, assignment operator and operators >, =, <=, ==, ++ (pre and post), +, +=, (), with the data members stored as pointer to integers.
10.	Define class vector of integers with all possible operations like constructor, destructor, copy constructor and assignment operators>, =, $<=$ , ==, $++$ (pre and post), $+$ , $+=$ , ().
11.	Define class matrix of integers with all possible operations like constructor, destructor, copy constructor and assignment operators>, =, $<=$ , ==, $++$ (pre and post), $+$ , $+=$ , ().
12	Define class matrix of integers using vector, with all possible operations like constructor, destructor, copy constructor and assignment operators>, =, <=, ==, ++ (pre and post), +, +=, ().
13	Define stack and queue inherited from array class, with standard functions and operators.
14	Define a class called 'array' with data type passed as template type with constructor, destructor, copy constructor and assignment operators and index operator
15	Define template functions for compare and use it in the algorithms like bubble sort, insertion sort, merge sort
16	Write a C++ program that demonstrates how to format output using manipulators like setw, setprecision, and fixed. Display a table of numbers with different formats (e.g., right-aligned, fixed-point notation)
17	Implement a program that reads different data types (e.g., integer, float, string) from the user.  Use input manipulators like to handle whitespaces and getline for reading entire lines.  Demonstrate how these manipulators affect the input operation
18	Create a class Complex to represent complex numbers. Overload the << and >> operators to enable formatted input and output of complex numbers. Write a program to read and display a complex number using these overloaded operator
19	Define class model for complex number, student class, book class and show it using UML diagram as well as concrete class
20	Show behavioral modeling through sequence diagram and activity diagram for workflow in a typical log-in, log-out situation.
21	Design a program that combines the use of manipulators and overloaded operators to format and display a list of student records (name, roll number, and grade) in a tabular format
22	Write a C++ program that defines a custom manipulator to format dates in a specific style (e.g., DD-MMYYYY). Demonstrate the use of this custom manipulator with input and output streams.



#### **GREATER NOIDA-201306**

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LAB Course Code:	LAB Course Name: Computational Statistic	L	T	P	C
BCSBS0351	Lab				
Course Offered in B.Tech. (	CSBS	0	0	4	2

**Pre-requisite:** Basic Python, Basic Data Structures, and Knowledge of Mathematics Fundamentals

**Course Objectives:** To develop and understand the modern computational statistical approaches and their applications to different datasets.

Course Outcome: Af	ter completion of the course, the student will be able to	Bloom's
		Knowledge
		Level (KL)
CO1	To understand the Python programs using normal Functions, Numeric Types, Sequences and Class Definition, Constructors, Text & Binary Files.	K2
CO2	Understanding the concepts of Data Wrangling includes Reshaping and Pivoting, Data Transformation, String Manipulation, Regular Expressions.	K2
CO3	Understand the visualization of Data Aggregation, Group Operations and Time series.	К3
CO4	Understand the implementation of Data Visualization in Python includes Plotting Graphs, Controlling Graph, Adding Text, More Graph Types	К3

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO- PO Mappin g	PO 1	PO 2	PO 3	PO 4		PO 6	PO 7	PO8	PO9	PO10	PO11	PSO 1	PSO 2	PSO 3
CO1	2	2	3	1	3	1	-	-	-	-	-	1	2	2
CO2	2	3	3	3	3	1	-	-	-	-	1	1	2	2
CO3	2	2	1	2	1	1	-	-	-	-	-	2	3	3
CO4	3	3	3	3	3	1	-	-	-	-	-	2	3	3

#### **List Of Practical's (Indicative & Not Limited To)**

- 1. Creation and manipulation of Vectors, Matrices, Arrays, Lists, Factors and Data Frames
- 2. Create a program to adding element of the matrix in a python
- 3. Compute Estimators of the main statistical measures like Mean, Variance, Standard Deviation, Covariance, Correlation and Standard error with respect to any example. Display graphically the distribution of samples.
  - 4. Install of Packages and scripts for Importing and Exporting Data
- 5. Plot the Normal Distribution for class test result of a particular subject. Identify the Skewness and Kurtosis
  - 6. Visualize Statistical Graphs using Scatter Plots, Box Plots, Histograms, Pie diagram
  - 7. Write a program to compute summary statistics such as standard
  - 8. Write a program to demonstrate Regression analysis

9. Load the dataset:

birthwt Risk Factors Associated with Low Infant Birth Weight at https://raw.github.com/neurospin/pystatsml/master/datasets/birthwt.csv

- a. Test the association of mother's (bwt) age and birth weight using the correlation test and linear regression.
- b. Test the association of mother's weight (lwt) and birth weight using the correlation test and linear regression.
  - c. Produce two scatter plots of: (i) age by birth weight; (ii) mother's weight by birth weight.
- 10. Perform clustering of the iris dataset based on all variables using Gaussian mixture models. Use PCA to visualize clusters.

Total Hours: 48 hrs.



#### **GREATER NOIDA-201306**

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LAB Course Code: BCSBS0354Z	LAB Course Name: Software Engineering Lab	L	T	P	C
Course Offered in: Computer Scien	0	0	4	2	

#### **Pre-requisite:**

**Course Objectives:** Students are able to develop software solutions by applying software engineering principles, integrating various development models and estimation techniques. They can implement quality assurance practices and testing strategies to ensure that the software meets specified standards and requirements

Course	e Outcome: After completion of the course, the student will be able to	Bloom's		
		Knowledge Level		
		(KL)		
CO1	Apply software solutions using software engineering principles	K3		
CO2	Implement and analyze software development models and estimation techniques	K4		
CO3	Apply quality assurance practices and testing strategies.	K3		

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	3	2	1	1	1	2	2	2	1	3	2	2
CO2	3	3	3	2	2	1	1	2	2	2	1	3	3	3
CO3	3	2	2	2	1	2	2	3	2	3	2	3	2	3

#### **List Of Practical's (Indicative & Not Limited To)**

- 1. Development of requirements specification on any of the given topic.
   Covid vaccination management system
   Online grocery store
   Online food delivery system
   Online medical store
   Doctors online OPD
- 2. Develop function-oriented design using SA/SD methodology.
- 3. Develop object-oriented design using UML.
- 4. Designing and implementing test cases manually.
- 5. Designing and implementing test cases automatically using a tool.
- 6. Use of appropriate CASE tools and other tools (any one) such as configuration management tools, program analysis tools in the software life cycle.
- 7. Create a Software Design Document (SDD): Object and Class diagram.
- 8. Create Interaction diagram: sequence diagram, collaboration diagram for SDD.
- 9. Design test suite for equivalence class partitioning
- 10.Mini Project with CASE tools

Total Hours: 20 hrs.



Module 1

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Cou	rse C	ode: B	NC03	803		Cou	rse N	ame: l	[ndiar	Const	itution		L '	ГР	(
Course Off	ered i	n: CS	BS										2	) 0	0
Pre-requisi	te: Ba	sic un	dersta	nding	of Ind	ian his	story,	civics,	the st	ructure	of gove	rnment	, and fu	ndame	nta
olitical con	cepts										_				
Course Ob	jectiv	es: To	unde	rstand	the m	odalit	ies ab	out In	dian C	Constitu	tion &	apply c	lifferen	t laws	an
egulations t	to eng	ineeri	ng pra	ctices.											
Course Out	come	: Afte	r com	oletion	of the	e cour	se, the	studei	nt will	be able	e to:	Bloom	ı's Kno	wledg	e
												Level	(KL)		
CO1 Identify and explore the basic features and modalities about Indian constitution.											K1				
CO2		Understand and relate the functioning of Indian parliamentar system at the center and state level.									entary	K.Z			
CO3		Apply different aspects of Indian Legal System and its related bodies									related	K3			
CO4	L		and ing pra			rent la	aws a	nd reg	gulatio	ns rela	ited to	K4			
COS			role		nginee	rs wi	th dif	ferent	orga	nizatior	ns and	K4			
CO-	PO M	<b>Lappi</b> r	ng (Sc	ale 1:	Low,	2: Me	dium,	3: Hi	gh)						
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSC	)3
CO1	2	2	-	2	2	3	-	2	-	1	-	2	2	2	
CO2	2	3	1	1	2	3	-	2	1	1	1	2	2	1	
CO3	3	2	3	2	2	2	1	2	1	2	2	3	2	2	
CO4	2	3	_	3	3	1	1	2	1	1	1	2	2	3	
CO5	2	2	2	2	3	1	_	2	2	2	1	3	2	2	
	rgo C		ts / Sy		_		<u> </u>			<u> </u>	<u>                                     </u>				

Meaning of the constitution law and constitutionalism, Historical Background of the Constituent Assembly, Government of India Act of 1935 and Indian Independence Act of 1947, Enforcement of the Constitution, Indian Constitution and its Salient Features, The Preamble of the Constitution, Fundamental Rights, Fundamental Duties, Directive Principles of State Policy, Parliamentary System, Federal System, CentreState Relations, Amendment of the Constitutional Powers and Procedure, The historical perspectives of the constitutional amendments in India, Emergency Provisions: National Emergency, President Rule, Financial Emergency, and Local Self Government – Constitutional Scheme in India.

**Indian Constitution** 

Introduction and Basic Information about

6 hours

Module 2	Union Executive and State Executive
Miduile 2	Union Executive and State Executive

6 hours

Powers of Indian Parliament Functions of Rajya Sabha, Functions of Lok Sabha, Powers and Functions of the President, Comparison of powers of Indian President with the United States, Powers and Functions of the Prime Minister, Judiciary – The Independence of the Supreme Court, Appointment of Judges, Judicial Review, Public Interest Litigation, Judicial Activism, Lok Pal, Lok Ayukta, The Lokpa I and Lok ayuktas Act 2013, State Executives – Powers and Functions of the Governor, Powers and Functions of the Chief Minister, Functions of State Cabinet, Functions of State Legislature, Functions of High Court and Subordinate Courts.

#### Module 3

**Introduction and Basic Information about Legal System** 

6 hours

The Legal System: Sources of Law and the Court Structure: Enacted law -Acts of Parliament are of primary legislation, Common Law or Case law, Principles taken from decisions of judges constitute binding legal rules. The Court System in India and Foreign Courtiers (District Court, District Consumer Forum, Tribunals, High Courts, Supreme Court). Arbitration: As an alternative to resolving disputes in the normal courts, parties who are in dispute can agree that this will instead be referred to arbitration. Contract law, Tort, Law at workplace.

# Module 4 Intellectual Property Laws and Regulation to Information & Business Organizations and E Governance

Intellectual Property Laws: Introduction, Legal Aspects of Patents, Filing of Patent Applications, Rights from Patents, Infringement of Patents, Copyright and its Ownership, Infringement of Copyright, Civil Remedies for Infringement, Regulation to Information Introduction, Right to Information Act, 2005, Information Technology Act, 2000, Electronic Governance, Secure Electronic Records and Digital Signatures, Digital Signature Certificates, Cyber Regulations Appellate Tribunal, Offences, Limitations of the Information Technology Act.

Sole Traders, Partnerships: Companies: The Company's Act: Introduction, Formation of a Company, Memorandum of Association, Articles of Association, Prospectus, Shares, Directors, General Meetings and Proceedings, Auditor, Winding up. E-Governance and role of engineers in E Governance, Need for reformed engineering serving at the Union and State level, Role of I.T. professionals in Judiciary, Problem of Alienation and Secessionism in few states creating hurdles in Industrial development.

	Total Lecture Hours											
Textbook:												
S.No	Book Title	A	uthor									
1.	Introduction to the Indian Constitution,	Bı	rij Kishore Sharma									
	8th Edition, PHI Learning Pvt. Ltd											
Reference Boo	Reference Books:											
S.No	Book Title	A	uthor									
1.	Intellectual Property Law, Eastern Law	P.	Narayan									
	House, New Delhi											
NPTEL/ Youtu	NPTEL/ Youtube/ Faculty Video Link:											

NPTEL	/ Youtube/ Faculty Video Link:
1.	https://www.youtube.com/watch?v=z-UzdY-pXTc
2.	https://www.youtube.com/watch?v=m6E83v_wzGg
3.	https://www.youtube.com/watch?v=dBo9SzzbugA
4.	https://www.youtube.com/watch?v=zkWJAvg6_ME



#### **GREATER NOIDA-201306**

(An Autonomous Institute) School of Computer Science in Emerging Technologies

Course Co	de: BO	CSBS	)403				irse N	ame: Syster	ms	L	T		P	C		
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												]	Knowledge Level			
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			Under	rstand	the fu	ndame	entals,	functi	ons, a	nd arch	itecture	of	. ,	K2		
Operating Systems.																
			Imple	ment a	and an	alyze	proces	ss man	nageme	ent poli	cies, C	PU				
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	systems.  Understand the need for process synchronization and apply															
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CO-	PO M	Iappir	ng (Sca	ale 1:	Low,	2: Me	dium,	3: Hi	gh)			•				
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO	3	
CO1	3	2	2	1	1	1	-	-	1	1	-	3	3	2		
CO2	3	3	3	2	2	1	-	-	2	2	-	3	3	2		
CO3	3	3	3	2	2	1	-	2	2	2	-	3	3	2		
CO4	3	3	3	2	2	1	_	-	1	1	-	3	3	_		
CO5	2	2	2	1	3	1	-	-	1	1	-	3	3	-		
Cou	rse C	ontent	ts / Syl	llabus												
Module 1							In	trodu	ction				10	hours		

Concept of Operating Systems (OS), Generations of OS, Types of OS, OS Services, Interrupt handling and System Calls, Basic architectural concepts of an OS, Concept of Virtual Machine, Resource Manager view, process view and hierarchical view of an OS.

**Processes**: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching.

Module 2 Process Scheduling 10 hours
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**Thread**: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads.

**Process Scheduling**: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.

**Scheduling algorithms**: Pre-emptive and non-pre-emptive, FCFS, SJF, RR, Multilevel Queue Scheduling and Multilevel Feedback Queue Scheduling

Module 3	Inter-process	Communication	&	10 hours
	Deadlocks			

**Inter-proces communication**: Concurrent processes, precedence graphs, Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Semaphores, Strict Alternation, Peterson's Solution, The Producer / Consumer Problem, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem, Barber's shop problem.

**Deadlocks**: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

**Concurrent Programming**: Critical region, conditional critical region, monitors, concurrent languages, communicating sequential process (CSP); Deadlocks - prevention, avoidance, detection and recovery.

Module 4 Memory Management 10 hours

**Memory Management**: Basic concept, Logical and Physical address maps, Memory allocation: Contiguous Memory allocation – Fixed and variable partition–Internal and External fragmentation and Compaction, Non Contiguous memory allocation, Paging, Segmentation, Segmentation with paging.

**Virtual Memory**: Background, Demand paging, Allocation of frames: First Fit, Best Fit, and Worst Fit, Page replacement algorithms (FCFS, Optimal, LRU), Belady's Anomaly, Thrashing

Module 5	I/O	Hardware,	File	and	Disk	08 hours
	Man	agement				

I/O Hardware: I/O devices, Device controllers, Direct Memory Access, Principles of I/O.

**File Management**: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation(linear list, hash table), efficiency and performance.

**Disk Management**: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, Disk reliability, Disk formatting, Boot-block, Bad blocks.

**Case study**: UNIX OS file system, shell, filters, shell programming, programming with the standard I/O, UNIX system calls.

		<b>Total Lecture Hours</b>	48 hours
Textbook:			
1.	Operating	Abraham Silbers	schatz, Peter Baer
	System Concepts	Galvin and Greg (	Gagne, Edition 8
	Essentials.		
Reference Books:	•	•	

1.	Operating	William Stallings, Edition 9					
2.	Systems: Internals and Design Principles	Charles Patrick					
3.	Operating	Gary J. Nutt.					
4.	System: A Design-oriented	Maurice J. Bach.					
5.	Approach	Daniel Pierre Bovet, Marco Cesa					
	Operating Systems: A Modern Perspective						
	Design of the						
	Unix Operating						
	Systems						
	Understanding						
	the Linux Kernel						
NPTEL/ Youtube/	Faculty Video Link:						
1.	https://www.youtube.com/watch?v=jciGIvn7UfM&list=PLyqSpQzTE6						
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	https://www.youtube.com/watch?v=Y1PF0fE-v9M						
3.	https://www.youtube.com/w						
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	https://www.youtube.com/w	atch?v=Ev4BET3i5R0					
5.	https://www.youtube.com/w						
	https://www.youtube.com/w	atch?v=4svECqoC6Do					
	https://www.youtube.com/w	atch?v=S4XYOiSoAOE					
	nttpb:// www.youtube.com/ w	aten. ( Difficulties					



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08 hours

Course Co	de: B	CSBS	0404		Cours Syster		ame:	Dat	abase	Man	ageme	nt L	T	P	С
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							ment (	lataha	se for	storing	manag	ing			
CO	3			Asses and implement database for storing, managing data efficiently by applying the Normalization process									K	ζ5	
				on the database.									-		
CO	4			Synthesize the concepts of transaction management,								K5			
CO	+			concurrency control and recovery.								K.J			
CO	5			Understand and implement the concepts of Database security and various types of databases.								K3			
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CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSC	)3
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CO2	3	3	2	3	3	1	1	1	2	1	2	3	3	2	
CO3	3	2	3	2	3	1	1	2	1	2	2	3	3	2	
CO4	2	3	2	3	3	1	2	2	1	2	2	2	3	2	
CO5	2	2	2	2	2	3	3	1	2	1	3	3	3	3	
Cou	rse C	onten	ts / Sy	llabus	5										
Module 1				]	Introd	luction	n							08 h	our
ntroduction															

**Relational Query Languages** Relational query languages: Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server. Relational

oriented data models, integrity constraints, data manipulation operations.

Module 2

Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML). Data models: Entity-relationship model, Keys, Mapping constraints, network model, relational and objectdatabase design: Domain and data dependency, Armstrong's axioms, Functional Dependencies, Normalization, Normal forms, Normal Forms based on Functional Dependencies (1 NF, 2 NF, 3 NF, BCNF), Multivalued Dependencies (MVDs) and 4NF, Join Dependencies (JDs) and 5NF and Domain Key, Normal Form (DKNF or 6NF), Inclusion Dependencies, Loss-Less Join Decompositions, Dependency preservation, Lossless design, Closure of an attribute set and FD sets, Canonical Cover of FD Sets.

#### Module 3 Query Processing and Optimization 08 hours

Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.

Introduction on SQL: Characteristics of SQL, advantage of SQL. SQL data type and literals. Types of SQL commands. SQL operators and their procedure. Tables, views and indexes. Queries and sub queries. Aggregate functions. Insert, update and delete operations, Joins, Unions, Intersection, Minus, Cursors, Triggers, Procedures in SQL/PL SQL.

Storage strategies: Indices, B-trees, Hashing.

Module 5

Module 4 Transaction Processing

Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp-based schedulers, Multi-version and optimistic, Concurrency Control schemes, Database recovery. Transaction system, Testing of serializability, serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log-based recovery, checkpoints, deadlock handling, Locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation-

based protocol, multiple granularity, Multi version schemes, Recovery with concurrent transaction, case study of Oracle.

08 hours

**Database Security** 

Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection.

Advanced topics: Object oriented and object relational databases, Distributed database Logical databases, Web databases, Distributed databases, Data warehousing and data mining.

	Total Lecture Hours 40 hour						
Textbook:							
1.	Database System Concepts, Seventh Edition,		Korth, Silbertz,				
2.	McGraw – Hill.		Sudarshan				
3.	Fundamentals of Database Systems, Seventh		Elmasri,				
	Edition, Addision Wesley. SQL,PL/SQL The		Navathe				
	programming language Oracle, Fourth Edition,		Ivan Bayross				
	BPB Publication						
Reference Book	s:						
1.	Database Systems: A Practical Approach to		Thomas				
	Design, Implementation and Management, Third		Cannolly and				
2.	Edition, Pearson Education, 2007.		Carolyn Begg				
3.	Database Management Systems" ThirdEdition,						
4.	McGrawHill.		Raghu				
	Implementing Database Security and Auditing, Digital		Ramakrishan and				
	Presss.		Johannes Gehrke				
	NoSQL with MongoDB in 24 Hours, First Edition,		Ron Ben Natan				
	Sams Publisher		Brad Dayley				
NPTEL/ Youtube	e/ Faculty Video Link:						
Unit 1	https://www.youtube.com/watch?v=hDcJnsYQiF	<u>Ec</u>					
Unit 2	https://www.youtube.com/watch?v=MYXIw5aq	YNQ					

Unit 3	https://www.youtube.com/watch?v=4YAsAdCa9sU
Unit 4	https://www.youtube.com/watch?v=mN7tHGBbg_Y
Unit 5	https://www.youtube.com/watch?v=B7tTQ272OHE



#### **GREATER NOIDA-201306**

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Course Code: BCSBS0402Z	Course Name: Software Design with UML	L	T	P	С
Course Offered in: B.TECH. (C	CSBS)	3	0	0	3

#### **Pre-requisite: Software Engineering concepts.**

**Course Objectives**: Students will understand the importance of modeling in the software development life cycle. They can apply the object-oriented approach to analyze and design systems and software solutions. They will understand how to employ the UML notation to create effective and efficient system designs.

<u> </u>						
<b>Course Outcome:</b> After completion of the course, the student will be able to						
		Knowledge				
		Level (KL)				
CO1	Understand the object-oriented approach to analysing and designing systems and software solutions.	K2				
CO2	Understand and become familiar with the Unified modelling Language	K2				
CO3	Analyze the requirements through use case driven approach.	K4				
CO4	Demonstrate the logical view of system using class diagram model.	K3				
CO5	Analyze and Evaluate the conceptual model into various scenarios and applications.	K5				

#### CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	2	-	2	-	-	-	1	-	2	3	2	2
CO2	2	-	2	-	2	-	-	-	1	-	1	2	3	3
CO3	2	3	2	-	1	-	-	-	1	-	1	2	2	2
CO4	3	2	3	2	2	-	-	-	1	-	1	2	2	2
CO5	3	2	3	2	2	1		1	2	1	2	3	3	3

#### **Course Contents / Syllabus**

Module 1 Software development process 10 hours
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The Waterfall Model vs. The Spiral Model, The Software Crisis, description of the real world using the Objects Model, Classes, inheritance and multiple configurations, Quality software characteristics, Description of the Object-Oriented Analysis process vs. the Structure, Study of approaches Cord & Yordon, Graddy Booch, James Raumbaugh.

Module 2	Introduction to the UML Language	8 hours

Standards, Elements of the language, General description of various models, The process of Object-Oriented software development, Design Patterns, and its types.

Module 3		Requirement s Analysis Using Case Mode	eling 8 hours
•	•	nents, Actor definitions. Writing a case goa	•
_		Diagrams: Description of goal, Defining U	ML Method, Operation, Object
	s, Sequence L	Diagram, Collaboration Diagram.	10 1
Module 4	Cl D'	The Logical View Design Stage	10 hours
•	_	gram Model, Attributes descriptions, Opera	-
-		odel, Association, Generalization, Aggregation	
		ram Model: Description of the model: Whi	tie box, black box, Connections
	gers. Interfac	es. Create a Package Diagram.	10 1
Module 5	1 G . D'	Models	10 hours
•	-	gram / Activity Diagram, Description of the	-
=	=	Diagram, Exercise in State Machines.Comp	
		Connections and Dependencies, User face.	Deployment Model: Processors,
Connections, C	components,	Γasks, Threads, Signals and Events.	
		Total Lectur	re Hours   46 hours
Textbook:		C. 1 M 1 11, 1 T T C , 1	C 1 D 1 I
1.		fied Modelling Language User Guide,	Grady Booch, James
2.		Education	Rumbaugh
	_	Oriented Software Engineering: using UML,	Erich Gamma, Richard Helm
D.C.		, and Java.	
Reference	Books:		
1.	Design I	Patterns: Elements of Reusable Object-	Erich Gamma, Richard Helm,
		Software.	Ralph Johnson, and John M.
NPTEL/ Youtu	be/Faculty V	ideo Link:	
1.	https://ww	w.youtube.com/watch?v=kSU2MPeptpM	
2.	https://ww	w.youtube.com/watch?v=WnMQ8HlmeXc	
3.	https://ww	w.youtube.com/watch?v=azTLDkiqGVk&lis	t=PLbRMhDVUMngf8oZR3Dn
	-	Kga90JVt&index=37	v i zerumz v emigreezhez p
		w.youtube.com/watch?v=19XFipXoJb0&list=	=PLbRMhDVUMngf8oZR3DpK
		ga90JVt&index=15	
4.	-	w.youtube.com/watch?v=9KokDbcr6cM&lis	
		Kga90JVt&index=36 https://www.youtube.co	
	https://ww	st=PLbRMhDVUMngf8oZR3DpKMvYhZKg	gaboj v techiuca—33



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Course Of	fered	in: B	. Tec	h. CS	SBS								3	0		0	3
Pre-requis	ite: C	lood l	(now	ledge	of Fu	ından	nental	s of N	Manag	gement	-						
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CO1	3	3	2	2	2	-	-	-	-	-	-	2	2	2			
CO2	3	3	3	3	2	-	-	2	2	1	-	2	2	2			
CO3	3	3	3	3	2	-	1	2	2	1	2	2	2	2			
CO4	3	3	3	3	2	2	1	2	2	1	2	2	2	3			
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Financial Projections and Valuation, Stages of financing, Debt, Venture Capital and other forms of Financing.

Module 5 Intellectual Property Rights (IPR) 8 Hours

Introduction and the economics behind the development of IPR: Business Perspective, IPR in India – Genesis and Development, International Context, Concept of IP Management, Use in marketing.

Types of Intellectual Property Patent- Procedure, Licensing and Assignment, Infringement and Penalty, Trademark- Use in marketing, example of trademarks- Domain name, Geographical Indications- What is GI, why protect them?

Copyright- What is copyright? Industrial Designs- What is design? How to protect?

		<b>Total Lecture Hours</b> 48 Hours
Textbook:		
1.	Joe Tidd, John Bessant. Managing	Joe Tidd, John Bessant.
	Innovation: Integrating Technological,	
	Market and Organizational Change	
Reference Books:	·	
1.	Case Study Materials: To be distributed	
	for class discussion	
NPTEL/ YouTube/	Faculty Video Link:	
1.	https://youtu.be/YtDh0J3m8JY, https://www	w.youtube.com/watch?v=-
	PjqIO45cJY&t=292s	
2.	https://www.youtube.com/watch?v=SXoRG	<u>Yz8wl0&amp;t=1s</u>
3.	https://www.youtube.com/watch?v=BAT	
	uWajjgLE&t=600s	
	https://www.youtube.com/watch?v=ntXx	
	BHWMKfo&t=2s	
4.	https://www.youtube.com/watch?v=1qy1G2	X6gugw&t=9s
5.	https://www.youtube.com/watch?v=pqRqJ36	e4PUE&t=1s
	https://www.youtube.com/watch?v=CElNe4	46m2iU



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Course Co	de: B	CSBS	0401			Co	urse N	lame:	Oper	ations 1	Researc	ch	L	T	P	
Course Of	fered	in: B.	Tech	(CSB	SS)								3	0	0	
Pre-requis	ite: T	his co	urse a	ims to	prov	ide ba	sic kn	owled	lge of	mather	natics a	about I	ndus	try		
Requireme	ent of	Subje	ct (m	ention	the c	ompai	nies w	here t	his su	bject ca	an play	a role	or th	is su	bject	t is
required fo	or the	menti	ioned	job ro	ole)											
Course Ob	-		ter co	mpleti	on of	the co	urse, tl	he stu	dent w	ill be al	ole to ap	ply the	conc	epts	of	
Operations													D1			
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													Know	vledg	ge Le	vel
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CO1											sion-ma proach			K	2	
COI				proble		appro	priate	uccisi	OII-IIIa	Kilig af	ргоасп	28 111		IX.	_	
CO2						ning pi	roblen	ı to bu	siness	and inc	lustry.			K	3	
CO3											blem to	real		K.	3	
life problems.  Apply project management concepts like CPM, PERT												K3				
COA					_	-		-						IZ:	2	
CO4	inventory Control to red production.							and u	and		K	3				
GO.					ept o	f Si	mulat	ion N	Iethod	ology	to real	life				
CO5			cation		· I · ·									K	3	
CO-PO M	appin	g (Sca	le 1: l	Low, 2	2: Med	lium,	3: Hig	gh)								
CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P/10	PO10	PO11	PSO1	PS	Ω2	PSC	12
Mapping	101	102	103	104	103	100	107	100	10)	1010	1011	1501	. 15	02	130	)3
CO1	3	2	1	2	-	-	-	-	-	-	-	2	2	2	2	
CO2	3	3	1	3	-	-	-	-	-	-	1	3	2	2	3	
CO3	3	2	1	3	-	_	-	-	-	-	2	3	2	2	3	
CO4	3	3	1	3	-	-	-	-	-	-	1	3	2	2	3	
CO5	3	2	1	2	-	-	-	-	-	-	1	3	2	2	3	
Course Co	ntents	s / Syll	labus													
Module 1			Ori	gin of	OR								1	0 ho	urs	
Origin of	OR a	nd its	defini	tion. (	Conce	pt of o	optimi	zing p	erforn	nance n	neasure	Types	s of C	OR p	roble	ems,
Determinis				-				-			-					ding
mathematic	cal mo	del, de						odel, c	ontrol	ling and	l implei	nenting				
Module 2				ear pr										0 ho		
Linear pro			– Exa	mples	from	indust	rial ca	ses, fo	rmula	tion &	definitio	ons, Ma	atrix f	orm.	. Imp	licit

**Some basic concepts and results of linear algebra** – Vectors, Matrices, Linear Independence/Dependence of vectors, Rank, Basis, System of linear eqns., Hyperplane, Convex set, Convex polyhedron, Extreme points, Basic feasible solutions.

Module 3 Transportation Problem & Assignment Problem: 10 hours

**Transportation Problem:** - Examples, Definitions – decision variables, supply & demand constraints, formulation, Balanced & unbalanced situations, Solution methods – NWCR, minimum cost and VAM, test for optimality (MODI method), degeneracy and its resolution.

**Assignment Problem:** - Examples, Definitions – decision variables, constraints, formulation, Balanced & unbalanced situations, Solution method – Hungarian Method.

#### Module 4 PERT – CPM & Inventory Control 10 hours

**PERT** – **CPM:** Project definition, Project scheduling techniques – Gantt chart, PERT & CPM, Determination of critical paths, Estimation of Project time and its variance in PERT using statistical principles, Concept of project crashing/time-cost trade-off.

**Inventory Control:** Functions of inventory and its disadvantages, Concept of inventory costs, Basics of inventory policy (order, lead time, types), Fixed order-quantity models – EOQ (only Deterministic model)

### Module 5 Simulation Methodology 08 hours

#### **Simulation Methodology:**

Definition and steps of simulation, random number, random number generator, Discrete Event System Simulation – clock, event list, Applications of simulation

Silliulai	11011 – C10CK,	event fist, Applications of simulation		
			<b>Total Lecture Hours</b>	48 hours
Textbo	ok:			
1.		Operations Research: An Introduction.	H.A. TAHA	
2.		Operations Research	S. KALAYATHY	
Referen	nce Books:			
1. 2. 3. 4.		K.G. Murthy, Linear Programming. G. Hadley, Linear Programming. Introduction to Operations Research. Operations Research and Management Science	KG. Murthy G. Hadley F.S. Hiller and G A. Ravi Ravindran	
NPTEL	/ Youtube/	Faculty Video Link:		
1.	https://v	www.youtube.com/watch?v=WrAf6zdteXI		
2.	https://v	www.youtube.com/watch?v=JxnPBrNccqY		
3.	https://v	www.youtube.com/watch?v=J1WwNKDdDC0		
4.	https://v	www.youtube.com/watch?v=v2FT9PoFJ9Y		
5.	https://v	www.youtube.com/watch?v=9qnLpjpnsuQ		



#### **GREATER NOIDA-201306**

(An Autonomous Institute) School of Computer Science in Emerging Technologies

Course Code: BCSBS0408 Course Name: Design Thinking	L	T	P	$\mathbf{C}$
Course Offered in: B. Tech. CSBS	2	0	0	2

**Pre-requisite:** None

**Course Objectives:** The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.

Course Outco	me: After completion of the course, the student will be able to	Bloom's Knowledge Level (KL)
CO1	Identify a strong understanding of the design process and apply it in a variety of business settings	K3
CO2	Understand the user, empathize and implement it to real life scenario	К3
CO3	Formulate specific problem statements of real time issues and generate innovative ideas using design tools	K5
CO4	Apply critical thinking skills to arrive at the root cause from a set of likely causes	К3
CO5	Demonstrate an enhanced ability to apply design thinking skills for evaluation of claims and arguments	K3

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2		PO4	PO5	PO6	PO7		PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1	2	2	1	1	2	1	2	2	2	2	2	2	3
CO2	1	2	1	1	1	1	2	2	2	1	2	2	2	2
CO3	1	2	1	2	2	2	1	2	2	1	2	2	3	3
CO4	1	2	1	1	1	1	1	1	1	1	2	2	2	2
CO5	1	2	1	1	1	1	1	1	1	1	2	2	3	2

**Course Contents / Syllabus** 

Module 1 Introduction 8 hours

Introduction to design thinking, traditional problem solving versus design thinking, history of design thinking, wicked problems. Innovation and creativity, the role of innovation and creativity in organizations, design mindset, Examples of good, bad and Great Design, Introduction to elements and principles of design, 13 Musical Notes for Design Mindset, Design Approaches across the world

Case Studies: Mumbai Dabbawallas, Gillette, Singapore, Bengaluru, Bahubali, Google, Embrace Incubator **Activity:** Observation, Wicked Problem

### Module 2 Empathy 8 hours

Understanding stakeholders, techniques to empathize with, identify key user problems. Empathy tools-Interviews, empathy maps, persona, immersion and observations, customer journey maps, Classifying insights after Observations, Classifying Stakeholders.

Case Studies: Pure-it, Royal Enfield, Big Basket, Air-bnb.

Activity: Moccasin Walk, Persona, Empathy map, Journey Map

Module 3	Define & Ideation	6 hours
Midual S	Define & Ideation	Unduis

Defining the problem statement, Finding Root cause of the problem: 5 Why's, 4W's, Point of View (POV) statements, How might We and Defining the problem using Ice-Cream Sticks, Market Research and it's types

Idea Generation-basic design directions, Themes of Thinking, brainstorming, Do's & Don'ts for Brainstorming, Increase the association, random association technique, Metaphor, ideation activity games – Mindmap, Six Thinking Hats, Million Dollar idea

Case Studies: The Good Kitchen, Flipkart, Uber, Redbus

Activity: 5 Why, HMW, Brainstorming, Six Thinking Hats

#### Module 4 **Prototyping & Testing**

8 hours

Prototyping (Convergence): Prototyping mindset, tools for prototyping – Sketching, paper models, pseudocodes, physical mockups, Interaction flows, storyboards, acting/role-playingetc, importance of garnering user feedback for revisiting Brainstormed ideas, Idea Selection: Refine and narrow down to the best idea, 10-100-1000gm, QBL, Design Tools for Convergence – SWOT Analysis for 1000gm discussion, Minimum Viable Prototype.

Storytelling: elements of storytelling, mapping persona with storytelling, elevator pitch Napkin Pitch, and inspirations and references some examples of Successful campaign

A/B Testing, Decision Making Tools and Approaches – Vroom Yetton Matrix, Shift-Left, Up, Right, Value Proposition, Testing of design with people, conducting usability test, testing as hypothesis, testing as empathy, observation and shadowing methods, Guerrilla Interviews, validation workshops, user feedback, record results, enhance, retest, and refine design, Software validation tools, design parameters, alpha & beta testing, Taguchi, defect classification, random sampling. Agile Methodology. Satori

Case Studies: Big Bazaar

**Activity:** 30 Circles, paper prototype, roleplay, Ad-Mad Show

Textb	ook:		
S.No		Book Title with publication agency &	Author
		year	
1.	UnMukt : Science &	Art of Design Thinking	Arun Jain
2.	Solving Problems wi	th Design Thinking – Ten Stories of What V	Vorks Jeanne Liedta
	Reference Books:		
S.No		Book Title with publication agency &	Author
		year	
1	Vijav Kumar 101 De	esign Methods: A Structured Approach for	or Driving Innovation in Your

- Vijay Kumar, 101 Design Methods: A Structured Approach for Driving Innovation in Your Organization, 2013, John Wiley and Sons Inc, New Jersey
- 2. BP Banerjee, Foundations of Ethics and Management, 2005, Excel Books
- Gavin Ambrose and Paul Harris, Basics Design 08: Design Thinking, 2010, AVA Publishing SA 3.
- Roger L. Martin, Design of Business: Why Design Thinking is the Next Competitive Advantage, 4. 2009, Harvard Business Press, Boston MA

#### NPTEL/ Youtube/ Faculty Video Link: https://youtu.be/rUUuhnLkJ2s?si=\_XCHnDbt\_U1z0Frx 1 https://www.youtube.com/watch?v=ldYzbV0NDp8 https://www.youtube.com/watch?v=0Fi83BHQsMA 2 https://www.youtube.com/watch?v=q654-kmF3Pc https://swayam.gov.in/nd1\_noc19\_mg60/preview 3 https://www.udemy.com/course/design-thinking-for-beginners/ https://www.interaction-design.org/literature/article/personas-why-and-how-you-shoulduse-them 4 https://www.d-thinking.com/2021/07/01/how-to-use-storytelling-in-design-thinking/ https://www.youtube.com/watch?v=GsF4reOqsGE



#### **GREATER NOIDA-201306**

(An Autonomous Institute) School of Computer Science in Emerging Technologies

LAB Cours BCSBS045		e:	LA	B Co	urse N	ame:	Opera	ting S	ystem	s Lab	(Unix)	L	TP	C
Course Off		n: B.T	ech.									0	0 2	1
Pre-requisi	te: Pro	ficien	cy in C	prog	rammi	ng, Fa	miliar	ity wit	h conti	rol struc	ctures, l	oops, an	d function	ons,
Knowledge	of data	a struc	tures (	queues	s, linke	d lists	, array	s) for	algorit	hm imp	olement	ation		
Course Ob	-			_		•								
mechanisms		Hands-	on and	d prac	tical ex	xperie	nce wi	th usa	ge of	the Lin	ux OS	and bas	ics of O	S Shell
Programmii		A fton	20000	lation	of the	201140	, tha a	tudant	vv.211	Dlas	ma'a Va	ovulada.	L aval (	VI)
<b>Course Ou</b> be able to	tcome	Aner	comp	letion	or the	course	e, the s	tuaent	WIII	B100	m s Kn	owieage	e Level (	KL)
be able to			Impl	mont	hosio	CDI	Look	adulin	a and					
CO1			Implement basic CPU scheduling and memory management algorithms.									K3		
			Develop and apply algorithms for process											
CO2													6	
			memory/page management.  Demonstrate understanding and application											
CO2							_					17.0		
CO3				file	systen ng, and	,	Unix/I		shell			K3		
CO-PO Ma	nning	(Scale			_				.5.					
СО-РО														
Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	2	3	_	_	1	2	2	2	3	3	2
CO2	3	3	3	2	3	1	1	2	2	2	2	3	3	3
CO3	3	3	2	2	3	1	1	2	2	2	3	2	3	3
List Of Pra	ctical'	s (Ind	icativ	e & No	ot Lim	ited T	(o)	•				•	•	•
Sr. No.	Prog	gram												
1.	Impl	ement	FCFS	CPU	Sched	uling a	algoritl	ım.						
2.	Impl	ement	the gi	ven Cl	PU Scl	nedulii	ng algo	orithm	a) SJF	b) Prio	ority Ba	sed		
3.	_		PRIO	RITY	CPU S	Schedu	ıling A	Algorit	hm (Fo	or both	Pre-em	ptive and	d nonpre	-
		tive).	D	1 D -1-	CDI	I C -1	11!	A 1						
4.     5.		ement								aphores				
6.		cute an							ig sem	apnores	· ·			
7.									idance					
8.									on sch					
9.											<u> </u>			
						-								
10.		lement Contiguous memory variable size partition scheme ulate the First-Fit contiguous memory allocation technique.												

Simulate the Best-Fit contiguous memory allocation technique.

Simulate the Worst-Fit contiguous memory allocation technique

11. 12.

	<del>_</del>
13.	Implement the Non Continuous Memory Allocation by using Paging.
14.	Write a Program to simulate the FIFO page replacement algorithm
15	Write a Program to simulate the LRU page replacement Algorithm
16	Write a Program to simulate the Optimal page replacement Algorithm.
17	Write a Program to simulate the FCFS Disk Scheduling Algorithm.
18	Write a Program to simulate the SSTF Disk Scheduling Algorithm.
19	Implement SCAN and C-SCAN Disk Scheduling Algorithms.
20	Implement LOOK and C-LOOK Disk Scheduling Algorithms.
21	Design an algorithm and implement to organize the file using the single-level directory
22	Write a program to organize the file using two-level directories.
23	Write a C program to Sequential files for processing the student information
24	Write a C program for random access files for processing the employee details
25	Execute Various types of Linux Commands (Miscellaneous, File oriented, Directory oriented)
26	Execute a shell program, which accepts the name of a file from standard input and performs the File Readable test on it.
27	Design and execute the code to accept the name of a file from standard input and performs the File Writable test on it
28	Implement a shell program, which accepts the name of a file from standard input and performs the File executable test on it.
29	Implement Linux Networking Commands: ipconfig, traceroute, tracepath, ping, host, hostname, iwconfig.
30	Implement the following system admin commands in Linux: man, uptime, users, service, pkill, ps
31	Implement the following in Unix: a) Process creation, b) Sleep Command c) Sleep command using getpid.
32	Analyse system calls of unix operating system (fork and exit)
33	Implement Unix commands for a) Signal handling using kil, b) Wait command, c)top
34	Write a program to simulate UNIX commands like cp, ls, and grep
35	Implement Unix Shell programming for concatenation of two strings
36	Implement Unix Shell programming for a) Comparison of two strings b) Maximum of three numbers.
37	Implement Unix Shell programming for Fibonacci series
38	Write a program in Unix to whether the given year is a) a leap year or not b) Arithmetic
20	operation using cases.
39	Write a program in Unix for factorial of a number.
40	Write a program in Unix to swap the two integers
41 <sub>1</sub>	Write a program in Unix to whether the given number is prime or not.

Total Hours: 48 hrs.



#### **GREATER NOIDA-201306**

(An Autonomous Institute) School of Computer Science in Emerging Technologies

LAF	Cou	rse Co	de: B	CSBS	0454			Dat			ame: gement		L	T	P	С
Cou	rse O	ffered	in: B	. Tech	(CSB	<b>S</b> )	•						0	0	2	1
Pre- structi	-	site: T	he stu	ident s	hould	have b	oasic k	nowle	dge of	discret	e mathe	ematics	anc	d data		
manag	gemen	t syste	ems (D		and a	pply t	hem to	desig	n and		al conc nent dat					
Cou	rse O	utcom	e: Aft	ter con	npletic	n of tl	ne cou	rse, th	e stude	ent will	be able		Kn	oom's owled vel (K	_	
CO1				Draw and implement the ER and EER model to solve real-world problems. Transform an information model into a relational database schema and utilize data effectively.										К3		
CO2	2			Formulate and evaluate queries using SQL to solve a broad range of query and data update problems.										K5		
CO3				Apply and create PL/SQL blocks, procedures, functions, packages, triggers, and cursors. Analyze entity integrity, referential integrity, key constraints, and domain constraints on a database.										K4		
CO-PO Ma	pping	g (Scal	le 1: I	Low, 2	: Med	ium, 3	3: Hig	h)								
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	P	SO2	PS	SO3
CO1	3	3	3	2	3	1	1	2	2	2	3	3	3		2	
	3	3	2	2	3	1	1	1	2	2	3	3	3		2	

#### **List Of Practical's (Indicative & Not Limited To)**

3

2

**CO3** 

Sr. No.	Program	
1.	Creating Entity-Relationship Diagram using case tools with Identifying (entities, attributes, keys and relationships between entities, cardinalities, generalization, specialization etc.)	
2.	I. Implement DDL commands – Create, Alter, Drop etc. II. Implement DML commands-Insert, Select, Update, Delete	
3.	I. Implement DCL Commands-Grant and Revoke	
4.	II. Implement TCL commands- Rollback, Commit, Save point	
5.	Practice Queries using COUNT, SUM, AVG, MAX, MIN, GROUP BY, HAVING, VIEWS Creation and Dropping.	

3

3

3

3

3

3

6.	Practicing Queries using ANY, ALL, IN, EXISTS, NOT EXISTS, UNION, INTERSECT,	
	CONSTRAINTS etc.	
7.	Practicing Sub queries (Nested, Correlated) and Joins (Inner, Outer and Equi).	
8.	Practicing on Triggers - creation of trigger, Insertion using trigger, Deletion using trigger, Updating using trigger	
9.	Procedures- Creation of Stored Procedures, Execution of Procedure, and Modification of Procedure.	
10.	Cursors- Declaring Cursor, Opening Cursor, Fetching the data, closing the cursor.	
11.	Study of Open Source NOSQL Database: MongoDB (Installation, Basic CRUD operations, Execution) Design and Develop MongoDB Queries using CRUD operations. (Use CRUD operations, SAVE method, logical operators)	

Total Hours: 20 hrs.



#### **GREATER NOIDA-201306**

(An Autonomous Institute) **School of Computer Science in Emerging Technologies** 

<b>LAB Course Code:</b>	LAB Course Name: Software Design with UML	L	T	P	C				
BCSBS0452	Lab								
Course Offered in: B.	0	0	2	1					
Pre-requisite: Software Engineering concents									

quisite: Software Engineering concepts

Course Objectives: Students are able to learn and apply UML modeling techniques for software design, including conceptual modeling, structural and behavioral diagrams, and system documentation, in the context of software development projects.

Course Outcome: Aft	er completion of the course, the student will be able to	Bloom's
		Knowledge
		Level (KL)
CO1	Identify and Understand ambiguities, inconsistencies, and incompleteness in a requirements specification, and articulate functional and non-functional requirements.	K2
CO2	Identify classes and their associations, and draw class diagrams. Graphically represent various UML diagrams, including associations, and depict the logical sequence of activities in a system.	K3
CO3	Apply and Analyze UML modeling techniques to design and develop software systems. Emphasize conceptual modeling, structural and behavioral diagrams, and system documentation.	K4

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	2	3	2	2	-	-	-	-	2	-	2	3	2	2
CO2	2	2	3	-	3	-	-	-	2	-	2	2	3	2
CO3	3	2	3	2	3	-	-	-	3	1	3	3	3	3
CO4	-	-	-	-	-		-	-	-	-	•	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-

#### **List Of Practical's**

- 1. Use Case Diagram.
- 2. Use Case Diagram for ATM.
- 3. Use Case Diagram for Stock Maintenance System
- 4. Use Case Diagram for Remote Procedure Call
- 5. Class Diagram
- 6. Class Diagram for ATM
- 7. Class Diagram for Stock Maintenance System
- 8. Object Diagram
- 9. Object Diagram for ATM
- 10. Object Diagram for Stock Maintenance System
- 11. Sequence Diagram

12. Sequence Diagram for ATM 13. Sequence Diagram for Stock Maintenance System 14. Collaboration Diagram 15. Collaboration Diagram for ATM 16. Collaboration Diagram for Stock Maintenance System 17. Collaboration Diagram for Remote Procedure Call 18. State Chart Diagram 19. State Chart Diagram for ATM 20. State Chart Diagram for Stock Maintenance System 21. Activity Diagram 22. Activity Diagram for ATM 23. Activity Diagram for Stock Maintenance System 24. Component Diagram 25. Component Diagram for ATM 26. Component Diagram for Stock Maintenance System 27. Deployment Diagram 28. Deployment Diagram for ATM

**Total Hours: 20 hrs** 

29. Deployment Diagram for Stock Maintenance System



#### **GREATER NOIDA-201306**

(An Autonomous Institute) School of Computer Science in Emerging Technologies

<b>LAB Course Code:</b>	LAB Course Name: Operations	L	T	P	Credit
BCSBS0451	Research Lab				
Course Offered in: I	B. Tech (CSBS)	0	0	2	1

**Pre-requisite:** Knowledge of Mathematics Fundamentals

**Course Objectives:** To develop and understand the modern computational statistical approaches and their applications to different datasets.

Cours	<b>se Outcome:</b> After completion of the course, the student will be able to	Bloom's
		Knowledge
		Level (KL)
CO1	Apply the characteristics of different types of decision-making environments and the appropriate decision-making approaches and tools to be used in each type.	К3
CO2	To find optimal solution of linear programming problem by applying graphical method and simplex method.	К3
CO3	To Solve Transportation problems and Assignment problems.	K3

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

	0 0 1 0 1120pping (0 0000 10 20 11) 11200000000, 0 0 213gm)													
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	1	2	-	-	-	-	-	-	-	2	2	2
CO2	3	3	1	3	-	-	-	-	-	-	-	2	2	3
CO3	3	2	1	3	-	-	-	-	-	1	-	3	1	1

#### **List Of Practical's (Indicative & Not Limited To)**

- 1. Solution of linear programming problem using graphical method with:
- 2. Enumeration of all basic solutions for linear programming problem.
- 3. Solution of linear programming problem with simplex method.
- 4. To solve LPP by using two phase method.
- 5. To solve LPP by using Big M method.
- 6. Solution on primal problem as well as dual problem
- 7. Solution based on dual simplex method.
- 8. Solution of transportation problem by using NWCR.
- 9. Solution of transportation problem by using VAM.
- 10. Solution of assignment problem.

Total Hours: 48 hrs.



#### **GREATER NOIDA-201306**

(An Autonomous Institute) School of Computer Science in Emerging Technologies

LAB Course Code: BCSBS458	LAB Course Name: Design Thinking Lab	L	T	P	С
Course Offered in: B. Tech CSBS		0	0	2	1

#### **Pre-requisite:** none

#### **Course Objectives:**

The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.

Cours	e Outcome: After completion of the course, the student will be able to	Bloom's				
		Knowledge				
		Level (KL)				
CO1	Identyfy a strong understanding of the design process and apply it in a variety of					
COI	business settings					
CO2	Understand the user, empathize and implement it to real life scenario	K3				
CO3	Formulate specific problem statements of real time issues and generate	K5				
003	innovative ideas using design tools					

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1	2	2	1	1	2	1	2	2	2	2	2	2	3
CO2	1	2	1	1	1	1	2	2	2	1	2	2	3	2
CO3	1	2	1	2	2	2	1	2	2	1	2	2	2	3

#### **List Of Practical's (Indicative & Not Limited To)**

1. Moccasin Walk activity for 1 hour to allow learners experience stepping into the shoes of another person. This is an individual activity. Sharing observations with the group. Suggest that students try this even in their free time away from studies. (Imagine designing a solution for people who struggle with grocery shopping. A Moccasin Walk might involve accompanying a user on their regular grocery trip, observing their navigation through the store, noting what products they choose, and how they interact with the checkout process. This firsthand experience can reveal challenges and opportunities that might not be apparent from a distance.)

#### 2. Immersion activity: Immersion activity

Participants will be divided into four groups. Each group will need to visit any one of the following places to conduct an immersion activity. They need to interview people and fill up the DT question template (explained in the last class)

Accounts Office, Admission / Placement Department, College cafeteria, College library, College sports facility, Transport facility near college

#### 3. Defining problem statements:

Group activity, in which each group will define the key problem statements (max three) for their lead personas.

Each group will present while the remaining groups will do a peer review.

Finally, lecturer will moderate/validate the problem statements (based on handouts provided by DT Team)

- 4. **Ideation games Game** 1: Six Thinking Hats, Game 2: Million-dollar idea
- **5. Ideate to find solutions**: Participants will work in their assigned groups to ideate solutions for the problem statements they identified (as continuation of immersion activity) applying ideation methods discussed in the previous session. They will get scores based on how well they can apply the ideation methods.
- **6. Prototype your idea:** This is a group activity in which the participants will work in groups (created at the beginning of the course, in which they did immersion, persona creation, defining problem statement and ideating) to create prototypes based on the solutions they had identified.
- **7. Test the Prototype:** Each group needs to test their prototype created earlier and:
  - 1. Document user feedback
  - 2. Write down their inference from the feedback
  - 3. Give test cases

#### 8,9,10: Project

**Option 1:** Each group needs to present a Prototype of how they can apply DT in their functional work or coding. Examples will be provided to explain what exactly they need to do.

**Option 2:** Each group will apply DT to create a prototype to improve any existing product or service. For both options, groups need to complete all phases of the Stanford DT model and include the outputs of each phase in their presentation.

Lecturers will evaluate the project based on the rubric provided by the DT Team.

Total Hours: 20 hrs.



#### **GREATER NOIDA-201306**

(An Autonomous Institute) School of Computer Science in Emerging Technologies

<b>Course Code:</b>	Course Name: Essence of Indian Traditional	L	T	P	Credits
BNC0404	Knowledge				
Course Offered i	n: B. Tech. (CSBS)	2	0	0	2

**Pre-requisite:** Students must have a basic understanding of human resource management.

Course Objectives: This introductory course on Human Resource Management will familiarize the students with the basic concepts, roles, functional areas, and activities of HR and help students understand the organization's employees, their interest, motivation, and satisfaction, and their belief in fair treatment- all of which impact the firm's current performance and sustainability in the long run.

	<b>Course Outcome:</b> After completion of the course, the student will be able to	Bloom's
	·	Knowledge Level
		(KL)
CO1	Understanding in-depth knowledge about human resource management.	K2
CO2	Apply the strategies on HR to gain a competitive advantage over its competitors.	К3
CO3	Understand the various effective sources and techniques for recruitment and selection of employees.	K2
CO4	Analyze and forecast the need for Human Resource Planning	K4
CO5	Understand the dimensions of Strategic HRM.	K2

#### CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	-	2	2	3	-	2	-	1		2	2	-
CO2	2	3	1	1	2	3	-	2	1	1	1	2	2	2
CO3	3	2	3	2	3	2	1	2	1	2	2	3	2	2
CO4	2	3	-	3	3	1	-	2	1	1	1	2	2	3
CO5	2	2	2	2	3	1	-	2	2	2	1	3	2	3

#### **Course Contents / Syllabus**

Module 1	Society State and Polity in India	7 hours
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Evolutionary Theory, Force Theory, Mystical Theory Contract Theory, Stages of State Formation in Ancient India, Kingship, Council of Ministers Administration Political Ideals in Ancient India Conditions' of the Welfare of Societies. The Seven Limbs of the State, Society in Ancient India, Purusārtha, Varnāshrama System, Āshrama or the Stages of Life, Marriage, Understanding Gender as a social category, The representation of Women in Historical traditions, Challenges faced by Women. Four-class Classification, Slavery.

Module 2	India	n Literatu	ıre, Cultu	re, Tra	dition, a	and Pra	actices		7 ho	urs
Evolution of script a	nd languages ir	n India: Ha	rappan Scr	ipt and	Brahmi :	Script. <sup>-</sup>	The Vedas	, the	Upanishad	ds, the
Ramavana and the I	Mahabharata, P	uranas. Bu	ddhist And	Jain Li	terature	in Pali.	Prakrit A	nd Sa	nskrit. Kaı	utilva's

Arthashastra. Famous Sanskrit Authors, Telugu Literature, Kannada Literature, Malayalam Literature, Sangama Literature Northern Indian Languages & Literature, Persian And Urdu ,Hindi Literature.

Module 3	Indian Religion, Philosophy, and Practices	8 hours

Pre-Vedic and Vedic Religion, Buddhism, Jainism, Six System Indian Philosophy, Shankaracharya, Various Philosophical Doctrines, Other Heterodox Sects. Bhakti Movement, Sufi movement, Socio religious reform movement of 19th century, Modern religious practices.

	5	
Module 4	Science, Management, Indian Knowledge System, Cultural	8 hours
	Heritage and Performing Arts	

Astronomy in India, Chemistry in India, Mathematics in India, Physics in India, Agriculture in India, Medicine in India, Metallurgy in India, Geography, Biology Harappan Technologies, Water Management in India, Textile Technology in India, Writing Technology in India Pyrotechnics in India Trade in Ancient India/India's Dominance up to Precolonial Times. Indian Architect, Engineering and Architecture in Ancient India, Sculptures, Seals, coins, Pottery, Puppetry, Dance, Music, Theatre, drama, Painting, Martial Arts Traditions, Fairs and Festivals, Current developments in Arts and Cultural, Indian's Cultural Contribution to the World. Indian Cinema.

	Total Lecture Hours	30 hours
Text	book:	
1.	Gary Dessler& Biju Varkkey, Human Resource Management, Pearson	
2.	Edwin B. Flippo, Personnel Management, Tata McGraw HillSharma, R	•
Refe	rence Books:	
1.	V.S.P. Rao, Human Resource Management, Excel, India	
2.	RS Dwivedi, HRD in Indian Companies, Mc Millan	
	C.B. Memoria, Personnel Management, Himalaya	

NPTEL/ Youtube/ Faculty Video Link:				
1.	https://youtu.be/yXiSNNfyBeE?si=tmTwT3Dwvz5vfG_V			
2.	https://youtu.be/VVpq6mO_WGk?si=VIx6AC0uwnASQKb6			
3.	https://youtu.be/ YzG4FRn7GA?si=i2Z055SXQaa CRex			
4.	https://www.youtube.com/live/gRHgFC5iwWA?si=InVg2T8f1ObuO4Un			