


KIT- Kalaigharkaranidhi Institute of Technology

(An Autonomous Institution)

Coimbatore – 641402.

B.Tech – Computer Science and Business Systems
UG – CSBS
Conceptual Framework

(For Students admitted from the Academic Year 2021-22 and onwards)

Semester	Level of Course	Hours/Week	No of Courses	Range of Credits/Courses	Total Credits	
PART I						
A - Foundation Courses						
I to VI	Humanities and Social Sciences (HS)	3-4	4	2-3	10	
I to IV	Basic Sciences (BS)	3-4	7	2-4	24	
I to II	Engineering Sciences (ES)	3-6	7	2-4	19	
B - Professional Core Courses						
II to VII	Professional Core (PC)	2-4	26	1-3	70	
C - Elective Courses						
V to VIII	Professional Elective (PE)	3	6	3	18	
V to VIII	Open Elective (OE)	3	4	3	12	
D – Project Work						
V, VII & VIII	Project Work (PW)	4-16	3	2-8	12	
E - Mandatory Courses Prescribed by AICTE/UGC (Not to be Included for CGPA)						
II, III & IV	Mandatory Course (MC)	3	3	NC	NC	
Total Credit					165	
PART II - Career Enhancement Courses (CEC)						
II	Soft Skills-I	2	1	1	1	
	Soft Skills-II	2	1	1	1	
III	Professional Certificate Course-I	2	1	1	1	
III	Online Certificate Courses (like NPTEL, Course era, Udemy, etc)	-	-	-	NC	
IV	Career Ability Course-I	2	1	1	NC	
IV	In-plant Training	-	-	-	NC	
	Career Ability Course-II	2	1	1	NC	
V	Professional Certificate Course-II	2	1	1	1	
	Summer Internship	-	1	1	1	
VI	Online Certificate Courses (like NPTEL, Course era, Udemy, etc)	-	-	-	NC	
VI	Career Ability Course-III	2	1	1	NC	
Total Credit					05	
Total Credit to be Earned					170	
PART III (Additional Credit Course- Not to be Included for CGPA)						
Semester	Course Code	Level of Course	Hours/Week	No of Courses	Range of Credits/Courses	Total Credits
III	B19CBA301	Handson Training	20-30	1	-	1
IV	B19CBA401	Handson Training	20-30	1	-	1
V	B19CBA501	Emerging Technology - Certificate Course – I	40-60	1	-	1
VI	B19CBA601	Emerging Technology - Certificate Course – II	40-60	1	-	1
VII	B19CBA701	Emerging Technology - Certificate Course – III	30-40	1	-	1

Programme Coordinator

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Scheme of Instructions and Examinations

(For Students admitted from the Academic Year 2021-22 and onwards)

Semester I												
Course Code	Course Name	Category	Instructional Hours				Assessment				Credit	
			Contact Periods	T	P	TU	Hours of Exam. (ESE)	CIA	ESE	Total		
Induction Programme												
B19ENT102	Business Communication & Value Science – I	HS	3	2	0	1	3	40	60	100	3	
B19MAT101	Matrices and Differential Calculus	BS	4	3	0	1	3	40	60	100	4	
B19PHT101	Engineering Physics	BS	3	3	0	0	3	40	60	100	3	
B19ADT101	Computer Programming in C	ES	3	3	0	0	3	40	60	100	3	
B19MET101	Engineering Graphics	ES	6	2	4	0	3	40	60	100	4	
B19PHP101	Physics Laboratory	BS	4	0	4	0	3	40	60	100	2	
B19ADP101	Computer Programming in C Laboratory	ES	4	0	4	0	3	40	60	100	2	
B19MCP101	Life Skills	MC	2	0	2	0	-	100	-	100	NC	
Total Contact Hours/Week			29	13	14	2	Total Credits				21	

Semester II												
Course Code	Course Name	Category	Instructional Hours				Assessment				Credit	
			Contact Periods	T	P	TU	Hours of Exam. (ESE)	CIA	ESE	Total		
B19ENT202	Business Communication & Value Science – II	HS	3	2	0	1	3	40	60	100	3	
B19MAT201	Integral Calculus and Complex Analysis	BS	4	3	0	1	3	40	60	100	4	
B19ADT201	Python Programming	ES	3	3	0	0	3	40	60	100	3	
B19CBT201	Programming for Data Structures	PC	3	3	0	0	3	40	60	100	3	
B19EET202	Basic Electrical, Electronics and Instrumentation Engineering	ES	3	3	0	0	3	40	60	100	3	
B19MEP201	Basic Workshop Practice Laboratory	ES	4	0	4	0	3	40	60	100	2	
B19ADP201	Python Programming Laboratory	ES	4	0	4	0	3	40	60	100	2	
B19CBP201	Programming for Data Structures Laboratory	PC	4	0	4	0	3	40	60	100	2	
B19CEP201	Soft Skills-I	CEC	2	0	2	0	-	100	-	100	1	
Total Contact Hours/Week			30	14	14	2	Total Credits				23	



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Semester III											
Course Code	Course Name	Category	Instructional Hours				Assessment				Credit
			Contact Periods	T	P	TU	Hours of Exam. (ESE)	CIA	ESE	Total	
B19MAT301	Discrete Mathematics	BS	4	3	0	1	3	40	60	100	4
B19CBT301	Fundamentals of Management	PC	3	3	0	0	3	40	60	100	3
B19CST402	Database Management Systems	PC	3	3	0	0	3	40	60	100	3
B19CBT302	Object Oriented Programming with C++	PC	3	3	0	0	3	40	60	100	3
B19CST303	Operating Systems	PC	3	3	0	0	3	40	60	100	3
B19MCT301	Environmental Sciences	MC	3	3	0	0	3	-	-	-	NC
B19CSP401	Database Management Systems Laboratory	PC	2	0	2	0	3	40	60	100	1
B19CBP301	Object Oriented Programming with C++ Laboratory	PC	2	0	2	0	3	40	60	100	1
B19CEP301	Soft Skills-II	CEC	2	0	2	0	-	100	-	100	1
B19CEP302	Professional Certificate Course-I	CEC	2	0	2	0	-	100	-	100	1
B19CEP303	Online Certificate Course	CEC	-	-	-	-	-	-	-	-	NC
Total Contact Hours/Week			27	18	8	1	Total Credits				20
In-plant Training: Minimum ONE week duration has to be completed (Review will be conducted in first week of Sem IV and its credit will be included in Sem IV)											

Semester IV											
Course Code	Course Name	Category	Instructional Hours				Assessment				Credit
			Contact Periods	T	P	TU	Hours of Exam. (ESE)	CIA	ESE	Total	
B19MAT305	Linear Algebra	BS	3	3	0	0	3	40	60	100	3
B19CBT401	Agile Software Engineering	PC	3	3	0	0	3	40	60	100	3
B19CBT402	Fundamentals of Economics	PC	3	3	0	0	3	40	60	100	3
B19CBT403	Introduction to Innovation, IP Management and Entrepreneurship	PC	3	3	0	0	3	40	60	100	3
B19CBT404	Web Application Development	PC	3	3	0	0	3	40	60	100	3
B19CBT405	Advanced Data Structures and Algorithms	PC	3	3	0	0	3	40	60	100	3
B19MCT302	Indian Constitution	MC	3	3	0	0	3	-	-	-	NC
B19CBP401	Web Application Development Laboratory	PC	4	0	4	0	3	40	60	100	2
B19ENP401	Business Communication & Value Science – III	HS	4	0	4	0	3	40	60	100	2
B19CEP401	Career Ability Course-I	CEC	2	0	2	0	-	100	-	100	NC
B19CEP402	In-plant Training	CEC	-	-	-	-	-	-	-	-	NC
Total Contact Hours/Week			31	21	10	0	Total Credits				22
Summer Internship-Duration 15days (Review will be conducted in first week of Sem V and Its credit will be included in Sem V) Online Certificate Course (like NPTEL, Course era, Udemy (etc))has to be completed within second year(NC)											



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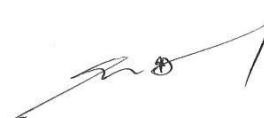
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Semester V											
Course Code	Course Name	Category	Instructional Hours				Assessment				Credit
			Contact Periods	T	P	TU	Hours of Exam. (ESE)	CIA	ESE	Total	
B19MAT502	Business Statistics	BS	4	3	0	1	3	40	60	100	4
B19CBT501	Business Strategy with DSS	PC	3	3	0	0	3	40	60	100	3
B19CBT502	Design Thinking	PC	4	3	0	1	3	40	60	100	4
B19ADT401	Fundamentals of Artificial Intelligence	PC	3	3	0	0	3	40	60	100	3
	Professional Elective- I	PE	3	3	0	0	3	40	60	100	3
	Open Elective-I	OE	3	3	0	0	3	40	60	100	3
B19ADP401	Artificial Intelligence Laboratory	PC	4	0	4	0	3	40	60	100	2
B19CBP502	Mini Project	PW	4	0	4	0	3	100	-	100	2
B19CEP501	Career Ability Course-II	CEC	2	0	2	0	-	100	-	100	NC
B19CEP502	Professional Certificate Course-II	CEC	2	0	2	0	-	100	-	100	1
B19CEP503	Summer Internship	CEC	-	-	-	-	-	-	-	-	1
Total Contact Hours/Week			32	18	12	2	Total Credits				26

Semester VI											
Course Code	Course Name	Category	Instructional Hours				Assessment				Credit
			Contact Periods	T	P	TU	Hours of Exam. (ESE)	CIA	ESE	Total	
B19CBT601	Operations Research	PC	4	3	0	1	3	40	60	100	4
B19CBT602	Software Test Automation	PC	3	3	0	0	3	40	60	100	3
B19CBT603	Financial and Cost Accounting	PC	3	3	0	0	3	40	60	100	3
	Professional Elective-II	PE	3	3	0	0	3	40	60	100	3
	Professional Elective-III	PE	3	3	0	0	3	40	60	100	3
	Open Elective-II	OE	3	3	0	0	3	40	60	100	3
B19CBP601	Software Test Automation Laboratory	PC	4	0	4	0	3	40	60	100	2
B19ENP601	Business Communication & Value Science – IV	HS	4	0	4	0	3	40	60	100	2
B19CEP601	Career Ability Course– III	CEC	2	0	2	0	-	100	-	100	NC
B19CEP603	Online Certificate Course	CEC	-	-	-	-	-	-	-	-	NC
Total Contact Hours/Week			29	18	10	1	Total Credits				23
Online Certificate Course (like NPTEL, Course era, Udemy (etc) has to be completed within third year(NC)											



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Semester VII											
Course Code	Course Name	Category	Instructional Hours				Assessment				Credit
			Contact Periods	T	P	TU	Hours of Exam. (ESE)	CIA	ESE	Total	
B19CBT701	IT Project Management	PC	3	3	0	0	3	40	60	100	3
B19CBT702	DevOps -Cloud Computing	PC	3	3	0	0	3	40	60	100	3
	Professional Elective-IV	PE	3	3	0	0	3	40	60	100	3
	Professional Elective-V	PE	3	3	0	0	3	40	60	100	3
	Open Elective-III	OE	3	3	0	0	3	40	60	100	3
B19CBP701	IT Project Management Laboratory	PC	4	0	4	0	3	40	60	100	2
B19CBP702	DevOps -Cloud Computing Laboratory	PC	4	0	4	0	3	40	60	100	2
B19CBP703	Project work Phase-I	PW	4	0	4	0	-	-	-	-	2
Total Contact Hours/Week			27	15	12	0	Total Credits				21

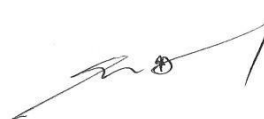
Semester VIII											
Course Code	Course Name	Category	Instructional Hours				Assessment				Credit
			Contact Periods	T	P	TU	Hours of Exam. (ESE)	CIA	ESE	Total	
	Professional Elective-VI	PE	3	3	0	0	3	40	60	100	3
	Open Elective - IV	OE	3	3	0	0	3	40	60	100	3
B19CBP801	Project Work Phase-II	PW	16	0	16	0	3	40	60	100	8
Total Contact Hours/Week			22	6	16	0	Total Credits				14

HUMANITIES AND SOCIALSCIENCES (HS)

Course Code	Course Name	Category	Instructional Hours				Assessment				Credit
			Contact Periods	T	P	TU	Hours of Exam. (ESE)	CIA	ESE	Total	
B19ENT102	Business Communication & Value Science – I	HS	3	2	0	1	3	40	60	100	3
B19ENT202	Business Communication & Value Science – II	HS	3	2	0	1	3	40	60	100	3
B19ENP401	Business Communication & Value Science – III	HS	4	0	4	0	3	40	60	100	2
B19ENP601	Business Communication & Value Science – IV	HS	4	0	4	0	3	40	60	100	2



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BASIC SCIENCES (BS)

Course Code	Course Name	Category	Instructional Hours				Assessment				Credit
			Contact Periods	T	P	TU	Hours of Exam. (ESE)	CIA	ESE	Total	
B19MAT101	Matrices and Differential Calculus	BS	4	3	0	1	3	40	60	100	4
B19PHT101	Engineering Physics	BS	3	3	0	0	3	40	60	100	3
B19PHP101	Physics Laboratory	BS	4	0	4	0	3	40	60	100	2
B19MAT201	Integral Calculus and Complex Analysis	BS	4	3	0	1	3	40	60	100	4
B19MAT301	Discrete Mathematics	BS	4	3	0	1	3	40	60	100	4
B19MAT305	Linear Algebra	BS	3	3	0	0	3	40	60	100	3
B19MAT502	Business Statistics	BS	4	3	0	1	3	40	60	100	4

ENGINEERING SCIENCES (ES)

Course Code	Course Name	Category	Instructional Hours				Assessment				Credit
			Contact Periods	T	P	TU	Hours of Exam. (ESE)	CIA	ESE	Total	
B19ADT101	Computer Programming in C	ES	3	3	0	0	3	40	60	100	3
B19MET101	Engineering Graphics	ES	6	2	4	0	3	40	60	100	4
B19ADP101	Computer Programming in C Laboratory	ES	4	0	4	0	3	40	60	100	2
B19ADT201	Python Programming	ES	3	3	0	0	3	40	60	100	3
B19EET202	Basic Electrical, Electronics and Instrumentation Engineering	ES	3	3	0	0	3	40	60	100	3
B19MEP201	Basic Workshop Practice Laboratory	ES	4	0	4	0	3	40	60	100	2
B19ADP201	Python Programming Laboratory	ES	4	0	4	0	3	40	60	100	2



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PROFESSIONAL CORE (PC)

Course Code	Course Name	Category	Instructional Hours				Assessment				Credit
			Contact Periods	T	P	TU	Hours of Exam. (ESE)	CIA	ESE	Total	
B19CBT201	Programming for Data Structures	PC	3	3	0	0	3	40	60	100	3
B19CBP201	Programming for Data Structures Laboratory	PC	4	0	4	0	3	40	60	100	2
B19CBT301	Fundamentals of Management	PC	3	3	0	0	3	40	60	100	3
B19CST402	Database Management Systems	PC	3	3	0	0	3	40	60	100	3
B19CBT302	Object Oriented Programming with C++	PC	3	3	0	0	3	40	60	100	3
B19CST303	Operating Systems	PC	3	3	0	0	3	40	60	100	3
B19CSP401	Database Management and Systems Laboratory	PC	2	0	2	0	3	40	60	100	1
B19CBP301	Object Oriented Programming with C++ Laboratory	PC	2	0	2	0	3	40	60	100	1
B19CBT401	Agile Software Engineering	PC	3	3	0	0	3	40	60	100	3
B19CBT402	Fundamentals of Economics	PC	3	3	0	0	3	40	60	100	3
B19CBT403	Introduction to Innovation, IP management and Entrepreneurship	PC	3	3	0	0	3	40	60	100	3
B19CBT404	Web Application Development	PC	3	3	0	0	3	40	60	100	3
B19CBT405	Advanced Data Structures and Algorithms	PC	3	3	0	0	3	40	60	100	3
B19CBP401	Web Application Development Laboratory	PC	4	0	4	0	3	40	60	100	2
B19CBT501	Business Strategy with DSS	PC	3	3	0	0	3	40	60	100	3
B19CBT502	Design Thinking	PC	4	3	0	1	3	40	60	100	4
B19ADT401	Fundamentals of Artificial Intelligence	PC	3	3	0	0	3	40	60	100	3
B19ADP401	Artificial Intelligence Laboratory	PC	4	0	4	0	3	40	60	100	2
B19CBT601	Operations Research	PC	4	3	0	1	3	40	60	100	4
B19CBT602	Software Test Automation	PC	3	3	0	0	3	40	60	100	3
B19CBT603	Financial and Cost Accounting	PC	3	3	0	0	3	40	60	100	3
B19CBP601	Software Test Automation Laboratory	PC	4	0	4	0	3	40	60	100	2
B19CBT701	IT Project Management	PC	3	3	0	0	3	40	60	100	3
B19CBT702	DevOps -Cloud Computing	PC	3	3	0	0	3	40	60	100	3
B19CBP701	IT Project Management Laboratory	PC	4	0	4	0	3	40	60	100	2
B19CBP702	DevOps -Cloud Computing Laboratory	PC	4	0	4	0	3	40	60	100	2



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PROFESSIONAL ELECTIVES (PE)

Semester-V

Elective-I

Course Code	Course Name	Category	Instructional Hours				Assessment				Credit
			Contact Periods	T	P	TU	Hours of Exam. (ESE)	CIA	ESE	Total	
B19CBE501	Essentials of Computer Networks	PE	3	3	0	0	3	40	60	100	3
B19CBE502	Blockchain Technologies	PE	3	3	0	0	3	40	60	100	3
B19CBE503	Quantum Computation and Quantum Information	PE	3	3	0	0	3	40	60	100	3
B19CBE504	Conversational Systems	PE	3	3	0	0	3	40	60	100	3
B19CBE505	Behavioral Economics	PE	3	3	0	0	3	40	60	100	3
B19CSE503	Distributed Systems	PE	3	3	0	0	3	40	60	100	3

Semester-VI

Elective-II

Course Code	Course Name	Category	Instructional Hours				Assessment				Credit
			Contact Periods	T	P	TU	Hours of Exam. (ESE)	CIA	ESE	Total	
B19CBE601	Information Security	PE	3	3	0	0	3	40	60	100	3
B19CBE602	Data Mining with Business Intelligence	PE	3	3	0	0	3	40	60	100	3
B19CBE603	Cognitive Science and Analytics	PE	3	3	0	0	3	40	60	100	3
B19CBE604	Computational Finance & Modeling	PE	3	3	0	0	3	40	60	100	3
B19CBE605	Industrial Psychology	PE	3	3	0	0	3	40	60	100	3
B19CSE604	Web Service and Service Oriented Architecture	PE	3	3	0	0	3	40	60	100	3

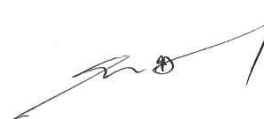
Semester-VI

Electives-III

Course Code	Course Name	Category	Instructional Hours				Assessment				Credit
			Contact Periods	T	P	TU	Hours of Exam. (ESE)	CIA	ESE	Total	
B19CBE605	Organization of Computer Architecture	PE	3	3	0	0	3	40	60	100	3
B19CBE606	People Analytics	PE	3	3	0	0	3	40	60	100	3
B19CBE607	Advance Finance	PE	3	3	0	0	3	40	60	100	3
B19CSE502	TCP/IP Socket Programming	PE	3	3	0	0	3	40	60	100	3
B19CSE610	E-Commerce Technology and Management	PE	3	3	0	0	3	40	60	100	3
B19CSE612	Social Network Analysis	PE	3	3	0	0	3	40	60	100	3



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**Semester-VII
Electives-IV**

Course Code	Course Name	Category	Instructional Hours				Assessment				Credit
			Contact Periods	T	P	TU	Hours of Exam. (ESE)	CIA	ESE	Total	
B19CBE701	Advanced Social Text and Media Analytics	PE	3	3	0	0	3	40	60	100	3
B19CBE702	Introduction to IOT	PE	3	3	0	0	3	40	60	100	3
B19CSE701	Software Quality Assurance	PE	3	3	0	0	3	40	60	100	3
B19CSE702	Multi-core Architectures and Programming	PE	3	3	0	0	3	40	60	100	3
B19CSE704	Soft Computing	PE	3	3	0	0	3	40	60	100	3
B19CSE705	Deep Learning	PE	3	3	0	0	3	40	60	100	3

**Semester-VII
Electives-V**

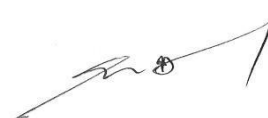
Course Code	Course Name	Category	Instructional Hours				Assessment				Credit
			Contact Periods	T	P	TU	Hours of Exam. (ESE)	CIA	ESE	Total	
B19CBE703	Enterprise Systems	PE	3	3	0	0	3	40	60	100	3
B19CBE704	Virtual and Augmented Reality	PE	3	3	0	0	3	40	60	100	3
B19CBE705	Marketing Research and Marketing Management	PE	3	3	0	0	3	40	60	100	3
B19CSE709	Information Retrieval Techniques	PE	3	3	0	0	3	40	60	100	3
B19CSE712	Intellectual Property Rights	PE	3	3	0	0	3	40	60	100	3
B19MGT101	Total Quality Management	PE	3	3	0	0	3	40	60	100	3

**Semester-VIII
Electives-VI**

Course Code	Course Name	Category	Instructional Hours				Assessment				Credit
			Contact Periods	T	P	TU	Hours of Exam. (ESE)	CIA	ESE	Total	
B19CBE801	Continuous Integration and Continuous Deployment	PE	3	3	0	0	3	40	60	100	3
B19CBE802	Basics of Robotics	PE	3	3	0	0	3	40	60	100	3
B19CBE803	Business Continuity and Disaster Recovery	PE	3	3	0	0	3	40	60	100	3
B19CBE804	Human Resource Management	PE	3	3	0	0	3	40	60	100	3
B19CSE803	Professional Ethics	PE	3	3	0	0	3	40	60	100	3
B19CSE805	Digital Forensics	PE	3	3	0	0	3	40	60	100	3



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OPEN ELECTIVES (OE)
Semester-V
Elective-I

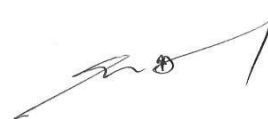
Course Code	Course Name	Category	Instructional Hours				Assessment				Credit
			Contact Periods	T	P	TU	Hours of Exam. (ESE)	CIA	ESE	Total	
B19AEO501	Basics of Flight Mechanics	OE	3	3	0	0	3	40	60	100	3
B19AGO501	Environment and Agriculture	OE	3	3	0	0	3	40	60	100	3
B19BMO501	Introduction to Medical Physics	OE	3	3	0	0	3	40	60	100	3
B19BTO501	Food Processing and Preservation	OE	3	3	0	0	3	40	60	100	3
B19ECO501	Logic and Distributed Control Systems	OE	3	3	0	0	3	40	60	100	3
B19EEO501	Rotating Machines & Transformers	OE	3	3	0	0	3	40	60	100	3
B19MEO501	Robotics	OE	3	3	0	0	3	40	60	100	3

OPEN ELECTIVES (OE)
Semester-VI
Elective-II

Course Code	Course Name	Category	Instructional Hours				Assessment				Credit
			Contact Periods	T	P	TU	Hours of Exam. (ESE)	CIA	ESE	Total	
B19AEO601	Aircraft Electrical and Electronic Systems	OE	3	3	0	0	3	40	60	100	3
B19AGO601	Integrated Water Resources Management	OE	3	3	0	0	3	40	60	100	3
B19BMO601	Introduction to Biomedical Engineering	OE	3	3	0	0	3	40	60	100	3
B19BTO601	Basic Bioinformatics	OE	3	3	0	0	3	40	60	100	3
B19ECO601	Geographic Information System	OE	3	3	0	0	3	40	60	100	3
B19EEO601	Fundamentals of Power Electronics	OE	3	3	0	0	3	40	60	100	3
B19MEO601	Entrepreneurship Development	OE	3	3	0	0	3	40	60	100	3



Programme Coordinator



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OPEN ELECTIVES (OE)
Semester-VII
Elective-III

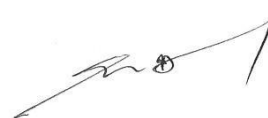
Course Code	Course Name	Category	Instructional Hours				Assessment				Credit
			Contact Periods	T	P	TU	Hours of Exam. (ESE)	CIA	ESE	Total	
B19AEO701	Unmanned Aircraft Systems Operation & MRO	OE	3	3	0	0	3	40	60	100	3
B19AGO701	Production Technology in Agricultural Machinery	OE	3	3	0	0	3	40	60	100	3
B19BMO701	Telemedicine	OE	3	3	0	0	3	40	60	100	3
B19BTO701	Fundamentals of Nano technology	OE	3	3	0	0	3	40	60	100	3
B19ECO701	Introduction to Communication Systems	OE	3	3	0	0	3	40	60	100	3
B19EEO701	Hybrid Electrical Vehicles	OE	3	3	0	0	3	40	60	100	3
B19MEO701	3D Printing and Tooling	OE	3	3	0	0	3	40	60	100	3

OPEN ELECTIVES (OE)
Semester-VIII
Elective-IV

Course Code	Course Name	Category	Instructional Hours				Assessment				Credit
			Contact Periods	T	P	TU	Hours of Exam. (ESE)	CIA	ESE	Total	
B19AEO801	Vehicle Aerodynamics	OE	3	3	0	0	3	40	60	100	3
B19AGO801	Agriculture Finance, Banking and Cooperatives	OE	3	3	0	0	3	40	60	100	3
B19BMO801	Hospital Management	OE	3	3	0	0	3	40	60	100	3
B19BTO801	Biological Waste Management	OE	3	3	0	0	3	40	60	100	3
B19ECO801	Wireless Technologies	OE	3	3	0	0	3	40	60	100	3
B19EEO801	Energy Conservation and Management	OE	3	3	0	0	3	40	60	100	3
B19MEO801	Lean Six Sigma	OE	3	3	0	0	3	40	60	100	3



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PROJECTWORK (PW)

Course Code	Course Name	Category	Instructional Hours				Assessment				Credit
			Contact Periods	T	P	TU	Hours of Exam. (ESE)	CIA	ESE	Total	
B19CBP502	Mini Project	PW	4	0	4	0	3	100	-	100	2
B19CBP703	Project work Phase – I	PW	4	0	4	0	3	40	60	100	2
B19CBP801	Project Work Phase - II	PW	16	0	16	0	3	40	60	100	8

CAREER ENHANCEMENT COURSE (CEC)

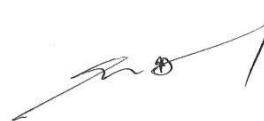
Course Code	Course Name	Category	Instructional Hours				Assessment				Credit
			Contact Periods	T	P	TU	Hours of Exam. (ESE)	CIA	ESE	Total	
B19CEP201	Soft Skills -I	CEC	2	0	2	0	-	100	-	100	1
B19CEP301	Soft Skills - II	CEC	2	0	2	0	-	100	-	100	1
B19CEP302	Professional Certificate Course-I	CEC	2	0	2	0	-	100	-	100	1
B19CEP402	In-plant Training	CEC	-	-	-	-	-	-	-	-	NC
B19CEP401	Career Ability Course - I	CEC	2	0	2	0	-	100	-	100	NC
B19CEP303	Online Certificate Course	CEC	-	-	-	-	-	-	-	-	NC
B19CEP501	Career Ability Course - II	CEC	2	0	2	0	-	100	-	100	NC
B19CEP502	Professional Certificate Course-II	CEC	2	0	2	0	-	100	-	100	1
B19CEP503	Summer Internship	CEC	-	-	-	-	-	-	-	-	1
B19CEP601	Career Ability Course - III	CEC	2	0	2	0	-	100	-	100	NC
B19CEP603	Online Certificate Course	CEC	-	-	-	-	-	-	-	-	NC

MANDATORY COURSE (MC)

Course Code	Course Name	Category	Instructional Hours				Assessment				Credit
			Contact Periods	T	P	TU	Hours of Exam. (ESE)	CIA	ESE	Total	
B19MCP101	Life Skills	MC	2	0	2	0	-	100	-	100	NC
B19MCT301	Environmental Sciences	MC	3	3	0	0	-	100	-	100	NC
B19MCT302	Indian Constitution	MC	3	3	0	0	-	100	-	100	NC



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UNIT V SEARCHING, SORTING**9**

Searching: Linear Search - Binary Search. Sorting: Bubble sort - Selection sort - Insertion sort - Quick Sort-Merge Sort -Heap Sort- shell sort-radix sort- comparison of sorting and searching methods.

Total Instructional hours: 45**Course Outcomes:**

Students will be able to

CO1: Build programs to implement linear data structures such as list.**CO2:** Apply the linear data structures such as stacks and queues to problem solutions.**CO3:**Apply the concept of tree data structure in real world scenarios.**CO4:** Analyze the various hashing algorithms**CO5:**Analyze the various searching and sorting techniques.**Text Books:**

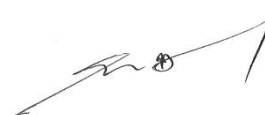
1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, 2010.

Reference Books:

1. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, "Fundamentals of Data Structures in C", Second Edition, University Press, 2008.
2. Reema Thareja, "Data Structures Using C", Second Edition, Oxford University Press, 2011.
3. M. Tenenbaum and Augestien, "Data Structures using C", Third Edition, Pearson Education 2007.
4. J. P. Tremblay and P. G. Sorenson, "An Introduction to Data Structures with applications", Second Edition, Tata McGraw Hill, 2007
5. Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education,1983.



Programme Coordinator



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B.Tech - CSBS	B19CBP201 - PROGRAMMING FOR DATA STRUCTURES LABORATORY	T	P	TU	C
		0	4	0	2

Course Objectives:

1. To understand the practical application of linear data structures.
2. To understand the different operations of search trees.
3. To get familiarized to non linear data structures.
4. To implement the different hashing techniques.
5. To demonstrate different sorting and searching techniques.

List of Experiments:

- 1 Implementation of Singly, Doubly and Circular Linked list.
- 2 Array implementation of Stack and Queue ADTs.
- 3 Linked list implementation of Stack and Queue ADTs.
- 4 Applications of Stack and Queue ADTs.
- 5 Implementation of Tree traversal algorithms.
- 6 Implementation of Binary Search Trees.
- 7 Implementation of AVL Trees.
- 8 Hashing – collision resolution techniques.
- 9 Implementation of searching algorithms.
- 10 Implementation of sorting algorithms.

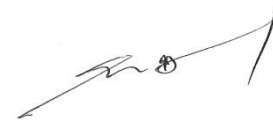
Total Instructional hours: 45**List of Equipment for a Batch of 30 Students:****Operating system:** Windows 7 or Higher.**Software:** Turbo C**Hardware:** (Standalone desktops – 30 No's) 2GB RAM / Intel I3 Processor / 80GB HD.**Course Outcomes:**

Students will be able to

- CO1:** Develop functions to implement linear and non-linear data structure Operations.
- CO2:** Choose the appropriate linear data structures for solving a given problem.
- CO3:** Select, implement and use the appropriate non-linear data structures for solving a given problem.
- CO4:** Apply appropriate hash functions that result in a collision free scenario for data storage and retrieval.
- CO5:** Design and development of optimal algorithms for searching and sorting.



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Semester IV

B.Tech - CSBS	B19CBT401 – AGILE SOFTWARE ENGINEERING	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To understand the phases in a software project.
2. To understand fundamental concepts of requirements engineering and Analysis Modeling.
3. To understand the various software design methodologies.
4. To learn various testing and maintenance measures.
5. To learn various agile execution methodologies.

UNIT-I SOFTWARE PROCESS AND AGILE DEVELOPMENT 9

Introduction to Software Engineering, Software Process, Introduction to Agility- Agile Software Engineering – Traditional Model vs. Agile Model - Classification of Agile Methods – Agile Manifesto and Principles.

UNIT-II REQUIREMENTS ANALYSIS AND AGILE PROCESS 9

Software Requirements: Functional and Non-Functional, User requirements, System requirements, Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management- Lean Production - SCRUM, Scrum roles : Product Owner, Scrum Master, Scrum Team, Adaptive Software Development.

UNIT-III SOFTWARE DESIGN 9

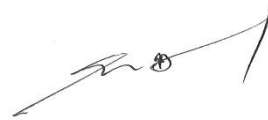
Design process – Design Concepts-Design Model– Design Heuristic – Architectural Design - Architectural styles, Architectural Design, Architectural Mapping using Data Flow- Agile Design: Agile design practices, Agile design philosophies, Agile design methodology and process, Agile Documentations, Agile SDLC(Software Development Life Cycle).

UNIT-IV TEST DRIVEN DEVELOPMENT 9

Software testing fundamentals-Internal and external views of Testing-white box testing - basis path testing-control structure testing-black box testing- Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing And Debugging –Software Project Management: Estimation – LOC, FP Based Estimation, Make/Buy Decision COCOMO I & II Model.



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UNIT-V**TRANSITION AND APPLICATION OF AGILE****9**

Business Leadership Transition, Customer Relationship Transition, Project Management Transition, Agile applicability, Agile in Distributed teams, Business benefits, Challenges in Agile, Risks and Mitigation, Agile projects on Cloud, Balancing Agility with Discipline.

Total Instructional hours:45**Course Outcomes:**

Students will be able to

- CO1:** Identify the key activities in managing a software project and compare different process models.
- CO2:** Concepts of requirements engineering and Analysis Modeling.
- CO3:** Apply systematic procedure for software design and deployment.
- CO4:** Compare the various testing and maintenance.
- CO5:** Explain the purpose and benefits of agile execution methodologies..

Text Books:

1. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", 8th Edition, Mc 49 Graw-Hill International Edition, 2019.
2. David J. Anderson and Eli Schragenheim, —Agile Management for Software Engineering: Applying the Theory of Constraints for Business ResultsII, Prentice Hall, 2003.

Reference Books:

1. Ian Sommerville, "Software Engineering", 10th Edition, Pearson Education Asia, 2017.
2. Johnny Schneider, "Understanding Design Thinking, Lean and Agile", O'Reilly Media, 2017.
3. Agile Software Development, Principles, Patterns and Practices by Robert C. Martin
Publisher: Prentice Hall, 2013.



Programme Coordinator



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B.Tech - CSBS	B19CBT402 – FUNDAMENTALS OF ECONOMICS	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To learn the principles of microeconomics relevant to managing an organization.
2. To study about firms and their decisions about optimal production.
3. To understand the market structure.
4. To understand the fundamentals of macroeconomics.
5. To familiarize the students about the money market.

UNIT-I INTRODUCTION TO MICROECONOMICS 9

Economics – Definition - Types of Economic Analysis – Micro and Macro Economics, Demand - Types, Determinants; Supply - Determinants - Demand Curve - Supply Curve - Market Equilibrium -Elasticity of Demand and Supply.

UNIT-II COST AND PRODUCTION FUNCTION 9

Production Function – Types, Return to scale and ISO-quants - Cost Minimization; Cost Curves - Total, Average and Marginal Costs - Long Run and Short Run Costs – Law of Production - Return to scale.

UNIT-III MARKET STRUCTURE 9

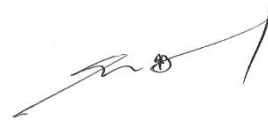
Market Structure – Types of Market structure – Perfect Competition - Monopoly and Monopsony – Sources of monopoly power - Pricing with Market Power - Monopolistic Competition – Oligopoly.

UNIT-IV MACRO ECONOMICS 9

Macro vs. Micro Economics - Limitations of Macroeconomics - Stock and Flow variables - Equilibrium and Disequilibrium - Partial and General Equilibrium Statics – Comparative Statics and Dynamics - National Income Concepts – GDP, GNP, NDP and NNP at market price, factor cost, real and nominal - Disposable personal Income.



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Demand for Money - Supply of Money - Integrating Money and Commodity Markets – Monetary Policy – Fiscal Policy - Central Bank and the Government; The Classical Paradigm - Price and Wage Rigidities - Voluntary and Involuntary Unemployment.

Total Instructional hours: 45

Course Outcomes:

- CO1:** Classify the basic principles and concepts of Microeconomics and use them to solve real world business problems.
- CO2:** Identify the fundamentals of national income and aggregate supply and aggregate demand consumption.
- CO3:** Explain the market structure for proper analysis of the market.
- CO4:** Analyse the basic macroeconomic principles.
- CO5:** Identify the concepts of money market.

Text Books:


1. Robert S.Pindyck, and Daniel L. Rubinfeld, "Microeconomics", Pearson Publishing House 9th Edition.
2. Dornbusch, Fischer and Startz, "Macroeconomics", McGraw-Hill, 12th Edition, 2018.
3. D N Dwivedi, "Macroeconomics: Theory and Policy", McGraw-Hill, 5th Edition.

Reference Books:

1. Hal R, Varian, "Intermediate Microeconomics: A Modern Approach", W W Norton & Co Inc; Eight edition.
2. N. Gregory Mankiw, "Principles of Macroeconomics", Cengage Learning, Eight Edition, 2017.
3. Paul Anthony Samuelson, William D. Nordhaus, "Economics", McGrawHill, 19th Edition, 2011.



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Course Outcomes:

Students will be able to

CO1: Explain the conceptual knowledge of innovation.

CO2: Illustrate the importance of IP.

CO3: Interpret the market needs and analyze the marketing strategy.

CO4: Build a business model based on technology innovation.

CO5: Convert an innovative idea into a venture and protect it through intellectual property rights.

Text Books:

1. Joe Tidd, John R. Bessant, "Managing Innovation – integrating technological, market and organizational change", 6th Edition, Wiley India edition, 2018

Reference Books:

1. Rajeev Roy, "Entrepreneurship", Second Edition, Oxford University Press, 2011.
2. Vivien Irish, Intellectual Property Rights for Engineers, Second Edition, The Institution of Engineering and Technology, 2015



Programme Coordinator



BOS Chairman

B.Tech - CSBS	B19CBT404 – WEB APPLICATION DEVELOPMENT	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To interpret the basics of Web and Web Architecture.
2. To device a front end design with HTML Tags
3. To design a dynamic webpage using CSS.
4. To articulate client side activities on a web site using Javascript.
5. To design a simple web application with database integration using Python.

UNIT-I INTRODUCTION TO WEB 9

Internet and World wide web , Protocols governing the Web - Web applications and Web Architecture - Issues in web development , Web servers , Web browsers - Internet addresses , TCP/IP suite , IP addresses and classes - MIME , HTTP & HTTPS - Web servers and clients , URL, URI,URN -HTTP message formate , Request and response message-Testing HTTP using telnet.

UNIT-II HTML FOUNDATION 9

History of HTML and W3C , HTML basics - Elements , Attributes and Tags - Basic HTML tags ,HTML comments , paragraphs , Line breaks - Text styles, Font ,Bold ,Italic , Underline, Combining styles , Heading , Preformatted string, Strikethrough text - Lists and HTML symbols.-Table tags ,Border, Row, column header,- rowspan and column span, Cell spacing and Cell padding - Nested Tables.

UNIT-III HTML FORMS & CSS 9

Form elements ,Text field, Text Area, Password field, Hidden field, Label - Checkbox, Radio Button, Selection List - Button , File Upload, Action Button, and Image Button- Frames and Layout , Iframes - Images , Meta tags , multimedia content - Cascading style sheets, , Embedded style sheet , Inline style sheet - External style sheet - Selectors and types of selectors , Pseudo classes and elements.

UNIT-IV CLIENT SIDE JAVA SCRIPTING 9

Introduction to java script - Inserting Javascript code , Adding comments - Browser Incompatibility - Placement of JavaScript Code - Javascript Keywords, Variables ,Literals, Operators - Control structure, if ,if else ,else if ladder , Switch case – Looping ,while ,for ,do while - Arrays ,Numeric array ,Associative array - Functions and Objects.

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UNIT-V**WEB DESIGN WITH PYTHON****9**

Introduction to Python's Django , Python packet Manager - Virtual environment , Integrated development repository - Django Basics - Django Installation and setup , Testing your setup - Creating Django project - Creating view , Mapping URL's - Templates and Media Files – Creating Models – Creating Databases and Accessing databases, tables.

TotalInstructionalhours:45**Course Outcomes:**

Students will be able to

CO1: Interpret the working of web sites and web servers.

CO2: Design web pages of a website with HTML.

CO3: Create dynamic styles using CSS.

CO4: Build client side activities with Javascript

CO5: Develop database integrated websites with python.

Text Books:

1. Uttam K.Roy ,“Web Technologies” by, Oxford University Press 2010, First edition, eight impression 2014.
2. Nigel George ,” Build a Website With Django 3”,GNW Independent publishing , Hamilton NSW, Australia , 11th June 2020

Reference Books:

1. Thomas Powell , “HTML & CSS: The Complete Reference”, Fifth Edition Paperback – 1, TataMcGrawHill, July 2017.
2. Arun Ravindran, “Django Design Patterns and Best Practices Second Edition: Industry-standard web development techniques and solutions using Python”, 2nd Edition Paperback – 1, Packt publishers, January 2018.
3. Leif Azzopardi and David Maxwell “Tango with Django”-A beginners guide to web development with Django 1.9, Learnpub,2017.



Programme Coordinator



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B.Tech - CSBS	B19CBT405 - ADVANCED DATA STRUCTURES AND ALGORITHMS	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To understand the concepts of algorithms.
2. To select and design algorithms that is appropriate for problems
3. To understand the concepts of string algorithms
4. To understand hierarchical data structures and its operations.
5. To design and implement graph and its applications.

UNIT - I ROLE OF ALGORITHMS IN COMPUTING 9

Algorithms – Algorithms as a Technology- Insertion Sort – Analyzing Algorithms – Designing Algorithms- Growth of Functions: Asymptotic Notation – Standard Notations and Common Functions- Recurrences: The Substitution Method – The Recursion-Tree Method.

UNIT - II ALGORITHM DESIGN TECHNIQUES 9

Dynamic Programming: Memorization, Tabulation- Coin change – Overlapping sub problem – Longest Common subsequence problem , Optimal sub structure property , Back tracking –N queens , Sub set sum, Hamilton cycle , Divide and conquer-Closest pair ,String algorithm – Mancher's algorithm for Longest palindrome string.

UNIT - III ADVANCED ALGORITHM DESIGN TECHNIQUES 9

Matrix-Chain Multiplication –Egg drop puzzle- Coin change problem - Palindrome Partitioning- Greedy Algorithms: An Activity-Selection Problem – Elements of the Greedy Strategy- Huffman Codes- Randomized Algorithms-Quick sort-Las Vegas Randomized Algorithms-Monte Carlo Randomized Algorithms.

UNIT - IV HIERARCHICAL DATA STRUCTURES 9

Binary Search Trees: Basics – Insertion and Deletion- Red-Black trees: Properties of Red-Black Trees – Rotations – Insertion – Deletion-Tournament tree: Types-operations-applications-2-3 trees: operations- 2-3-4 trees: operations-Splay Tree: rotations-operations-applications-standard tries.

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UNIT - V**GRAPHS****9**

Elementary Graph Algorithms: Representations of Graphs – Breadth-First Search – Depth-First Search – Topological Sort – Minimum Spanning Trees: Kruskal and Prim- Single-Source Shortest Paths: The Bellman-Ford algorithm – Single-Source Shortest paths in Directed Acyclic Graphs – Dijkstra's Algorithm; All-Pairs Shortest Paths: The Floyd Warshall Algorithm.

Total Instructional hours: 45**Course Outcomes:**

Students will be able to

CO1: Analyze the asymptotic performance of algorithms.

CO2: Apply suitable design strategy for problem solving

CO3: Apply suitable design strategy for advanced problem solving

CO4: Implement the concept of hierarchical data structures in real world scenarios.

CO5: Analyze important algorithmic design paradigms to implement graph data structure.

Text Books:

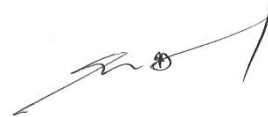
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Reference Books:

1. Ellis Horowitz, SartajSahni, Susan Anderson-Freed, "Fundamentals of Data Structures in C", Second Edition, University Press, 2008.
2. ReemaThareja, "Data Structures Using C", Second Edition, Oxford University Press, 2011.
3. M. Tenenbaum and Augestien, "Data Structures using C", Third Edition, Pearson Education 2007.
4. J. P. Tremblay and P. G. Sorenson, "An Introduction to Data Structures with applications", Second Edition, Tata McGraw Hill, 2007
5. Aho, Hopcroft and Ullman, "Data Structures and Algorithms", Pearson Education, 1983.



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B.Tech - CSBS	B19CBP401 - WEB APPLICATION DEVELOPMENT LABORATORY	T	P	TU	C
		0	4	0	2

Course Objectives:

1. To interpret the basics of Web and Web Architecture.
2. To design a front end design with HTML Tags
3. To design a dynamic webpage using CSS.
4. To articulate client side activities on a web site using Javascript.
5. To design a simple web application with database integration using Python.

List of Experiments:

- 1 Create a Web page using HTML5- Formatting Tags
- 2 Create a Web page using HTML5 – List & Tables
- 3 Design a Web page to capture data using HTML forms
- 4 Perform a client side validation using JavaScript.
- 5 Design a game puzzle using HTML forms and JavaScript.
- 6 Develop a Web page and perform login validation and Navigation using JavaScript.
- 7 Design a Web page to illustrate the concept of event handling through JavaScript.
- 8 Develop an ERP portal for student mark management using Python-Django
- 9 Develop a web project with Python Django for student result management.
- 10 Develop a web project with Python Django for Flight booking and status checking.

Total Instructional hours:45**List of Equipment for a Batch of 30 Students:****Operating system:** Windows 7 or Higher.**Software:** Python 3.5 or Higher, Django 10.1, Tomcat Server.**Hardware:** (Standalone desktops – 30 No's) 2GB RAM / Intel I3 Processor / 80GB HD.**Course Outcomes:**

Students will be able to

- CO1:** Design web pages of a website with HTML.
- CO2:** Create dynamic styles using CSS.
- CO3:** Build client side activities with Javascript.
- CO4:** Inspect client side activities with Javascript.
- CO5:** Develop a database integrated websites with python.



Programme Coordinator



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Semester III

B.Tech - CSBS	B19CBT301 – FUNDAMENTALS OF MANAGEMENT	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To help the students gain understanding of the functions and responsibilities of managers.
2. To study about the forms of Business organization.
3. To understand the tools and techniques used in strategic management.
4. To learn how organizing and staffing are done in an organization.
5. To study the process of effective directing and controlling in the organization.

UNIT-I INTRODUCTION TO MANAGEMENT 9

Definition of Management – Manager Vs Entrepreneur – Types of managers -managerial roles and skills – Evolution of Management – Scientific, human relations, system and contingency approaches — Current trends and issues in Management – Business Ethics.

UNIT-II BUSINESS ORGANIZATION 9

Organization - Forms of Organizations: Sole Proprietorship, Partnership – Company - Statutory Bodies and Corporations - HUF and Family Business, Cooperatives, Societies and Trusts; Limited Liability Partnership - Organization culture and Environment.

UNIT-III INTRODUCTION TO STRATEGIC MANAGEMENT 9

Nature and purpose of planning – planning process – Types of planning – objectives – policies – Planning premises – Strategic Management – Planning Tools and Techniques – Decision making steps and process.

UNIT-IV ORGANISING & STAFFING 9

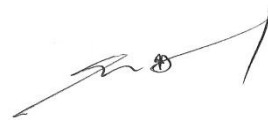
Nature and purpose – Formal and informal organization – organization chart – organization structure – types – Line and staff authority – departmentalization – delegation of authority – centralization and decentralization – Job Design – Staffing – Staffing process.

UNIT-V DIRECTING & CONTROLLING 9

Controlling – Process – Forms and types of controlling - budgetary and non-budgetary control techniques – Productivity problems and management – control and performance – reporting.

Total Instructional hours:45


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Course Outcomes:

CO1: Outline the unique concepts of management and the responsibilities of a manager.

CO2: Identify the different forms of business organization.

CO3: Apply strategic management concepts in order to have a smooth working progress.

CO4: Build the ability to organize and staff effectively.

CO5: Inspect on directing and controlling functions.

Text Books:

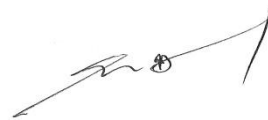
1. Stephen P. Robbins & Mary Coulter, "Management", 14th Edition, Prentice Hall (India) Pvt. Ltd., 2018.
2. JAF Stoner, Freeman R.E and Daniel R Gilbert "Management", 6th Edition, Pearson Education, 2004.

Reference Books:

1. Stephen A. Robbins & David A. Decenzo & Mary Coulter, "Fundamentals of Management" 10th Edition, Pearson Education, 2017.
2. Robert Kreitner & Mamata Mohapatra, "Management", Biztantra, 2008.
3. Harold Koontz & Heinz Weihrich "Essentials of management" Tata McGraw Hill, 1998.
4. Tripathy PC & Reddy PN, "Principles of Management", Tata McGraw Hill, 1999.



Programme Coordinator



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B. Tech - CSBS	B19CBT302 – OBJECT ORIENTED PROGRAMMING WITH C++	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To learn the fundamentals of Object-oriented programming and to study OOP concepts through C++.
2. To understand the concepts such as classes and member functions in C++.
3. To understand the fundamental concepts of object creation and deletion through constructors and destructors.
4. To study the concepts of inheritance, pointer to classes, virtual and pure virtual functions.
5. To have knowledge on file processing system, templates and exception handling mechanism.

UNIT-I INTRODUCTION TO OOP 9

Principles of OOP- Applications and structure of C++ program, Different Data types, Variables, Different Operators, Member Dereferencing operators, Memory Management Operators, expressions, operator overloading, operator precedence and control structures in C++.

UNIT-II FUNCTIONS, CLASSES AND OBJECTS 9

Functions, Inline function, function overloading, friend and virtual functions, specifying a class, Defining Member Functions, A C++ program with a class, Nesting of Member Functions, arrays within a class, memory allocation to objects, Static Data Members, array of objects, Friendly Functions, const Member Functions, Pointers to Members.

UNIT-III CONSTRUCTORS, DESTRUCTORS AND OPERATOR OVERLOADING 9

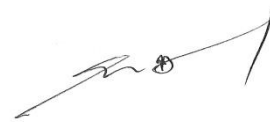
Constructors, Multiple constructors in a class, Copy constructor, Dynamic constructors, Destructors, Operator overloading, Overloading Unary and binary operators, Overloading Binary Operators using Friends, Manipulation of strings using operators, Type Conversions.

UNIT-IV INHERITANCE, POINTERS, VIRTUAL FUNCTIONS, POLYMORPHISM 9

Derived Classes, Single, multilevel, multiple inheritance, Virtual Base Classes, Abstract Classes, Pointers to objects and derived classes, this pointer, Virtual and pure virtual functions.



Programme Coordinator



BOS Chairman

UNIT-V FILE OPERATIONS, TEMPLATES AND EXCEPTION HANDLING 9

Classes for file stream operations, opening and closing a file, Detecting EOF, File Pointers and their Manipulations, Error handling during File operations. Class Templates with multiple Parameters, Function Templates, Overloading of Template Functions and Member Function Templates. Basics of Exception Handling, Exception Handling Mechanism.

Total Instructional hours: 45

Course Outcomes:

Students will be able to

CO1: Explain the basics of Object-Oriented Programming concepts.

CO2: Apply the concept of functions, classes and objects.

CO3: Apply the object initialization and destroy concept using constructors and destructors.

CO4: Build the concept of inheritance to reduce the length of code and evaluate the usefulness, run time polymorphism by using virtual functions, overriding functions and abstract class in programs

CO5: Apply the concept of file streams, templates and exception handling.

Text Books:

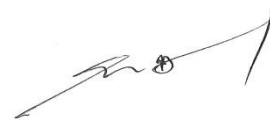
1. Robert Lafore, "Object Oriented Programming using C++", Galgotia publication 2010.
2. Herbert Schildt, "The Complete Reference C++" , 4th Edition, 2017

Reference Books:

1. Bjarne Stroustrup, Addison Wesley, "The C++ programming Language", 4th edition, 2013
2. Stanley B Lippman, Josee Lajoie, Barbara E, Moo, Addison Wesley, "C++ primer", Fifth edition, 2012.
3. Harvey M. Deitel and Paul J. Deitel, "C++ How to Program", 7th edition, Prentice Hall 2010



Programme Coordinator



BOS Chairman

B. Tech - CSBS	B19CBP301 - OBJECT ORIENTED PROGRAMMING WITH C++ LABORATORY	T	P	TU	C
		0	2	0	1

Course Objectives:

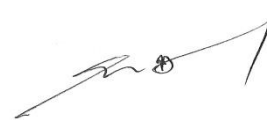
1. To understand the classes and member functions to solve the problem.
2. To develop the programs for object creation and deletion through constructors and destructors.
3. To implement different inheritance types.
4. To study the concepts of pointer to classes, virtual and pure virtual functions.
5. To equip the students on the knowledge of file processing systems and templates and Exception Handling.

List of Experiments:

- 1 Develop a C++ program by using Functions with Default arguments, Friend Function and Inline Function.
- 2 Construct a C++ program to implement the concept of Call by Value, Call by Address and Call by Reference.
- 3 Construct C++ program to implement the classes with pointers as data members
- 4 Construct a C++ program to implement the concept of class with static member functions.
- 5 Develop a C++ program to implement the friend function concept.
- 6 Write a C++ program to implement the concept of Unary operator overloading, Binary operator overloading and Function overloading.
- 7 Write a C++ program to implement single, multiple and multilevel inheritance.
- 8 Construct a C++ program to implement the concept of Virtual functions and Virtual base class.
- 9 Write a C++ program to implement the concept of class template.
- 10 Construct a C++ program for swapping two values using function templates.
- 11 Develop a C++ program to read and write values through object using File Handling.
- 12 Write a C++ Program for Nested Exception Handling.

Total Instructional hours:45


Programme Coordinator



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List of Equipment for a Batch of 30 Students:**Operating system:** Windows 7 or Higher.**Software:** Turbo C++**Hardware:** (Standalone desktops – 30 No's) 2GB RAM / Intel I3 Processor / 80GB HD.

Course Outcomes:

Students will be able to

CO1: Demonstrate the fundamentals of object-oriented programming using C++.**CO2:** Illustrate class, object concepts by using C++.**CO3:** Develop programs using Constructors, Destructors and Operator Overloading.**CO4:** Implement programs using object-oriented concepts such as inheritance and polymorphism.**CO5:** Build applications using file streams, templates and exception handling concepts.

Programme Coordinator



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Semester V

B.Tech - CSBS	B19CBT501 – BUSINESS STRATEGY WITH DSS	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To help the students gain understanding on business intelligence and decision support system
2. To study about working and modeling of computerized decision support
3. To understand the need and importance of business intelligence
4. To learn a foundation on managing and mining data in a computerized technology
5. To study the process of knowledge management in intelligent systems over the web.

UNIT I DECISION SUPPORT SYSTEM AND BUSINESS INTELLIGENCE 9

Changing Business environments and Computerized Decision support – Managerial Decision making – Computerized support for decision making –Concept of decision support systems –Framework for Business intelligence – A work system view of Decision support –Major tools and techniques for managerial decision support-Implementing Computer based managerial decision support systems.

UNIT II COMPUTERIZED DECISION SUPPORT 9

Decision making, Systems, Modeling and Support –Decision support system configuration and description- Decision support system characteristics and capabilities –Components of DSS-Data management subsystem, Model management subsystem, User interface subsystem, Knowledge based management subsystem- Decision support system user & Hardware, classification.

UNIT III BUSINESS INTELLIGENCE 9

Essentials of business intelligence , Major characteristics of Business Intelligence, Structure and components of business intelligence- Business analytics and Data visualization, Online analytical processing(OLAP)- Reports and queries, Advanced Business analytics-Data visualization-Geographical information system – Real time business intelligence Automated decision support system(ADS) – Business analytics and web.



Programme Coordinator



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UNIT IV DATA WAREHOUSING, DATA, TEXT AND WEB MINING**9**

Data warehousing definition and concepts - Data warehouse architectures-Data integration and ETL processes-Data warehouse development –Realtime data warehousing –Data warehousing administration and security issues –Data mining concepts and applications –Data mining techniques and tools – Text mining – Web mining –Basic concepts of neural networks –Artificial neural network.

UNIT V KNOWLEDGE MANAGEMENT AND INTELLIGENT SYSTEMS**9**

Introduction to knowledge management –Knowledge management activities – Knowledge management system implementation –Basic concepts of expert systems- Application of expert systems-Structure of expert systems- Problem area suitable for expert systems-Development of expert systems –Benefits and limitations of expert systems – Web based intelligent systems –Classification and types of intelligent agents –Web based recommendation system.

Total Instructional hours:45**Course Outcomes:**

Students will be able to

CO1: Outline the foundation concepts of decision support system

CO2: Identify the different forms of computerized decision support system.

CO3: Apply business intelligence concepts in order to have a smooth working progress.

CO4: Build and manage data ,text from web for mining

CO5: Identify and apply different models of intelligent system for knowledge management.

Text Books:

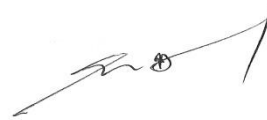
1. Efraim turban ,Jay E.Aronson ,Teng-Peng Liang , Ramesh sharada ,”Decision support and Business Intelligence Systems”, Eight edition ,Pearson publication , 9e Paperback – 1 January 2013

Reference Books:

1. Efraim Turban ,”Decision Support and Business Intelligence Systems (Old Edition) “,Pearson publication , Paperback – 1 January 2011
2. Ramesh Sharda , Dursun Delen , Efraim Turban ,”Business Intelligence and Analytics: Systems for Decision Support”,Pearson publication , Paperback – 27 February 2018



Programme Coordinator



BOS Chairman

B. Tech - CSBS	B19CBT502 – DESIGN THINKING	T	P	TU	C
		3	0	1	4

Course Objectives:

1. To learn design thinking concepts and principles.
2. To use design thinking methods in every stage of the problem.
3. To learn the different phases of design thinking.
4. To apply various methods in design thinking to different problems.
5. To apply design thinking on real world case studies

UNIT I INTRODUCTION**9**

Why Design? - Four Questions, Ten Tools - Principles of Design Thinking - The process of Design Thinking - How to plan a Design Thinking project.

UNIT II UNDERSTAND, OBSERVE AND DEFINE THE PROBLEM**9**

Search field determination - Problem clarification - Understanding of the problem – Problem analysis - Reformulation of the problem - Observation Phase - Empathetic design - Tips for observing - Methods for Empathetic Design - Point-of-View Phase - Characterization of the target group - Description of customer needs.

UNIT III IDEATION AND PROTOTYPING**9**

Ideate Phase - The creative process and creative principles - Creativity techniques - Evaluation of ideas - Prototype Phase - Lean Startup Method for Prototype Development - Visualization and presentation techniques.

UNIT IV TESTING AND IMPLEMENTATION**9**

Test Phase - Tips for interviews - Tips for surveys - Kano Model - Desirability Testing - How to conduct workshops - Requirements for the space - Material requirements - Agility for Design Thinking.

UNIT V FUTURE**9**

Design Thinking meets the corporation – The New Social Contract – Design Activism – Designing tomorrow.

Total Instructional hours:45


Programme Coordinator



BOS Chairman

Course Outcomes:

Students will be able to

CO1: Planning of design thinking process.

CO2: Define key concepts of design thinking.

CO3: Prototyping of design thinking process.

CO4: Practice design thinking in all stages of problem solving.

CO5: Apply design thinking approach to real world problems.

Text Books:

1. Christian Mueller-Roterberg, Handbook of Design Thinking - Tips & Tools for how to design thinking. [Unit 1, 2, 3, 4]
2. Designing for Growth: a design thinking tool kit for managers By Jeanne Liedtka and Tim Ogilvie. [Unit 1]
3. Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation by Tim Brown. [Unit 5]

References:

1. Johnny Schneider, "Understanding Design Thinking, Lean and Agile", O'Reilly Media, 2017.
2. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press , 2009.
3. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011
4. <http://ajjuliani.com/design-thinking-activities/>
5. <https://venturewell.org/class-exercises>



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Course Outcomes:

Students will be able to

- CO1:** Apply the concept of linear programming in Formulation, Graphical method, Simplex and Artificial variable techniques.
- CO2:** Solve transportation and assignment problems to get the optimal solutions.
- CO3:** Apply the concepts of game theory in operations research.
- CO4:** Construct the network modeling for planning and scheduling the project activities.
- CO5:** Identify and analyze appropriate queuing model to reduce the waiting time in queue.

Text Books:

1. Natarajan A M, Balasubramanie P, Tamilarasi R, "Operations Research", 2nd Edition, Pearson Education 2014.
2. Taha H.A., "Operations Research : An Introduction " 10th Edition, Pearson Education, 2017.

Reference Books:

1. Gupta Prem Kumar and Hira D.S., Operations Research, Sultan Chand, Revised Edition, 2017.
2. Donald Gross, John F. Shortle, James M. Thompson, Carl M. Harris, "Fundamentals of Queueing Theory", John Wiley & Sons, 5th Edition, New Jersey, 2020.
3. Ibe, O.C. "Fundamentals of Applied Probability and Random Processes", Elsevier, U.P., 2nd Edition, 2014.
4. John W. Chinneck "Feasibility and Infeasibility in Optimization Algorithms and Computational Methods' Springer, 2015.
5. N. D Vohra, Quantitative Techniques in Management, TataMcgraw Hill, 5th Edition 2017.



Programme Coordinator



BOS Chairman

B.Tech - CSBS	B19CBT602 – SOFTWARE TEST AUTOMATION	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To help the students in understanding of the functions and process involved in software testing.
2. To study about the different forms of testing strategies.
3. To understand the different software testing tools and their working.
4. To develop test cases and test various software using software testing tools.
5. To study and setup of Selenium as a software testing tool.

Unit I SOFTWARE TESTING FOUNDATION 9

Software Engineering evaluation -Software development process models, Requirement Management, Software Design, Coding and Unit testing, Integration testing, System testing, Installation and Acceptance, Customer support and Maintenance. System testing process –System test plan, commencement, design, execution, reporting and defect tracking., Software testing strategies – Strategic approach to software testing, Strategic issues.

Unit II SOFTWARE TESTING STRATEGIES 9

Testing strategies for conventional software-Unit testing, integration testing ,Whitebox, Basic path , control structure, Blackbox, Testing for specialized Environments, Testing strategies for Object oriented software, Testing OOA and OOD Models, Object oriented Testing strategies, Object oriented testing Methods, Testing methods applicable at the class level, Interclass Test case design. Testing Concepts for Webapp, Content testing, User interface testing, Component level testing, Navigation Testing, Configuration testing, Security Testing, Performance testing for Web apps.

Unit III SOFTWARE TESTING TOOLS 9

System test process, System test commencement, System test planning, Test design,Test execution, Test reporting and defect tracking, Introduction to Winrunner, Checkpoint in winrunner, Data driven and Batch testing in win runner, Improving test automation in winrunner, Web test option in winrunner, Introduction to QTP, Checkpoint in QTP, Data driven and Batch testing in QTP, Improving test automation in QTP, Web test option in QTP.



Programme Coordinator



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Unit IV**SOFTWARE TESTING TOOLS & TESTING****9**

Introduction to load runner, Checkpoint in load runner, Data driven and Batch testing in load runner .Improving test automation in load runner, Web test option in load runner, Vuserscript creation using LoadRunner, Vuserscript execution and result analysis, Site administrator, Understanding test administrator.

Unit – V**WEB TESTING USING SLENIUM****9**

Selenium - Important Conceptual Background, Selenium IDE, Locators in Selenium, Installation and Setup, Selenium Web Driver, Unit Test Creation in Python, Synchronizing Tests, Parameterization of Tests, Handling Different Web Elements, Working with Frames, Concept of the Page Object Model, Implementing Selenium Grid.

Course Outcomes:**Students will be able to do**

CO1: Outline the unique concepts of software testing and the responsibilities of a software tester.

CO2: Identify the different forms of software testing strategies.

CO3: Apply different testing strategies for a software

CO4: Build an effecting test case using different software testing tools for testing.

CO5: Inspect and Implement software testing principles using selenium as testing tool.

Text Books:


1. Nageswara Rao Pusuluri "Software Testing Concepts and Tools" , Dream Tech Press 2012.(Unit 1,3, 4)
2. Roger S. Pressman ,Tata McGraw-Hill ,Seventh Edition "Software Engineering – A practitioner's Approach", (Unit 2)
3. Pallavi R Sharma "Selenium With Python - A Beginners Guide: Get Started With Selenium Using Python As A Programming Language , January 2019" , , BPB publication (Unit 5)

Reference Books:

1. Unmesh Gundecha, Selenium testing tools Cookbook Paperback – 1 January 2012, PACKT publications.
2. Dr. K.V.K.K Prasad "Software Testing Certification study guide" Dream Tech Press 2007



Programme Coordinator



BOS Chairman

B.TECH CSBS	B19CBT603 – FINANCIAL AND COST ACCOUNTING	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To understand the need of accounting and basic accounting terminologies.
2. To acquire the reasonable knowledge of accounting.
3. To understand the financial statements of an organization for planning and decision making.
4. To describe the fundamentals of cost sheet.
5. To understand the marginal costing techniques and budgets.

UNIT- I FUNDAMENTALS OF ACCOUNTING 9

Introduction to accounting – evolution of accounting- meaning and definition of accounting – accounting cycle – need, objectives, function and importance of accounting – basic accounting terminologies – branches of accounting – bases of accounting.

UNIT- II CONCEPTUAL FRAMEWORK OF ACCOUNTING 9

Book keeping –An Introduction – Book keeping vs Accounting - Generally Accepted Accounting Principles and Practices (GAPP), Basic concepts and conventions. Accounting Standards in India. Origin and Analysis of Business Transactions - Types of Accounts, Journal, Ledger and Trail Balance and subsidiary books.

UNIT- III DEPRECIATION AND FINAL ACCOUNTS 9

Meaning and nature of depreciation. Methods of computing depreciation: straight line method and diminishing balance method.

Final Accounts: Capital and revenue expenditures and receipts, Preparation of financial statements – trading Account, Profit and Loss A/C (P/L), Balance Sheet.

UNIT- IV COST ACCOUNTING 9

Cost Accounting: Definition, Meaning and objectives - Distinction between Cost and Financial Accounting. Elements of cost and preparation of cost sheets and tender.

UNIT- V MARGINAL COSTING 9

Marginal Costing: The Concept - Break Even Analysis - Break - Even Chart - Importance and assumptions - Application of Profit Volumes Ratio (P/V Ratio)- Different types of problems (with special emphasis on decision making problems). Budget and Budgetary Control: Procedure and Utility - Preparation of different types of Budget – Cash Budget, Sales Budget and Flexible Budget.



Programme Coordinator



BOS Chairman

Total Instructional hours: 45**Course Outcomes:**

Students will be able to

CO1: Outline the Importance and branches of accounting.

CO2: Identify the events that need to be recorded in the accounting books.

CO3: Make use of Depreciation methods and identify the suitable decisions through the results of Final accounts.

CO4: Categorize the different overhead cost to operate a business.

CO5: Analyze cost accounting methods for project business performance and examine the role of budgets and Budgetary Control system in business organization.

Text Books:

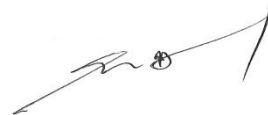
1. Narayanaswamy R, Financial Accounting - A managerial perspective, New Delhi, PHI Learning, 2020.
2. Jain and Narang, Cost and Management Accounting, 15th edition, Ludhiana Kalyani Publishers, 2018.
3. CA Dr.P C Tulsian and CA Bharat Tulsian, Financial Accounting, 2nd Edition, S.Chand Publishing, New Delhi, 2016.

Reference Books:

- 1.Sawyers, Jackson, Jenkins & Arora, Managerial Accounting, 2nd edition, Cengage, 2011.
- 2.Godwin, Alderman, Sanyal, Financial Accounting, 2nd edition, Cengage, 2011.
- 3.Jan Williams, Financial and Managerial Accounting - The basis for business Decisions, 15th edition, Tata McGraw Hill Publishers, 2010.
- 4.Stice & Stice, Financial Accounting Reporting and Analysis, 8th edition, Cengage, 2010.
- 5.Ashish K. Battacharya, Introduction to Financial Statement Analysis, Elsevier, 2009.
6. M N Arora & Priyanka Katyal, Cost Accounting, Vikas Publishing, New Delhi, 2017.
- 7.CA Sachin Gupta, Cost and Management Accounting, Taxmann Publication Pvt Limited, 2019.



Programme Coordinator



BOS Chairman

B. Tech - CSBS	B19CBP601 – SOFTWARE TEST AUTOMATION LABORATORY	T	P	TU	C
		0	2	0	2

Course Objectives:

1. To understand the installation and configuration of selenium web driver
2. To develop and run successful testcases using selenium web driver.
3. To implement different testing strategies for web components of webpage using selenium
4. To handle and track dynamic activities of web page using selenium IDE.
5. To handle and integrate javascript with selenium for software testing.

List of Experiments:

- 1 Study and Installation of Selenium Web driver.
- 2 Selenium web driver scripting and testing in Firefox Browser.
- 3 Run Selenium WebDriver Script in Chrome browser.
- 4 Installing Selenium IDE, Fire Bug, Fire Path for software testing
- 5 Software testing using Locators in selenium IDE
- 6 Writing Dynamic Xpath In Selenium WebDriver
- 7 Handling mouse event using selenium web driver.
- 8 Implementation of screen capture in Selenium web diver.
- 9 Handling Excel Files Using Apache POI In Selenium WebDriver
Handle Javascript Alerts/PopUps in Selenium WebDriver
- 10

Total Instructional hours:45


Programme Coordinator



BOS Chairman

List of Equipment for a Batch of 30 Students:

Operating system: Windows 7 or Higher.

Software: Mozilla firefox / Google chrome (Latest version)

Hardware: (Standalone desktops – 30 No's) 4GB RAM / Intel I3 Processor / 80GB HD.

Course Outcomes:

Students will be able to

CO1: Demonstrate the Installation and configuration of Selenium Web driver

CO2: Illustrate different testing strategies for various web components of a web page

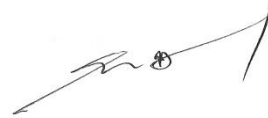
CO3: Develop programs using selenium to test and monitor activities on web sites.

CO4: Implement programs using Locaters to handle Mouse and screen record events on web sites.

CO5: Build and integrate javascript application for selenium software testing.



Programme Coordinator



BOS Chairman

B. Tech - CSBS	B19CBT701 – IT PROJECT MANAGEMENT	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To gain knowledge on fundamental concepts of project and project scheduling.
2. To understand Project Cost Control, Scheduling and Management Features.
3. To obtain knowledge on Agile Project Management.
4. To know about the Scrum framework in detail.
5. To learn software quality management.

UNIT-I PROJECT OVERVIEW AND PROJECT SCHEDULING 9

Project Overview and Feasibility Studies: Identification, Market and Demand Analysis, Project Cost Estimate, Financial Appraisal- Project Scheduling: Project Scheduling, Introduction to PERT and CPM, Critical Path Calculation, Precedence Relationship, Difference between PERT and CPM, Float Calculation and its importance, Cost reduction by Crashing of activity.

UNIT-II COST CONTROL, SCHEDULING AND MANAGEMENT FEATURES 9

Cost Control and Scheduling: Project Cost Control (PERT/Cost), Resource Scheduling & Resource Leveling - Project Management Features: Risk Analysis, Project Control, Project Audit and Project Termination.

UNIT-III AGILE PROJECT MANAGEMENT 9

Agile Project Management: Introduction, Agile Principles, Agile methodologies, Relationship between Agile Scrum, Lean, DevOps and IT Service Management (ITIL), Other Agile Methodologies: Introduction to XP, FDD, DSDM, Crystal.

UNIT-IV SCRUM 9

Scrum: Various terminologies used in Scrum, (Sprint, product backlog, sprint backlog, sprint review, retro perspective), various roles (Roles in Scrum), Best practices of Scrum, Case Study.

UNIT-V SOFTWARE QUALITY MANAGEMENT 9

Product quality and software quality - quality management systems - principles and features- System quality specification and measurement - Process and product quality approaches - Quality assurance and quality control - project audit and quality audit - Methods of enhancing quality: the different types of testing – inspections – reviews – standards - Management and control of testing.

Total Instructional hours:45


Programme Coordinator



BOS Chairman

Course Outcomes:

CO1: Understand about project overview and scheduling.

CO2: Apply the concept of Project scheduling and control projects within time and cost targets.

CO3: Identify the project management features and perform agile project management.

CO4: Understand about various terminologies used in Scrum.

CO5: Learn software quality management.

Text Books:

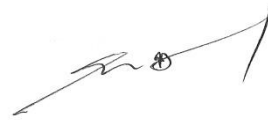
2. Clifford Gray and Erik Larson, Project Management, Tata McGraw Hill Edition, 2010.
3. Mike Cohn, "Succeeding with Agile: Software Development Using Scrum", Addison-Wesley Professional Publisher, 1st Edition, 2009.

Reference Books:

1. John M. Nicholas, Project Management for Business and Technology - Principles and Practice, Third Edition, Pearson Education, 2008.
2. Roman Pichler, "Agile Product Management with Scrum", Addison-Wesley publisher, 1st Edition, 2010.
3. Ken Schwaber, "Agile Project Management with Scrum (Microsoft Professional)", Microsoft Press US publisher, 1st Edition, 2004.



Programme Coordinator



BOS Chairman

B. Tech - CSBS	B19CBT702 – DEVOPS - CLOUD COMPUTING	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To gain knowledge on software life cycle models and DevOps phases.
2. To understand Cloud on DevOps using cloud computing models.
3. To obtain knowledge on DevOps Development Tools.
4. To know about the DevOps Operational Tools.
5. To learn Cloud Computing Services.

UNIT-I INTRODUCTION TO DEVOPS 9

Software life cycle models: Waterfall Model – Advantages and Disadvantages of Waterfall Model – Lean – ITIL - Agile Model – Workflow of Agile model - Advantages and Disadvantages of Agile Model – Introduction to DevOps – DevOps phases.

UNIT-II CLOUD ON DEVOPS 9

Cloud computing basics – service models – deployment models – cloud providers – cloud computing with AWS – Lifecycle of a cloud computing solutions – AWS – Microsoft Azure – GCP – compute service - Elastic Compute and Storage Volumes - Load Balancing, Autoscaling, and DNS - Virtual Private Cloud – Storage – Simple Storage Service (S3) - Databases and In-Memory Datastores.

UNIT-III DEVOPS DEVELOPMENT TOOLS 9

Source code management tools – SVN – TFS – Git – Version control system – Centralized version control system – Distributed version control system – Git workflow – Git Commands – Continuous integration tools - Jenkins – Jenkins Architecture – Mavens – Maven build life cycle – Case study.

UNIT-IV DEVOPS OPERATIONAL TOOLS 9

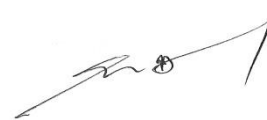
Continuous Deployment: Containerization with Docker - Configuration Management using Ansible and Puppet - Software Testing using Selenium - Container Orchestration using Kubernetes - Continuous Monitoring using Nagios.

UNIT-V CLOUD COMPUTING SERVICES 9

AWS basics – AWS products and services – Database services – Microsoft Azure services – Google cloud service providers.

Total Instructional hours:45


Programme Coordinator



BOS Chairman

Course Outcomes:

- CO1:** Understand about software life cycle models and DevOps phases.
- CO2:** Apply the concept of Cloud on DevOps using cloud computing models.
- CO3:** Demonstrate about DevOps Development Tools.
- CO4:** Interpret various operational Tools on DevOps.
- CO5:** Illustrate about Cloud Computing Services.

Text Books:

1. Mitesh Soni, "Agile, Devops and Cloud Computing with Microsoft Azure: Hands-On Devops Practices Implementation Using Azure Devops", BPB Publications, 2019.
2. Mikael Krief, "Learning DevOps", Packt Publishing, 1st Edition, 2019.

Reference Books:

1. Hideto Saito, Hui-Chuan Chloe Lee and Cheng-Yang Wu, "DevOps with Kubernetes: Accelerating software delivery with container orchestrators", Packt Publishing, 1st edition, 2017.
2. Roman Pichler, "DevOps. Building CI/CD Pipelines with Jenkins, Docker Container, AWS ECS, JDK 11, Git and Maven 3", Addison-Wesley publisher, 1st Edition, 2010.
3. Web resources
(<https://www.simplilearn.com/tutorials/aws-tutorial>, <https://www.simplilearn.com/tutorials/azure-tutorial>)



Programme Coordinator



BOS Chairman

B. Tech - CSBS	B19CBP701 – IT PROJECT MANAGEMENT LABORATORY	T	P	TU	C
		0	4	0	2

Course Objectives:

1. To gain knowledge on fundamental concepts of project and project scheduling.
2. To understand Project Cost Control, Scheduling and Management Features.
3. To obtain knowledge on Agile Project Management.
4. To know about the Scrum framework in detail.
5. To learn software quality management.

List of Experiments:

A mini-project to be identified in the given domain (Crowd Source System, Day Book, Smart Transport System, Resume Builder, E-Commerce, Expert System, Puzzle Corner) to apply the IT Project Management Principles.

1. Estimation of project cost and control activity using open-source tools
2. Scheduling of project with PERT and CPM techniques to estimate the completion time
3. Assessment of IT Project Risk Analysis using open-source tools.
4. Perform IT Project Audit and generate a report using open-source tools.
5. Study of Agile project management tools.
6. Application of Scrum practices in the project.
7. Design and perform automated testing.

Total Instructional hours:45**List of Equipment for a Batch of 30 Students:**

Operating system: Windows 7 or Higher.

Hardware: (Standalone desktops – 30 No's) 4GB RAM / Intel I3 Processor / 80GB HD.

Course Outcomes:

Students will be able to

- CO1:** Learn to effectively plan, and schedule projects within time and cost targets.
- CO2:** Have Knowledge in Cost Control, Scheduling and Management Features.
- CO3:** Analyze different Agile Project Methodologies.
- CO4:** Know in detail about Scrum.
- CO5:** Understand about Software Quality Management



Programme Coordinator



BOS Chairman

B. Tech - CSBS	B19CBP702 – DEVOPS - CLOUD COMPUTING LABORATORY	T	P	TU	C
		0	4	0	2

Course Objectives:

1. To gain knowledge on create and setup AWS account.
2. To understand Cloud on DevOps using cloud computing models.
3. To obtain knowledge on DevOps Development Tools.
4. To know about the DevOps Operational Tools.
5. To learn Cloud Computing Services.

List of Experiments:

1. AWS- Create and setup AWS account.
2. AWS- Create a VPC and subnets.
3. AWS- Create EC2 instance & volume.
4. AWS- Create a S3 bucket.
5. AWS- Create a RDS instance with private access only.
6. AWS-Deploy a server with EC2 instance, S3 bucket and RDS instances.
7. Configure Jenkins with git hub and deploy it on a server/computer.
8. Create a configuration with Jenkins with git push auto deploy functionality.
9. Create a configuration with Jenkins with manual deploy functionality.
10. Run MySQL in docker and configure query login to host disk (system memory rather than docker memory) and check the health of this container every 10 seconds.
11. Run nginx in docker and configure any web location/url to redirect to an url and limit only 5 connection per user each minute.

Total Instructional hours:45


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List of Equipment for a Batch of 30 Students:

Operating system: Windows 7 or Higher with Internet Connectivity.

Hardware: (Standalone desktops – 30 No's) 4GB RAM / Intel I3 Processor / 80GB HD.

Course Outcomes:

Students will be able to

CO1: Understand about AWS account creation and setup.

CO2: Apply the concept of Cloud on DevOps using cloud computing models.

CO3: Demonstrate about DevOps Development Tools.

CO4: Interpret various operational Tools on DevOps.

CO5: Illustrate about Cloud Computing Services.



Programme Coordinator



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Professional Electives (PE)

Semester – V Elective - I

B.Tech - CSBS	B19CBE501 – ESSENTIALS OF COMPUTER NETWORKS	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To study the concepts of data communications and functions of different layers of ISO/OSI reference architecture.
2. To understand the error detection and correction methods and types of LAN.
3. To study the concepts of sub netting and routing mechanisms.
4. To understand the different types of protocols and network components.
5. To study and configure Switches and Routers.

UNIT-I INTRODUCTION 9

Computer networks and distributed systems, Classifications of computer networks, Preliminaries of layered network structures. Data communication Components: Representation of data and its flow, Various Connection Topology, Protocols and Standards, OSI model, Transmission Media. LAN: Wired LAN, Wireless LAN, Virtual LAN. Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.

UNIT-II DATA LINK LAYER AND MEDIUM ACCESS SUB LAYER 9

Fundamentals of Error Detection and Error Correction, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go-back-N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA, CSMA/CD, CDMA/CA.

UNIT-III NETWORK LAYER 9

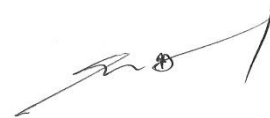
Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.

UNIT-IV TRANSPORT LAYER 9

Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service (QoS), QoS improving techniques - Leaky Bucket and Token Bucket algorithms.



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UNIT-V**APPLICATION LAYER AND SECURITY****9**

Application Layer: DNS, DDNS, TELNET, EMAIL, FTP, WWW, HTTP, SNMP, Bluetooth, Firewalls. Network Security: Electronic mail, directory services and network management, Basic concepts of Cryptography.

Total Instructional hours:45**Course Outcomes:**

CO1: Understand the fundamentals of data communications and functions of layered architecture.

CO2: Practice the error detection and correction methods and understand the different network technologies in Data link layer and MAC.

CO3: Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and routing technologies.

CO4: Configure Routers and Switches for efficient Data Transfer.

CO5: Understand the application layer protocols and also the use of cryptography and network security.

Text Books:


1. James F.Kurose & Keith W.Ross, "Computer Networking", 8th Edition, Pearson Education, 2022.
2. William Stallings, "Data and Computer Communications", 10th Edition, Pearson Education, 2021.

Reference Books:

1. Charlie Kaufman, Radia Perlman, Mike Speciner & Ray Perlner, "Network Security: Private Communication in a Public World" 3rd Edition, Pearson Education, 2022.
2. W. Richard Stevens, "UNIX Network Programming, Vol. 1,2 & 3", Prentice-Hall of India, 2004.



Programme Coordinator



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B.Tech - CSBS	B19CBE502 – BLOCKCHAIN TECHNOLOGIES	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To understand how blockchain systems work,
2. To explain how cryptocurrency works, from when a transaction is created to when it is considered part of the blockchain.
3. To explain the components of ethereum and programming languages for ethereum.
4. To study the basics hyperledger and Web3.
5. To provide a detail of alternative blockchain and blockchain projects in different perspective.

UNIT-I INTRODUCTION TO BLOCKCHAIN 9

History, Definition, Distributed Ledger, Blockchain Categories – Public, Private, Consortium, Blockchain Network and Nodes, Peer-to-Peer Network, Mining Mechanism, Generic elements of Blockchain, Features of Blockchain, and Types of Blockchain.

UNIT-II INTRODUCTION TO CRYPTOCURRENCY 9

Tokens – Cryptosecurities, Players involved - Cryptocurrency Users, Miners, Cryptocurrency exchanges, Trading platforms, Wallet providers, Coin inventors, Coin offerors. Bitcoin (BTC) – Genesis Block, Buy Bitcoin, Transactions, Unspent Transaction Output (UTXO), Bitcoin Mining, Value of Bitcoin, Advantages and Disadvantages.

UNIT-III ETHEREUM CRYPTOCURRENCY 9

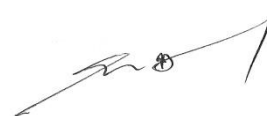
The Ethereum Network –Smart Contracts- UTXO- Merkle Tree- Ether- Components of Ethereum Ecosystem - Ethereum Programming Languages: Runtime Byte Code, Blocks and Blockchain-Bitcoin Stack versus Ethereum Stack.

UNIT-IV WEB3 AND HYPERLEDGER 9

Web3 – Contract Deployment – POST Requests – Development frameworks – Hyperledger as a protocol – The Reference Architecture – Hyperledger Fabric – Distributed Ledger – Corda.



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UNIT-V ALTERNATIVE BLOCKCHAINS AND NEXT EMERGING TRENDS**9**

Kadena – Ripple- Rootstock – Quorum – Tendermint – Scalability – Privacy – Other Challenges – Blockchain Research – Notable Projects – Miscellaneous tools.

Total Instructional hours:45**Course Outcomes:**

CO1: Outline the basic concepts and technology used for blockchain.

CO2: Illustrate the concepts of Bitcoin and their usage.

CO3: Outline the concept of Ethereum block chain contract.

CO4: Explain the architectural components of a Hyperledger and its development framework.

CO5: Demonstrate the Alternative blockchains and emerging trends in blockchain.

Text Books:

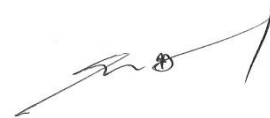
1. Imran Bashir, "Mastering Blockchain: Distributed Ledger Technology, Decentralization, and Smart Contracts Explained", Second Edition, Packt Publishing, 2018.

Reference Books:

1. Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction", Princeton University Press, 2016.
2. Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System.
3. Josh Thompson, 'Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming', Create Space Independent Publishing Platform, 2017
3. DR. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger,"Yellow paper.2014.



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B.Tech - CSBS	B19CBE503 – QUANTUM COMPUTATION AND QUANTUM INFORMATION	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To understand the principles, quantum information, and limitation of quantum operations formalizing.
2. To understand quantum algorithms.
3. To know about the applications of quantum computing.
4. To Interpret the various types of quantum key distribution.
5. To gain knowledge about the quantum error and its correction.

UNIT-I INTRODUCTION TO QUANTUM INFORMATION 9

States, Operators, Measurements, Quantum Entanglement: Quantum Teleportation, Super-dense coding, CHSH Game, Quantum gates, and circuits.

UNIT-II QUANTUM ALGORITHMS AND QUANTUM CRYPTOGRAPHY 9

Deutsch-Jozsa, Simon, Grover, Shor, Implication of Grover's and Simon's algorithms towards classical symmetric key cryptosystems, Implication of Shor's algorithm towards factorization and discrete logarithm based classical public-key cryptosystem.

UNIT-III QUANTUM TRUE RANDOM NUMBER GENERATORS (QTRNG) 9

Detailed design and issues of quantumness, Commercial products and applications.

UNIT-IV QUANTUM KEY DISTRIBUTION (QKD) 9

BB84, Ekert, Semi-Quantum QKD protocols and their variations, Issues of Device Independence, Commercial products.

UNIT-V QUANTUM NOISE AND ERROR-CORRECTION 9

Distance measures, Knill-Laflamme conditions, quantum error-correcting codes, Hamming bound.

Total Instructional hours:45


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Course Outcomes:

CO1: Explain the basic concepts of quantum computing.

CO2: Outline the quantum computing algorithms and operations.

CO3: Interpret the applications of quantum computing.

CO4: Interpret the various types of quantum key distribution.

CO5: Analyze the various Quantum noise and error-correction algorithms.

Text Books:

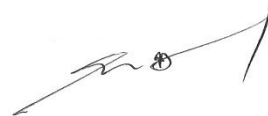
1. Quantum Computation and Quantum Information. M. A. Nielsen and I. L. Chuang, Cambridge University Press, 2012.

Reference Books:

1. Quantum error correction, D. A. Lidar & T. A. Brun, Cambridge University Press (2013).
2. Quantum systems, channels, information, A.S. Holevo, de Gruyter Studies in Mathematical Physics (2012).
3. Lecture notes by Prof. John Preskill, California Institute of Technology



Programme Coordinator



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B.Tech - CSBS	B19CBE504 – CONVERSATIONAL SYSTEMS	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To enable attendees to acquire knowledge on chatbots and its terminologies.
2. To work with ML concepts and different algorithms to build custom ML Model
3. To understand on conversational experiences.
4. To implement a conversational system using an existing framework.
5. To provide better customer experiences.

UNIT-I FUNDAMENTALS OF CONVERSATIONAL SYSTEMS 9

Overview, Case studies, Explanation about different modes of engagement for a human being, History and impact of AI, Underlying technologies-Natural Language Processing, Artificial Intelligence, and Machine Learning, NLG, Speech-To-Text, Text-To-Speech, Computer Vision, etc, Introduction to Top players in Market-Google, MS, Amazon & Market trends Messaging Platforms (Facebook, WhatsApp).

UNIT II FOUNDATIONAL BLOCKS FOR PROGRAMMING AND NATURAL LANGUAGE PROCESSING 9

Basic Python programming concepts, Node Basics, Coding Best Practices, Evaluation Test(Hands-On)-1HR, Introduction-Brief history, Basic Concepts, Phases of NLP, Application of chatbots, General chatbot architecture, Basic concepts in chatbots-Intents, Entities, Utterances, Variables and Slots, Fulfilment Lexical Knowledge Networks (WordNet, Verbnet, PropBank, etc.).

UNIT III BUILDING A CHATBOT/CONVERSATIONAL AI SYSTEMS 9

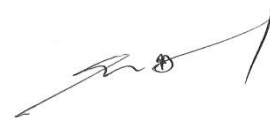
Fundamentals of Conversational Systems (NLU, DM, and NLG), Chatbot framework & Architecture, Conversational Flow & Design, Intent Classification (ML and DL based techniques).Introduction to popular chatbot frameworks-Google Dialog flow, Microsoft Bot Framework, Amazon Lex, RASA Channels-Facebook Messenger, Google Home, Alexa, WhatsApp, Custom Apps.

UNIT IV ROLE OF ML / AI IN CONVERSATIONAL TECHNOLOGIES 9

Brief Understanding on how Conversational Systems uses ML technologies in ASR, NLP, Advanced Dialog management, Language Translation, Emotion/Sentiment Analysis, Information extraction, etc, to effectively converse.



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UNIT V CONTACT CENTERS AND OVERVIEW ON CONVERSATIONAL ANALYTICS**9**

Introduction to Contact centers-Impact & Terminologies, Case studies & Trends, how does a Virtual Agent/Assistant fit in here, Conversation Analytics-The need of it, Introduction to Conversational Metrics, Summary.

Total Instructional hours:45**Course Outcomes:**

- CO1:** Classify the fundamentals of conversational systems.
- CO2:** Outline the basic concepts in chatbots using the Natural Language Processing.
- CO3:** Design a chatbot using Conversational Artificial Intelligence Systems.
- CO4:** Analyze how a conversational system uses ML technologies.
- CO5:** Outline the XR technologies in Conversational Systems.

Text Books:


1. Michael McTear, "Conversational AI: Dialogue Systems, Conversational Agents, and Chatbots", Second Edition, Moran and Claypool Publishers, 2020.

Reference Books:

1. Cathy Pearl, "Designing Voice User Interfaces: Principles of Conversational Experiences", O'REILLY, 2016.
2. NitinIndurkha, Fred J. Damerau, Handbook of Natural Language Processing, 2010.
3. GerardusBlokdyk , Conversational Chatbots for Analytics Third Edition 2018
4. Designing Bots: Creating Conversational Experiences By Amir Shevat O'Reilly



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B.Tech - CSBS	B19CBE505 – BEHAVIOURAL ECONOMICS	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To understand the concept and theory of economics.
2. To acquire knowledge on the choices and behavior of firms, households and other economics entities.
3. To learn the behavioral science perspective in economics
4. To know the current ideas and concepts regarding decision making in economics
5. To study the intertemporal choice in economics.

UNIT I INTRODUCTION**9**

The neoclassical/standard model and behavioral economics in contrast; historical background; behavioral economics and other social sciences; theory and evidence in the social sciences and in behavioral economics; applications – gains and losses, money illusion, charitable donation

UNIT II BASICS OF CHOICE THEORY**9**

Revisiting the neoclassical model; utility in economics and psychology; models of rationality; connections with evolutionary biology and cognitive neuroscience; policy analysis – consumption and addiction, environmental protection, retail therapy; applications – pricing, valuation, public goods, choice anomalies

UNIT III BELIEFS, HEURISTICS AND BIASES**9**

Revisiting rationality; causal aspects of irrationality; different kinds of biases and beliefs; self-evaluation and selfprojection; inconsistent and biased beliefs; probability estimation; trading applications – trade in counterfeit goods, financial trading behavior, trade in memorabilia, policy analysis – norms and markets, labor markets, market clearing, public goods; applications – logic and knowledge, voluntary contribution, compensation design.

UNIT IV CHOICE UNDER UNCERTAINTY**9**

Background and expected utility theory; prospect theory and other theories; reference points; loss aversion; marginal utility; decision and probability weighting; applications – ownership and trade, income and consumption, performance in sports. Strategic choice-Review of game theory and Nash equilibrium – strategies, information, equilibrium in pure and mixed strategies, iterated games, bargaining, signaling, learning; applications – competitive sports, bargaining and negotiation, monopoly and market entry.

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Geometric discounting; preferences over time; anomalies of inter-temporal decisions; hyperbolic discounting; instantaneous utility; alternative concepts – future projection, mental accounts, heterogeneous selves, procedural choice; policy analysis – mobile calls, credit cards, organization of government; applications – consumption and savings, clubs and membership, consumption planning. Individual preferences; choice anomalies and inconsistencies; social preferences; altruism; fairness; reciprocity; trust; learning; communication; intention; demographic and cultural aspects; social norms; compliance and punishment; inequity aversion.

Total Instructional hours:45

Course Outcomes:

CO1: Apply various concepts in traditional and modern Microeconomics.

CO2: Demonstrate decision making and improve policies.

CO3: Classify the concept of Beliefs, heuristics and biases for self-evaluation and self-projection.

CO4: Develop a holistic understanding of these concepts and their interconnections.

CO5: Outline the current ideas and concepts regarding decision making in Economics.

Text Book:

1. Philip Corr, Anke Plagnol, “Behavioral Economics: The Basic”, Routledge; 1st edition, 2018.

Reference Books :

1. N. Wilkinson and M. Klaes, An Introduction to Behavioural Economics, 3rd Edition, Palgrave Macmillan, 2012
2. Richard Lipsey and Alec Charystal, “Economics”, Oxford, University Press, 12th Edition, 2011.
3. Paul A. Samuelson, William D. Nordhaus, Sudip Chaudhuri and Anindya Sen, “Economics”, 19th edition, Tata McGraw Hill, 2010.
4. Robert H. Frank, 2014, “Microeconomics and Behaviour”, McGraw-Hill, 9th Edition, 2014.



Programme Coordinator



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Professional Electives (PE)

Semester – VI Elective - II

B.Tech - CSBS	B19CBE601 – INFORMATIONSECURITY	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To understand the overview of computer security.
2. To understand the information security policy and system design.
3. To understand techniques of system security.
4. To learn about various applications of system security.
5. To learn about operating system and database security.

UNIT I INTRODUCTION 9

Characteristics of Algorithm-Analysis of Algorithm-Asymptotic analysis of Complexity Bounds- Best-Average and Worst-Case behavior-Performance Measurements of Algorithm-Time and Space Trade-Offs-Analysis of Recursive Algorithms through Recurrence Relations-Substitution Method- Recursion Tree Method and Masters Theorem.

UNIT II FUNDAMENTAL ALGORITHMIC STRATEGIES 9

Brute-Force-Heuristics-Greedy-Dynamic Programming-Branch and Bound and Backtracking Methodologies-Illustrations of these techniques for Problem Solving-Bin Packing-Knapsack-Travelling Salesman Problem.

UNIT III GRAPH AND TREE ALGORITHMS 9

Traversal algorithms-Depth First Search (DFS) and Breadth First Search (BFS)-Shortest path algorithms-Transitive closure-Minimum Spanning Tree-Topological sorting, Network Flow Algorithm.

UNIT IV TRACTABLE AND INTRACTABLE PROBLEMS 9

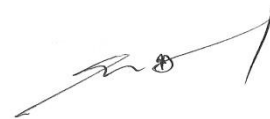
Computability of Algorithms-Computability classes-P-NP-NP-complete and NP-hard-Cooks theorem-Standard NP-complete problems and Reduction techniques.

UNIT V ADVANCED TOPICS 9

Approximation algorithms-Randomized algorithms-Class of problems beyond NP-P SPACE, Introduction to Quantum Algorithms.

Total Instructional hours:45


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Course Outcomes:

CO1: Examine the business drivers behind the information security analysis design process

CO2: Illustrate the major competence for each of the levels of security algorithms

CO3: Apply the suitable tree and graph algorithms in security technologies

CO4: Apply the suitable NP-hard data structure approaches for tractable and intractable problems

CO5: Analyze the different advanced algorithms for the security process

Text Book:

1. E. Horowitz and S. Sahni, Fundamental of Computer Algorithms, First Edition, Galgotia Publisher, 2010

Reference Books:

1. A. Aho, J. Hopcroft and J. Ullman, The Design and Analysis of Computer Algorithms, 4th Edition, Pearson, 2009

2. T. H. Cormen, C. E. Leiserson and R. L. Rivest, Introduction to Algorithms, 3rd Edition, MIT Press, 2009

3. S. Baase, Computer Algorithms: Introduction to Design and Analysis, 3rd Edition, Pearson, 2000

4. D. E. Knuth, The Art of Computer Programming, Vol. 1, Vol. 2 and Vol. 3, 1st edition, Addison-Wesley, 2011

5. Michael A. Nielsen and Isaac L. Chuang, Quantum Computation and Quantum Information, Anniversary edition, Cambridge University Press, 2003.



Programme Coordinator



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B.Tech - CSBS	B19CBE602 – DATA MINING WITH BUSINESS INTELLIGENCE	T	P	TU	C
		3	0	0	3

Course Objectives:

- 1.To introduce concept of data Mining as an important tool for enterprise data management.
2. To enable students to effectively identify sources of data and process it for data mining.
3. To make students well versed in all data mining algorithms, methods, and tools.
4. Learning how to gather and analyse large sets of data to gain useful business understanding.
5. To impart skills that can enable students to approach business problems analytically.

UNIT-I**INTRODUCTION****9**

Introduction to Data Mining: Introduction, Definition of Data Mining, Data mining parameters, How Data Mining works?, Types of relationships, Architecture of Data Mining, Kinds of Data which can be mined, Functionalities of Data Mining, Classification on Data Mining system, Various risks in Data Mining, Advantages and disadvantages of Data Mining, Ethical issues in Data Mining, Analysis of Ethical issues, Global issues.

UNIT-II**DATA WAREHOUSING****9**

Data ware house – characteristics and view - OLTP and OLAP - Design and development of data warehouse, Meta data models, Extract/ Transform / Load (ETL) design.

UNIT-III**DATA MINING TOOLS, METHODS AND TECHNIQUES****9**

Data mining, Text mining, Web mining, Spatial mining, Process mining, BI process Private and Public intelligence, Strategic assessment of implementing BI Data Mining Techniques: Introduction, Statistical Perspective on Data Mining, Statistics-need and algorithms, Naïve Bayes Algorithm, CHI-Square Automatic Interaction-Detectors (CHAID)- Classification and Regression Tree (CART) - Analysis of Unstructured Data.

UNIT-IV**MODERN INFORMATION TECHNOLOGY****9**

Business intelligence software, BI on web, Ethical and legal limits, Industrial espionage, modern techniques of crypto analysis, managing and organizing for an effective BI Team.

UNIT-V**BI AND DATA MINING APPLICATIONS****9**

Applications in various sectors – Retailing, CRM, Banking, Stock Pricing, Production, Crime, Genetics, Medical, Pharmaceutical.

Total Instructional hours:45


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Course Outcomes:

CO1: Demonstrate an understanding of the importance of data mining and the principles of business intelligence.

CO2: Able to prepare the data needed for data mining algorithms in terms of attributes and class inputs, training, validating, and testing files.

CO3: Implement the appropriate data mining methods like classification, clustering or association mining on large data sets.

CO4: Define and apply metrics to measure the performance of various data mining algorithms .

CO5: Apply BI to solve practical problems : Analyse the problem domain, use the data collected in enterprise apply the appropriate data mining technique, interpret and visualize the results and provide decision support .

Text Books:


1. Introduction to Data Mining, Vipin Kumar, Pang-Ning Tan Michael Steinbach, Pearson,2016.
2. Elizabeth Vitt, Michael LuckevichStaciaMisner, Business Intelligence, Microsoft, 2011.

Reference Books:

1. Data Mining Concepts and Techniques, Vikram Pudi& Radha Krishna, Oxford University Press, 2009.
2. Data Mining for Managers, Richard Boire, Palgrave Macmillan, 2014.
3. Michel Berry and Gordon Linoff, Mastering Data mining, John Wiley and Sons Inc, 2nd Edition, 2011.
4. Michel Berry and Gordon Linoff, Data mining techniques for Marketing, Sales and Customer support, John Wiley, 2011.
5. G. K. Gupta, Introduction to Data mining with Case Studies, Prentice hall of India, 2011.
6. Giudici, Applied Data mining – Statistical Methods for Business and Industry, John Wiley. 2009
7. Michalewicz Z., Schmidt M. Michalewicz M and Chiriac C, Adaptive Business Intelligence, Springer – Verlag, 2007.
8. GalitShmueli, Nitin R. Patel and Peter C. Bruce, Data Mining for Business Intelligence Concepts, Techniques and Applications Wiley, India, 2010



Programme Coordinator



BOS Chairman

B.Tech - CSBS	B19CBE603 – COGNITIVE SCIENCE AND ANALYTICS	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To know about the basics of science, psychology, nervous system and brain.
2. To understand brain and sensory motor information, representation of sensory information.
3. To analyze from sensation to cognition; Roots of cognitive science.
4. To develop language and embodiment.
5. To implement affordances in biological and artificial systems, cognitive development.

UNIT-I INTRODUCTION TO THE STUDY OF COGNITIVE SCIENCES 9

Introduction to the study of cognitive sciences - A brief history of cognitive science - Methodological concerns in philosophy - Artificial intelligence and psychology - Structure and constituents of the brain - Brief history of neuroscience - Mathematical models - Looking at brain signals - Processing of sensory information in the brain.

UNIT-II COGNITIVE MODELS 9

Brain Imaging - FMRI, MEG - PET, EEG - Multisensory integration in cortex - Information fusion - From sensation to cognition – Cybernetics - From physics to meaning, Analog vs. Digital: Code duality.

UNIT-III LINGUISTIC KNOWLEDGE 9

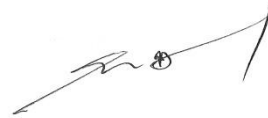
Linguistic knowledge: Syntax, semantics, (and pragmatics) - Generative linguistic - Brain and language - Language disorders – Lateralization - The great past tense debate - Cognitivist and emergent stand points - A robotic perspective.

UNIT-IV AFFORDANCES 9

Direct perception - Ecological Psychology - Affordance learning in robotics - Child and robotic development - Attention and related concepts - Human visual attention - Computational models of attention - Applications of computational models of attention.



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Logic; Machine learning - Constructing memories - Explicit vs. implicit memory - Information processing (three-boxes) model of memory - Sensory memory; Short term memory – Long term memory; Rationality - Bounded rationality; Prospect theory; Heuristics and biases - Reasoning in computers - Key points in social cognition - Context and social judgment; Schemas; Social signals.

Total Instructional hours:45

Course Outcomes:

CO1: Outline the concept of cognitive science, psychology, nervous system and brain.

CO2: Illustrate brain and sensory motor information, representation of sensory information.

CO3: Analyze from sensation to cognition; Roots of Cognitive Science.

CO4: Apply affordances in biological and artificial systems, cognitive development.

CO5: Relate the concepts of learning, memory, reasoning, social cognition.

Text Books:

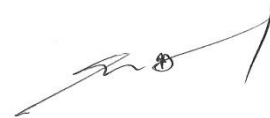
1. Pradeep Kumar Mallick, Samarjeet Borah," Emerging Trends and Applications in Cognitive Computing", IGI Global Publishers, 2019.

Reference Books:

1. Jose Luis Bermudez, "Cognitive Science: An Introduction to the Science of the Mind", Cambridge University Press, New York, 2020.
2. Judith H Hurwitz, Marcia Kaufman, Adrian Bowles, "Cognitive computing and Big Data Analytics", Wiley, 2015.
3. Vijay Raghvan, Venu Govindaraju, C.R. Rao, Cognitive Computing: Theory and Applications", by Elsevier publications, North Holland Publication, 1st Edition, 2016.
4. G. A. S. Vans, Vyvyan and Melanie Green; Cognitive linguistics: an introduction, Routledge, 2006.
5. Min Chen and Kai Hwang, Big-Data Analytics for Cloud, IoT and Cognitive Computing Wiley Publication, 1st Edition, 2017



Programme Coordinator



BOS Chairman

B.Tech - CSBS	B19CBE604 – COMPUTATIONAL FINANCE & MODELING	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To understand the financial modeling need and Built in functions using spread sheets.
2. To build the financial models for capital budgeting techniques.
3. To acquire the knowledge of bond and equity share valuation modeling.
4. To know the portfolio construction modeling.
5. To enrich the knowledge about the derivative modeling.

UNIT- I INTRODUCTION TO FINANCIAL MODELLING & BUILT IN FUNCTIONS USING SPREAD SHEETS 9

Introduction to Financial Modeling- Need for Financial Modeling- Steps for effective financial modeling- Introduction to Time value of money & Lookup array functions :FV,PV,PMT,RATE,NPER, Vlookup, Hlookup ,if, countifetc - Time value of Money Models: EMI with Single & Two Interest rates –Loan amortization modeling-Debenture redemption modeling.

UNIT- II CORPORATE FINANCIAL MODELLING 9

Alt Man Z score Bankruptcy Modeling-Indifference point modeling – Financial Break even modeling - Business Modeling for capital budgeting evaluation: Payback period ,NPV ,IRR and MIRR.

UNIT- III BOND & EQUITY SHARE VALUATION MODELLING 9

Bond valuation – Yield to Maturity (YTM): Rate method Vs IRR method-Flexi Bond and Strip Bond YTM Modeling-Bond redemption modeling - Corporate valuation modeling (Two stage growth) - Equity share valuation: Multiple growth rate valuation modeling with and without growth rates.

UNIT- IV PORTFOLIO MODELLING 9

Risk, Beta and Annualized Return –Security Market Line Modeling –Portfolio risk calculation (Equal Proportions)-Portfolio risk optimization (varying proportions)-Portfolio construction modeling

UNIT- V DERIVATIVE MODELLING 9

Option pay off modeling: Long and Short Call & Put options -Option pricing modeling (B-S Model)- Optimal Hedge Contract modeling.

Total Instructional hours: 45



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Course Outcomes:

Students will be able to

CO1: Develop fast, efficient and accurate excel skills.

CO2: Make use of efficient financial budgeting and forecasting techniques.

CO3: Construct useful and robust financial modeling applications.

CO4: Construct optimal portfolio modeling of securities.

CO5: Develop various derivative models for avoiding risks.

Text Books:


1. John C. Hull, Options, Futures, and Other Derivatives Prentice Hall, Tenth Edition.
2. Ruey S. T say, Analysis of Financial Time Series, John Wiley, 2020.

Reference Books:

1. Wayne L Winston, "Microsoft Excel 2016 - Data Analysis and Business Modelling", PHI publications, (Microsoft Press), New Delhi, 2017.
2. Chandan Sen Gupta, "Financial analysis and Modelling –Using Excel and VBA" , Wiley Publishing House, 2014.
3. Craig W Holden, "Excel Modelling in Investments" Pearson Prentice Hall, Pearson Inc, New Jersey, 5th Edition 2015
4. Ruzhbeh J Bodanwala , "Financial Management Using Excel Spread Sheet", Taxman Allied services Pvt Ltd, New Delhi, 3rd Edition 2015.



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BOS Chairman

B.Tech - CSBS	B19CBE605 – INDUSTRIAL PSYCHOLOGY	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To understand about human communication and behaviour.
2. To develop the awareness on visual system, auditory system and learning perception.
3. To better understanding about the philosophy of mind and emotions.
4. To learn to use the various kinds of thinking in a formal context.
5. To critically evaluate content and comprehend the message on the bases of perception, personality and intelligence.

UNIT- I INTRODUCTION 5

Psychology as science – Behavior and its role in human communication – socio-cultural bases of behaviour – Biological bases of behavior - Brain and its functions – Principles of Heredity – Cognition and its functions Fields of psychology – Cognitive and Perceptual – Industrial and Organizational.

UNIT- II SENSORY & PERCEPTUAL PROCESSES 12

Some general properties of Senses: Visual system – the eye, colour vision – Auditory system – Hearing, listening, Sounds - Other senses - Selective attention; physiological correlates of attention; Internal influences on perception learning – set - motivation & emotion - cognitive styles; External influences on perception figure and ground separation – movement – organization – illusion; Internal- external interactions: Constancy - Depth Perception- Binocular & Monocular Perception; Perceptual defense & Perceptual vigilance; Sensory deprivation -Sensory bombardment; ESP - Social Perception.

UNIT- III COGNITION & AFFECT 9

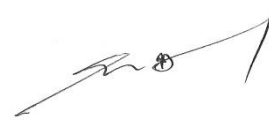
Learning and memory – philosophy of mind – concepts - words – images – semantic features – Association of words – Repetition – Retrieval – Chunking - Schemata - Emotion and motivation – nature and types of motivation – Biological & Psychosocial motivation – nature and types of emotions – physiological & cognitive bases of emotions – expressions of emotions – managing negative emotions - enhancing positive emotions.

UNIT- IV THINKING, PROBLEM-SOLVING & DECISION MAKING 9

Thinking skills – Types of thinking skills – Concrete & Abstract thinking – Convergent & Divergent - Analytical & Creative thinking – Problem & Possibility thinking – Vertical & Lateral thinking – Problem solving skills – stages of problem solving skills – Decision making - intuition and reasoning skills - Thinking and language - The thinking process- concepts, problem solving, decision-making, creative thinking; language communication.



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Psychological phenomena & Attributes of humans - cognition, motivation, and behaviour - thoughts, feelings, perceptions, and actions – personality dimensions, traits, patterns - Specialized knowledge, performance accomplishments, automaticity or ease of functioning, skilled performance under challenge - generative flexibility, and speed of learning or behaviour change.

Total instructional hours: 45

Course Outcomes:

Students will be able to

CO1: Outline the human communication and human behaviour.

CO2: Apply visual system; auditory system and other senses for identify the learning perception.

CO3: Select different kinds of motivations to managing negative emotions.

CO4: Make use of the various kinds of thinking in a formal context.

CO5: Make use of the content and comprehend the message on the bases of perception, personality and intelligence.

Text Books:

1. K.Aswatappa, Human Resource Management, Mc Graw Hill, 7th Edition, 874 pages, May 2013.
2. Dessler Human Resource Management, Pearson Education Limited, 14th Edition, 2015.

Reference Books:

1. Decenzo and Robbins, Fundamentals of Human Resource Management, Wiley, 11th Edition, 2013.
2. Luis R.Gomez-Mejia, David B.Balkin, Robert L Cardy. Managing Human Resource. PHI Learning 2012.
3. Bernadin, Human Resource Management, Tata Mcgraw Hill ,8th edition 2012.
4. Wayne Cascio, Managing Human Resource, McGraw Hill, 2007.
5. Ivancevich, Human Resource Management, McGraw Hill 2012.
6. Uday Kumar Haldar, Juthika Sarkar. Human Resource management. Oxford. 2012.



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Introduction- Advanced Optimizations of Cache Performance- Memory Technology and Optimizations- Virtual Memory and Virtual Machines- The Design of Memory Hierarchy - Introduction to Pin Instrumentation and Cache grind.

Total Instructional hours:45

Course Outcomes:

Students will be able to

CO1: Apply the knowledge of performance metrics to find the performance of systems.

CO2: Determine the technique to execute multiple instruction in single core and multi-core processor.

CO3: Analyze how parallel processing and memory system can have significant impact on performance of a digital computer.

CO4: Identify the different types of parallelism that can be exploited in a computer architecture.

CO5: Understand the process of controlling and coordinating computer memory.

Text Books:

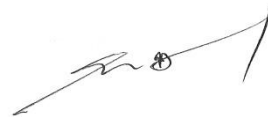
1. David A Patterson and John L Hennessey, Computer organization and design, Sixth edition, Morgan Kauffman, 2020.
2. Morris Mano, "Computer System Architecture", 3rd Edition, Prentice Hall of India, New Delhi, 2014.

Reference Books:

1. Carl Hamacher, Zvonko G Varanesic and Safat G Zaky, Computer Organisation, sixth edition, Mc Graw-Hill Inc, 2012.
2. William Stallings, Computer Organization and Architecture, eleventh Edition, Pearson Education, 2019.
3. Vincent P. Heuring and Harry F. Jordan, "Computer System Design and Architecture", Prentice Hall, 2nd Edition, 2004.



Programme Coordinator



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B.Tech - CSBS	B19CBE606 – PEOPLE ANALYTICS	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To develop the ability of the learners to define HR metrics that are aligned with the overall business strategy.
2. To know about the learning analytics and their respective impact and application.
3. To learn about the sound management practices.
4. To understand the indicators of success in people analytics.
5. To acquire knowledge about technology's role in learning measurement.

UNIT-I INTRODUCTION 9

Introduction – The L & D value gap – The rise of learning analytics – Data availability – Talent analytics work – Employee behavior – Analytics rises – Notes.

UNIT-II LEARNING ANALYTICS 9

Learning analytics today - Measure for measure – Efficiency, effectiveness and business outcomes – closing the learning measurement gap – The four levels of evaluation – Value-centred learning organization – Delivering and demonstrating value – The Talent Development Value Framework.

UNIT-III ESTABLISHING SOUND MEASUREMENT PRACTICES 9

Aligning L & D's value with the C-suite – Connecting L & D with the business strategy – Building business alignment – Benefits of portfolio alignment – Portfolio management – Change of conversation – Linking learning to business impact – Experimental designs – Alternative designs : practical ways forward.

UNIT-IV INDICATORS OF SUCCESS 9

Effective training programmes – Scrap learning – Performance improvement – Predictive Learning Impact Model 2.0 : Casual Modelling – Sustainable reporting strategy – Perform gap assessment – Special cases : dashboards and scorecards – Monitor the strategy : success indicators - Conclusion.



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UNIT-V**TECHNOLOGY'S ROLE IN LEARNING MEASUREMENT****9**

Benefits and costs of learning technologies – The requirements for a new technology system in the BI space – The challenge of self-reported data – ROI of technology systems – Standards for decision making – Benchmarking – Statistical significance – MTM beyond benchmarks – Benchmarks to support decision-making.

Total Instructional hours:45**Course Outcomes:**

Students will be able to

CO1: Apply HR metrics that are aligned to business strategy.

CO2: Inspect the various levels of learning analytics.

CO3: Analyze various design of sound measurement practices.

CO4: Determine the indicators of success in people analytics.

CO5: Interpret the technology's role in learning measurement.

Text Books:

1. Introduction to People Analytics: A Practical Guide to Data-driven HR, Dave Millner and Nadeem Khan, Kogan Page, 2020 .
2. Ferrar, J. and Green, D. Excellence in people analytics: How to use workforce data to create business value. Kogan Page, 2021.

Reference Books:

1. Dearborn, J. and Swanson, D. The data driven leader: A powerful approach to delivering measurable business impact through people analytics. Wiley, 2018.
2. Guenole, N., Ferrar, J. and Feinzig, S. (2017). The power of people: Learn how successful organizations use workforce analytics to improve business performance. Pearson Education, 2017.



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B.Tech - CSBS	B19CBE607 – ADVANCE FINANCE	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To understand the fundamentals of Financial management and operations nuances of a Finance Manager.
2. To familiarize the students with the valuation of firm and Comprehend the technique of making decisions related to finance function.
3. To make a student's familiarize with capital structure and design the dividend policy.
4. To demonstrate the importance of working capital management and the tools to manage it.
5. To understand the significance of long term sources of finance.

UNIT- I FOUNDATIONS OF FINANCE 9

Introduction to finance- Financial Management - functions of Finance, organization of financial functions, objectives of Financial management, Major financial decisions - Time value of money - features and valuation of shares and bonds - Concept of risk and return - single asset and of a portfolio.

UNIT- II INVESTMENT DECISIONS 9

Capital Budgeting: Principles and techniques - Nature of capital budgeting- Identifying relevant cash flows - Evaluation Techniques: Payback, Accounting rate of return, Net Present Value, Internal Rate of Return, Profitability Index - Comparison of DCF techniques Concept and measurement of cost of capital - Specific cost and overall cost of capital.

UNIT- III FINANCING AND DIVIDEND DECISION 9

Financial and operating leverage - Combined leverage. Capital structure - Theories - Net Income Approach, Net Operating Income Approach, MM Approach- Determinants of Capital structure. Dividend policy - Aspects of dividend policy - practical consideration - forms of dividend policy - forms of dividends - share splits.

UNIT- IV WORKING CAPITAL MANAGEMENT 9

Principles of working capital: Concepts, Needs, Determinants, issues and estimation of working capital- Accounts Receivables Management and factoring - Inventory management - Cash management - Working capital finance: Trade credit, Bank finance and Commercial paper.

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Indian capital and stock market, New issues market Long term finance: Shares, debentures and term loans, lease, hire purchase, venture capital financing, Private Equity.

Total Instructional hours: 45

Course Outcomes:

Students will be able to

CO1: Identify the functions of finance, role of finance managers, and importance of risk and return within the context of financial decision making.

CO2: Compare and contrast the financial techniques in light of conflicting rankings with valuation of firm.

CO3: Appraise the value and earnings of the firms through leverages, capital structure and dividend decision.

CO4: Explain on identification and solution of financial problems confronting Business enterprises.

CO5: Choose the fund raising mechanism including public issue process.

Text Books:

1. Brigham and Ehrhardt, Financial Management, 14th edition, Cengage, 2015.
2. Pandey M, Financial Management, 10th edition, Vikas Publishing House Pvt. Ltd, 2012.
3. Khan M.Y and Jain P.K, Financial management Text, Problems and cases, 6th edition, Tata McGraw Hill, 2011.

Reference Books:

1. Parasuraman.N.R, Financial Management, Cengage, 2014.
2. William R.Lasher, Financial Management, 7th Edition, Cengage, 2014.
3. James C. Vanhorne, Fundamentals of Financial Management, 11th Edition PHI Learning, 2012.
4. Prasanna Chandra, Financial Management, 9th edition, Tata McGraw Hill, 2012.
5. Aswat Damodaran, Corporate Finance Theory and practice, John Wiley & Sons, 2011.
6. Srivatsava, Mishra, Financial Management, Oxford University Press, 2011.
7. Sudersena Reddy G, Financial Management- Principles & Practices, 2nd Edition, Himalaya Publishing House, 2010.



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Professional Electives (PE)

Semester – VII Elective - IV

B.Tech - CSBS	B19CBE701 – ADVANCED SOCIAL TEXT AND MEDIA ANALYTICS	T	P	TU	C
		3	0	0	3

Course Objectives:

- 1.To understand the basic issues and types of social, text and media mining
- 2.To familiarize the learners with the concept of social, text and media analytics and understand its significance.
- 3.To familiarize the learners with the tools of social, text and media analytics.
- 4.To enable the learners to develop skills required for analyzing the effectiveness of social, text and media for business purposes.
- 5.To know the applications in real time systems.

UNIT I INTRODUCTION TO SOCIAL MEDIA ANALYSIS 9

Social media landscape, Need for SMA; SMA in Small organizations; SMA in large organizations; Application of SMA in different areas. Network fundamentals and models: The social networks perspective - nodes, ties and influencers, Social network and web data and methods. Graphs and Matrices- Basic measures for individuals and networks. Information visualization.

UNIT II OVERVIEW OF TEXT MINING 9

Overview of text mining- Definition- General Architecture– Algorithms– Core Operations – Preprocessing–Types of Problems- basics of document classification- information retrieval- clustering and organizing documents- information extraction- prediction and evaluation-Textual information to numerical vectors -Collecting documents- document standardization- tokenization-lemmatization vector generation for prediction- sentence boundary determination -evaluation performance.

UNIT III TEXT MINING FOR INFORMATION RETRIEVAL AND EXTRACTION 9

Information retrieval and text mining- keyword search- nearest-neighbor methods- similarity- web based document search- matching- inverted lists- evaluation. Information extraction- Architecture - Co-reference - Named Entity and Relation Extraction- Template filling and database construction – Applications. Inductive -Unsupervised Algorithms for Information Extraction. Text Summarization Techniques - Topic Representation - Influence of Context - Indicator Representations – Pattern Extraction - Apriori Algorithm – FP Tree algorithm.



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UNIT IV WEB ANALYTICS TOOLS**9**

Clickstream analysis, A/B testing, online surveys, Web crawling and Indexing. Natural Language Processing Techniques for Micro-text Analysis.

UNIT V SOCIAL MEDIA ANALYTICS**9**

Introduction, parameters, demographics. Analyzing page audience. Reach and Engagement analysis. Post- performance on FB. Social campaigns. Measuring and Analyzing social campaigns, defining goals and evaluating outcomes, Network Analysis.

Total Instructional hours:45**Course Outcomes:**

Students will be able to

CO1: Understand about social, text and media mining .

CO2: Understand the problems and algorithms involved in text mining.

CO3: Understand the significance of social text and media analytics

CO4: Learn tools of social, text and media analytics.

CO5: Develop skills required for analyzing the effectiveness of social text and media for business purposes

Text Books:

1. Marshall Sponder, Social Media Analytics, McGraw Hill ,2011.
2. Charu C. Aggarwal ,ChengXiang Zhai, Mining Text Data, Springer; 2012

Reference Books:

1. Matthew Ganis, Avinash Kohirkar , Social Media Analytics: Techniques and Insights for Extracting Business Value Out of Social Media, Pearson, 2016.
2. Jim Sterne, Social Media Metrics: How to Measure and Optimize Your Marketing Investment, Wiley, 2010.
3. Oliver Blanchard ,Social Media ROI: Managing and Measuring Social Media Efforts in Your Organization (Que Biz-Tech), 2019.



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4. Sholom Weiss, Nitin Indurkha, Tong Zhang, Fred Damerau "The Text Mining Handbook.
5. "Advanced Approaches in Analyzing Unstructured Data", Springer, paperback 2010
6. Ronen Feldman, James Sanger -" The Text Mining Handbook: Advanced Approaches in Analyzing Unstructured Data", Springer, paperback 2010.
7. Tracy L. Tuten, Michael R. Solomon, Social Media Marketing , Sage, 2016.

A handwritten signature in blue ink, appearing to read 'Plahas', is written on a yellow rectangular background.

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A handwritten signature in black ink, consisting of several stylized, overlapping strokes, is written on a white background.

BOS Chairman

B.Tech - CSBS	B19CBE702 – INTRODUCTION TO IOT	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To understand Smart Objects and IoT Architectures
2. To understand about various IoT-related protocols
3. To learn about simple IoT Systems using Arduino and Raspberry Pi.
4. To understand data analytics and cloud in the context of IoT
5. To understand about IoT infrastructure for popular applications

UNIT I FUNDAMENTALS OF IoT**9**

Evolution of Internet of Things - Enabling Technologies – IoT Architectures: oneM2M, IoT World Forum (IoTWF) and Alternative IoT models – Simplified IoT Architecture and Core IoT Functional Stack – Fog, Edge and Cloud in IoT – Functional blocks of an IoT ecosystem – Sensors, Actuators, Smart Objects and Connecting Smart Objects

UNIT II IoT PROTOCOLS**9**

IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and LoRaWAN – Network Layer: IP versions, Constrained Nodes and Constrained Networks – Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks – Application Transport Methods: Supervisory Control and Data Acquisition – Application Layer Protocols: CoAP and MQTT

UNIT III DESIGN AND DEVELOPMENT**9**

Design Methodology - Embedded computing logic - Microcontroller, System on Chips - IoT system building blocks - Arduino - Board details, IDE programming - Raspberry Pi - Interfaces and Raspberry Pi with Python Programming.

UNIT IV DATA ANALYTICS AND SUPPORTING SERVICES**9**

Structured Vs Unstructured Data and Data in Motion Vs Data in Rest – Role of Machine Learning – No SQL Databases – Hadoop Ecosystem – Apache Kafka, Apache Spark – Edge Streaming Analytics and Network Analytics – Xively Cloud for IoT, Python Web Application Framework – Django – AWS for IoT – System Management with NETCONF-YANG

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UNIT V CASE STUDIES/INDUSTRIAL APPLICATIONS**9**

Cisco IoT system - IBM Watson IoT platform – Manufacturing - Converged Plantwide Ethernet Model (CPwE) – Power Utility Industry – GridBlocks Reference Model - Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control

Total Instructional hours:45**Course Outcomes:**

Students will be able to

CO1: Infer the components that forms part of IoT Architecture.

CO2: Experiment the connections between devices and sensors.

CO3: Analyze the communication protocols for IoT.

CO4: Experiment the most appropriate IoT devices and sensors based on Case Studies.

CO5: Utilize the services of Data analytics.

Text Books:


1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, —IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017

Reference Books:

1. Arshdeep Bahga, Vijay Madiseti, —Internet of Things – A hands-on approach, Universities Press, 2015
2. Olivier Hersent, David Boswarthick, Omar Elloumi , —The Internet of Things – Key applications and Protocols, Wiley, 2012 (for Unit 2).
3. Jan Ho" ller, Vlasios Tsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.
4. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), —Architecting the Internet of Things, Springer, 2011.



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Professional Electives (PE)

Semester – VII Elective - V

B.Tech - CSBS	B19CBE703 – ENTERPRISE SYSTEMS	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To understand the Evolution of Enterprise Systems.
2. To study the modules and Management system.
3. To understand the Framework of Enterprise Systems.
4. To understand the impact factor of ERP Implementation.
5. To learn about various trends of Enterprise systems.

UNIT I**INTRODUCTION****9**

Overview of enterprise systems – Evolution - Risks and benefits - Fundamental technology - Issues to be consider in planning design and implementation of cross functional integrated ERP systems

UNIT II**ERP SOLUTIONS AND FUNCTIONAL MODULES****9**

Overview of ERP software solutions- Small medium and large enterprise vendor solutions, BPR, Business Engineering and best Business practices – Business process Management. Overview of ERP modules -sales and Marketing, Accounting and Finance, Materials and Production management.

UNIT III ERP IMPLEMENTATION**9**

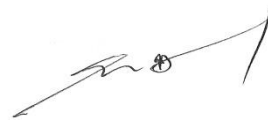
Planning Evaluation and selection of ERP systems- Implementation life cycle - ERP implementation, Methodology and Frame work- Training Data Migration. People Organization in implementation - Consultants, Vendors and Employees.

UNIT IV POST IMPLEMENTATION**9**

Maintenance of ERP- Organizational and Industrial impact; Success and Failure factors of ERP Implementation



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UNIT IV EMERGING TRENDS ON ERP**9**

Extended ERP systems and ERP add-ons -CRM, SCM, Business analytics etc- Future trends in ERP systems-web enabled, Wireless technologies so on.

Total Instructional hours:45**Course Outcomes:**

Students will be able to

CO1: Infer the Implementation of ERP Systems.

CO2: Analyze various models of Enterprise Systems.

CO3: Inter the Methodologies and Frameworks.

CO4: Experiment the impact factor of Enterprise Implementation.

CO5: Utilize the services of ERP.

Text Books:


1. Alexis Leon, ERP demystified, Third Edition Tata McGraw-Hill, 2014.

Reference Books:

1. Jagan Nathan Vaman, ERP in Practice, Tata McGraw-Hill, 2008
2. Alexis Leon, Enterprise Resource Planning, second edition, Tata McGraw-Hill, 2008.
3. Mahadeo Jaiswal and Ganesh Vanapalli, ERP Macmillan India, 2009.
4. Vinod Kumar Grag and N.K. Venkitakrishnan, ERP- Concepts and Practice, Prentice Hall of India, 2nd edition, 2006.
5. Summer, ERP, Pearson Education, 2008.



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B.Tech - CSBS	B19CBE704 – VIRTUAL AND AUGMENTED REALITY	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To understand the relevance of this course to the existing technology through demonstrations, case studies and applications with a futuristic vision along with socio-economic impact and issues.
2. To understand virtual reality, augmented reality and using them to build Biomedical engineering applications.
3. To learn about the intricacies of these platform to develop PDA applications with better optimality.
4. To understand about various modeling processes.
5. To study about Simulations and Applications.

UNIT I INTRODUCTION 9

The three I's of virtual reality-commercial VR technology and the five classic components of a VR system - Input Devices: (Trackers, Navigation, and Gesture Interfaces): Three-dimensional position trackers, navigation and manipulation-interfaces and gesture interfaces-Output Devices: Graphics displays-sound displays & haptic feedback.

UNIT II VR DEVELOPMENT PROCESS 9

Geometric modeling - kinematics modeling- physical modeling - behavior modeling - model Management.

UNIT III CONTENT CREATION CONSIDERATIONS FOR VR 9


Methodology and terminology-user performance studies-VR health and safety issues-Usability of virtual reality system- cyber sickness -side effects of exposures to virtual reality environment

UNIT IV VR ON THE WEB & VR ON THE MOBILE 10

JS-pros and cons-building blocks (WebVR, WebGL, Three.js, device orientation events)- frameworks (A-frame, React VR)-Google VR for Android-Scripts, mobile device configuration, building to android-cameras and interaction-teleporting-spatial audio-Assessing human parameters-device development and drivers-Design Haptics



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UNIT V APPLICATIONS**8**

Medical applications-military applications-robotics applications- Advanced Real time Tracking- other applications- games, movies, simulations, therapy

Course Outcomes:

CO1: Outline the technology and concepts of VR Systems.

CO2: Identify the process development of VR.

CO3: Build the considerations for VR.

CO4: Apply VR on the Web and mobile concepts.

CO5: Inspect the applications and simulations of VR.

Text Books:

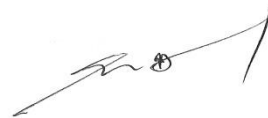
1. C. Burdea & Philippe Coiffet, "Virtual Reality Technology", Second Edition, Gregory, John Wiley & Sons, Inc.,2008
2. Jason Jerald. 2015. The VR Book: Human-Centred Design for Virtual Reality. Association for Computing Machinery and Morgan & Claypool, New York, NY, USA.

References Books:

1. Augmented Reality: Principles and Practice (Usability) by Dieter Schmalstieg & Tobias Hollerer, Pearson Education (US), Addison-Wesley Educational Publishers Inc, New Jersey, United States, 2016. ISBN: 9780321883575
2. Practical Augmented Reality: A Guide to the Technologies, Applications, and Human Factors for AR and VR (Usability),Steve Aukstakalnis, Addison-Wesley Professional; 1 edition, 2016.
3. The Fourth Transformation: How Augmented Reality & Artificial Intelligence Will Change Everything, Robert Scoble & Shel Israel, Patrick Brewster Press; 1 edition, 2016.
4. Learning Virtual Reality: Developing Immersive Experiences and Applications for Desktop, Web, and Mobile, Tony Parisi, O'Reilly Media; 1 edition, 2015.
5. Programming 3D Applications with HTML5 and WebGL: 3D Animation and Visualization for Web Pages, Tony Parisi, O'Reilly Media; 1 edition, 2014.
6. Learning Three.js: The JavaScript 3D Library for WebGL - Second Edition, Jos Dirksen, Packt Publishing - ebooks Account; 2nd Revised ed. Edition 2015.



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UNIT- V**MARKETING RESEARCH & TRENDS IN MARKETING****9**

Marketing Information System- Research Process- Concepts and applications: Product-Advertising - Promotion - Consumer Behaviour - Retail research - Customer driven organizations -Cause related marketing - Ethics in marketing -Online marketing - Emerging trends.

Total instructional hours: 45**Course Outcomes:**

Students will be able to

CO1: Develop awareness of marketing management.

CO2: Make use of marketing mix decisions.

CO3: Discover about marketing strategic mix components.

CO4: Analyze industrial and individual buying behavior.

CO5: Assess marketing research & trends in marketing management.

Text Books:

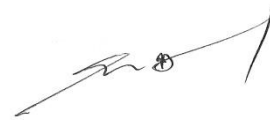
1. Philip Kotler and Kevin Lane Keller, Marketing Management, PHI 14th Edition, 2012.
2. KS Chandrasekar, "Marketing management-Text and Cases", Tata McGraw Hill, First edition,2010.

Reference Books:

1. Lamb, hair, Sharma, Mc Daniel- Marketing - An Innovative approach to learning and teaching- A south Asian perspective, Cengage Learning, 2012.
2. Paul Baines, Chris Fill and Kelly Page, Marketing, Oxford University Press, 2nd Edition,2011.
3. MichealR.Czinkota& Masaaki Kotabe, Marketing Management, Cengage, 2000.



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Professional Electives (PE)

Semester – VIII Elective - VI

B.Tech - CSBS	B19CBE801 – CONTINUOUS INTEGRATION AND CONTINUOUS DEPLOYMENT	T	P	TU	C
		3	0	0	3

Course Objectives:

1. To help the students gain understanding of continuous integration and deployment
2. To study about anatomy of continuous delivery pipeline
3. To understand the process steps for achieving continuous integration.
4. To learn the concept of static code analysis concepts and working
5. To study about various devops tools and its usage on continuous integration and development.

UNIT-I CONTINUOUS INTEGRATION AND CONTINUOUS DEPLOYMENT 8

An example to understand CI/CD - Agile runs on CI/CD - Types of project that benefit from CI/CD

UNIT-II ANATOMY OF CONTINUOUS DELIVERY PIPELINE 10

Rebase frequently from the mainline - Check-in frequently - Frequent build - Automate the testing as much as possible - Automate the deployment

UNIT-III ACHIEVE CONTINUOUS INTEGRATION 10

Development operations - Use a version control system - Use repository tools - Use a Continuous Integration tool - Automate the packaging - Automating the deployments - Automating the testing

UNIT-IV STATIC CODE ANALYSIS AND DEVOPS 8

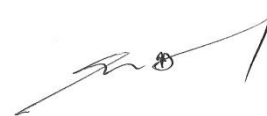
Data Flow Analysis - Control Flow Graph (CFG) - Taint Analysis - Lexical Analysis- Defining the emerging role of devops-10 continuous integration tools to spur API development

UNIT-V API-Driven DevOps: Strategies for Continuous Deployment 9

Reaching devops Zen: Tracking the process of continuous integration-Introduction to docker containers-Tools build on top of docker API-Present and future of configuration management-Securities for continuous delivery environment.

Total Instructional hours:45


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Course Outcomes:

Students will be able to do

- CO1:** Outline the concept of continuous integration and development
- CO2:** Identify the steps involved in continuous delivery pipeline
- CO3:** Apply knowledge to achieve continuous integration.
- CO4:** Study about static code analyzers and devops.
- CO5:** Build and inspect strategies for continuous development on API-driven devops tools.

Text Books:

1. Continuous delivery and DevOps A Quickstart Guide - Book by Paul Swartout , Shroff Publishers & Distributors Pvt Ltd (1 July 2014).
2. API-Driven DevOps: Strategies for Continuous Deployment, by Chris Wood (Author), Vassili van der Mersch (Author), Kristopher Sandoval (Author), Bill Doerrfeld (Editor), Kindle edition.

Reference Books:

1. Continuous Delivery - Jez Humble and David Farley, Addison-Wesley Professional; 1st edition (27 July 2010).
2. Jenkins: The Definitive Guide - John Ferguson Smart , O'Reilly; 1st edition (9 August 2011).



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UNIT IV ROBOT KINEMATICS AND ROBOT PROGRAMMING 13

Forward Kinematics, Inverse Kinematics and Difference; Forward Kinematics and Reverse Kinematics of manipulators with Two, Three Degrees of Freedom (in 2 Dimension), Four Degrees of freedom (in 3 Dimension) Jacobians, Velocity and Forces-Manipulator Dynamics, Trajectory Generator, Manipulator Mechanism Design-Derivations and problems. Lead through Programming, Robot programming Languages-VAL Programming-Motion Commands, Sensor Commands, End Effector commands and simple Programs.

UNIT IV IMPLEMENTATION AND ROBOT ECONOMICS 5

RGV, AGV; Implementation of Robots in Industries-Various Steps; Safety Considerations for Robot Operations - Economic Analysis of Robots.

Total Instructional hours:45

Course Outcomes:

Students will be able to

- CO1:** Utilize the different parts and functions of Robot.
- CO2:** Infer the applications of different types of Sensors.
- CO3:** Interpret various Robot Programming Languages.
- CO4:** Experiment various Robotic operations for safety Considerations.
- CO5:** Inspect the different types of drive systems.

Text Books:

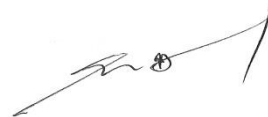
1. Klafter R.D., Chmielewski T.A and Negin M., "Robotic Engineering - An Integrated Approach", Prentice Hall, 2003.
2. Groover M.P., "Industrial Robotics -Technology Programming and Applications", McGraw Hill, 2001.

References Books:

1. Craig J.J., "Introduction to Robotics Mechanics and Control", Pearson Education, 2008.
2. Deb S.R., "Robotics Technology and Flexible Automation" Tata McGraw Hill Book Co., 1994.
3. Koren Y., "Robotics for Engineers", Mc Graw Hill Book Co., 1992.
4. Fu.K.S.,Gonzalz R.C. and Lee C.S.G., "Robotics Control, Sensing, Vision and Intelligence", McGraw Hill Book Co., 1987.
5. Janakiraman P.A., "Robotics and Image Processing", Tata McGraw Hill, 1995.
6. Rajput R.K., "Robotics and Industrial Automation", S.Chand and Company, 2008.



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B.Tech - CSBS	B19CBE803 – BUSINESS CONTINUITY AND DISASTER RECOVERY	T	P	TU	C
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Course Objectives:

1. To understand the concept of business continuity management.
2. To learn about risk and business impact analysis.
3. To learn the importance of Business Continuity Planning.
4. To acquire knowledge about disaster and recovery.
5. To understand the concept of data recovery.

UNIT- I INTRODUCTION**9**

Introduction to Business Continuity Management (BCM) and Disaster Recovery (DR) -Terms and definitions - BCM principles - BCM life cycle - (BCM program management, Understanding the organization - Determining business continuity strategy, Developing and implementing a BCM response, BCM exercising, Maintaining and reviewing BCM arrangements, Embedding BCM in the organization's culture)- BCM in business: Benefits and consequence - Contemporary landscape: Trends and directions.

UNIT- II BUSINESS IMPACT ANALYSIS**9**

BCM and DR–The relationship with Risk Management - Risk Management concepts and framework - Concepts of threat, vulnerabilities and hazard - Risk Management process - Risk assessment, risk control options analysis, risk control implementation, risk control decision, and risk reporting - Business Impact Analysis (BIA) concept, benefits and responsibilities - BIA methodology - Assessment of financial and operational impacts, identification of critical IT systems and applications, identifications of recovery requirements and BIA reporting - Relationship between BIA and Risk Management.

UNIT- III BUSINESS CONTINUITY STRATEGY AND BUSINESS CONTINUITY PLAN (BCP) DEVELOPMENT**9**

Business continuity strategy development framework - Cost-benefit assessment - Site assessment and selection - Selection of recovery options - Strategy considerations and selection - Linking strategy to plan - Coordinating with External Agencies -Business continuity plan contents - Information Systems aspects of BCP - Crisis Management - Emergency response plan and crisis communication plan - Awareness, training and communication - Plan activation - Business Continuity Planning Tools.

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UNIT- IV INTRODUCTION TO DISASTER AND RECOVERY**9**

Meaning of disaster - Types of Disaster - Emergency Management-Need, Emergency Management Phases. Effect of Disaster on Business Organizations - Emergency Management for Business Organizations. Disaster Recovery -- Principles of Disaster Recovery and Business Continuity- activities of Disaster Recovery & Business Continuity. International Strategy for Disaster Reduction (ISDR).

UNIT- V DATA RECOVERY**9**

Risk Analysis - IT Security Risk Management- Data Recovery - Types of Data Recovery - Steps in Data Recovery – IT Recovery strategy – IT recovery architecture – IT Disaster recovery Plan. System Recovery - Need for Backup - Centralized and Decentralized System Recovery - Distributed Computing. Recent Trends in data recovery.

Total Instructional hours:45**Course Outcomes:**

Students will be able to

CO1: Outline the Importance of business continuity management.

CO2: Summarize the risk management and business impact analysis.

CO3: Make use of business continuity development tools.

CO4: Select the emergency management for business organization and identify the activities of Disaster Recovery and Business Continuity.

CO5: Choose best data recovery with a help of modern technology.

Reference Books:

1. Susan Snedaker, "Business Continuity and Disaster Recovery Planning for IT Professionals" 2nd Edition, 2020.
2. Brenda Phillips and Mark Landahl, "Business Continuity Planning Increasing Workplace Resilience to Disasters", 1st Edition, 2020.
3. Dean Correia, Business Continuity, 1st edition 2013.



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Course Outcomes:

Students will be able to

- CO1:** Plan an in-depth understanding on the perspectives in human resource management.
- CO2:** Identify the concept of Best Fit Employee.
- CO3:** Experiment with the various training methods and executive development.
- CO4:** Examine various compensation plans to sustain employee interest.
- CO5:** Assess performance evaluation and control process of HRM.

Text Books:

1. K.Aswatappa, Human Resource Management, Mc Graw Hill, 7th Edition, 874 pages, May 2013.
2. Dessler Human Resource Management, Pearson Education Limited, 14th Edition, 2015.

Reference Books:

1. Decenzo and Robbins, Fundamentals of Human Resource Management, Wiley, 11th Edition, 2013.
2. Luis R.Gomez-Mejia, David B.Balkin, Robert L Cardy. Managing Human Resource. PHI Learning 2012.
3. Bernadin, Human Resource Management, Tata Mcgraw Hill ,8th edition 2012.
4. Wayne Cascio, Managing Human Resource, McGraw Hill, 2007.
5. Ivancevich, Human Resource Management, McGraw Hill 2012.
6. Uday Kumar Haldar, Juthika Sarkar. Human Resource management. Oxford. 2012.



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