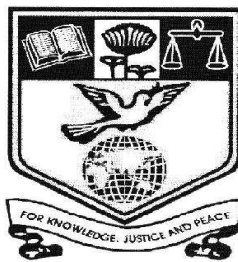


Curriculum Framework and Syllabus for
BACHELOR OF SCIENCE IN DATA SCIENCE (B.Sc. DS)
For the students admitted on the academic year 2019-2020
(UNDER CHOICE BASED CREDIT SYSTEM)

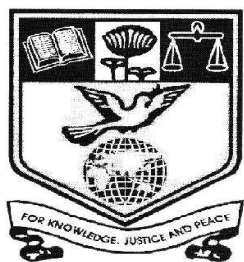


2019-2020



POST GRADUATE DEPARTMENT OF DATA SCIENCE
NEHRU MEMORIAL COLLEGE

[Nationally Accredited with 'A' Grade by NAAC]
An Autonomous College affiliated to Bharathidasan University
Puthanampatti—621 007



NEHRU MEMORIAL COLLEGE

[Nationally Accredited with 'A' Grade by NAAC]
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Puthanampatti—621 007

POST GRADUATE DEPARTMENT OF DATA SCIENCE

We feel proud and immense pleasure to introduce B.Sc Data Science programme under Bharathidasan University affiliated colleges in the academic year 2018-2019 which will be helpful to the students in and around our institution, especially to the students in rural setup.

PROGRAMME DESCRIPTION

The global demand for graduates with high-level knowledge, understanding and skills in both Computer Science and Statistics is huge, and still growing. The BSc in Data Science degree exists to satisfy part of this demand in a particular way, through a carefully designed course that has strong, high-level mathematical underpinning. This course will introduce students to this rapidly growing field and equip them with some of its basic principles and tools as well as its general mindset.

The curriculum is built on the principle that module choices get more and more flexible as the students progress through the degree.

First Year: The compulsory modules in year 1 build a strong, general statistical foundation. The students are introduced with Probability, Statistics, Machine Learning, Java Programming, Data Structures, Database concepts and Exploratory Data Analysis.

Second Year: In year 2, Statistical topics are explored in considerable depth, and students are exposed to Python, R programming language, Discrete Mathematics and Operation Research. There are a number of optional core modules, such as Cloud Computing, Artificial Intelligence, Internet of Things and Linear Statistical Modeling.

Third Year: The remainder of the year consists of optional, advanced modules from both Statistics and Computer Science, such as Machine Learning and Big Data Analytics. Another compulsory module is the Data Science Project in the sixth semester, which allows the students to showcase the skills that they have developed.

The focus in the treatment of these topics will be on breadth, rather than depth, and emphasis will be placed on integration and synthesis of concepts and their application to solving problems. To make the learning contextual, real datasets from a variety of disciplines will be used.

ELIGIBILITY

The minimum eligibility to study this course is a Pass in 10+2 with Mathematics as one of the core subject.

BACHELOR OF SCIENCE IN DATA SCIENCE (B.Sc. DS) – VISION AND MISSION

Vision

- Produce excellence in data science education and to address key challenges in the field of data science

Mission

- Create a new breed of data science professionals engaging in data science related activities
- Develop technology and services in the area of data science to serve local and international needs.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO1: Provide an understanding of methods need to handle data

PEO2: Identify relevant methods to analyze data at various sources

PEO3: Apply the acquired knowledge for implementation of real world problems

PEO4: Motivate and inspire the students to pursue their post degree programmes

PROGRAMME OUTCOME (PO)

PO1: Scientific Knowledge

Apply the knowledge of methods and techniques to handle data on effective storage

PO2: Problem Analysis

Analyze the techniques of data analytical methods

PO3: Design and Development of Solution

Develop solutions to structure and analyze data

PO4: Conduct investigations of complex problems

Design algorithms to solve real world complex problems with big data

PO5: Modern tool usage

Implement algorithms or methods using advanced data analytical tools

PO6: Life long learning

Extend life long learning in the field of data analytics in order to undertake and solve the various challenging problems at diverse platforms

PROGRAMME SPECIFIC OUTCOME (PSO)

PSO1: Understand the basic concepts of data science and mathematics

PSO2: Apply the techniques and methods to handle data

PSO3: Analyze data by using data mining techniques and algorithms

PSO4: Implement data analytical algorithms to structure and query big data

OUTLINE OF UG COURSES AND CREDITS - B.SC DATA SCIENCE

Part	Semester	Specifications	No. of Courses	No. of Credits Each	Total Credits
I	I – IV	Language Courses	4	3	12
II	I – IV	English Language Courses	4	3	12
III	I – VI	Core Courses	9	5	40
	I – VI	Core Practical	6	2/4	17
	V – VI	Major Based Elective	3	5	15
	VI	Mini Project	1	5	5
	I – II	Allied Courses	2	4	8
	III – IV		2	4	8
	I – IV	Allied Practical	2	2/3	5
IV	I	Value Education	1	2	2
	II	Environmental Science	1	2	2
	IV & V	Non-Major Elective	2	2	4
	II & III	Skill Based Elective	2	2	4
	III	Gender Studies	1	1	1
	IV	Soft Skill Course	1	2	2
	V	VI	Extension Activities	1	1
Technical Skill Development			1	2	2
Total No. of Courses			43		140

Courses having Focus on Employability/Skills/Knowledge

Courses	Title	Employability	Skill based	Knowledge based
Core Course – I (CC)	Java Programming		Y	
Core Course - II (CC)-Lab	Java Programming Lab		Y	
Core Course – III (CC)	Database Systems			Y
Core Course - IV (CC)-Lab	MySQL Lab		Y	
Core Course – V (CC)	Python Programming and Data Structures			Y
Core Course - VI (CC)-Lab	Python Programming Lab	Y		
Core Course – VII (CC)	Data Mining and Visualization			Y
Core Course - VIII (CC)-Lab	Data Mining and Visualization Lab	Y		
Core Course IX [CC]	NoSQL Databases			Y
Core Course X [CC]	Data Science for Business	Y		
Core Course XI [CC]	Machine Learning			Y
Core Course XII [CC]-Lab	NoSQL Lab	Y		
Core Course XIII [CC]	Big Data Analytics			Y
Core Course XIV [CC]-Lab	Big Data Analytics Lab	Y		
Core Course XV [CC]	Mini Project		Y	
Total		5	4	6
Allied Course –I (AC)	Statistics I			Y
Allied Course – II a (AC)-Lab	R Programming Lab		Y	
Allied Course – III (AC)	Statistics II			Y
Allied Course – II b (AC)-Lab	R Programming Lab		Y	
Allied Course – IV (AC)	Operations Research – I			Y
Allied Course – V a (AC)-Lab	Mathematical Tool Lab	Y		
Allied Course - VI (AC)	Operations Research – II			Y
Allied Course – V b (AC)-Lab	Mathematical Tool Lab	Y		
Total		2	2	4

Courses	Title	Employability	Skill based	Knowledge based
Skill Based Elective – I	Office Automation / HTML Lab		Y	
Skill Based Elective – II	Animation / Shell Programming Lab		Y	
Non Major Elective I	Fundamentals of Data Science			Y
Non Major Elective II	Data Science for Entrepreneurship Development			Y
Major Based Elective – I	Neural Network / Genetic Algorithm			Y
Major Based Elective - II	Data Security / Ethical Hacking			Y
Major Based Elective - III	Cloud Computing / Internet of Things /			Y
	Total	-	2	5

NEHRU MEMORIAL COLLEGE (AUTONOMOUS)
PUTHANAMPATTI, TIRUCHIRAPPALLI – 621 007

B.Sc. Data Science Course Structure under CBCS

(For the Candidates admitted on the Academic year 2019-2020 onwards)

Semester	Part	Course	Title	Instru. Hours/ Week	Credit	Exam Hours	Marks		Total	
							Int	Extn		
I	I	Language Course – I (LC)	Tamil	6	3	3	25	75	100	
	II	English Language Course - I (ELC)	English	6	3	3	25	75	100	
	III		Core Course – I (CC)	Java Programming	6	5	3	25	75	100
			Core Course - II (CC) Lab	Java Programming Lab	3	2	3	40	60	100
			Allied Course –I (AC)	Statistics I	4	4	3	25	75	100
		Allied Course – II a (AC)	R Programming Lab	3	-	-	-	-	-	
	IV	Value Education – VE	Value Education (tho;tpay; fy;tpAk; kdpj cupikfSk;)	2	2	3	25	75	100	
Total				30	19				600	
II	I	Language Course – II (LC)	Tamil	6	3	3	25	75	100	
	II	English Language Course – II (ELC)	English	6	3	3	25	75	100	
	III		Core Course – III (CC)	Database Systems	5	5	3	25	75	100
			Core Course - IV (CC) – Lab	MySQL Lab	3	2	3	40	60	100
			Allied Course – III (AC)	Statistics II	4	4	3	25	75	100
		Allied Course –II b (AC) – Lab	R Programming Lab	2	2	4	40	60	100	
	IV		Skill Based Elective Course– I (SKBC)	Office Automation / HTML Lab	2	2	3	40	60	100
		Environmental Science – EVS	Environmental Science	2	2	3	25	75	100	
Total				30	23				800	
III	I	Language Course – III (LC)	Tamil	6	3	3	25	75	100	
	II	English Language Course - III (ELC)	English	6	3	3	25	75	100	
	III		Core Course – V (CC)	Python Programming and Data Structures	6	5	3	25	75	100
			Core Course - VI (CC) –Lab	Python Programming Lab	3	2	3	40	60	100
			Allied Course – IV (AC)	Operations Research – I	4	4	3	25	75	100
		Allied Course – V a (AC)	Mathematical Tool Lab	3	-	-	-	-	-	
	IV		Skill Based Elective Course – II (SKBC)	Shell Programming/ Animation Lab	2	2	3	40	60	100
		Gender Studies – GS	Gender Studies	0	1	3	25	75	100	
Total				30	20				700	

IV	I	Language Course –IV (LC) – Tami	Tamil	6	3	3	25	75	100	
	II	English Language Course–IV (ELC)	English	6	3	3	25	75	100	
	III	Core Course – VII (CC)		Data Mining and Visualization	6	5	3	25	75	100
		Core Course - VIII (CC) –Lab		Data Mining and Visualization Lab	3	3	3	40	60	100
		Allied Course–VI (AC)		Operations Research – II	4	4	3	25	75	100
		Allied Practical – V b (AC)		Mathematical Tool Lab	3	3	3	40	60	100
	IV	Non Major Elective Course I (NMEC)		Fundamentals of Data Science	2	2	3	25	75	100
		Soft Skills Course – SSC		Soft Skills Course	0	2	3	25	75	100
Total				30	25				800	
V	III	Core Course IX [CC]		NoSQL Databases	6	5	3	25	75	100
		Core Course X [CC]		Data Science for Business	6	5	3	25	75	100
		Core Course XI [CC]		Machine Learning	6	5	3	25	75	100
		Core Course XII [CC] – Lab		NoSQL Lab	4	4	3	40	60	100
		Major Based Elective Course – I		Genetic Algorithm/ Data Security	6	5	3	25	75	100
	IV	Non Major Elective Course II (NMEC)		Data Science for Entrepreneurship Development	2	2	3	25	75	100
Total				30	26				600	
VI	III	Core Course XIII [CC]		Big Data Analytics	6	5	3	25	75	100
		Core Course XIV [CC] – Lab		Big Data Analytics Lab	4	4	3	40	60	100
		Core Course XV [CC]		Mini Project	6	5	3	40	60	100
		Major Based Elective Course – II		Simulation and Modeling / Data Warehouse Tools and Techniques	6	5	3	25	75	100
		Major Based Elective Course – III		Cloud Computing / Internet of Things /	6	5	3	40	60	100
	IV	Extension Activities – EA		Extension Activities	0	1	-	-	-	-
		Technical Skill Development		Technical Skill Development	2	2	-	-	-	-
	Total				30	27				500
Grand Total				180	140	-	-	-	4000	

Summary of Courses

Language Part – I	4
English Part –II	4
Core Paper	9
Core Practical	6
Allied Paper	4
Allied Practical	2
Non-Major Elective	2
Skill Based Elective	2
Major Based Elective	3
Value Education	1
Environmental Science	1
Gender Studies	1 (Credit only)
Soft Skill Course	1 (Credit only)
Extension Activities	1 (Credit only)
Technical Skill Development	1
Mini Project	1
Total	43

Marks to be Awarded

	Internal Marks	External Marks
1. Theory	25	75
2. Practical	40	60

Separate passing minimum is prescribed for Internal and External marks

FOR THEORY

The passing minimum for CIA shall be 40% out of 25 marks [i.e. 10 marks]

The passing minimum for Examinations shall be 40% out of 75 marks [i.e. 30 marks]

FOR PRACTICAL

The passing minimum for CIA shall be 40% out of 40 marks [i.e. 16 marks]

The passing minimum for Examinations shall be 40% out of 60 marks [i.e. 24 marks]

Core Course – I (CC)	Java Programming
Core Course - II (CC) – Lab	Java Programming Lab
Core Course – III (CC)	Database Management System
Core Course - IV (CC) – Lab	MySQL Lab
Core Course – V (CC)	Python Programming & Data Structures
Core Course - VI (CC) –Lab	Python Programming Lab
Core Course – VII (CC)	Data Mining and Visualization
Core Course - VIII (CC) - Lab	Data Mining and Visualization Lab
Core Course IX [CC]	NoSQL Databases
Core Course X [CC]	Data Science for Business
Core Course XI [CC]	Machine Learning
Core Course XII [CC] – Lab	NoSQL Lab
Core Course XIII [CC]	Big Data Analytics
Core Course XIV [CC] – Lab	Big Data Analytics Lab
Core Course XV [CC]	Mini Project

LIST OF CORE COURSES AND PRACTICALS (CC & CP)

LIST OF ALLIED COURSES (AC)

Allied Course –I (AC)	Statistics I
Allied Course – II a & b (AC) - Lab	R Programming Lab
Allied Course –III (AC)	Statistics II
Allied Course – IV (AC)	Operations Research – I
Allied Course – V a & b (AC) - Lab	Mathematical Tool Lab
Allied Course–VI (AC)	Operations Research – II

Allied Course I – **Basic Statistics**

Allied Course II – **Mathematics (OR)**

LIST OF MAJOR BASED ELECTIVE (MBE) COURSES

MBE – I		MBE – II	
1	Neural Network	1	Data Security
2	Genetic Algorithm	2	Simulation and modeling
MBE – III			
1	Cloud Computing		
2	Internet of Things		

LIST OF SKILL BASED ELECTIVE (SBE) COURSES

SBE – I		SBE – II	
1	Office Automation Lab	1	Animation Lab
2	HTML Lab	2	Shell Programming Lab

LIST OF NON-MAJOR BASED ELECTIVE (NME) COURSES

NME – I	NME – II
Fundamentals of Data Science	Data Science for Entrepreneurship Development

**Part 1 Tamil - Proposed Course Structure under CBCS
(For the candidate admitted from the academic year 2019-2020 onwards)**

Semester	Course	Course Title	Ins. Hrs/Week	Credits	Exam hrs	Int. Marks	Ext. Marks	Total
I	Language course 1 (LC 1)	செய்யுள் (இக்காலம்), சிறுகதை, பயன்முறைத் தமிழ், தமிழ் இலக்கிய வரலாறு	6	3	3	25	75	100
II	Language course 2 (LC 2)	செய்யுள் (இடைக்காலம்), உரைநடை, தமிழ்ச் செம்மொழி வரலாறு, மொழிபெயர்ப்பியல், தமிழ் இலக்கிய வரலாறு	6	3	3	25	75	100
III	Language course 3 (LC 3)	செய்யுள் (காப்பியங்கள்), கட்டுரை இலக்கியம், புதினம் , தமிழ் இலக்கிய வரலாறு	6	3	3	25	75	100
IV	Language course 4 (LC4)	செய்யுள் (பழந்தமிழ் இலக்கியம்) நாடகம், தமிழ் இலக்கிய வரலாறு, கட்டுரை வரைவியல்	6	3	3	25	75	100
Total			24	12				400

இளநிலைப் பட்டப் படிப்பு (கலையியல், அறிவியல், வணிகவியல் மற்றும்
வணிக மேலாண்மையியல்)

முதலாமாண்டு : முதற்பருவம்

பகுதி 1 தமிழ் - தாள் 1

செய்யுள் (இக்காலம்), சிறுகதை, பயன்முறைத் தமிழ்,
தமிழ் இலக்கிய வரலாறு

பாட நோக்கம் (Course Objectives)

தன்னம்பிக்கை, பொறுப்புணர்வு, சமுதாய அக்கறை, மனித உறவுகளைப்
போற்றுதல், சுற்றுச்சூழல் விழிப்புணர்வு, உலக அமைதி, அற உணர்ச்சி,
தாய்மொழிப் பற்று முதலான இன்றைய இளம் தலைமுறையினருக்குத்
தேவையான அடிப்படைப் பண்புகளைக் கற்பித்தல்.
இக்காலப் படைப்பிலக்கிய வகைமைகளை, படைப்பிலக்கியச் சூழல்களை,
படைப்பாளர்களை அறிமுகம் செய்தல்.

பிழையின்றித் தமிழ் எழுதத் தேவையான அடிப்படைகளைக் கற்கச் செய்தல்.

பணித்தேர்வுகளுக்கு உதவக்கூடிய தமிழ்ப் பாடப்பகுதிகளைக் கற்பித்தல்.

அலகு - 1

1. பாரதியார் பாடல்கள் - புதுமைப்பெண் பா.எண்கள் 3,4,5,7,8
2. பாரதிதாசன் பாடல்கள் - எந்நாளோ
3. பெருஞ்சித்திரனார் - தமிழ் நெஞ்சம்
4. தமிழ் ஒளி - மழைக் காலம்
5. முருகுசுந்தரம் - சமுதாய தர்மம்
6. பொன்னடியான் - உள்ளம் உயர்....
7. முடியரசன் - மொழியுணர்ச்சி

8. முத்துலிங்கம் – எது தேசியம்
9. தமிழேந்தி – தொண்டின் பழம்
10. தாரா பாரதி – வெறுங்கை என்பது
11. இன்குலாப் – கவலையும் கண்ணீரும் நம்முடன் இருக்கட்டும்
12. நா.காமராசன் - காகிதப்பூக்கள்
13. ஈரோடு தமிழன்பன் – இப்போது நினைந்து
14. தேவதேவன் – நுனிக்கொம்பர் நாரைகள்
15. காசி ஆனந்தன் – தமிழ் மண் வளம்

அலகு – 2

1. அப்துல் ரகுமான் - ஆறாத அறிவு
2. தணிகைச்செல்வன் - சுகம் எங்கே
3. மீரா - உழவன்
4. மு.மேத்தா – கண்ணீரின் கதை
5. சிற்பி - தம்பி உனக்காக
6. வைரமுத்து – கூடு
7. அறிவுமதி - வலி
8. பழநிபாரதி – கண்ணில் தெரியுது வானம், இரத்தத்தின் நிறம் பச்சை
9. பிச்சினிக்காடு இளங்கோ – பகல் நீ, தஸ்லிமா நஸ்ரின்
10. இளம்பிறை – மகளிர் நாள் வாழ்த்துகள், ஆசைகள்
11. சக்தி ஜோதி - நிலவென்று சொல்லாதே, பெண்
12. பாவலர் வையவன் – முறிந்த சிறகு, பாதை மறந்த போதை

13. தாமரை – என்னையும் அழைத்துப் போ, ஒரு கதவும் கொஞ்சம்
கள்ளிப்பாலும்
14. ந.வீ.விசயபாரதி - தன்னம்பிக்கைத் தாமரைகள், புன்னகை மந்திரம்,
அன்புள்ள அம்மா
15. அ.வெண்ணிலா - ஆதியில் சொற்கள் இருந்தன

அலகு : 3

சிறுகதை – சிறுகதை மலர்

அலகு : 4

பயன்முறைத் தமிழ்

பிழைகளும், திருத்தங்களும் - வலிமிகுதல், வலி மிகாமை,
மயங்கொலி எழுத்துகளின் வேறுபாடுகள் - தமிழில் பிறமொழிச் சொற்கள்

அலகு : 5

தமிழ் இலக்கிய வரலாறு – இக்காலம்

கற்றல் விளைவுகள் (Course Outcome)

மாணவர்கள் வாழ்வியல் கூறுகளை அறிந்துகொள்வதோடு, நற்பண்புகளை
வளர்த்துக்கொள்வர்.

இன்றைய இலக்கியப் படைப்புச் சூழலை அறிந்து கொள்வதால்
படைப்பிலக்கியவாதிகளாகும் ஆற்றல் பெறுவர்.

சமுதாய, அரசியல், சூழலியல் விழிப்புணர்வு பெறுவர்.

தாய்மொழியில் திறன் பெறுவர்.

பணித்தேர்வுகளுக்கு உரிய தமிழ்த்திறன் பெறுவர்.

பாட நூல்கள்

1. செய்யுள் திரட்டு, தமிழ்த்துறை வெளியீடு.
2. சிறுகதை மலர் - பிரமி பதிப்பகம், திருச்சி-21.
3. பயன்பாட்டுத் தமிழ் (இலக்கணக் கையேடு), தமிழ் நாதன் பதிப்பகம், சென்னை - 110.
4. தமிழ் இலக்கிய வரலாறு,
முனைவர் கோ.பாக்கியவதி, முனைவர் க.சுந்தரபாண்டியன்,
பிரமி பதிப்பகம், திருச்சி-21.

B.A/B.SC/B.COM/ BCA/BBA PART II ENGLISH COURSE PATTERN (FROM 2019-2020)

Sem.	Course	Course Title	Hrs / Week	Credits	MAX.MARKS		
					Int.	Ext.	Total
I	Core Course I	English For Communication I	6	3	25	75	100
	Core Course II	English For Communication II	6	3	25	75	100
	Core Course III	English For Communication III	6	3	25	75	100
	Core Course IV	English For Communication IV	6	3	25	75	100
			TOTAL	24	12	200	300

Programme Educational objectives (PEO)

Programme Educational Objectives are broad statements that describe the career and professional accomplishments that the program is preparing the graduates to achieve. PEO's are measured 4-5 years after graduation. The PEO is measured through employer satisfaction survey (yearly), alumni survey and placement records.

PEO 1: Learners will participate in critical conversations and prepare, organize, and deliver their work to the public

PEO 2: They will appreciate the literary works.

PEO 3: The Graduates will attain phonological and morphological aspects of English.

PEO 4: Learners can express a thorough command of English and its linguistic structures.

Program Outcome (PO)

The POs are narrower statements that describe what the students are expected to know and be able to do by the time of graduation. POs are based on relevance.

PO 1 Become knowledgeable in the subject of English for Communication and apply the principles of the same to the needs of the Employer/Institution/Enterprise/Society.

PO 2: Gain Analytical skills in the field/area of English for Communication.

PO 3: Understand and appreciate professional ethics, community living and Nation Building initiatives.

PO 4: Develop language learning skills like Listening, Speaking, Reading and Writing.

PO 5: Making the Learners to realize their own Identity.

PROGRAMME SPECIFIC OUTCOME (PSO)

PSOs are Statement that describe what the graduates of a specific educational Programme should be able to

PSO1: Design solution to overcome Communication Problems.

PSO 2: Apply Ethical Principles and Commit to Professional Ethics and Responsibilities.

PSO 3: Recognize the need of Extensive Reading Skills.

PSO 4: function as a team and an individual member amicably with other co-workers.

PSO 5: Use English effectively in formal and informal situations.

PSO 6: Develop vocabulary and communicative skills.

Course Code & Title	ENGLISH FOR COMMUNICATION - I		
Class	<u>I YEAR</u>	Semester	<u>I</u>
Cognitive Level	K – 1 Acquire K – 2 Understand K – 3 Apply K – 4 Evaluate K – 5 Analyze		
Course Objectives	The Course aims <ul style="list-style-type: none"> • To expose students to effective communication in the form of prose • To make the learners aware of social issues • To help them to know great personalities • To make them aware of dangers from human carelessness • To help them realize the need for honesty 		
UNIT	Content	No. of Hours	
I	1.Spoken English and Broken English: G.B.Shaw 2. Give us a Role Model : Dr. A.P. J. Abdul Kalam		
II	Water-The Elixir of Life : Sir C. V. Raman No Guarantee Please No Longer : A Newspaper Article		
III	I have a Dream : Martin Luther King Jr. The Gettysburg Address : Abraham Lincoln		

IV	Mosquitoes : Article Polluting the World :Article	
V	A Little Incident : Lu Hsun Jimmy Valentine : O. Henry	
	GRAMMAR: 1. Articles 2. Preposition 3. Adjective 4. Adverb	
Reference	Lessons will be edited and compiled.	
Course Outcomes	On completion of the course, students should be able to CO 1: communicate effectively CO 2: aware of social issues CO 3: know great personalities. CO 4: aware of dangers from human carelessness. CO 5: know the need for honesty	

Mapping of COs with PSOs & POs:

CO/PO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
CO1	S	M	S	M	M	M	S	S	M	M	S
CO2	S	M	M	M	M	S	M	S	M	M	M
CO3	S	M	S	M	M	M	S	S	M	M	S
CO4	S	M	M	M	M	S	M	S	M	M	M
CO5	S	M	S	M	M	M	S	S	M	M	S

- Strongly Correlating(S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

Course Code & Title	CC-I JAVA PROGRAMMING		
BSc	Semester : I	Credits : 5	Hrs: 6
Cognitive Level	K2 – Understand K3 – Apply K4 – Evaluate K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • identify the basics of OOPs • describe the fundamentals of Java language • identify the concept of class, packages and interfaces • state the concepts of exception handling, multithreading • explain file I/O and applet programming 		

Unit I

Object Oriented Programming: Introduction to OOP – Objects and Classes – Characteristics of OOP – Difference between OOP and Procedure Oriented Language – Introduction to java Programming : Introduction – Features of Java – Comparing java and Other Languages – Applications and Applets – Java Development Kit – Complex Programs – Java Source File Structure – Prerequisites for Compiling and Running Java Programs. (18)

Unit II

Java Language Fundamentals: The Building Blocks of Java – Data Types – Variable Declarations – Wrapper Classes – Operations and Assignment – Control Structures – Arrays – Strings – String Buffer Class. (18)

Unit III

Java as an OOP Language: Defining Classes – Modifiers – Packages – Interfaces. (18)

Unit IV

Exception Handling: Introduction – Basics of Exception Handling – Exception Hierarchy – Constructors and Methods in Throwable Class - Unchecked and Checked Exceptions – Handling Exceptions in Java – Exception and Inheritance – Throwing User-defined Exceptions – Redirecting and Rethrowing Exceptions – Advantages of Exception Handling Mechanism – Multithreading : Introduction – Creating Threads – Thread Life-cycle – Thread Priorities and Thread Scheduling – Thread Synchronization – Daemon Threads – Thread Groups – Communication of Threads. (18)

Unit V

Files and I/O Streams: Overview – Java I/O – File Streams – FileInputStream and File Output Stream – File Streams – Random Access File – Serialization - Applets : Introduction – Java Applications versus Java Applets – Applet Life-cycle – Working with Applets – The HTML APPLET Tag – The java. Applet package. (18)

Text Book:

1. P. Radha Krishna, “Object Oriented Programming through Java”, University Press, 2011.

Reference Book:

1. K. Rajkumar, “Java Programming”, Pearson India, 2013

Course Outcomes:

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

- CO1:** Understand basic concepts of Java -K2
- CO2:** Apply the concepts and write the sample codes in java -K3
- CO3:** Develop programs by applying the concepts using classes, packages and interfaces -K4, K5
- CO4:** Write programs using the concepts of exception handling and multithreading -K4, K5
- CO5:** Design and develop code for file I/O operations and applet programs -K4, K5

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	M	S	M	M	M
CO2	S	S	S	W	M	S	S	S	S	S
CO3	S	S	S	M	M	S	S	S	S	S
CO4	S	S	S	M	M	S	S	S	S	S
CO5	S	S	S	M	M	S	S	S	S	S

Strongly Correlating (S)
Weakly Correlating (W)

Moderately Correlating (M)
No Correlating (N)

Course Code & Title	CC-II JAVA PROGRAMMING LAB		
BSc	Semester : I	Credits : 2	Hrs: 3
Cognitive Level	K1 – Recall K2 – Understand K3 – Apply K4 – Evaluate K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • understand the basics of java programming • develop programs using Java 		

1. Write a program to sort the given numbers using arrays.
2. Write a program to implement the FIND and REPLACE operations in the given multiple text.
3. Write a program to implement a calculator to perform basic arithmetic Operations.
4. Write a program to find the area of a rectangle using constructor
5. Write a program to find the student's percentage and grade using command line arguments.
6. Write a program to draw circle or triangle or square using polymorphism and inheritance.
7. Implement multiple inheritance concepts in java using interface, you can choose your own example of a company or education institution or a general concept which requires the use of interface to solve a particular problems.
8. Write a program to create threads and assign priorities to them
9. Write a program to develop an applet to play multiple audio clips using multithreading.
10. Write a program to create a window with three check boxes called red, green and blue.
The applet should change the colors according to the selection.

Course Outcomes:

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

CO1: Recall and identify the basic concepts of Java	-K1
CO2: Understand the sample codes in java	-K2
CO3: Apply the concepts to the real time problems	-K3
CO4: Evaluate the code developed to solve the problems	-K4
CO5: Develop the programs of their own	-K5

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	S	S	M	M	S	S	S	S	S
CO3	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	M	S	S	S	S	S	S

Strongly Correlating(S)
Weakly Correlating (W)

Moderately Correlating (M)
No Correlating (N)

Course Code & Title	AC-I STATISTICS – I		
BSc	Semester : I	Credits : 4	Hrs: 4
Cognitive Level	K1 – Recall K2 – Understand K3 – Apply K4 – Evaluate K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • understand the basic concepts of mathematics • gain the skill on the basic concepts of measurement • learn the basics of probability • attain the knowledge in descriptive statistics and graphics • state inferential statistics 		

Unit 1

Review of Basic Mathematics: Laws of Arithmetic - Exponents and Roots. (12)

Unit II

Basic Concepts of Measurement: Measurement – Levels of Measurement – True and Error Scores – Reliability and Validity – Measurement Bias. (12)

Unit III

Probability: About Formulas – Basic Definitions – Defining Probability – Bayes’s Theorem – Enough Exposition, Let’s Do Some Statistics. (12)

Unit IV

Descriptive Statistics and Graphics: Populations and Samples – Measures of Central Tendency – Measures of Dispersion – Outliers – Graphic Methods – Bar Charts – Bivariate Charts. (12)

Unit V

Inferential Statistics: Probability Distributions – Independent and Dependent Variables – Populations and Samples – The Central Limit Theorem – Hypothesis Testing – Confidence Intervals – p-values – Data Transformations. (12)

Text Book:

1. Sarah Boslaugh and Paul Andrew Watters, “*Statistics in Nutshell*”, Published by O’Reilly Media, Inc., 2008.

Course Outcomes:

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

CO1: Identify the basic concepts of mathematics	-K1
CO2: Apply the concepts of measurement	-K2
CO3: Solve the problems with probability	-K3,K4
CO4: Compute problems with statistics and graphs	-K3,K4
CO5: Create and solve problems of probability distributions	-K5

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	M	M	W	N	S	S	S	M	S
CO3	S	S	S	M	N	S	S	S	S	S
CO4	S	S	S	M	N	S	S	S	S	S
CO4	S	S	S	M	N	S	S	S	S	S

Strongly Correlating (S)
Weakly Correlating (W)

Moderately Correlating (M)
No Correlating (N)

Course Code & Title	AC-II a R PROGRAMMING LAB		
BSc	Semester : I	Credits: NIL	Hrs: 3
Cognitive Level	K1 – Recall K2 – Understand K3 – Apply K4 – Evaluate K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • learn good statistical packages for solving a variety of statistical problems 		

1. To implement the basics of R
2. Getting data In and Out of R
3. Subsetting R objects
4. Vectorized operations
5. Managing Data Frames
6. Control Structures
7. Functions in R
8. Loop functions

Reference for Lab Manual:

1. Internet Source “<https://www.cs.upc.edu/~robert/teaching/estadistica/rprogramming.pdf>”

Course Outcomes:

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

CO1: Identify the basic concepts of R programming	-K1
CO2: Understand the sample codes in R	-K2
CO3: Apply the concepts to the real time problems	-K3
CO4: Evaluate the code developed to solve the problems	-K4
CO5: Develop the programs of their own	-K5

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	S	S	W	N	S	S	S	S	S
CO3	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	M	S	S	S	S	S	S

Strongly Correlating(S)
Weakly Correlating (W)

Moderately Correlating (M)
No Correlating (N)

**இளநிலைப் பட்டப் படிப்பு (கலையியல், அறிவியல், வணிகவியல் மற்றும்
வணிக மேலாண்மையியல்)**

Semester	Course	Course Title	Ins. Hrs/Week	Credits	Exam hrs	Int. Marks	Ext. Marks	Total
I	Value Education (VE)	வாழ்வியல் கல்வியும் மனித உரிமைகளும் (Value Education and Human Rights)	2	1	3	-	100	100

முதலாமாண்டு : முதற்பருவம்

**வாழ்வியல் கல்வியும் மனித உரிமைகளும்
(Value Education and Human Rights)**

பாட நோக்கம் (Course Objectives)

தனித்திறன் மேம்பாடு, தன்னம்பிக்கை, நாட்டுப்பற்று, சமுதாயப் பொறுப்புணர்வு, மனித உறவுகளைப் போற்றும் பண்பு, அறச்சிந்தனை முதலான இன்றைய இளம் தலைமுறையினருக்குத் தேவையான அடிப்படை வாழ்வியல் பண்புகளைக் கற்பித்தல்.

கவலை, சினம், பொறாமை, சோம்பல் முதலான தீமை தரும் பண்புகளை விலக்கச் செய்தல். உடல்நலத்தில் அக்கறை கொள்ளச் செய்தல்.

மனித உரிமைகளை அறியச் செய்தல்.

அலகு :1

வாழ்வியல் கல்வி : திறன் மேம்பாடும் உயர் பண்புகளும்

கல்வி, வாழ்வியல் கல்வியின் நோக்கம் - வாழ்வியல் கல்வியின் பரிணாம வளர்ச்சி - வாழ்வியல் கல்வியின் கூறுகள் - சுய முன்னேற்றம் - திறன் மேம்பாடு - உயர்பண்புகள் - தன்மதிப்பீடும் சுயபரிசோதனையும் - பாலினச் சமத்துவத்தை உளமாரப் பின்பற்றுதல் - மாற்றுத் திறனாளிகள், மனவளம்

குன்றியோர், வயதில் பெரியவர்கள், அனுபவசாலிகள், சான்றோர்கள், குடும்ப உறுப்பினர்கள், அருகில் வசிப்பவர்கள், சுற்றத்தார், உடன் பணியாற்றுவோர் இவர்களுக்கு மதிப்பளித்தல் - நற்பண்புகளும் நடத்தை உருவாக்கமும் - உண்மை - ஆக்கத்திறன் - தியாகம் - நேர்மை - கட்டுப்பாடு - உதவி செய்யும் மனப்பான்மை - சகிப்புத்தன்மை - அறிவியல் கண்ணோட்டம்

அலகு : 2

தேசிய, உலக முன்னேற்றத்திற்கான வாழ்வியல் கல்வி

தேசம், சர்வ தேசங்கள் குறித்த எண்ணங்கள் - நமது நாடு - அரசமைப்பு - மக்காளாட்சித் தத்துவம் - சமதர்மம் - மதச்சார்பின்மை - சமத்துவம் - சமூக நீதி, தனியுரிமை - சுதந்திரமும் சகோதரத்துவமும் சமூகப் பண்புகள் - இரக்கம் மற்றும் நேர்மை, சுயகட்டுப்பாடு, உலகளாவிய சகோதரத்துவம் - தொழில் சார் பண்புகள் - அறிவு வேட்கை - தொழிலில் நேர்மை - முறைமை - காலந்தவறாமையும் நம்பிக்கையும் - மதம் சார்ந்த பண்புகள் - சகிப்புத்தன்மை, மெய்யறிவு, நன்னடத்தை - அழகியல் பண்புகள் - இலக்கியம், நுண்கலைகள் ஆகியவற்றைப் பயில்தல், சுவைத்தல், மனதாரப் பாராட்டுதல் மதித்தல், பாதுகாத்தல், தேசிய ஒருமைப்பாடும் சர்வதேசப் புரிதலும்.

அலகு : 3

அறப்பண்புகள் மற்றும் வாழ்வியலில் உலகளாவிய பெருவளர்ச்சிகள் ஏற்படுத்தும் தாக்கங்கள்

அறிவியல் வளர்ச்சியின் தாக்கங்கள் - பண்பண்பாட்டு முரண்பாடுகளின் தாக்கங்கள் - பொருளியல் சிந்தனைகள் - மக்கள் தொடர்புச் சாதனங்கள் - இளமை உணர்ச்சி வேக நடத்தையின் நவீன

அறைகூவல்கள் - இல்லறமும் நல்லுணர்வும் - ஒப்பீடும் போட்டி இடுதலும் - நேர்மறை, எதிர்மறை எண்ணங்கள் - அகந்தை - சினம் - சுயநலம் - அறைகூவல்கள்

அலகு : 4

உடல், உள்ள நலமும்

நோய் தீர்க்கும் செயல்பாடுகளும் உணவுப் பழக்கமும் உணவு முறைகளும் - பொருந்தும் உணவுகள் - பொருந்தா உணவுகள் - மனக் கட்டுப்பாடு - மனத்திண்மை - எளிய உடற்பயிற்சி - தியானம் - மனம், ஆன்மா சார்ந்த விளைவுகள் - யோகா - நோக்கங்கள் - வகைகள் - முறைகள் - ஆசனங்கள் - ஆசைகளை ஒழுங்குபடுத்துதல் - கவலை நீக்குதல் - சினம் தணிதல் - நெடுநீர், மறதி, சோம்பல் தவிர்த்தல் - தூக்கம் முறைப்படுத்துதல் - துக்கம், இழப்புகளை எதிர்கொள்ளல் - புகை, மது முதலானவைகளின் தீங்கு உணர்தல்- வாழ்த்துகளின் பயன்கள்

குறிப்பு : இந்த அலகு உடற்பயிற்சி : தியானம் - யோகா செய்முறைப் பயற்சிகளுடன் கூடியது.

அலகு : 5

மனித உரிமை, மனித உரிமைக் கருத்துகள்

தேசிய மற்றும் பன்னாட்டுக் கண்ணோட்டங்கள் - மனித உரிமையின் பரிணாமம் - மனித உரிமையின் பரந்த வகைப்பாடுகள் வாழ்தற்கான உரிமை, சுதந்திரம், கண்ணியத்துடன் வாழ்வதற்கான உரிமைகள் - கலாச்சாரம் மற்றும் கல்விக்கான உரிமைகள் - பொருளாதார உரிமைகள் - அரசியல் உரிமைகள் - சமூக உரிமைகள் - பெண்கள் மற்றும் குழந்தைகளின் மனித உரிமை - சமூகப் பழக்கங்களும் அரசியலமைப்புப் பாதுகாப்புகளும்.

கற்றல் விளைவுகள் (Course Outcome)

மாணவர்கள் வாழ்வியல் கூறுகளை அறிந்துகொள்வதோடு நற்பண்புகளை வளர்த்துக்கொள்வர். தீமை தரும் பண்புகளை அறிந்து அவற்றிலிருந்து தம்மைக் காத்துக்கொள்வர்.

உடல்நலத்தில் அக்கறை கொள்வர்.

மனித உரிமைகளை அறிந்து கொள்வர்.

பாடநூல்

வாழ்வியல் கல்வியும் மனித உரிமைகளும்,

தமிழ்த்துறை வெளியீடு,

நேரு நினைவுக் கல்லூரி, புத்தனாம்பட்டி.

முதலாமாண்டு : இரண்டாம் பருவம்

பகுதி 1 தமிழ் - தாள் 2

செய்யுள் (இடைக்காலம்), உரைநடை, தமிழ்ச் செம்மொழி வரலாறு,
மொழிபெயர்ப்பியல், தமிழ் இலக்கிய வரலாறு

பாட நோக்கம் (Course Objectives)

பக்தி இலக்கியம், சிற்றிலக்கியங்களை அறிமுகம் செய்தல்.

இக்காலத் தமிழ் உரைநடையை அறிமுகம் செய்தல்.

தமிழ்ச் செம்மொழி வரலாற்றைக் கற்கச் செய்தல்.

ஆங்கிலச் சொற்களுக்கு இணையான தமிழ்ச்சொற்களைப் பயன்பாட்டு முறையில் அறியச்செய்தல்.

பணித்தேர்வுகளுக்கு உதவக்கூடிய தமிழ்ப் பாடப்பகுதிகளைக் கற்பித்தல்.

அலகு – 1 இடைக்கால இலக்கியங்கள்

1.தேவாரம் - திருநாவுக்கரசர் தேவாரம்

திருவையாற்றுப் பதிகம் - 3 பாடல்கள்

1. ஏருமதிக் கண்ணி யானை (பா.எண் -5)
2. விரும்பு மதிக் கண்ணி யானை (பா.எண் -8)
3. திங்கள் மதிக் கண்ணி யானை (பா.எண் -10)

தனித்திருத் தாண்டகம் - 4 பாடல்கள்

1. முடிகொண்டார் முளையிளவெண் (பா.எண் -3)
2. பொக்கணமும் புலித்தோலும் (பா.எண் -4)
3. அணிதில்லை அம்பலமா (பா.எண் -7)

4. கடையொன்றிற் கங்ககையயுந் (பா.எண் -10)

2.திருவாசகம் - திருப்பூ வல்லி - 3 பாடல்கள்

1. எந்தையெந்தாய் சுற்றம் (பா.எண் -276)

2. தேனாடு கொன்றை (பா.எண் -279)

3. வானவன் மாலயன் (பா.எண் 286)

திருச்சதகம் - 4 பாடல்கள்

1. மெய்தான் அரும்பி (பா.எண் -5)

2. நாடகத்தா லுன்னடியார் (பா.எண் -15)

3. ஆமாறுன் திருவடிக்கே (பா.எண் -18)

4. வானாது மண்ணாது (பா.எண் -19)

3.திருமந்திரம் - 10 பாடல்கள்

1. நான் பெற்ற இன்பம் பெறுக (பா.எண் -85)

2. அன்பும் சிவமும் இரண்டென்ப (பா.எண் -270)

3. என்பே விறகா இறைச்சி (பா.எண் -272)

4. நிற்கின்ற போதே (பா.எண் -292)

5. கல்லாத மூடரைக் காணவும் (பா.எண் -317)

6. உள்ளத்தின் உள்ளே (பா.எண் -509)

7. உள்ளம் பெருங்கோயில் (பா.எண் -823)

8. உடம்பினை யானிருந்து (பா.எண் -725)

9. ஒன்றே குலம் ஒருவனே தேவனும் (பா.எண் -2103)

10. அறிவுக்கு அழிவில்லை (பா.எண் 2358)

4.நாலாயிரத் திவ்ய பிரபந்தம் - 10 பாடல்கள்

குலசேகர ஆழ்வார் - பெருமாள் திருமொழி - நான்காம் திருமொழி

திருவேங்கடத்தில் இருத்தலும் போதியது எனல்

1. ஊனேறு செல்வத்து பா.எண் 677
2. ஆனாத செல்வத்து பா.எண் 678
3. ஒண்பவள வேலை பா.எண் 680
4. மின்னனைய நுண்ணியர் பா. எண் 682
5. வான்ஆளும் மாமதிபோல் பா.எண் 683

வித்துவக்கோட்டு அம்மாளை வேண்டி நின்றல்

1. தருதுயரம் தடாயேல் பா.எண் 688
2. கண்டார் பா.எண் 689
3. மீன் நோக்கும் பா.எண் 690
4. வாளால் அறுத்து பா.எண் 691
5. வெங்களத்தின் பா.எண் 692

5.இயேசு காவியம் - மலைப்பொழிவு

6.தீன் குறள் - இரு அதிகாரங்கள் - நல்லிணக்கம், வரன் தட்சணை

7. கலிங்கத்துப் பரணி - களம் பாடியது - 10 பாடல்கள்

1. தேவாசுரம், இராமாயணம் (பா.எண் -473)
2. உடலின் மேல் பல காயம் (பா.எண் -476)
3. நெடுங்குதிரை மிசைக் கலணை (பா.எண் -477)
4. விருந்தினமும் வறியவரும் (பா.எண் -478)

5. மா மழைபோல் பொழிகின்ற (பா.எண் -480)
6. தன் கணவருடன் தாமும் (பா.எண் -482)
7. வாய் மடித்துக் கிடந்ததலை (பா.எண் -483)
8. பொரு தடக்கை வாள் எங்கே (பா.எண் -485)
9. ஆடல் துரங்கம் பிடித்து (பா.எண் -486)
10. சாதுரங்கத் தலைவனைப் போர்க் களத்தில் . . . (பா.எண்-502)

8. குற்றாலக் குறவஞ்சி - குறத்தி கூறும் நாட்டு வளம் - 5 பாடல்கள்

1. சூழ மேதி இலங்குந் துறையில் (பா.எண் -3)
2. தக்க பூமிக்கு முன்புள்ள நாடு (பா.எண் -5)
3. அஞ்சுநூறு மகம்கொண்ட நாடு (பா.எண் -6)
4. மாதம் மூன்றும் மழையுள்ள நாடு (பா.எண் -7)
5. நீங்கக் காண்பது சேர்ந்தவர் பாவம் (பா.எண் -8)

9. தமிழ் விடுதாது - 110 -120 கண்ணிகள்

அலகு : 2

உரைநடை - காற்றின் கையெழுத்து - பழநிபாரதி

அலகு - 3

தமிழ்ச் செம்மொழி வரலாறு

செம்மொழி விளக்கம் - செம்மொழி வரலாறு - உலகச் செம்மொழிகள் - இந்தியச் செம்மொழிகள் - செம்மொழிக்கான தகுதிகள் அல்லது செம்மொழிப் பண்புகள் - தமிழ்ச் செம்மொழி நூல்கள்.

அலகு - 4

மொழிபெயர்ப்பியல் - ஒரு மடல்(கடிதம்) , ஒரு பத்தி
ஆங்கிலத்திலிருந்து தமிழில் மொழிபெயர்த்தல்.

அலகு - 5

தமிழ் இலக்கிய வரலாறு - இடைக்காலம்

கற்றல் விளைவுகள் (Course Outcome)

மாணவர்கள் ஆன்மீகச் சிந்தனையுடன் கூடிய நற்பண்புகளை
வளர்த்துக்கொள்வர்.

இடைக்கால இலக்கியப் படைப்புச் சூழலை அறிந்து கொள்வதால் இலக்கிய
வரலாற்று அறிவு பெறுவர்.

சமுதாய, அரசியல், சூழலியல் விழிப்புணர்வு பெறுவர்.

தாய்மொழியில் திறன் பெறுவர்.

பணித்தேர்வுகளுக்கு உரிய தமிழ்த்திறன் பெறுவர்.

பாட நூல்கள்

1. செய்யுள் திரட்டு, தமிழ்த்துறை வெளியீடு.
2. தமிழ்ச் சொம்மொழி வரலாறு, முனைவர் மு.சாதிக்பாட்சா, இராஜா
பப்ளிகேசன், திருச்சி-23.
3. மொழிபெயர்ப்புகள் (கடிதங்களும் பத்திகளும்)
மகிழினி பதிப்பகம், சென்னை- 106.
4. தமிழ் இலக்கிய வரலாறு -பிரமி பதிப்பகம், திருச்சி-21.
5. காற்றின் கையெழுத்து, பழநிபாரதி, தமிழ்நாதன் பதிப்பகம், சென்னை.

Course Code & Title	ENGLISH FOR COMMUNICATION – II		
Class	<u>I YEAR</u>	Semester	<u>II</u>
Cognitive Level	K – 1 Acquire K – 2 Understand K – 3 Apply K – 4 Evaluate K – 5 Analyze		
Course Objectives	The Course aims To expose students to the wisdom of great men To familiarize students with the danger of modern food and entertainment To make them realize to treat all equally To make them know to use science carefully To make them understand the need to help others		
UNIT	Content	No. of Hours	
I	It is Personality that matters : Swami Vivekananda Pele		
II	Fun Food Keep Television at Arm's length		
III	Women not the weaker sex : M.K. Gandhi A Tree Speaks : C. Rajagopalachary		
IV	The Despair of the Ganges : A. Damodharan The Fukushima- Nuclear Disaster :		
V	The Verger : William Somerset Maugham The Selfish Giant : Oscar Wilde		
Reference	Lessons will be edited and compiled.		
Course Outcomes	On completion of the course, students should be able to CO 1: Know the wisdom of great men. CO 2: know the dangers in modern life. CO 3: accept to treat all equally CO 4: realize the need to use science carefully. CO 5: understand the need to help others.		

Mapping of COs with PSOs & POs:

CO/PO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
CO1	S	M	M	M	M	S	M	S	M	M	M
CO2	S	M	S	M	M	M	S	S	M	M	S
CO3	S	M	M	M	M	S	M	S	M	M	M
CO4	S	M	S	M	M	M	S	S	M	M	S
CO5	S	M	M	M	M	S	M	S	M	M	M

- Strongly Correlating(S) - 3 marks
 Moderately Correlating (M) - 2 marks
 Weakly Correlating (W) - 1 mark
 No Correlation (N) - 0 mark

Course Code & Title	CC-III DATABASE SYSTEMS		
BSc	Semester : II	Credits : 5	Hrs: 5
Cognitive Level	K2 – Understand K3 – Apply K4 – Evaluate K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • explain the role of database administration • apply the theory of various database models • gain the skill on relational data model and relational algebra • explain query languages to design databases for different applications • state file organization and structure of files 		

Unit I

Databases and Database Users: Introduction - characteristics of data base approach - intended uses of a DBMS- advantages and implication of database approach.

Database Systems Concepts and Architecture: Data models- schemas and instances- DBMS architecture and data independence- database languages and interfaces- database system environment- classification of data base management systems. (17)

Unit II

Data Modeling: High level conceptual data models for database design- Entity types- entity sets- attributes and keys- Relationships- relationship types- roles and structural constraints - Weak entity types- ER diagrams and design issues. (18)

Unit III

Relational Data Model and Relational Algebra: Brief discussion on CODD rules- relational model concepts- constraints and schemas- Update operation on relations- basic and additional relational algebra operations- queries in relational algebra. (18)

Unit IV

Structured Query Language (SQL): Data definition in SQL2- Basic and complex queries- SQL Insert- delete- update statements and views in SQL- embedded SQL.

Database Design: Design guidelines for relational schemas- functional Dependencies- normalization -1st, 2nd, 3rd, 4th and 5th normal forms- Database design process- factors influencing physical database design guidelines and guidelines for relational systems. (19)

Unit V

Record Storage and Primary File Organizations: Secondary storage devices- buffering of blocks- placing file records on disk- operations on files- heap files and sorted files- hashing techniques.

Index Structure of Files: Single-level and multilevel ordered indexes- dynamic multi level indexes using B-trees and B+ trees. (18)

Reference Books:

1. Ramez Elmasri and Shamkanth B. Navathe, "Fundamentals of Database Systems", Pearson Education, 5th Edition, 2008, ISBN: 978- 81- 317 - 1625-0.
2. Raghuram Ramakrishnan, "Database Management System", McGraw Hill, 3rd Edition, 1997, ISBN: 0071230572
3. Gary W. Hansen and James V. Hansen, "Database Management and Design" PHI Pvt. Ltd., 2nd Edition, 1995 ISBN: 81-203-1465-4
4. Date C J, Kanna A, "Database Systems", Pearson Education, 8th Edition, 2006, ISBN: 978-81-775-8556-8

Course Outcomes:

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

CO1: Understand the basic concepts of database systems	-K2
CO2: Understand the relational data model	-K2
CO3: Apply the concepts of data base design to design database	-K3
CO4: Design and create database with normalization	-K4, K5
CO5: Identify the organization of files	-K2

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	M	M	W	N	S	S	S	M	S
CO3	S	S	S	M	M	S	S	S	S	M
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	M	M	W	M	S	S	M	M	M

Strongly Correlating(S)

Weakly Correlating (W)

Moderately Correlating (M)

No Correlating (N)

Course Code & Title	CC-IV MySQL LAB		
BSc	Semester :II	Credits : 2	Hrs: 3
Cognitive Level	K1 – Recall K2 – Understand K3 – Apply K4 – Evaluate K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • learn to store and retrieve data with MySQL database • understand the transactional controls 		

1. To implement Data Definition language

1.1. Create, alter, drop, truncate

1.2. To implement Constraints.

1.2.1. (a). Primary key, (b).Foreign Key, (c). Unique, (d). Null, (e). Not null, (f). Default, (g). Enable Constraints, (h). Disable Constraints (i). Drop Constraints

2. To implement DML, TCL and DRL

2.1. (a).Insert, (b).Select, (c).Update, (d).Delete, (e).commit, (f).rollback, (g).save point, (i). Like'%', (j).Relational Operator.

3. To implement Nested Queries & Join Queries

3.1. (a). To implementation of Nested Queries

3.2. (b). (a) Inner join, (b).Left join, (c).Right join (d).Full join

4. To implement Views

4.1. (a). View, (b). joint view, (c). force view

Course Outcomes:

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

CO1: Identify the basic concepts of database

-K1

CO2: Understand the sample database design

-K2

CO3: Apply the concepts to create a database

-K3

CO4: Evaluate the database designed for a real world problem

-K4

CO5: Design new database and make queries

-K5

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	M	M	W	N	S	S	S	S	S
CO3	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	M	S	S	S	S	S	S

Strongly Correlating(S)

Moderately Correlating (M)

Weakly Correlating (W)

No Correlating (N)

Course Code & Title	AC-III STATISTICS – II		
BSc	Semester : II	Credits : 4	Hrs: 4
Cognitive Level	K2 – Understand K3 – Apply K4 – Evaluate K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • understand the basic concepts of t-Test • learn correlation coefficient • identify the categorical data • acquire the knowledge on linear model • gain the skill on regression techniques 		

Unit I

The t-Test: The t Distribution – t-Tests – One-Sample t-Test – Two-Sample t-Test – Repeated Measures t-Test – Unequal Variance t-Test – Effect Size and Power. (12)

Unit II

The Correlation Coefficient: Measuring Association – Graphing Associations Through Scatterplots – Pearson’s Product-Moment Correlation Coefficient – Coefficient of Determination – Spearman Rank-Order Coefficient – Advanced Techniques (12)

Unit III

Categorical Data: The R-C Table – The Chi-Square Distribution – The Chi-Square Test – Fisher’s Exact Test – McNemar’s Test for Matched Pairs – Correlation Statistics for Categorical Data – The Likert and Semantic Differential Scales (12)

Unit IV

Introduction to the General Linear Model: The General Linear Model – Linear Regression – Analysis of Variance (ANOVA) (12)

Unit V

Multiple Linear Regression: Multiple Regression Models – Common Problems with Multiple Regression. **Other Types of Regression:** Logistic Regression – Logarithmic Transformations – Polynomial Regression – Overfitting. (12)

Text Book:

1. Sarah Boslaugh and Paul Andrew Watters, "Statistics in Nutshell", Published by O'Reilly Media, Inc., 2008.

Course Outcomes:

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

CO1: Identify the basic concepts of t-distribution	-K2
CO2: Understand correlation coefficient	-K2
CO3: Apply the concepts to solve problems using chi-square test	-K3
CO4: Design ANOVA model	-K4, K5
CO5: Create linear regression model	-K4, K5

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	M	M	W	N	S	S	S	M	S
CO3	S	S	S	M	M	S	S	S	S	S
CO4	S	S	S	M	M	S	S	S	S	S
CO5	S	S	S	M	M	S	S	S	S	S

Strongly Correlating(S)
Weakly Correlating (W)

Moderately Correlating (M)
No Correlating (N)

Course Code & Title	AC-II b R PROGRAMMING LAB		
BSc	Semester : II	Credits : 2	Hrs: 2
Cognitive Level	K1 – Recall K2 – Understand K3 – Apply K4 – Evaluate K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • learn statistical packages for solving a variety of statistical problems 		

List of Exercises:

1. Formation of discrete and continuous frequency distributions descriptive statistics.
2. Graphs and diagrams: Pie, bar, line and scatter diagrams-Histogram and Normal probability plot.
3. Correlation coefficient rank correlation, partial and multiple correlations.
4. Regression: Simple and multiple linear regression.
5. Curve estimation.
6. Compare means: Independent sample test and paired t- test.
7. Cross tabulation and Chi-square – test.
8. One way and two way ANOVA – Factorial designs.
9. Non parametric test: Binomial tests, run test, sign test, Median test, Mann-whitney test, Kruskal-Wallis, Kendall’s and Fried man tests.

Text Book

1. Brian Everitt and Torsten Hothorn. “A Handbook of Statistical Analyses Using R”. Chapman & Hall/CRC, Boca Raton, FL, 2006. ISBN 1-584-88539-4.

Reference Books

1. William N. Venables and Brian D. Ripley. "Modern Applied Statistics with S". Fourth Edition, Springer, New York, 2002. ISBN 0-387-95457-0.
2. John Maindonald and John Braun. "Data Analysis and Graphics Using R". Cambridge University Press, Cambridge, 2003.

Course Outcomes:

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

- | | |
|---|------------|
| CO1: Identify the basic concepts of R programming | -K1 |
| CO2: Understand the sample codes in R programming | -K2 |
| CO3: Apply the concepts to the real time problems | -K3 |
| CO4: Evaluate the code developed to solve the problems | -K4 |
| CO5: Develop the programs of their own | -K5 |

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	M	M	W	N	S	S	S	M	S
CO3	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	M	M	S	S	S	S	S
CO5	S	S	S	M	M	S	S	S	S	S

Strongly Correlating(S)
Weakly Correlating (W)

Moderately Correlating (M)
No Correlating (N)

Course Code & Title	SBEC I OFFICE AUTOMATION		
BSc	Semester : II	Credits : 2	Hrs: 2
Cognitive Level	K2 – Understand K3 – Apply K4 – Evaluate K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • state the basics of the desktop • describe the basics of MS-WORD • work with tables and graphs • gain the skill on working with MS_EXCEL work sheet • describe statistical applications on MS_EXCEL 		

UNIT – I: WINDOWS 2007

Windows Explorer – My Computer - My Documents - Folder Creation – Creating, Copying, Editing and Deleting a File – Find and Replace Facility – Desktop Configuration – File Compression and extraction. (5)

UNIT – II: MS – WORD BASICS

Creating, saving, Previewing and Printing a Word document - Editing: cut, copy, paste, find, replace, undo, redo, and book working - Applying Basic formatting: changing font and font size – bold, italic and under line features - color selection – alignment – Bullet and Numbered Lists. (6)

UNIT – III: MS WORD – WORKING WITH TABLES AND GRAPH

Adding a Table to your document – deleting, merging and splitting cells – Adding and deleting columns and rows. Inserting a Picture – clip Art, Shape and Smart Art – Designing and Reviewing a word document – Headers and Footers – Page margins, page orientation, page breaks – Performing Spelling and grammar checks. (6)

UNIT – IV: MS EXCEL WORK SHEET BASICS

Data Entry on the Worksheet – Built-in functions for good use – operations on Table – printing the data and results. (6)

UNIT – V: MS EXCEL – STATISTICAL APPLICATIONS

Construction of Line charts, Bar charts, Pie charts and scatter diagrams – Exporting data to Word and Power point. Descriptive Statistics – Data Analysis PAK in Excel – Frequency Distribution, Histogram, Cross Tabulation and Pivot Tables – Summary Statistics (Measures of central Tendency, Variation, Skewness and kurtosis) – Correlation and Regression Analysis. (7)

Text Books:

1. Kogent solutions Team, “Office 2010 in simple steps”, Dream Tech., 2010 (chapters 1 to7)
2. K.V.S. Sharma, “Statistics made simple”, PHI, 2006 (chapters 4 to 7 and 9).

Course Outcomes:

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

- Develop documents using MS-WORD
- Create and execute applications using MS-EXCEL

CO1: Identify the basics of Windows 2007

-K2

CO2: Apply formatting

-K3

CO3: Working with tables

-K3, K4

CO4: Understand MS-Excel

-K2

CO5: Design worksheet for data analysis

-K4, K5

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	M	S	S	S	M	M	M
CO2	S	M	M	M	S	S	S	S	M	S
CO3	S	S	S	M	S	S	S	S	S	M
CO4	S	S	S	M	S	S	S	M	S	S
CO5	S	S	S	M	S	S	S	S	S	S

Strongly Correlating(S)

Moderately Correlating (M)

Weakly Correlating (W)

No Correlating (N)

Course Code & Title	SBEC I HTML LAB		
BSc	Semester : II	Credits : 2	Hrs: 2
Cognitive Level	K2 – Understand K3 – Apply K4 – Evaluate K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • develop skill & knowledge of Web page design 		

Module 1: Web Design Principles

- 1.1 Basic principles involved in developing a web site
- 1.2 Planning process
- 1.3 Five Golden rules of web designing
- 1.4 Designing navigation bar
- 1.5 Page design
- 1.6 Home Page Layout
- 1.7 Design Concept

Module 2: Basics in Web Design

- 2.1 Brief History of Internet
- 2.2 What is World Wide Web
- 2.3 Why create a web site
- 2.4 Web Standards
- 2.5 Audience requirement.

Module 3: Introduction to HTML

- 3.1 What is HTML
- 3.2 HTML Documents
- 3.3 Basic structure of an HTML document
- 3.4 Creating an HTML document
- 3.5 Mark up Tags
- 3.6 Heading-Paragraphs
- 3.7 Line Breaks
- 3.8 HTML Tags

Module 4: Elements of HTML

- 4.1 Introduction to elements of HTML
- 4.2 Working with Text
- 4.3 Working with Lists, Tables and Frames
- 4.4 Working with Hyperlinks, Images and Multimedia
- 4.5 Working with Forms and controls

Module 5: Introduction to Cascading Style Sheets

5.1 Concept of CSS

5.2 Creating Style Sheet

5.3 CSS Properties

5.4 CSS Styling (Background, Text Format, Controlling Fonts)

5.5 Working with block elements and objects

5.6 Working with Lists and Tables

5.7 CSS Id and Class

Course Outcomes:

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

CO1: Understand the basic concepts of web design and HTML **-K2**

CO2: Understand CSS **-K2**

CO3: Apply the concepts to design the web page **-K3**

CO4: Evaluate the page designed **-K4**

CO5: Design new web page with CSS **-K5**

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	S	S	S	M	M	M
CO2	S	M	M	W	S	S	S	S	S	S
CO3	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	M	S	S	S	S	S	S

Strongly Correlating (S)

Moderately Correlating (M)

Weakly Correlating (W)

No Correlating (N)

இரண்டாமாண்டு : மூன்றாம் பருவம்

பகுதி 1 தமிழ் - தாள் 3

செய்யுள் (காப்பியங்கள்), கட்டுரை இலக்கியம், புதினம்,
தமிழ் இலக்கிய வரலாறு

பாட நோக்கம் (Course Objectives)

பண்டைத் தமிழரின் அரசியல் நேர்மை, குடிமக்களின் உரிமை, குடிமக்களின் பொறுப்புணர்வு, அறச்சிந்தனைகளை அறியச்செய்தல்.

நேர்மை, பிறருக்கு உதவும் பண்பு, நன்னெறிகளைப் பின்பற்றுதல் முதலான வாழ்வியல் பண்புகளை வளர்த்தல்.

வாழ்வின் எல்லா நிலைகளிலும் திறம்படச் செயலாற்றக் கற்றுத்தருதல். பெண்களை மதிக்கச் செய்தல், சொல்லாடல் திறன் வளர்த்துக்கொள்ள உதவுதல்.

மிகச் சிறந்த தமிழ் உரைநடைகளை அறிமுகம் செய்தல்.

பணித்தேர்வுகளுக்கு உதவக்கூடிய தமிழ்ப் பாடப்பகுதிகளைக் கற்பித்தல்.

அலகு - 1

1. சிலப்பதிகாரம் : வழக்குரை காதை
2. மணிமேகலை : சிறைக்கோட்டத்தை அறக்கோட்டம் ஆக்கிய காதை
3. கம்பராமாயணம் - வாலி வதைப் படலம் – 106 பாடல்கள்

அலகு - 2

1. வில்லிபாரதம் : கன்னபருவம் – பதினேழாம் போர்ச்சருக்கம்-104பாள்
2. சீறாப் புராணம் : மானுக்குப் பிணைநின்ற படலம் - 30 பாடல்கள்

3. தேம்பாவணி - வளன் சனித்த படலம் - 30 பாடல்கள்

4. இராவண காவியம் : இலங்கைக் காண்டம்-அரசியற்படலம் -40 பாள்

அலகு : 3 கட்டுரை இலக்கியம் - 'கட்டுரை இலக்கியம்', பிரமி பதிப்பகம் .

அலகு : 4 புதினம் - வேரில் பழுத்த பலா, சு.சமுத்திரம்

அலகு : 5

தமிழ் இலக்கிய வரலாறு - காப்பிய காலம்

கற்றல் விளைவுகள் (Course Out Come)

மாணவர்கள் நேர்மைப் பண்பு, துணிவுடைமை, சமுதாய அக்கறை உள்ளவர்களாக வளம்பெறுவர்.

இல்லற வாழ்வில் பெண்களை மதித்தல் வேண்டும் என்ற உணர்வு பெறுவர்.

சமுதாய, அரசியல், சூழலியல் விழிப்புணர்வு பெறுவர்.

நல்ல தமிழ் உரைநடையில் பயிற்சி பெறுவர்.

பணித்தேர்வுகளுக்கு உரிய தமிழ்த்திறன் பெறுவர்.

பாடநூல்கள்

1. செய்யுள் திரட்டு, தமிழ்த்துறை வெளியீடு.

2. கட்டுரை இலக்கியம் - பிரமி பதிப்பகம், திருச்சி-21.

3. வேரில் பழுத்த பலா, சு.சமுத்திரம் என்.சி.பி.எச்.வெளியீடு, சென்னை.

தமிழ் இலக்கிய வரலாறு – பிரமி பதிப்பகம், திருச்சி-21.

Course Code & Title	ENGLISH FOR COMMUNICATION III		
Class	<u>II YEAR</u>	Semester	<u>III</u>
Cognitive Level	K – 1 Acquire K – 2 Understand K – 3 Apply K – 4 Evaluate K – 5 Analyze		
Course Objectives	The Course aims <ul style="list-style-type: none"> • To expose students to vocabulary • To familiarize students with different levels of meaning. • To help them to think logically • To read and analyze a passage • To make them competent to face an interview 		
UNIT	Content	No. of Hours	
I	1. Synonyms : 100 2. Antonyms : 100 3. Words that Confuse : 50 4. Single Word Substitution : 100		
II	5. Phrasal verbs : 50 6. Idioms : 50		
III	7. Errors and How to avoid them :100 8. Spotting Errors :100 9. Jumbled Sentences :25		
IV	10. Reading Comprehension : 15 11. Dialogue Writing : 20		
V	12. Letter Writing (Application, Business& Complaints): 15 13. Report Writing : 10 14. Interview Skills 15. Group Discussion		
Reference	Lessons will be edited and compiled.		
Course Outcomes	On completion of the course, students should be able to CO 1: use words correctly. CO 2: understand different levels of meaning.		

	CO 3: think logically. CO 4: analyze a passage. CO 5: face an interview successfully
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Mapping of COs with PSOs & POs:

CO/PO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
CO1	S	M	S	M	M	M	S	S	M	M	S
CO2	S	M	M	M	M	S	M	S	M	M	M
CO3	S	M	S	M	M	M	S	S	M	M	S
CO4	S	M	M	M	M	S	M	S	M	M	M
CO5	S	M	S	M	M	M	S	S	M	M	S

- Strongly Correlating(S) - 3 marks
 Moderately Correlating (M) - 2 marks
 Weakly Correlating (W) - 1 mark
 No Correlation (N) - 0 mark

Course Code & Title	CC-V PYTHON PROGRAMMING AND DATA STRUCTURES		
BSc	Semester : III	Credits : 5	Hrs: 6
Cognitive Level	K2 – Understand K3 – Apply K4 – Evaluate K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • understand the basics of Python • learn the overview of Collections • gain skill on sorting algorithms • identify the data structures array and linked structure • learn stack and queue 		

Unit I

Basic Python Programming: Basic program elements – Control statements – Strings and their operations – Built-in python collections and their operations – Creating new functions – Catching exceptions – Files and their operations – Creating new classes (18)

Unit II

An Overview of Collections: Collection types – Operations on Collections – Implementations of Collections. **Searching and Complexity Analysis:** Measuring the Efficiency of Algorithms – Complexity Analysis – Search Algorithms (18)

Unit III

Sorting Algorithms: Basic Sort Algorithms – Selection Sort – Bubble Sort – Insertion Sort – Best-Case, Worst-Case, and Average-Case Performance Revisited. Faster Sorting – Overview of Quicksort – Merge Sort. (18)

Unit IV

Arrays and Linked Structures: The array data structure – Operations on Arrays – Two-dimensional Arrays – Linked Structures – Operations on Singly Linked Structures. (18)

Unit V

Stacks and Queues: Overview of Stacks – Using a Stack – Three Applications of Stacks – **Queues:** Overview of Queues – The Queues interface and its use – Two applications of Queues – Implementations of Queues. (18)

Text Book:

1. Kenneth A. Lambert, “Fundamentals of Python: Data Structures”, Cengage Learning, 2014, ISBN-13: 978-1-285-75200-6.

Course Outcomes:

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

CO1: Understand the basic concepts of python programming

-K2

CO2: Understand the overview of collections

-K2

CO3: Apply the concepts of sorting algorithms
CO4: Understand the array and linked data structures
CO5: Implement stack and queue data structures

-K3
-K2
-K4, K5

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	M	M	W	N	S	S	S	M	S
CO3	S	S	S	M	M	S	S	S	S	S
CO4	S	S	S	M	M	S	S	S	S	S
CO5	S	S	S	M	M	S	S	S	S	S

Strongly Correlating(S)
 Weakly Correlating (W)

Moderately Correlating (M)
 No Correlating (N)

Course Code & Title	CC-VI PYTHON PROGRAMMING LAB		
BSc	Semester : III	Credits : 2	Hrs: 3
Cognitive Level	K1 – Recall K2 – Understand K3 – Apply K4 – Evaluate K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • learn data structures, algorithms and implement the same using Python 		

List of Exercises:

1. Write Python applications using variables, data types, strings and functions.
2. Write Python applications using loops, arrays, sorting and hashes.
3. Write Python applications using dictionaries, lists and tuples.
4. Write Python programs for implementing the following sorting methods:
 - (a) Bubble sort
 - (b) Selection sort
 - (c) Insertion sort
 - (d) Quick sort
 - (e) Merge sort

Course Outcomes:

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

CO1: Identify the basic concepts of python programming	-K1
CO2: Understand the sample codes in python	-K2
CO3: Apply the concepts to implement data structures	-K3
CO4: Evaluate the code developed to solve the problems	-K4
CO5: Develop python programs of their own	-K5

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	M	M	W	N	S	S	S	M	S
CO3	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	M	S	S	S	S	S	S

Strongly Correlating(S)
Weakly Correlating (W)

Moderately Correlating (M)
No Correlating (N)

Course Code & Title	AC-IV OPERATIONS RESEARCH-I		
BSc	Semester : III	Credits : 4	Hrs: 4
Cognitive Level	K2 – Understand K3 – Apply K4 – Evaluate K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • learn the basics of OR • identify and work with simplex method • gain exposure on working with transportation problems • acquire the knowledge on sequencing problems • attain the skill on CPM 		

Unit – I

Origin and Development of OR – Nature and feature of OR – Applications of OR – Formulation of L.P.P. – Graphical solution of two variables – Canonical and standard forms of L.P.P. (12)

Unit – II

Simplex method for $<,=,>$ constraints – Simplex method – Big-M method. (12)

Unit – III

Transportation problem – Algorithm – Degeneracy algorithm – Degeneracy in transportation problem – Unbalanced transportation problem – Assignment problem – Algorithm – Unbalanced assignment problem. (12)

Unit – IV

Sequencing problem – Processing of n jobs through two machines – Processing of n jobs using three machines - Processing of two jobs through m machines. (12)

Unit – V

Network-Introduction – Rules of network construction – CPM computations – PERT computations – Distinction between CPM and PERT. (12)

Text book:

1. Kantiswarup, P.K.Gupta, Manmohan, “ Operations Research”, Sultan Chand & Company 11th Edition, 2003.

Unit – I : Ch 1,2.

Unit – II: Ch 3.

Unit – III : Ch 6, 7(7.1-7.3).

Unit – IV : Ch 10(10.1-10.5).

Unit – V : Ch 21.

Reference Books:

1. Taha, “Operations Research”, Keerthi publishing house, 1997.
2. Nita H.Shah, Ravi M. Gor&HardikSoni, ”Operations Research”, PHI, NewDelhi, 2010.
3. J. K Sharma, “Operations Research: Theory and Applications” Macmillan India Ltd., 1997.

Course Outcomes:

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

- CO1:** Identify the basic concepts of OR **-K2**
CO2: Understand and apply simplex method **-K2, K3**
CO3: Apply the concepts to solve transportation problems **-K3**
CO4: Solve sequencing problem **-K4**
CO4: Understand the basics and the methods of solving network problems **-K2, K5**

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	M	M	W	N	S	S	S	M	S

CO3	S	S	S	M	M	S	S	S	S	S
CO4	S	S	S	M	M	S	S	S	S	S
CO5	S	S	S	M	M	S	S	S	S	S

Strongly Correlating(S)

Weakly Correlating (W)

Moderately Correlating (M)

No Correlating (N)

Course Code & Title	AC-V a MATHEMATICAL TOOL LAB		
BSc	Semester : III	Credits: NIL	Hrs: 3
Cognitive Level	K2 – Understand K3 – Apply K4 – Evaluate K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • understand the basics of Scilab • learn the basic programs using Scilab 		

List of Exercises:

Introduction

Exercise 1 – Scilab Environment

Exercise 1 – Scilab Environment

Exercise 2 – The Workspace and Working Directory

Exercise 2 – The Workspace and Working Directory

Exercise 3 – Matrix Operations

Exercise 3 – Matrix Operations

Exercise 4 – Sub-matrices

Exercise 4 – Sub-matrices

Exercise 5 – Statistics

Exercise 6 – Plotting Graphs

Exercise 7 – Plotting 3D Graphs

Web Reference:

<https://www.cse.iitb.ac.in/~cs626-449/scilab.pdf>

Course Outcomes:

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

CO1: Understand and identify the Scilab environment	-K2
CO2: Understand the sample codes in Scilab	-K2
CO3: Apply the concepts to the real time problems	-K3
CO4: Evaluate the code developed to solve the problems	-K4
CO5: Develop the programs of their own	-K5

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	M	M	W	N	S	S	M	M	S
CO3	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	M	S	S	S	S	S	S

Strongly Correlating(S)
Weakly Correlating (W)

Moderately Correlating (M)
No Correlating (N)

course Code & Title	SBEC II SHELL PROGRAMMING LAB		
BSc	Semester : III	Credits : 2	Hrs: 2
Cognitive Level	K2 – Understand K3 – Apply K4 – Evaluate K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • develop shell scripts to solve problems • implement some standard Linux utilities such as ls,cp,etc using system calls 		

List of Exercises:

1. Use of Basic UNIX Shell Commands: ls, mkdir, rmdir, cd, cat, touch, file, wc, sort, cut, grep, dd, dfspace, du, ulimit
2. Commands related to inode, I/O redirection and piping, process control commands, mails.
3. Shell Programming: Shell script exercises based on following: (i) Interactive shell scripts (ii) Positional parameters (iii) Arithmetic (iv) if-then-fi, if-then- else-fi, nested if-else (v) Logical operators (vi) else + if equals elif, case structure (vii) while, until, for loops, use of break
4. Write a shell script to create a file. Follow the instructions (i) Input a page profile to yourself, copy it into other existing file; (ii) Start printing file at certain line (iii) Print all the difference between two file, copy the two files. (iv) Print lines matching certain word pattern.
5. Write shell script for- (i) Showing the count of users logged in, (ii) Printing Column list of files in your home directory (iii) Listing your job with below normal priority (IV) Continue running your job after logging out.
6. Write a shell script to change data format. Show the time taken in execution of this script.
7. Write a shell script to print files names in a directory showing date of creation & serial number of the file.
8. Write a shell script to count lines, words and characters in its input (do not use wc).
9. Write a shell script to print end of a Glossary file in reverse order using Array. (Use awk tail)
10. Write a shell script to check whether Ram logged in, Continue checking further after every 30 seconds till success.
11. Write a shell script to compute gcd lcm & of two numbers. Use the basic function to find gcd & LCM of N numbers.
12. Write a shell script to find whether a given number is prime. Take a large number such as 15 digits or higher and use a proper algorithm.

Course Outcomes:

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

CO1: Understand the basic concepts of shell programming	-K2
CO2: Apply the concepts to write shell scripts	-K3
CO3: Evaluate the scripts	-K4
CO4: Design new scripts	-K5

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	M	M	W	N	S	S	S	M	S
CO3	S	S	S	M	M	S	S	S	S	S
CO4	S	S	S	M	M	S	S	S	S	S

Strongly Correlating(S)

Weakly Correlating (W)

Moderately Correlating (M)

No Correlating (N)

Course Code & Title	SBEC II ANIMATION LAB		
BSc	Semester : III	Credits : 2	Hrs: 2
Cognitive Level	K2 – Understand K3 – Apply K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • describe and develop techniques involved in animation and image editing 		

List of Exercises to be worked out in GIMP:

1. Two Images Layer Masking
2. Compose old Images to New Images
3. Convert New Images into old Images
4. Wind Effect on an Image
5. Create own Background Using Various Tools
6. Color Management
7. Pattern Filling
8. Image Slicing with path Tool and Marquee Tool
9. Creating a Blazing Flame Text
10. A simple Animation

Books for reference:

1. Jason Van Gumster, Robert Shimonski, “**GIMP Bible**”, Willey Publishing. Inc., ISBN-13 978-0470523971, ISBN-10: 0470523972.
2. Karin Kylander & Olof S . Kylander,” **GIMP User’s Manual**”, ISBN-1: 57610-520-2 .

Course Outcomes:

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

- | | |
|---|------------|
| CO1: Identify the GIMP environment | -K2 |
| CO2: Apply the concepts to create animations | -K3 |
| CO3: Develop applications using GIMP | -K5 |

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	M	S	S	M	M	M
CO2	S	M	M	M	M	S	S	S	M	S
CO3	S	S	S	M	M	S	S	S	S	S

Strongly Correlating(S)
Weakly Correlating (W)

Moderately Correlating (M)
No Correlating (N)

Course Code & Title	GS - Gender Studies		
BSc	Semester : III	Credits : 1	Hrs: 0
Cognitive Level	K2 – Understand K3 – Apply		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • make boys and girls aware of each other’s strength and weakness. • develop sensitivity towards both genders in order to lead an ethically enriched life. • promote attitudinal change towards a gender balanced ambience and women empowerment. 		

UNIT-I: Concepts of Gender

Sex – Gender – Biological Determination – patriarchy – Feminism – Gender Discrimination – Gender Division of Labour - Gender Stereotyping: Gender Sensitivity – Gender Equality – Gender Mainstreaming – Empowerment. (3)

UNIT-II: Women’s Studies VS Gender Studies

UGC’s Guidelines – VII to XI Plans – Gender Studies: Beijing Conference and Convention on the Elimination of All forms of Discrimination against Women (CEDAW) – Exclusiveness and inclusiveness. (3)

UNIT-III: Areas of Gender Discrimination

Family – Sex Ratio – Literacy – Health – Governance – Religion Work VS Employment - Market-Media – Politics – Domestic Violence – Sexual Harassment – State Policies and Planning. (3)

UNIT-IV: Women Development and Gender Development

Initiatives – International Women’s Decade – International Women’s Year – National Policy for Empowerment Year 2001 – Mainstreaming Global Policies. (3)

UNIT-V: Women’s Movement and Safeguarding Mechanism in India

National Commission for Women (NCW) – All Women Police Station – Family Court – Domestic Violence Act – Prevention of Sexual Harassment at Work Place – Supreme Court Guidelines – Maternity Benefit Act – Pre-natal Diagnostic Act – Hindu Succession Act 2005 – Eve Teasing Prevention Act – Self Help Group – 73rd and 74th Amendment Act for PRIS. (3)

Text Book:

N. Manimekalai and S. Suba – Gender Studies – Bharathidasan University – Trichirappalli – 620024

Reference Book:

V.S. Gurusamy – Empowerment of Women in India – New Century Publications – New Delhi – First Edition

Course Outcomes:

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

CO1: Identify the basic concepts of gender	-K2
CO2: Understand the gender studies	-K2
CO3: Realize and apply the areas of gender discrimination	-K3
CO4: State women and gender development	-K2
CO5: Observe the safeguarding mechanism in india	-K2

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	M	M	W	N	S	S	M	M	M
CO3	S	M	M	M	N	S	S	S	S	M
CO4	S	S	S	M	N	S	S	S	S	S
CO5	S	S	S	M	N	S	S	S	S	S

Strongly Correlating(S)

Weakly Correlating (W)

Moderately Correlating (M)

No Correlating (N)

இரண்டாமாண்டு : நான்காம் பருவம்

பகுதி 1 தமிழ் - தாள் 4

செய்யுள் (பழந்தமிழ் இலக்கியம்) நாடகம், தமிழ் இலக்கிய வரலாறு,
கட்டுரை வரைவியல்

பாட நோக்கம் (Course Objectives)

பழந்தமிழரின் வாழ்வியல் அறம், வாழ்வியல் நூட்பங்கள், அக வாழ்வுச் சிந்தனைகளை அறியச்செய்தல்.

தனித் திறன்களை மேம்படுத்திக் கொள்ள உதவுதல்.

கடமை உணர்ச்சி, பெரியோரை மதித்தல் முதலான உயர்பண்புகளை வளர்த்தல்.

தமிழர்தம் இயற்கை வளம், செல்வ வளம், இலக்கிய வளங்களை அறிமுகம் செய்தல்.

நிகழ்கால வாழ்வியல் சிக்கல்களில் தெளிவுபெறச் செய்தல், சமுதாய அக்கறை கொள்ளச்செய்தல்.

பணித்தேர்வுகளுக்கு உதவக்கூடிய தமிழ்ப் பாடப்பகுதியைக் கற்பித்தல்.

அலகு - 1

1. குறுந்தொகை - 10 பாடல்கள்

குறிஞ்சி

1. நிலத்தினும் பெரிதே (பா.எண் -3)
2. வேரல் வேலி (பா.எண் -18)
3. யாயும் ஞாயும் (பா.எண் -40)
4. இடிக்கும் கேளிர் (பா.எண் -58)

நெய்தல்

1. அணிற்பல் அன்ன (பா.எண் -49)
2. ஞாயிறு பட்ட அகல்வாய் (பா.எண் -92)
3. கடும்புனல் தொடுத்த (பா.எண் -103)

மருதம்

1. தச்சன் செய்த சிறுமா (பா.எண் -61)
2. நன்நலம் தொலைய (பா.எண் -100)
3. வேம்பின் பைங்காய் (பா.எண் -205)

2. நற்றிணை – 5 பாடல்கள்

1. நின்ற சொல்லர் ,... . . . (குறிஞ்சி) . (பா.எண் -1)
2. விளம்பழம் கமழும் (பாலை) . (பா.எண் -12)
3. தடமருப்பு எருமை (மருதம்) . (பா.எண் 120)
4. விளையாடு ஆயமொடு (நெய்தல்) . (பா.எண் -172)
5. அம்ம வாழி தோழி (முல்லை) . (பா.எண் -289)

3. கலித்தொகை - 5 பாடல்கள்

1. பாலைக் கலி - வயக்குறு மண்டிலம் (பா.எண் 24)
2. குறிஞ்சிக் கலி - பாடுகம் வா வாழி தோழி (பா.எண் 05)
3. மருதக்கலி - ஈண்டு, நீர்மிசைத் தோன்றி (பா.எண் 24)
4. முல்லைக் கலி - தனி பெறு தண் புலத்துத் (பா.எண் 1)
5. நெய்தற் கலி - மா மலர் முண்டகம் (பா.எண் 16)

4. ஐங்குறுநூறு - 10 பாடல்கள்

வேழப்பத்து

1. மனைநடு வயலை வேழம் (பா.எண் 11)
2. பரியுடை நன்மான் (பா.எண் 13)
3. ஓங்குபூ வேழத்துத் (பா.எண் 16)
4. இருஞ்சாய் அன்ன (பா.எண் 18)
5. நெகிழ்பு ஓடும் வளை (பா.எண் 20)

அன்னாய் வாழிப் பத்து

1. அன்னாய் வாழி! வேண்டு அன்னை! நம் படப்பை (பா.எண் 203)
2. அன்னாய் வாழி! வேண்டு அன்னை! அஃதெவன்கொல்?.. (பா. 204)
3. அன்னாய் வாழி! வேண்டு அன்னை! எந்தோழி (பா.எண் 206)
4. அன்னாய் வாழி! வேண்டு அன்னை! நன்றும் (பா.எண் 208)
5. அன்னாய் வாழி! வேண்டு அன்னை! கானவர் (பா.எண் 208)

5. புறநானூறு - 5 பாடல்கள்

1. இரும்பனை வெண்தோடு. . . (பா.எண் 54)
2. உண்டாலம்ம இவ்வுலகம்... (பா.எண் 14)
3. யாண்டு பலவாக . . . (பா.எண் 191)
4. யாதும் ஊரே... (பாடல் எண் 192)
5. செய்குவம் கொல்லோ நல்வினை... (பா.எண் 214)

6. பத்துப்பாட்டு - பட்டினப்பாலை முழுவதும்

அலகு - 2

1. திருக்குறள் - 3 அதிகாரங்கள்

1. மடியின்மை
2. இடுக்கண் அழியாமை
3. சொல்வன்மை

2. நாலடியார் - 12 பாடல்கள்

பொறையுடைமை

1. காதலர் சொல்லுங் (பா.எண் 73)
2. அறிவதறிந்தடங்கி (பா.எண் 74)
3. இன்னா செயினும் (பா.எண் 76)
4. தான்கெடினும் தக்கார். . . (பா.எண் 80)

தீவினையச்சம்

1. அக்கே போல் அங்கை . . . (பா.எண் 123)
2. நெருப்பழல் சேர்ந்தக் கால் . . . (பா.எண் 124)
3. பெரியவர் கேண்மை . . . (பா.எண் 125)
4. யாஅர் ஒருவர் (பா.எண் 127)

பெரியாரைப் பிழையாமை

1. பொறுப்பரென் . . . (பா.எண் 161)
2. அவமதிப்பும் ஆன்ற . . . (பா.எண் 163)
3. நளிகடல் தண்சேர்ப்ப (பா.எண் 166)
4. பெரியார் பெருமை (பா.எண் 170)

3.பழமொழி - 12 பாடல்கள்

அறிவுடைமை

1. அறிவின் மாண்பு (பா.எண் 27)
2. அறிவினர் மாண்பு(பா.எண் 28)
3. அறிவுடையாருடன் அறிவுடையார் சேர்தல் (பா.எண் 30)
4. அறிவிலாரை அறிவுடையார் புகவிடாமை(பா.எண் 31)

இன்னா செய்யாமை

1. முற்பகல் செய்யின் பிற்பகல் விளையும்(பா.எண்- 47)
2. நலியப் பெற்ற எளியர் அழுத கண்ணீர்(பா.எண் 48)
3. மதிப்பு மிக்கவரை அழிக்க முயலுதல்(பா.எண்-49)
4. நலிந்தாரை நலியாமை(பா.எண் 50)

சான்றோர் இயல்பு

1. சான்றோர் பெருமை(பா.எண் 70)
2. வறுமையினும் நின்ற நிலையில் வழுவாமை(பா.எண் 71)
3. பீடிலாவிடத்தும் பெருந்தகைமையில் வழுவாமை(பா.எண் 72)
4. இடருற்ற விடத்தும் மதிப்பிற் குறையாமை(பா.எண் 73)

4.இன்னா நாற்பது – 5 பாடல்கள்

1. அறமனத்தர் கூறும் கடுமொழி (பா.எண் 6)
2. உண்ணாது வைக்கும் பெரும் பொருள் . . . (பா.எண் 16)
3. குலத்துப் பிறந்தவன் கல்லாமை யின்னா . . . (பா.எண் 19)

4. யானையின் மன்னரைக் கண்டால் . . . (பா.எண் 22)
5. பிறன் மனையாள் பின்னோக்கும் பேதைமை யின்னா . . . (பா.எண் 38)

5. இனியவை நாற்பது – 5 பாடல்கள்

1. பிச்சை புக்காயினும் கற்றல் (பா.எண் 1)
2. மானமழிந்தபின் வாழாமை முன்னினதே . . . (பா.எண் 13)
3. குழவிதளர் நடை காண்டல் இனிதே . . . (பா.எண் 14)
4. வருவா யறிந்து வழங்கல் . . . (பா.எண் 22)
5. பத்து கொடுத்தும் பதியிருந்து (பா.எண் 40)

அலகு : 3

நாடகம் - பிசிராந்தையார் - பாரதிதாசன்

அலகு : 4

கட்டுரை வரைவியல் - பொதுக்கட்டுரைகள்

அலகு : 5

தமிழ் இலக்கிய வரலாறு – சங்க காலம், சங்கம் மருவிய காலம்

கற்றல் விளைவுகள் (Course OutCome)

மாணவர்கள் வாழ்வியல் நுட்பங்களில் வல்லமை பெறுவர்.

சமுதாய அக்கறை உள்ளவர்களாக மனவளம் பெறுவர்.

சமுதாய, பொருளியல், சூழலியல் விழிப்புணர்வு பெறுவர்.

பணித்தேர்வுகளுக்கு உரிய தமிழ்த்திறன் பெறுவர்.

பாடநூல்கள்

1. செய்யுள் திரட்டு, தமிழ்த்துறை வெளியீடு.
2. பிசிராந்தையார் - பாரதிதாசன், தமிழ் நாதன் பதிப்பகம், சென்னை – 110
3. பொதுக்கட்டுரைகள், மகிழினி பதிப்பகம், சென்னை- 106.
4. தமிழ் இலக்கிய வரலாறு,
பிரமி பதிப்பகம், திருச்சி-21.

Course Code & Title	ENGLISH FOR COMMUNICATION IV		
Class	<u>II YEAR</u>	Semester	<u>IV</u>
Cognitive Level	K – 1 Acquire K – 2 Understand K – 3 Apply K – 4 Evaluate K – 5 Analyze		
Course Objectives	The Course aims <ul style="list-style-type: none"> • To make the students to live meaningfully • To Familiarize students with various great personalities • To understand qualities like freedom • To know human values like patriotism and universal brotherhood • To realize the value of comradeship 		
UNIT	Content	No. of Hours	
I	A Poison Tree : William Blake King Bruce and the Spider : Eliza Cook The Character of a Happy Life : Henry Wotton		
II	Ulysses : Lord Alfred Tennyson Money Madness : D. H. Lawrence I vow to thee my Country		

III	The Ocean The Unknown Citizen Night of the Scorpion	: Lord Byron : W. H. Auden : Nissim Ezekiel	
IV	The Rising of the Moon The Little Man The Path Finder	: Lady Gregory : John Galsworthy : Herman Ould	
V	A Tale of two cities	: Charles Dickens	
Reference	Lessons will be edited and compiled.		
Course Outcomes	On completion of the course, students should be able to CO 1: live meaningfully. CO 2: know great qualities like leadership. CO 3: understand qualities like freedom and parenthood CO 4: live as a group in unity CO5: realize the value of comradeship		

Mapping of COs with PSOs & POs:

CO/PO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
CO1	S	M	M	M	M	S	M	S	M	M	M
CO2	S	M	S	M	M	M	S	S	M	M	S
CO3	S	M	M	M	M	S	M	S	M	M	M
CO4	S	M	S	M	M	M	S	S	M	M	S
CO5	S	M	M	M	M	S	M	S	M	M	M

Strongly Correlating(S) - 3 marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 mark

No Correlation (N) - 0 mark

Course Code & Title	CC-VII DATA MINING AND VISUALIZATION		
BSc	Semester : IV	Credits : 5	Hrs: 6
Cognitive Level	K2 – Understand K3 – Apply K4 – Evaluate K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • learn the basics of data mining • state and explain the classification and clustering algorithms • understood the basic concepts of data warehousing • gain the skill on Cognos visualization tool • attain the knowledge on creating visualizations using RAVE 		

Unit I

Introduction to data mining: Datamining process- Applications-Techniques-Examples – Future – Limitations-Software – Data understanding and preparation - Association Rule Mining (14)

Unit II

Classification: Decision Tree –Building a decision tree-Split algorithm – Rules-Naïve Bayes method – Cluster analysis (16)

Unit III

Data warehousing – Operational Data Stores-Data Warehouses – Design –Guidelines – Metatdata – Software (15)

Unit IV

Introduction to Cognos – Environment – Overview (15)

Unit V

Creating Visualizations using RAVE (15)

Text book:

1. G.K. Gupta, “Introduction to Data mining with case studies”, Prentice Hall India, 3rd Edition

Web reference for visualization tool:

<https://www.tutorialspoint.com/cognos>

Reference Book:

1. S. K. Mourya, Shalu Gupta, “Data Mining and Data Warehousing”, Alpha Science International Limited, 2013
2. K.P.Soman&ShyamDiwakar and V. Ajay, “Insight to Data Mining Theory and Practice”, Prentice Hall of India, 2006. (ISBN -81-203- 2897-3)

3. Jiawei Han and MichelineKamber, “Data Mining Concepts and Techniques”, Elsevier, Second Edition, 2007 (ISBN: 81-312-0535-5)

Course Outcomes:

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

- CO1:** Understand the basic concepts of data mining **-K2**
- CO2:** Understand classification and clustering **-K2**
- CO3:** Identify data ware housing **-K2**
- CO4:** Knowing Cognos environment **-K2**
- CO5:** Creating visualizations using RAVE **-K3, K4, K5**

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	M	M	W	N	S	S	S	M	S
CO3	S	S	S	M	S	S	S	S	S	M
CO4	S	S	S	M	M	S	S	M	S	S
CO5	S	S	S	M	M	S	S	S	S	S

Strongly Correlating(S)
Weakly Correlating (W)

Moderately Correlating (M)
No Correlating (N)

Course Code & Title	CC-VIII DATAMINING AND VISUALIZATION LAB		
BSc	Semester : IV	Credits : 3	Hrs: 3
Cognitive Level	K1 – Recall K2 – Understand K3 – Apply K4 – Evaluate K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • learn data warehousing and data mining techniques 		

List of experiments for datamining:

1. Data Preprocessing
2. Creation of data warehouse
3. Bayesian Classification.
4. Decision Tree.
5. K-Means Clustering.
6. One Hierarchical Clustering Algorithm.
7. Case Study on Text Mining or any Commercial Application.

Software: WEKA, RapidMiner, DB Miner Or Equivalent

List of experiments for visualization lab:

1. Draw Chart with RAVE
2. Working with data
3. Coordinates and Axes
4. Elements and Labels
5. Legends and Sizes
6. Styles and Colors
7. Aesthetics

Web reference: <https://www.tutorialspoint.com/cognos>

Course Outcomes:

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

- | | |
|--|------------|
| CO1: Identify the basic concepts of data mining and visualization | -K1 |
| CO2: Understand the sample programs | -K2 |
| CO3: Apply the concepts to the real time problems | -K3 |
| CO4: Evaluate the code developed to solve the problems | -K4 |
| CO5: Develop the programs of their own | -K5 |

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	M	M	W	N	S	S	S	M	S
CO3	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	M	S	S	S	S	S	S

Strongly Correlating(S)
Weakly Correlating (W)

Moderately Correlating (M)
No Correlating (N)

Course Code & Title	AC-VI OPERATIONS RESEARCH-II		
BSc	Semester : IV	Credits : 4	Hrs: 4
Cognitive Level	K2 – Understand K3 – Apply K4 – Evaluate K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • learn decision theory • state and explain the theory of games • understand the concepts of inventory control models • gain the skill on queuing theory • attain the knowledge on EM algorithm 		

UNIT-I

Decision Theory-Introduction-Steps in Decision Theory Approach – Types of Decision Making Environments – Decision Making under uncertainty – Decision making under risk. (9)

UNIT -II

Theory of Games – Introduction – Two-person zero – Sum Games – Pure Strategies: Games with saddle point – Mixed Strategies: Games without saddle point. (9)

UNIT-III

Deterministic Inventory Control Models – Introduction – The meaning of Inventory control- Functional role of inventory- Reasons for carrying Inventory - Factors involved in Inventory problem Analysis – Inventory Model Building- Single Item Inventory control Models without Shortage- Single Item Inventory control Models with Shortage. (9)

UNIT-IV

Queuing Theory- Introduction – Essential Features of Queuing systems – Operating Characteristics of Queuing System – Probability Distribution in Queuing systems – Classification of Queuing Models – Solution of Queuing Models. (9)

UNIT-V

The EM Algorithm – Introduction – Definition of EM Algorithm – Allele frequency estimation – Transmission of Tomography – Factor Analysis – Hidden Markov Chains – Problems. (9)

Text Book:

1. J. K Sharma, "Operations Research: Theory and Applications" Macmillan India Ltd., 1997.
2. Kenneth Lange, "Optimization" Springer verlag, 2004.

Unit-I: Ch 11(11.1-11,5)

Unit-II: Ch 12 (12.1 -12.6)

Unit-III: Ch 14 (14.1-14.7)

Unit-IV: Ch 16 (16.1-16.6)

Unit-V :Ch 7 (7.1-7.7) of book 2.

Reference Books:

1. Rathindra P. Sen, "Operations Research Algorithms and Applications", PHI, New Delhi, 2010.
2. R. PanneerSelvam, "Operations Research", PHI, NewDelhi, 2nd Ed., 2010.
3. Taha, "Operations Research", Keerthi Publishing House, 1997.
4. Geoffrey J. McLachlan, Thriyambakam Krishnan, " The EM Algorithm and Extensions", John Wiley & Sons inc., Publications.

Course Outcomes:

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

- CO1:** Identify the basic concepts of decision theory **-K2**
CO2: Understand the theory of games **-K2**
CO3: Apply the concepts of inventory control models to solve problems **-K3**
CO4: Solve problems using queuing theory **-K4, K5**
CO5: Understand EM algorithm and solve problems **-K2, K5**

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	M	M	W	M	S	S	S	M	S
CO3	S	S	S	M	M	S	S	S	S	S
CO4	S	S	S	M	M	S	S	S	S	S
CO5	S	S	S	M	M	S	S	S	S	S

Strongly Correlating (S)

Weakly Correlating (W)

Moderately Correlating (M)

No Correlating (N)

Course Code & Title	AC-V b MATHEMATICAL TOOL LAB		
BSc	Semester : IV	Credits : 3	Hrs: 3
Cognitive Level	K2 – Understand K3 – Apply K4 – Evaluate K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • learn programs using Scilab 		

Introduction

- Exercise 1 – Scilab Programming Language
- Exercise 2 – Script Files and Function Files
- Exercise 3 – Functions in Scilab
- Exercise 4 – File Operations
- Exercise 5 – Reading Microsoft Excel Files
- Exercise 6 – Some Miscellaneous Commands

Web Reference: <https://www.cse.iitb.ac.in/~cs626-449/scilab.pdf>

Course Outcomes:

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

- CO1:** Understand the basic concepts of Scilab **-K2**
- CO2:** Understand the sample codes **-K2**
- CO3:** Apply the concepts to the real time problems **-K3**
- CO4:** Evaluate the code developed to solve the problems **-K4**
- CO5:** Develop the code of their own **-K5**

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	M	M	W	N	S	S	S	M	S
CO3	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	M	S	S	S	S	S	S

Strongly Correlating (S)

Moderately Correlating (M)

Weakly Correlating (W)

No Correlating (N)

Course Code & Title	NMEC I FUNDAMENTALS OF DATA SCIENCE		
BSc	Semester : IV	Credits : 2	Hrs: 2
Cognitive Level	K2 – Understand K3 – Apply K4 – Evaluate		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • describe the key concepts in data science, including their real-world applications and the toolkit used by data scientist • state the data collection and management • attain the skill on data analysis • acquire the knowledge on the basic machine learning algorithms • explain the data visualization model 		

Unit I

Introduction to core concepts and technologies: Introduction - Data science in a nutshell – Terminology - The data science process - A data science toolkit - Types of data - Example applications (5)

Unit II

Data collection and management: Introduction - Sources of data - Data collection and APIs - Exploring and fixing data - Data storage and management - Using multiple data sources (5)

Unit III:

Data analysis: Introduction - Terminology and concepts - Introduction to statistics - Nature of statistics and introduction - Central tendencies and distributions – Variance - Distribution properties and arithmetic - Samples/CLT (6)

Unit IV:

Basic machine learning algorithms - Linear regression – SVM - Naive Bayes – k-means clustering algorithm. (7)

Unit V:

Data Visualization: Introduction - Types of data visualization – Exploratory – Explanatory - Data for visualization - Data types - Data encodings - Retinal variables - Mapping variables to encodings - Visual encodings – Future of Data Science (7)

Text Books:

1. James, G., Witten, D., Hastie, T., Tibshirani, R., "An introduction to statistical learning with applications in R", Springer, 2013.
2. Han, J., Kamber, M., Pei, J. "Data mining concepts and techniques". Morgan Kaufmann, 2011.

3. Hastie, T., Tibshirani, R., Friedman, J. "The Elements of Statistical Learning", 2nd edition. — Springer, 2009.
4. Murphy, K. "Machine Learning: A Probabilistic Perspective". - MIT Press, 2012.
5. Nina Zumel, John Mount. Manning, "Practical Data Science with R". 2014
6. F. Provost, T Fawcett, "Data Science for business", 2013

Course Outcomes:

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

- | | |
|--|----------------|
| CO1: Identify the basic concepts of data science | -K2 |
| CO2: Understand the data collection and management | -K2 |
| CO3: Analyze the data | -K3, K4 |
| CO4: Understand and apply machine learning problems | -K2, K3 |
| CO5: Identify data visualization | -K2 |

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	W	W	N	S	S	M	W	W
CO2	S	M	M	W	N	S	S	S	W	W
CO3	S	S	M	M	N	S	S	S	M	M
CO4	S	S	M	M	N	S	S	M	W	W
CO5	S	S	M	M	N	S	S	S	W	W

Strongly Correlating (S)
Weakly Correlating (W)

Moderately Correlating (M)
No Correlating (N)

Course Code & Title	SOFT SKILLS DEVELOPMENT		
BSc	Semester : IV	Credits : 2	Hrs: 0
Cognitive Level	K2 – Understand K3 – Apply K4 – Evaluate K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • describe the basic skills that required of an educated youth • develop to present the best as job seekers 		

Unit 1: Effective Communication & Resume Writing

Basics of communication - definition of communication, Barriers of Communication, Non-verbal Communication; Effective Communication - Johari Window, The Art of Listening, Conversation Techniques, Good manners and Etiquettes. (6)

Unit II: Resume Writing & Interview skills

Resume Writing: What is resume? Types of Resume - Chronological, Functional and Mixed Resume, Steps in preparation of Resume. Interview Skills: Common interview questions, Attitude, Body Language, The mock interviews, Phone interviews, Behavioral interviews. (6)

Unit III: Group Discussion

Group Discussion Basics, GD Topics for Practice, Points for GD Topics. Personal Effectiveness: Self Discovery; and Goal Setting (6)

Unit IV: Numerical Ability

Average, Percentage; Profit and Loss, Simple Interest, Compound Interest; Time and Work, Pipes and Cisterns; Time and Distance, Problems on Trains, Boats and Streams; and Calendar, Rations and Proportions. (6)

Unit V: Test of Reasoning

Verbal Reasoning: Series Completion, Analogy; Data Sufficiency, Assertion and Reasoning; and Logical Deduction. Non-Verbal Reasoning: Series; and Classification (6)

Text Books

1. Aggarwal, R.S. 2010. "A Modern Approach to Verbal and Non Verbal Reasoning". S.Chand, New Delhi.
2. Covey, Stephen. 2004. "7 Habits of Highly effective people", Free Press. Egan, Gerard. (1994). The Skilled Helper (5th Ed). Pacific Grove, Brooks/Cole. 58 59
3. Khera, Shiv 2003. "You Can Win". Macmillan Books , Revised Edition.

4. Murphy, Raymond. 1998. "Essential English Grammar". 2nd ed., Cambridge University Press.
- Sankaran, K., & Kumar, M. "Group Discussion and Public Speaking". M.I. Pub, Agra, 5th ed., Adams, Media.
5. Trishna's 2006. "How to do well in GDs & Interviews", Trishna Knowledge Systems.
6. Yate, Martin. 2005. "Hiring the Best: A Manager's Guide to Effective Interviewing and Recruiting".

Course Outcomes:

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

- | | |
|---|----------------|
| CO1: Understand effective communication and resume writing | -K2 |
| CO2: Learn to develop interview skills | -K2 |
| CO3: Practice group discussions | -K3, K4 |
| CO4: Develop numerical ability | -K5 |
| CO5: Learn verbal reasoning | -K2 |

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	M	M	W	N	S	S	S	M	S
CO3	S	S	S	M	W	S	S	S	S	M
CO4	S	S	S	M	W	S	S	M	S	S
CO5	S	S	S	M	W	S	S	S	S	S

Strongly Correlating(S)
Weakly Correlating (W)

Moderately Correlating (M)
No Correlating (N)

Course Code & Title	CC-IX NoSQL DATABASES		
BSc	Semester : V	Credits : 5	Hrs: 6
Cognitive Level	K1 – Recall K2 – Understand K3 – Apply K4 – Evaluate K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • understand the difference between conventional SQL query language and NoSQL basic concepts • learn the overview of NoSQL • gain the skill on NoSQL storage types • compare NoSQL products • learn to design and build MongoDB based Big data Applications and learn MongoDB query language 		

Unit – I

Technology Evolution: Emerging Database Landscape: The Database Evolution – The Scale-Out Architecture – Database Workloads – Database Technologies for Managing the Workloads – Requirements for the Next Generation Data Warehouses – The Next Generation Database Architecture. (16)

Unit – II

An Overview of NoSQL - Defining NoSQL - What NoSQL is and what it is not - List of NoSQL Databases - Characteristics of NoSQL -RDBMS approach – Challenges -NoSQL approach. (16)

Unit – III

NoSQL Storage Types - Storage types - Column-oriented databases - Document store - Key-value store -Multi-storage type databases - Advantages and Drawbacks - Transactional application - Computational application - Web-scale application. (15)

Unit – IV

Comparative Study of NoSQL Products - Technical comparison – Nontechnical comparison. (14)

Unit – V

Case Study - Application definition - Requirement analysis - Implementation using MongoDB.

Text Books:

1. Soumendra Mohanty, Madhu Jagadeesh, and Harsha Srivatsa, “Big Data Imperatives: Enterprise Big Data Warehouse, BI Implementations and Analytics”, Published by Apress Media, 2013.
2. Gaurav Vaish, “Getting Started with NoSQL”, Published by Packt Publishing Ltd., 2013, ISBN 978-1-84969-4-988.

Course Outcomes:

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

CO1: Identify the basic concepts of database and data ware house	-K1
CO2: Understand the terminologies in NoSQL	-K2
CO3: Understand storage types	-K2
CO4: Comparative study of NoSQL products	-K4
CO5: Design the database of their own using MongoDB	-K3, K5

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	M	M	W	N	S	S	S	M	S
CO3	S	S	S	M	N	S	S	S	S	M
CO4	S	S	S	M	N	S	S	M	S	S
CO5	S	S	S	M	S	S	S	S	S	S

Strongly Correlating(S)

Weakly Correlating (W)

Moderately Correlating (M)

No Correlating (N)

Course Code & Title	CC-X DATA SCIENCE FOR BUSINESS		
BSc	Semester : V	Credits : 5	Hrs: 6
Cognitive Level	K2 – Understand K3 – Apply		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • learn to apply fundamental algorithmic ideas to process data • identify the predictive modeling • state the concept of overfitting • gain the skill on clusters • study the visualization techniques 		

Unit – I

Introduction: Data-Analytic Thinking - The Ubiquity of Data Opportunities - Data Science, Engineering, and Data-Driven Decision Making - Data Processing and “Big Data” - Data and Data Science Capability as a Strategic Asset - Need for Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization (15)

Unit – II

Introduction to Predictive Modeling: From Correlation to Supervised Segmentation - Models, Induction, and Prediction - Supervised Segmentation -Visualizing Segmentations - Trees as Sets of Rules. (15)

Unit – III

Overfitting and Its Avoidance – Generalization – Overfitting– Overfitting Examined -From Holdout Evaluation to Cross-Validation - Learning Curves – Overfitting Avoidance and Complexity Control. (15)

Unit – IV

Similarity, Neighbors, and Clusters - Similarity and Distance - Nearest-Neighbor Reasoning - Some Important Technical Details Relating to Similarities and Neighbors – Clustering - Stepping Back: Solving a Business Problem Versus Data Exploration. (15)

Unit – V

Decision Analytic Thinking: What Is a Good Model? - Visualizing Model Performance - Representing and Mining Text - Other Data Science Tasks and Techniques. (15)

Text Books:

1. Foster Provost and Tom Fawcett, “Data Science for Business”, Published by O’Reilly Media, Inc., 1005 Gravenstein Highway North, Sebastopol, CA 95472, 2013, ISBN: 978-1-449-36132-7.

2. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques” , Second Edition, Elsevier, Reprinted 2008., ISBN 13: 978-1-55860-901-3

Course Outcomes:

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

- CO1:** Identify the basic concepts of data science **-K2**
CO2: Understand the predictive modelling **-K2**
CO3: Apply the concepts of overfitting **-K3**
CO4: Understand clustering algorithms **-K2**
CO5: Learn visualization model **-K2**

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	M	M	W	N	S	S	S	M	S
CO3	S	S	S	M	N	S	S	S	S	M
CO4	S	S	S	M	N	S	S	M	S	S
CO5	S	S	S	M	N	S	S	S	S	S

Strongly Correlating(S)
Weakly Correlating (W)

Moderately Correlating (M)
No Correlating (N)

Course Code & Title	CC-XI MACHINE LEARNING		
BSc	Semester : V	Credits : 5	Hrs: 6
Cognitive Level	K2 – Understand K3 – Apply K4 – Evaluate K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • understand the basics of machine learning • learn supervised learning • gain the skill on multivariate methods • state and explain clustering methods • identify and state kernel machines 		

Unit I

Introduction: What Is Machine Learning? – Examples of Machine Learning Applications: Learning Associations – Classification – Regression – Unsupervised Learning – Reinforcement Learning (15)

Unit II

Supervised Learning: Learning a Class from Examples Vapnik-Chervonenkis – Dimension – Probably Approximately Correct (PAC) Learning – Noise – Learning Multiple Classes – Regression – Model Selection and Generalization – Dimensions of a Supervised Machine Learning Algorithm (15)

Unit III

Multivariate Methods: Multivariate Data Parameter Estimation – Estimation of Missing Values – Multivariate Normal Distribution – Multivariate Classification – Tuning Complexity – Discrete Features (15)

Unit IV

Clustering: Introduction – Mixture Densities – k-Means Clustering – Expectation-Maximization Algorithm – Mixtures of Latent Variable Models – Supervised Learning after Clustering – Hierarchical Clustering – Choosing the Number of Clusters (15)

Unit V

Kernel Machines: Introduction – Optimal Separating Hyperplane – The Nonseparable Case: Soft Margin Hyperplane – ν -SVM – Kernel Trick – Vectorial Kernels – Defining Kernels –

Multiple Kernel Learning – Multiclass Kernel Machines – Kernel Machines for Regression – One-Class Kernel Machines – Kernel Dimensionality Reduction (15)

Text Book:

1. Ethem Alpaydm, “Introduction to Machine Learning”, The MIT Press Cambridge, Massachusetts London, England, 2010.

Course Outcomes:

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

- CO1: Identify the basic concepts of machine learning -K2
- CO2: Understand supervised learning and apply its methods -K2, K3
- CO3: Apply multivariate methods -K3
- CO4: Design and apply clustering algorithms -K4
- CO5: Understand kernel machines -K2

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	M	M	W	N	S	S	S	M	S
CO3	S	S	S	M	M	S	S	S	S	M
CO4	S	S	S	M	M	S	S	M	S	S
CO5	S	S	S	M	M	S	S	S	S	S

Strongly Correlating(S)
Weakly Correlating (W)

Moderately Correlating (M)
No Correlating (N)

Course Code & Title	CC-XII NoSQL LAB		
BSc	Semester : V	Credits : 4	Hrs: 4
Cognitive Level	K2 – Understand K3 – Apply K4 – Evaluate K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • understand and practice MontoDB and process files on the same 		

List of Exercises:

1. Installation of MongoDB
2. Reading CSV file and loading into MongoDB
3. Reading JSON file and Loading into MongoDB
4. Reading MongoDB and writing into MySQL

Outcomes:

Course Outcomes:

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

CO1: Identify the basic concepts of MongoDB **-K2**

CO2: Apply the concepts to read other files and load into MongoDB **-K3**

CO3: Evaluate the database designed **-K4**

CO4: Read MongoDB and write into MySQL **-K5**

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	M	M	W	N	S	S	S	M	S
CO3	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	M	S	S	S	S	S	S

Strongly Correlating(S)

Weakly Correlating (W)

Moderately Correlating (M)

No Correlating (N)

Course Code & Title	MBEC I GENETIC ALGORITHM		
BSc	Semester : V	Credits : 5	Hrs: 6
Cognitive Level	K2 – Understand K3 – Apply K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • learn the basics of Genetic Algorithms(GA) • understand the applications of GA • gain the skill on Dominance • acquire the knowledge on genetic based machine • state and describe genetic based machine learning algorithms 		

Unit - I

Introduction: Genetic Algorithms (GA) – Traditional optimization and search methods – GA Vs Traditional methods – Simple GA- schemata – learning the Lingo- GA mathematical foundation: Schema processing – Two armed and K – armed bandit problem – building block hypothesis – minimal deceptive problem. Data structure – GA operations – mapping objective functions to fitness values. Fitness scaling – coding – multi parameter representation Discretization – constrains. (15)

Unit - II

Applications of GA: The Rise of GA – Bagley and Adaptive Game playing program, Tosenberg and Biological cell simulation – pattern recognition – metalevel GAs – Hollstien and Function optimization – Real genes – Box and Evolutionary operations – Evolutionary optimization techniques, programming. Function optimization – improvements in basic techniques – Current applications – Pipeline system s – Structural optimization – medical registration (15)

Unit - III

Dominance – Diploidy and Abeyance and reordering operators- other micro operators: Segregation, Translocation and multiple chromosome structure – Duplication and Deletion. Sexual determination and Differentiation – Niche and speciation. Multi objective optimization – Knowledge based techniques – GA and Parallel Processors. (15)

Unit - IV

Genetic based Machine: Classifier system – Rule and Message system – The Bucket Brigade GA – Implementation issues. (15)

Unit - V

Genetic Based Machine Learning (GBML) – Development of CS-1-Smith s Poker Player – LS – Performance – GBML efforts – ANIMAT classifier system pipeline operation classifier system. (15)

Text Book:

1. D.E. Goldberg, "Genetic Algorithms, Optimization, and Machine Learning", Addison Wesley 2000.

Course Outcomes:

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

CO1: Identify the basic concepts of genetic algorithms	-K2
CO2: Understand the applications of genetic algorithms	-K2
CO3: Learn and apply the optimization technique	-K3
CO4: Design genetic based classifier system	-K5
CO5: Understand GBML	-K2

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	M	M	W	N	S	S	S	M	S
CO3	S	S	S	M	M	S	S	S	S	M
CO4	S	S	S	M	M	S	S	M	S	S
CO5	S	S	S	W	M	S	S	S	S	S

Strongly Correlating(S)

Weakly Correlating (W)

Moderately Correlating (M)

No Correlating (N)

Course Code & Title	MBEC I DATA SECURITY		
BSc	Semester : V	Credits : 5	Hrs: 6
Cognitive Level	K2 – Understand K3 – Apply K4 – Evaluate		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • understood the basic concepts of data security • learn block ciphers and data encryption standards • gain skill on public key encryption • identify authentication applications • state and explain the system security 		

Unit – I

Introduction: Security Trends – The OSI Architecture – Security Attacks – Security Services – Security Mechanisms – A model for Network Security – Classic Encryption Techniques – Symmetric Cipher Model – Substitution Techniques – Transposition techniques – Rotor Machines – Steganography. (15)

Unit – II

Block Ciphers and Data Encryption Standards: Block Cipher - Principles - Data Encryption Standard – The strength of DES – Differential and Linear Cryptanalysis – Block Cipher design principles – Advanced encryption Standard – The AES Cipher (15)

Unit - III

Public Key Encryption and Hash functions: Principles of Public Key Crypto Systems – The RSA algorithm – Message Authentication – Authentication Requirements – Authentication Functions – Message Authentication codes – Hash Functions – Security of Hash Functions and MAC - Whirlpool – HMAC – CMAC – Digital Signatures – Authentication Protocols – Digital Signature standard (15)

Unit - IV

Authentication Applications: Kerberos – X.509 Authentication Service – PKI – Electronic Mail Security - Pretty Good Privacy – S/MIME – IP Security – IP Security Overview – IP Security Architecture – Authentication Header – Key Management – Web Security – Web Security Considerations-SSL and Transport Layer Security (15)

Unit – V

System Security: Intruders – Intrusion Detection – Password Management – Viruses – DOS and DDOS Attacks – Firewalls – Firewall Design Principles – Trusted Systems – IT Security Evaluation (15)

Text Book:

1. William Stallings, “Cryptography and network Security”, Principles and Practices, Prentice Hall (Pearson Education), Fourth Edition, 2006

Reference Books:

1. Atul Kahate, “Cryptography and Network Security”, Tata McGraw Hill Publications, New Delhi.

Course Outcomes:

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

CO1: Identify the security trends and mechanism	-K2
CO2: Understand block ciphers and DES	-K2
CO3: Learn and apply public key encryption	-K3
CO4: Compare the various authentication applications	-K4
CO5: Understand the techniques for system security	-K2

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	M	M	W	N	S	S	S	M	M
CO3	S	S	M	M	M	S	S	S	S	M
CO4	S	S	S	M	M	S	S	M	S	S
CO5	S	M	M	M	M	S	S	S	S	S

Strongly Correlating (S)
Weakly Correlating (W)

Moderately Correlating (M)
No Correlating (N)

Course Code & Title	NMEC II DATA SCIENCE FOR ENTREPRENEURSHIP DEVELOPMENT		
BSc	Semester : V	Credits : 2	Hrs: 2
Cognitive Level	K2 – Understand K3 – Apply K4 – Evaluate K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • identify the basics of Statistical Analysis Software (SAS) • learn SAS operators • gain the skill on working with SAS raw data sets • attain the knowledge on SAS SQL • work with SAS arithmetic mean 		

Unit I:

Statistical Analysis Software (SAS): Overview – Environment - User Interface – Program Structure – Basic Syntax - Data Sets - Variables – Strings – Arrays – Numerical Formats (6)

Unit II:

SAS Operators – Loops – Decision Making – Functions – Input Methods – Macros – Dates and Times (6)

Unit III:

SAS – Read raw data sets – Write data sets – Concatenate – Merging – Subsetting – Sort – Format Data sets (6)

Unit IV:

SAS SQL – Histograms – Bar charts – Pie charts – Scatter Plots – Box Plots (6)

Unit V:

SAS Arithmetic Mean – Standard Deviation – Frequency Distributions – Cross Tabulations – T Tests – Linear Regression – Chi-Square - One-Way Anova (6)

Web Reference:

<https://www.tutorialspoint.com/sas/index.htm>

Course Outcomes:

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

- CO1:** Identify the SAS environment and program structure **-K2**
CO2: Understand the SAS operators and methods **-K2**
CO3: Apply the concepts of SAS data sets **-K3**
CO4: Understand and solve problems using SAS SQL **-K2, K4**
CO5: Design and implement statistical problems using SAS **-K5**

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	M	M	W	N	S	S	S	M	S
CO3	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	M	S	S	S	S	S	S

Strongly Correlating(S)

Weakly Correlating (W)

Moderately Correlating (M)

No Correlating (N)

Course Code & Title	CC-XIII BIG DATA ANALYTICS		
BSc	Semester : VI	Credits : 5	Hrs: 6
Cognitive Level	K2 – Understand K3 – Apply K4 – Evaluate K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • learn introduction about big data • identify the hadoop eco system • understand the concepts and commands of Hive and Pig • gain the skill on statistical techniques for data analysis • experience on data mining through statistics 		

UNIT-I:

Introduction - What is big data?– sources of big data – real time application of big data – sensitivity analysis using big data – challenges in collecting and validating big data. (17)

UNIT-II:

Hadoop – Hadoop ecosystem for processing big data –Hadoop cluster- Hadoop distributed file system – working with files in HDFS – map reduce technique for big processing – Joining data from different sources using map reduce. (19)

UNIT-III:

Hive and pig – need for high-level tools in big data processing – unstructured and structured data – Not Only SQL (NOSQL) commands – use of Hive as an interface to Hadoop – Use of pig as a programming Tool for big data processing. (18)

UNIT-IV:

Statistical techniques for data analysis – Hypothesis teaching – Regression analysis – Use of toolpak in excel for statistical techniques – Use of R language for high-level big data process tasks. (18)

UNIT-V:

Data mining through statistics – data mining for marketing, sales and customer relationship management – predictive modeling – nearest neighbour approach – survival analysis – automatic cluster deduction – market basket analysis. (18)

Book for Study

1. Big data analysis for Dummies, Dummies press, 2011.
2. Hadoop Fundamentals, packet Publications, 2012.

Course Outcomes:

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

CO1: Identify the basic concepts of big data	-K2
CO2: Understand hadoop ecosystem and cluster	-K2
CO3: Apply the concepts of pig and hive	-K3
CO4: Apply statistical techniques for data analysis	-K3
CO5: Apply data mining through statistics	-K3

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	M	M	W	M	S	S	S	M	S
CO3	S	S	S	M	S	S	S	S	S	M
CO4	S	S	S	M	S	S	S	M	S	S
CO5	S	S	S	M	S	S	S	S	S	S

Strongly Correlating(S)

Weakly Correlating (W)

Moderately Correlating (M)

No Correlating (N)

Course Code & Title	CC-XIV BIG DATA ANALYTICS LAB		
BSc	Semester : VI	Credits : 4	Hrs: 4
Cognitive Level	K1 – Recall K2 – Understand K3 – Apply		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • understand setting up of Hadoop Cluster 		

LIST OF EXERCISES

1. Set up a pseudo-distributed, single-node Hadoop cluster backed by the Hadoop Distributed File System, running on Ubuntu Linux.
2. Installation of Hadoop Ecosystems
 - a. Pig
 - b. Hive
 - c. Hbase
 - d. Sqoop
 - e. Zookeeper
 - f. Flume

Course Outcomes:

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

- CO1:** Identify the basic concepts of hadoop eco systems **-K1**
CO2: Understand the installation process **-K2**
CO3: Apply the concepts to the real time **-K3**

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	M	S	S	M	M	M
CO2	S	M	M	W	S	S	S	S	M	S
CO3	S	S	S	M	S	S	S	S	S	S

Strongly Correlating(S)
Weakly Correlating (W)

Moderately Correlating (M)
No Correlating (N)

Course Code & Title	CC-XV MINI PROJECT		
BSc	Semester : VI	Credits : 5	Hrs: 6
Cognitive Level	K2 – Understand K3 – Apply K4 – Evaluate K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • learn to get the knowledge to prepare the document • implement tools for the specific problem and learn the industrial need programs for the placement 		

GROUP PROJECT WORK

SL	Area of Work	Maximum Marks
1.	PROJECT WORK:	20
	(i) Plan of the Project	
	(ii) Execution of the plan / Collection of data / Organization of materials / Fabrication Experimental study / Hypothesis, Testing etc., and Presentation of the report.	45
	(iii) Individual Initiative	15
2.	VIVA VOCE EXAMINATION	20
TOTAL		100

Note:

- Minimum two and maximum three members for a group
- Passing Minimum – 40 MARKS

Course Outcomes:

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

CO1: Identify the problem and its environment	-K2
CO2: Understand the plan of execution of project	-K2
CO3: Apply the concepts to implement	-K3
CO4: Evaluate the system implemented	-K4
CO5: Create the entire system of their own	-K5

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	M	M	W	W	S	S	S	M	S
CO3	S	S	S	M	S	S	S	S	S	M
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	M	S	S	S	S	S	S

Strongly Correlating(S)

Weakly Correlating (W)

Moderately Correlating (M)

No Correlating (N)

Course Code & Title	MBEC II SIMULATION AND MODELING		
BSc	Semester : VI	Credits : 5	Hrs: 6
Cognitive Level	K2 – Understand K3 – Apply K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • define the basics of simulation modeling and replicating the practical situations in organizations • generate random numbers and random variates using different techniques. • develop simulation model using heuristic methods. • gain the skill on an analysis of Simulation models using input analyzer • attain the knowledge on output analysis and simulation softwares 		

Unit – I

Introduction to Simulation: Simulation, Advantages, Disadvantages, Areas of application, System environment, components of a system, Model of a system, types of models, steps in a simulation study.

Simulation Examples: Simulation of Queuing systems, Simulation of Inventory System, Other simulation examples. (18)

Unit – II

General Principles: Concepts in discrete - event simulation, event scheduling/ Time advance algorithm, simulation using event scheduling.

Random Numbers: Properties, Generations methods, Tests for Random number- Frequency test, Runs test, Autocorrelation test. (18)

Unit – III

Random Variate Generation: Inverse Transform Technique- Exponential, Uniform, Weibull, Triangular distributions, Direct transformation for Normal and log normal Distributions, convolution methods- Erlang distribution, Acceptance Rejection Technique

Optimization Via Simulation: Meaning, difficulty, Robust Heuristics, Random Search. (18)

Unit – IV

Analysis of Simulation Data

Input Modeling: Data collection, Identification and distribution with data, parameter estimation, Goodness of fit tests, Selection of input models without data, Multivariate and time series analysis.

Verification and Validation of Model – Model Building, Verification, Calibration and Validation of Models. (18)

Unit – V

Output Analysis – Types of Simulations with Respect to Output Analysis, Stochastic Nature of output data, Measures of Performance and their estimation, Output analysis of terminating simulation, Output analysis of steady state simulations.

Simulation Softwares: Selection of Simulation Software, Simulation packages, Trend in Simulation Software. (18)

Reference Books:

1. Jerry Banks, John S Carson, II, Berry L Nelson, David M Nicol, “Discrete Event system Simulation, Pearson Education”, Asia, 4th Edition, 2007, ISBN: 81-203-2832-9.
2. Geoffrey Gordon, “System Simulation”, Prentice Hall publication, 2nd Edition, 1978, ISBN: 81-203-0140-3.
3. Averill M Law, W David Kelton, “Simulation Modelling & Analysis”, McGraw Hill International Editions – Industrial Engineering series, 4th Edition, ISBN: 0-07-100803-9.
4. Narsingh Deo, “Systems Simulation with Digital Computer”, PHI Publication (EEE), 3rd Edition, 2004, ISBN : 0-87692-028-8.

Course Outcomes:

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

CO1: Identify the basic concepts of simulation	-K2
CO2: Understand the terminologies in simulation and modeling	-K2
CO3: Apply the optimization concepts in simulation	-K3
CO4: Learn analysis of the data to be simulated	-K3
CO5: Learn and create simulation softwares	-K5

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	M	M	W	M	S	S	S	M	S
CO3	S	S	S	M	M	S	S	S	S	M
CO4	S	S	S	M	S	S	S	M	S	S
CO5	S	S	S	M	S	S	S	S	S	S

Strongly Correlating(S)

Weakly Correlating (W)

Moderately Correlating (M)

No Correlating (N)

Course Code & Title	MBEC II DATA WAREHOUSE TOOLS AND TECHNIQUES		
BSc	Semester : VI	Credits : 5	Hrs: 6
Cognitive Level	K2 – Understand K3 – Apply K5 – Create		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • identify the concepts and principles of Informatica – an ETL tool • gain the skill on working with mapping • understand the filter transformations • learn and apply sequence generator transformations • learn the role of XML and how to process XML data 		

Unit I

Introduction to Informatica - Informatica Architecture – Installation - Configure Clients and Repositories in Informatica - Source Analyzer and Target Designer in Informatica. (15)

Unit II

Mappings – Workflows – Workflow monitor – Debug Mappings - Session Objects (15)

Unit III

Transformations in Informatica and Filter Transformation - Source Qualifier Transformation - Aggregator Transformation – Router – Joiner - Rank Transformation (15)

Unit IV

Sequence Generator Transformation - Transaction Control Transformation - Lookup and Re-usable transformation - Normalizer Transformation - Performance Tuning for Transformation (15)

Unit V

The role of XML: Introduction – How to use – Tree –Syntax –Elements – Attributes – Namespaces – Display-HttpRequest – Parser – XML DOM – XSLT – DTD (15)

Web References:

<https://www.guru99.com/informatica-tutorials.html> - for Units I-IV

<https://www.w3schools.com/xml/default.asp> - for Unit V

Course Outcomes:

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

CO1: Identify the basic concepts of informatica	-K2
CO2: Understand and create mapping	-K2, K5
CO3: Apply the basic transformations	-K3
CO4: Apply the advanced transformations	-K3
CO5: Understand the role of XML	-K2

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	S	S	S	M	M	M
CO2	S	M	M	W	S	S	S	S	M	S
CO3	S	S	S	M	S	S	S	S	S	M
CO4	S	S	S	M	S	S	S	M	S	S
CO5	S	S	S	M	S	S	S	S	S	S

Strongly Correlating(S)
Weakly Correlating (W)

Moderately Correlating (M)
No Correlating (N)

Course Code & Title	MBEC III CLOUD COMPUTING		
BSc	Semester : VI	Credits : 5	Hrs: 6
Cognitive Level	K2 – Understand K3 – Apply		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • learn the concepts in Cloud Computing • understand the cloud architecture • gain the skill on data storage in cloud • identify the security in cloud storage • attain the knowledge in cloud applications 		

Unit I

Cloud Computing Foundation: Introduction to Cloud Computing – Move to Cloud Computing – Types of Cloud – Working of Cloud Computing (18)

Unit II

Cloud Computing Architecture: Cloud Computing Technology – Cloud Architecture – Cloud Modeling and Design - Virtualization: Foundation – Grid,Cloud and Virtualization – Virtualization and Cloud Computing (18)

Unit III

Data Storage and Cloud Computing: Data Storage – Cloud Storage – Cloud Storage from LANs to WANs – Cloud Computing Services: Cloud Services – Cloud Computing at Work (18)

Unit IV

Cloud Computing and Security: Risks in Cloud Computing – Data Security in Cloud – Cloud Security Services – Cloud Computing Tools: Tools and Technologies for Cloud – Cloud Mashaps – Apache Hadoop – Cloud Tools (18)

Unit V

Cloud Applications – Moving Applications to the Cloud – Microsoft Cloud Services – Google Cloud Applications – Amazon Cloud Services – Cloud Applications (18)

Text Book

1. A. Srinivasan and J.Suresh, “Cloud Computing – A Practical Approach for Learning and Implementation”, Pearson India Publications, 2014

Reference Book

1. Rajkumar Buyya, James Broberg, Andrzej, “Cloud Computing: Principles and Paradigms”, Wiley India Publications, 2011.

Course Outcomes:

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

CO1: Identify the basic concepts of cloud computing	-K2
CO2: Understand the architecture of cloud computing	-K2
CO3: Apply data storage in cloud	-K3
CO4: Understand security in cloud	-K2
CO5: Realize the various cloud applications	-K2

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	M	M	W	N	S	S	S	M	S
CO3	S	S	S	M	S	S	S	S	S	M
CO4	S	S	S	M	M	S	S	M	S	S
CO5	S	S	S	M	M	S	S	S	S	S

Strongly Correlating(S)

Weakly Correlating (W)

Moderately Correlating (M)

No Correlating (N)

Course Code & Title	MBEC III INTERNET OF THINGS		
BSc	Semester : VI	Credits : 5	Hrs: 6
Cognitive Level	K2 – Understand K3 – Apply		
Learning Objectives	This Course aims to <ul style="list-style-type: none"> • state the basics of Internet of Things • understand the protocols for IoT • learn the comparisons between IoT with WoT • gain the skill on models of IoT • define the applications of IoT 		

Unit I

Definitions and Functional Requirements – Motivation – Architecture - Web 3.0 View of IoT – Ubiquitous IoT Applications – Four Pillars of IoT – DNA of IoT -The Toolkit Approach for End-user Participation in the Internet of Things. Middleware for IoT: Overview – Communication middleware for IoT – IoT Information Security (18)

Unit II

Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Issues with IoT Standardization – Unified Data Standards –Protocols –IEEE 802.15.4 – BACNet Protocol – Modbus – KNX – Zigbee–Network layer – APS layer –Security (18)

Unit III

Web of Things versus Internet of Things – Two Pillars of the Web – Architecture standardization for WoT – Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence. (18)

Unit IV

Integrated Billing Solutions in the Internet of Things Business Models for the Internet of things - Network Dynamics: Population Models – Information Cascades - Network Effects –Network Dynamics: Structural Models - Cascading Behavior in Networks - The Small-World phenomenon (18)

Unit V

The Role of the Internet of Things for Increased Autonomy and Agility in Collaborative Production Environments -Resource Management in the Internet of Things: Clustering, Synchronization and Software Agents. Applications -Smart Grid –Electrical Vehicle charging

References

1. Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC Press, 2012.
2. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet of Things", Springer, 2011.
3. David Easley and Jon Kleinberg, "Networks, Crowds, and Markets: Reasoning About a highly Connected World", Cambridge University Press, 2010.
4. Olivier Hersent, Omar Elloumi and David Boswarthick, "The Internet of Things: Applications to the Smart Grid and Building", Wiley, 2012.
5. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things –Key Applications and Protocols", Wiley, 2012.

Course Outcomes:

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

CO1: Identify the basic concepts of web	-K2
CO2: Understand the protocols in web	-K2
CO3: Compare web with IoT	-K3
CO4: Understand IoT models	-K2
CO5: Realize the role and applications of IoT	-K2

Mapping of COs with POs & PSOs:

CO/PO	PO						PSO			
	1	2	3	4	5	6	1	2	3	4
CO1	S	M	M	W	N	S	S	M	M	M
CO2	S	M	M	W	N	S	S	S	M	S
CO3	S	S	S	M	W	S	S	S	S	M
CO4	S	S	S	M	M	S	S	M	S	S
CO5	S	S	S	M	S	S	S	S	S	S

Strongly Correlating(S)
Weakly Correlating (W)

Moderately Correlating (M)
No Correlating (N)

Annexure - II

Evaluation and Question Paper Pattern:

Marks to be Awarded:

	Internal Marks	External Marks
1. Theory	25	75
2. Practical	40	60

Passing minimum for Internal and External marks:

FOR THEORY

The passing minimum for CIA shall be 40% out of 25 marks [i.e. 10 marks]

The passing minimum for Examinations shall be 40% out of 75 marks [i.e. 30 marks]

FOR PRACTICAL

The passing minimum for CIA shall be 40% out of 40 marks [i.e. 16 marks]

The passing minimum for Examinations shall be 40% out of 60 marks [i.e. 24 marks]

Internal and External Assessment

Theory

Internal: 25marks

Marks Distribution:	Assignment	- 5 marks
	CIA - I	- 10 marks
	CIA – II	- 10 marks
	Total	- 25 marks

External: 75 marks

Marks Distribution:	Section A	10*2 (20 marks)
	Section B	5*5 (25 marks) [Either or type]
	Section C	3*10 (30 marks) [Open choice]
	Total	- 75 marks

Practical

Internal: 40 marks

Marks Distribution:	Test1	- 15 marks
	Test2	- 15 marks
	Observation	- 10 marks
	Total	- 40 marks

External: 60 marks

Marks Distribution:	Practical	- 50marks
	Record	- 10marks
	Total	- 60marks

Question Paper Pattern for CIA I & II and External:

CIA I – for first two and half units

CIA II – for remaining two and half units

Section A: 10 Questions x 2 Marks = 20 Marks

(Two Questions from each unit)

Section B: 5 Questions x 5 Marks = 25 Marks

(Internal Choice and one question from each unit)

Section C: 3 Questions x 10 Marks = 30 Marks

(Answer any three out of 5 questions and one question from each unit)